A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA"

By

Dr. HARISH PRASAD B.R. **M.B.B.S**

Dissertation submitted to the

Sri Devaraj Urs Academy of Higher Education and Research,

Tamaka, kolar, karnataka,

In partial fulfillment of the requirement

for the degree of

DOCTOR OF MEDICINE (M.D.)

IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY

UNDER THE GUIDANCE OF

Dr. RAJENDRA OKADE **M.B.B.S., M.D., D.N.B.**

PROFESSOR AND HEAD OF DEPARTMENT

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY AND LEPROSY.

Sri Devaraj Urs Medical College,Tamaka, Kolar, Karnataka.

April- 2013.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

DECLARATION BY THE CANDIDATE

I HEREBY DECLARE THAT THIS DISSERTATION / THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE AND GENUINE RESEARCH WORK CARRIED OUT BY ME

UNDER THE GUIDANCE OF

Dr. RAJENDRA OKADE M.D, D.N.B.

PROFESSOR AND HEAD OF DEPARTMENT,

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY AND LEPROSY,

SRI DEVARAJ URS MEDICAL COLLEGE, KOLAR, KARNATAKA.

DATE: SIGNATURE OF CANDIDATE

PLACE: (Dr. HARISH PRASAD B.R.)

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

CERTIFICATE BY THE GUIDE

THIS IS TO CERTIFY THAT THE DISSERTATION/ THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE RESEARCH WORK DONE BY

Dr. HARISH PRASAD.B.R.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE

OF

DOCTOR OF MEDICINE (**M.D.)** IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

DATE
PLACE

SIGNATURE OF GUIDE.
Dr. RAJENDRA OKADE, M.D, D.N.B.
PROFESSOR &HOD
DEPARTMEMT OF DERMATOLOGY.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

CERTIFICATE BY THE CO-GUIDE

THIS IS TO CERTIFY THAT THE DISSERTATION/ THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE RESEARCH WORK DONE BY

Dr. HARISH PRASAD.B.R.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

DOCTOR OF MEDICINE (**M.D.)** IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

DATE

PLACE

SIGNATURE OF CO-GUIDE.

Dr. HARENDRA KUMAR M.L. M.D.

PROFESSOR & HOD

DEPARTMEMT OF PATHOLOGY.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

ENDORSEMENT

This is to certify that the dissertation entitled

A STUDY ON CLINICAL SPECTRUM OF

"WHITE LESIONS OF ORAL MUCOSA".

Is a bonafide research work done by

Dr. HARISH PRASAD B.R.

under the guidance of

Dr. RAJENDRA OKADE. M.D, D.N.B.

Professor and Head of the department

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

Dr. RAJENDRA OKADE	**Dr.M.B.SANIKOP**
Prof. & HOD	Principal
Department of	Sri Devaraj Urs Medical College
Dermatology, Venereology and Leprosy.	
Date :	**Date :**
Place : Kolar	**Place : Kolar**

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH

TAMAKA, KOLAR, KARNATAKA.

SRI DEVARAJ URS MEDICAL COLLEGE,

TAMAKA, KOLAR

ETHICAL COMMITTEE CERTIFICATE

This is to certify that the Ethical committee of Sri Devaraj Urs Medical College, Tamaka, Kolar, has unanimously approved

Dr. HARISH PRASAD.B.R.

Post graduate student, in the department of Dermatology at Sri Devaraj Urs Medical College, Tamaka, Kolar,

to take up the dissertation work titled

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

To be submitted to the

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR.

Member secretary
Ethical committee

Dr. M.B. Sanikop
Principal

Date :
Place **:**

DECLARATION BY THE CANDIDATE

I hereby declare that the Sri Devaraj Urs Academy of Higher Education and Research, Tamaka, Kolar, Karnataka shall have the rights to preserve, use and disseminate this dissertation / thesis in print or electronic format for academic / research purpose.

Date : **Signature of the Candidate**

Place : Kolar **Dr. HARISH PRASAD .B.R .**

ACKNOWLEDGEMENT

*I thank the **LORD ALMIGHTY** for showering his blessings on me. It is indeed a great pleasure to recall the people who have helped me in completion of this dissertation. Naming all the people who have helped me in achieving this goal would be impossible, yet I attempt to thank a select few, who have helped me in diverse ways.*

*I express my heartfelt and sincere gratitude to my guide **Prof Dr.Rajendra okade** M.D.DNB., Professor and Head Department of Dermatology, Sri Devaraj Urs Medical College, Tamaka, Kolar, for guiding me through the intricacies of writing a dissertation. It is his step-by-step guidance, valuable suggestions, great care and attention to the detail that he has so willingly shown in the preparation of this dissertation. I am blessed and privileged to be taught by such an eminent teacher.*

*I thank my co-guide **Prof. Dr.Harendra kumar M.L**.M.D Professor and Head,Department of pathology for helping me and guiding me during the period of my study.*

*I am thankful to **Prof.Dr.Shiva kumar V.** M.D. DNB., Professor, Department of Dermatology, has extended relentless support and rendered meticulous expert advice that has enhanced the stature of this dissertation.*

I am so thankful to my beloved and inspiring master ***Prof. Dr. Gurcharan Singh****.Bsc.M.D., for his encouragement and help during the period of selection of dissertation topic for my study.*

I thank ***Dr. Rajashekar T.S.****, Assoc. Professor, Department of Dermatology, venereology and leprosy, for his kindly advice and support during the preparation of this study .*

I am thankful to ***Dr. Rajesh G.*** *for his invaluable suggestions and advice during the preparation of this study*

Heartfelt gratitude to all my colleagues and friends for having helped me in collecting cases and helping me through-out my study.

My deep felt gratitude to ***My Dear Parents****, without whom I would not be the person I am today. They have given me constant support, wise advice and let me fulfill all my desires. Their prayers and sacrifices have done wonders for me.*

I would be failing in my duty if I don't thank all my patients for their utmost co-operation for making this study possible.

Date: *Harish Prasad B.R.*

DEDICATED

To my dearest parents,

Smt. Saroja lakshmi and Sri. Rama Prasad B.C.

- *But for whom I would not have been in this world.*
- *Who understood me and had faith in my abilities.*
- *Whose unending love and care help bring out the best in me and keeps me going…….*

To my beloved teacher,

Dr. Rajendra Okade

- *Whose constant encouragement brought best in me.*
- *For having made me what I am today.*

To my dearest teacher

Dr.Shiva kumar V

- *Whose guidance and support was a back bone through out*

To my respected teacher,

Dr. Gurcharan singh

- *For being an inspiration to aim high.!*

To all my teachers throughout my life.

LIST OF ABBREVIATIONS USED

1. WHO - World Health Organisation
2. OLP - Oral Lichen Planus
3. WSN - White Sponge Naevus
4. DKC - Dyskeratosis Congenita
5. OSCC - Oral Squamous Cell Carcinoma
6. OSF - Oral Submucous Fibrosis
7. OHL - Oral Hairy Leukoplakia

ABSTRACT

BACKGROUND:

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma. Many of these lesions are harmless and do not require any treatment other than reassurance. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

As not much data is available in India on white lesions of oral mucosa, this study will help us to characterize the different clinical patterns and frequency of white lesions of oral mucosa in our population.

AIMS AND OBJECTIVES:

1) To know the frequency and various morphological patterns of oral white lesions in patients attending Dermatology out- patient department
2) to determine possible aetiological and predisposing factors of oral white lesions.

MATERIALS AND METHODS:

This hospital based study was carried out from January 2011 to September 2012 at R.L.JALAPPA HOSPITAL & RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR . A total of 197 patients with oral white lesions fulfilling the criteria were enrolled. A detailed history with complete clinical examination was carried out.

RESULTS:

In our study, the prevalence of Oral white lesions was 1.09%. The lesions were more frequently observed between 20 to 40 years (41.6%), with males (54.8%) being more affected than females (45.2%). Personal history of tobacco usage (52.7%) was elicited in majority of patients. Buccal mucosa (50.2%) was the common affected site, with plaque (31.9%) being the common morphological pattern seen. Oral lichen planus (20.3%) and candidal infection (16.7%) was the common dermatological condition and infective agent, respectively, causing oral white lesions.

CONCLUSIONS:

Though oral white lesions constitute only a small minority of pathological conditions, they are enormously troublesome to patients, thus diminishing their quality of life.

Hence, awareness and education programmes are necessary to reduce and eliminate the modifiable risk factors. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

Key words: Oral White Lesions; Lichen Planus, Oral; Tobacco.

TABLE OF CONTENTS

SL NO	PARTICULARS	PAGE NO
1	INTRODUCTION	**1-3**
2	AIMS AND OBJECTIVES	**4-5**
3	REVIEW OF LITERATURE	**6-60**
4	MATERIALS AND METHODS	**61-62**
5	OBSERVATIONS AND RESULTS	**63-92**
6	DISCUSSION	**93-98**
7	CONCLUSION	**99-100**
8	SUMMARY	**101-103**
9	BIBLIOGRAPHY	**104-119**
10	ANNEXURES I. CONSENT FORM II. CLINICAL PROFORMA III. MASTER CHART	 **121** **122-125** **126-128**

LIST OF TABLES

Table number	Title	Page no.
1	Prevalence of oral white lesions.	**65**
2	Age- wise distribution of patients with oral white lesions.	**66**
3	Sex-wise distribution of patients with oral white lesions.	**68**
4	Distribution of various oral white lesions according to age and sex.	**69**
5	Presenting symptoms of oral white lesions.	**70**
6	Distribution of oral white lesions according to duration.	**71**
7	Associated risk factors with oral white lesions.	**72**
8	Distribution of white lesions in oral cavity.	**74**
9	Morphology of oral white lesions.	**76**
10	Aetiological classification of oral white lesions.	**78**
11	Clinical types of oral white lesions.	**80**
12	Demographic and disease characteristics of oral lichen planus.	**82**
13	Demographic and disease characteristics of candidosis.	**84**

LIST OF CHARTS / DIAGRAMS

Diagram no.	Title	Page no.
1	Prevalence of oral white lesions.	**65**
2	Age-wise distribution of oral white lesions.	**67**
3	Sex-wise distribution of patients with oral white lesions.	**68**
4	Presenting symptoms.	**70**
5	Duration of disease.	**71**
6	Risk factors associated with oral white lesions.	**73**
7	Distribution of oral white lesions in oral cavity.	**75**
8	Morphology of oral white lesions.	**77**
9	Aetiological classification of oral white lesions.	**79**
10	Clinical types of oral white lesions.	**81**

LIST OF CLINICAL PHOTOGRAPHS:

Photographs No.	Title.	Page No.
1&2	Oral lichen planus.	87
3&4	Candidosis.	88
5	Oral mucosal vitiligo.	89
6	Leukoplakia.	89
7	Darier's disease.	90
8	Oral warts.	90
9	Oral squamous cell carcinoma.	91
10	White sponge naevi.	91
11	Mucocele.	92
12	Fordyce's spots.	92

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA"

By

Dr. HARISH PRASAD B.R. **M.B.B.S**

Dissertation submitted to the

Sri Devaraj Urs Academy of Higher Education and Research,

Tamaka, kolar, karnataka,

In partial fulfillment of the requirement

for the degree of

DOCTOR OF MEDICINE (M.D.)

IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY

UNDER THE GUIDANCE OF

Dr. RAJENDRA OKADE **M.B.B.S., M.D., D.N.B.**

PROFESSOR AND HEAD OF DEPARTMENT

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY AND LEPROSY.

Sri Devaraj Urs Medical College,Tamaka, Kolar, Karnataka.

April- 2013.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

DECLARATION BY THE CANDIDATE

I HEREBY DECLARE THAT THIS DISSERTATION / THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE AND GENUINE RESEARCH WORK CARRIED OUT BY ME

UNDER THE GUIDANCE OF

Dr. RAJENDRA OKADE M.D, D.N.B.

PROFESSOR AND HEAD OF DEPARTMENT,

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY AND LEPROSY,

SRI DEVARAJ URS MEDICAL COLLEGE, KOLAR, KARNATAKA.

DATE: SIGNATURE OF CANDIDATE

PLACE: (Dr. HARISH PRASAD B.R.)

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

CERTIFICATE BY THE GUIDE

THIS IS TO CERTIFY THAT THE DISSERTATION/ THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE RESEARCH WORK DONE BY

Dr. HARISH PRASAD.B.R.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE

OF

DOCTOR OF MEDICINE (**M.D.)** IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

DATE
PLACE

SIGNATURE OF GUIDE.
Dr. RAJENDRA OKADE, M.D, D.N.B.
PROFESSOR &HOD
DEPARTMEMT OF DERMATOLOGY.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

CERTIFICATE BY THE CO-GUIDE

THIS IS TO CERTIFY THAT THE DISSERTATION/ THESIS ENTITLED

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

IS A BONAFIDE RESEARCH WORK DONE BY

Dr. HARISH PRASAD.B.R.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

DOCTOR OF MEDICINE (**M.D.)** IN

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

DATE

PLACE

SIGNATURE OF CO-GUIDE.

Dr. HARENDRA KUMAR M.L. M.D.

PROFESSOR & HOD

DEPARTMEMT OF PATHOLOGY.

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION &RESEARCH

TAMAKA, KOLAR, KARNATAKA.

ENDORSEMENT

This is to certify that the dissertation entitled

A STUDY ON CLINICAL SPECTRUM OF

"WHITE LESIONS OF ORAL MUCOSA".

Is a bonafide research work done by

Dr. HARISH PRASAD B.R.

under the guidance of

Dr. RAJENDRA OKADE. M.D, D.N.B.

Professor and Head of the department

DERMATOLOGY, VENEREOLOGY AND LEPROSY.

Dr. RAJENDRA OKADE	**Dr.M.B.SANIKOP**
Prof. & HOD	Principal
Department of	Sri Devaraj Urs Medical College
Dermatology, Venereology and Leprosy.	
Date :	**Date :**
Place : Kolar	**Place : Kolar**

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH

TAMAKA, KOLAR, KARNATAKA.

SRI DEVARAJ URS MEDICAL COLLEGE,

TAMAKA, KOLAR

ETHICAL COMMITTEE CERTIFICATE

This is to certify that the Ethical committee of Sri Devaraj Urs Medical College, Tamaka, Kolar, has unanimously approved

Dr. HARISH PRASAD.B.R.

Post graduate student, in the department of Dermatology at Sri Devaraj Urs Medical College, Tamaka, Kolar,

to take up the dissertation work titled

A STUDY ON CLINICAL SPECTRUM OF "WHITE LESIONS OF ORAL MUCOSA".

To be submitted to the

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR.

Member secretary
Ethical committee

Dr. M.B. Sanikop
Principal

Date :
Place **:**

DECLARATION BY THE CANDIDATE

I hereby declare that the Sri Devaraj Urs Academy of Higher Education and Research, Tamaka, Kolar, Karnataka shall have the rights to preserve, use and disseminate this dissertation / thesis in print or electronic format for academic / research purpose.

Date : **Signature of the Candidate**

Place : Kolar **Dr. HARISH PRASAD .B.R .**

ACKNOWLEDGEMENT

*I thank the **LORD ALMIGHTY** for showering his blessings on me. It is indeed a great pleasure to recall the people who have helped me in completion of this dissertation. Naming all the people who have helped me in achieving this goal would be impossible, yet I attempt to thank a select few, who have helped me in diverse ways.*

*I express my heartfelt and sincere gratitude to my guide **Prof Dr.Rajendra okade** M.D.DNB., Professor and Head Department of Dermatology, Sri Devaraj Urs Medical College, Tamaka, Kolar, for guiding me through the intricacies of writing a dissertation. It is his step-by-step guidance, valuable suggestions, great care and attention to the detail that he has so willingly shown in the preparation of this dissertation. I am blessed and privileged to be taught by such an eminent teacher.*

*I thank my co-guide **Prof. Dr.Harendra kumar M.L**.M.D Professor and Head,Department of pathology for helping me and guiding me during the period of my study.*

*I am thankful to **Prof.Dr.Shiva kumar V.** M.D. DNB., Professor, Department of Dermatology, has extended relentless support and rendered meticulous expert advice that has enhanced the stature of this dissertation.*

*I am so thankful to my beloved and inspiring master **Prof. Dr. Gurcharan Singh**.Bsc.M.D., for his encouragement and help during the period of selection of dissertation topic for my study.*

*I thank **Dr. Rajashekar T.S.**, Assoc. Professor, Department of Dermatology, venereology and leprosy, for his kindly advice and support during the preparation of this study .*

*I am thankful to **Dr. Rajesh G.** for his invaluable suggestions and advice during the preparation of this study*

Heartfelt gratitude to all my colleagues and friends for having helped me in collecting cases and helping me through-out my study.

*My deep felt gratitude to **My Dear Parents**, without whom I would not be the person I am today. They have given me constant support, wise advice and let me fulfill all my desires. Their prayers and sacrifices have done wonders for me.*

I would be failing in my duty if I don't thank all my patients for their utmost co-operation for making this study possible.

Date: *Harish Prasad B.R.*

DEDICATED

To my dearest parents,

Smt. Saroja lakshmi and Sri. Rama Prasad B.C.

- *But for whom I would not have been in this world.*
- *Who understood me and had faith in my abilities.*
- *Whose unending love and care help bring out the best in me and keeps me going…….*

To my beloved teacher,

Dr. Rajendra Okade

- *Whose constant encouragement brought best in me.*
- *For having made me what I am today.*

To my dearest teacher

Dr.Shiva kumar V

- *Whose guidance and support was a back bone through out*

To my respected teacher,

Dr. Gurcharan singh

- *For being an inspiration to aim high.!*

To all my teachers throughout my life.

LIST OF ABBREVIATIONS USED

1. WHO - World Health Organisation
2. OLP - Oral Lichen Planus
3. WSN - White Sponge Naevus
4. DKC - Dyskeratosis Congenita
5. OSCC - Oral Squamous Cell Carcinoma
6. OSF - Oral Submucous Fibrosis
7. OHL - Oral Hairy Leukoplakia

ABSTRACT

BACKGROUND:

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma. Many of these lesions are harmless and do not require any treatment other than reassurance. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

As not much data is available in India on white lesions of oral mucosa, this study will help us to characterize the different clinical patterns and frequency of white lesions of oral mucosa in our population.

AIMS AND OBJECTIVES:

1) To know the frequency and various morphological patterns of oral white lesions in patients attending Dermatology out- patient department
2) to determine possible aetiological and predisposing factors of oral white lesions.

MATERIALS AND METHODS:

This hospital based study was carried out from January 2011 to September 2012 at R.L.JALAPPA HOSPITAL & RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR . A total of 197 patients with oral white lesions fulfilling the criteria were enrolled. A detailed history with complete clinical examination was carried out.

RESULTS:

In our study, the prevalence of Oral white lesions was 1.09%. The lesions were more frequently observed between 20 to 40 years (41.6%), with males (54.8%) being more affected than females (45.2%). Personal history of tobacco usage (52.7%) was elicited in majority of patients. Buccal mucosa (50.2%) was the common affected site, with plaque (31.9%) being the common morphological pattern seen. Oral lichen planus (20.3%) and candidal infection (16.7%) was the common dermatological condition and infective agent, respectively, causing oral white lesions.

CONCLUSIONS:

Though oral white lesions constitute only a small minority of pathological conditions, they are enormously troublesome to patients, thus diminishing their quality of life.

Hence, awareness and education programmes are necessary to reduce and eliminate the modifiable risk factors. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

Key words: Oral White Lesions; Lichen Planus, Oral; Tobacco.

TABLE OF CONTENTS

SL NO	PARTICULARS	PAGE NO
1	INTRODUCTION	**1-3**
2	AIMS AND OBJECTIVES	**4-5**
3	REVIEW OF LITERATURE	**6-60**
4	MATERIALS AND METHODS	**61-62**
5	OBSERVATIONS AND RESULTS	**63-92**
6	DISCUSSION	**93-98**
7	CONCLUSION	**99-100**
8	SUMMARY	**101-103**
9	BIBLIOGRAPHY	**104-119**
10	ANNEXURES I. CONSENT FORM II. CLINICAL PROFORMA III. MASTER CHART	 **121** **122-125** **126-128**

LIST OF TABLES

Table number	Title	Page no.
1	Prevalence of oral white lesions.	**65**
2	Age- wise distribution of patients with oral white lesions.	**66**
3	Sex-wise distribution of patients with oral white lesions.	**68**
4	Distribution of various oral white lesions according to age and sex.	**69**
5	Presenting symptoms of oral white lesions.	**70**
6	Distribution of oral white lesions according to duration.	**71**
7	Associated risk factors with oral white lesions.	**72**
8	Distribution of white lesions in oral cavity.	**74**
9	Morphology of oral white lesions.	**76**
10	Aetiological classification of oral white lesions.	**78**
11	Clinical types of oral white lesions.	**80**
12	Demographic and disease characteristics of oral lichen planus.	**82**
13	Demographic and disease characteristics of candidosis.	**84**

LIST OF CHARTS / DIAGRAMS

Diagram no.	Title	Page no.
1	Prevalence of oral white lesions.	**65**
2	Age-wise distribution of oral white lesions.	**67**
3	Sex-wise distribution of patients with oral white lesions.	**68**
4	Presenting symptoms.	**70**
5	Duration of disease.	**71**
6	Risk factors associated with oral white lesions.	**73**
7	Distribution of oral white lesions in oral cavity.	**75**
8	Morphology of oral white lesions.	**77**
9	Aetiological classification of oral white lesions.	**79**
10	Clinical types of oral white lesions.	**81**

LIST OF CLINICAL PHOTOGRAPHS:

Photographs No.	Title.	Page No.
1&2	Oral lichen planus.	87
3&4	Candidosis.	88
5	Oral mucosal vitiligo.	89
6	Leukoplakia.	89
7	Darier's disease.	90
8	Oral warts.	90
9	Oral squamous cell carcinoma.	91
10	White sponge naevi.	91
11	Mucocele.	92
12	Fordyce's spots.	92

INTRODUCTION

INTRODUCTION

Diseases of the oral cavity constitute only a small minority of pathological conditions. But they are enormously troublesome to patients, impacting their ability to communicate and to interact socially and in the workplace, thus diminishing their quality of life.[1]

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma.

The prevalence of these lesions in U.S. adults was 27.9%,[2] whereas the prevalence of oral white lesions in hospital based studies varied from 19.1% -22.4%.[3]

White lesions of the oral mucosa obtain their characteristic appearance from the scattering of light due to[4]

→Increased thickness of surface epithelium or epithelial maturation products

→Presence of superficial debris on oral mucosa

→Blanching caused by reduced vascularity

→Loss of pigmentation due to acquired causes.

Many of these lesions are harmless and do not require any treatment other than reassurance. But still a small minority, roughly 4% are potentially dangerous if left unattended.[5] Suspicious looking lesions can be pursued and a definitive diagnosis made through biopsy. Identifying and recognizing a premalignant lesion or a frank malignancy in the early stages will go a long way in facilitating early diagnosis, treatment and prevention of possible malignancy. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

As not much data is available in India on white lesions of oral mucosa, this study will help us to characterize the different clinical patterns and frequency of white lesions of oral mucosa in our population.

AIMS AND OBJECTIVES

AIMS OF THE STUDY

1. To know the frequency of oral white lesions in patients attending Dermatology out- patient department
2. To identify various morphological patterns of oral white lesions
3. To determine possible aetiological factors of oral white lesions.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORICAL ASPECTS:

The first serious suggestion of an association between a oral mucosal lesion and the subsequent development of oral malignancy was reported in the mid-nineteenth century. Sir James Paget of London wondered in 1851 about the cancer-producing potential of pipe smoker's palate or "leukokeratosis," and in 1870 he clearly implied that oral "ichthyosis" (white keratotic plaque) was a significant precursor to lingual carcinoma.[6]

The latter association was independently advanced in 1877 by Hungarian dermatologist Ernst Schwimmer, [7] who is credited with coining the term "leukoplakia" for white tongue changes seen prior to lingual cancer development in tertiary syphilis.

In 1978, World Health Organisation (WHO) working group defined leukoplakia as "a keratotic white patch or plaque that cannot be scraped off and cannot be characterized clinically or pathologically as any other disease."[8]

Hornstein[9] in 1977 classified leukoplakia aetiologically and nosologically into two groups: 1) leukoplakia in the broad sense (so called hereditary and endogenous leukoplakia) and 2) leukoplakia in the narrow sense (so-called exogenous-irritative and precancerous leukoplakia).

Pindborg[9] and others in 1963 differentiated two main groups according to clinical appearance as homogeneous type and speckled or nodular type.

In 1984, Greenspan[10] and co-workers first described oral hairy leukoplakia (OHL) among male homosexuals in San Francisco.

In 1896, Fordyce[11] described whitish spots on the vermilion border of the lips, oral mucosa and, rarely, genital mucosa. Leukoedema was first described by

Sandstead and Lowe in 1953.[12] Hyde reported the first case of WSN in 1909.[13] Dyskeratosis congenita (DKC) is a rare genodermatosis which was first described by Zinsser in 1906.[14]

Erasmus Wilson first described Lichen planus in 1869,[15] as a chronic disease affecting the skin, scalp, nails, and mucosa, with possible rare malignant degeneration. Francois Henri Hallopeau reported the first case of oral lichen planus (OLP)–related carcinoma in 1910.[15] .The histologic features of OLP were first described by Dubreuill in 1906 which was later revised by Shklar[16] in 1972. Andreasen in 1968 classified oral lichen planus into six types: reticular, papular, plaque-like, erosive, atrophic, and bullous.[17] The WHO developed a set of histopathological criteria for OLP in 1978,[8] which was further modified in 2003.

Vitiligo is an ancient malady and a historical background will facilitate continuity with current research. The earliest authentic reference of vitiligo can be traced back to the period of Aushooryan (2200 BC), in the classic Tarikh-e- Tib-e-Iran.[18]

Oral thrush is perhaps one of the earliest oral diseases documented, which may be found in Hippocrate's "Epidemics" from the fourth century B.C. Rosen von Rosenstein (1771) was the first to attempt to divide the disease into categories based on the severity and distribution of the lesions. The fungus now known as Candida albicans was isolated by Bennett (1844) from the sputum of a tuberculosis patient, by Wilkinson (1849) from vaginal candidiasis.[19]

Anatomy of oral cavity: [20, 21, 22, 23]

The oral cavity consists of two parts.

I. An outer vestibule, which is bounded by lips and cheeks.

II. The oral cavity proper, separated by an alveolus bearing gingiva and the teeth.

Oral mucosa is a moist lining of the oral cavity. Generally, oral mucosa appears pale pink, as the epithelium and connective tissue of lamina propria are relatively translucent and allow red light to reflect from blood in the underlying capillary bed.

The oral cavity is lined by epithelium derived from both the ectoderm and endoderm. The regions of the oral cavity lined with the epithelium of ectodermal origin include the gingiva, the mucosa lining the cheeks, hard and soft palates. The structures derived from the endoderm are the tongue, the floor of the mouth, the pharynx and the epiglottis.

Oral mucosa is composed of:

a. Epithelial tissue which is a stratified squamous epithelium analogous to epidermis of the skin.

b. The underlying loose connective tissue component called lamina proporia analogous to dermis of skin. A basal lamina - basement membrane complex separates the epithelium from the lamina propria.

c. Sub mucosa.

The epithelial tissues of gingiva and hard palate are keratinized, although in many individuals the gingival epithelium is para keratinized. The cheek, faucial and the sub lingual tissues are non- keratinized.

Lamina propria is composed of cells, fibres and amorphous ground substance. It also contains blood vessels and nerves.

Sub mucosa lies beneath the lamina propria. It consists of connective tissue of varying thickness, minor salivary glands, blood vessels, nerves and adipose tissue. Lymphoid nodules are found at the base of tongue.

Aetiology of oral white lesions:

White lesions of oral mucosa are a common clinical finding in oral cavity examination with problems in differential diagnosis. These lesions represent a wide spectrum of diseases, which can be classified as follows,

Classification of white lesions in oral cavity[4, 24]

A. Developmental or Congenital

- Leukoedema
- White sponge naevus
- Dyskeratosis congenita
- Fordyces spots

B. Inflammatory/Reactive:

- Morsicatio buccarum et labiorum
- Frictional,chemical and thermal keratosis
- Tobacco pouch keratosis

C. Infective

- Candidosis
- Oral hairy leukoplakia
- Warts
- Syphilitic mucous patches

D. Oral manifestation of Systemic disorders

- Uremic stomatitis

E. Oral manifestation of Dermatological disorders

- Lichen planus
- Keratosis follicularis
- Discoid lupus erythematosus
- Mucosal vitiligo

F. Premalignant

- Oral submucosal fibrosis
- Proliferative verrucous leukoplakia
- Florid oral papillomatosis
- Leukoplakia

G. Malignant

- Squamous cell carcinoma.

H. Miscellaneous

- Mucosal retention cyst
- Graft versus host disease
- Drugs

A. DEVELOPMENTAL OR CONGENITAL:

1. LEUKOEDEMA

Introduction:

Leukoedema is a common mucosal alteration that represents a variation of a normal condition rather than a true pathologic change.

Epidemiology and aetiopathogenesis:

Prevalence rates vary greatly in different countries and in different ethnic groups. A higher prevalence (90%) is seen in black adults compared to whites (10-90%). In Indian population prevalence ranges between 1.6%- 4.3%. [25]

It is more prevalent in the age group of 40-60years with no sex predilection.

It has been proposed that leukoedema is an acquired benign lesion that develops as a result of repeated subclinical insults to the oral mucosa by certain low-grade irritants (eg, accumulated oral debris, tobacco, and food spices). Some reports have suggested that leukoedema is more severe in smokers and lessens with cessation.[26]

Clinical features:

Leukoedema is characterized by a diffuse, grayish white opalescent appearance, occurring bilaterally on the buccal mucosa; it may also be noted on the floor of the mouth and palatopharyngeal tissues. The surface appears folded, resulting in wrinkling of the mucosa. It cannot be scrapped off and it diminishes or disappears with the stretching and eversion of the oral mucosa.[25]

Histopathology:

Oral lesions of leukoedema show parakeratosis and an increase in thickness of the oral mucosa epithelium with intracellular edema of the spinous layer. The cells of

the spinous layer are large with pyknotic nuclei. Rete ridges may be elongated. No evidence of dysplasia is seen.

Diagnosis:

The white lesions of leukoedema do not rub off. Stretching of the oral mucosa and the resultant disappearance of the opalescence in the mucosa is diagnostic.

Differential diagnosis:

Areas exhibiting leukoedema will either disappear or persist upon stretching, whereas lesions of lichen planus will become more pronounced. In White sponge nevus buccal mucosa appears thickened and folded"[27] Superficial erosions that alternate with irregular white flakes are present in lesions of habitual cheek-biting whereas areas of leukoedema are usually smooth and grayish-white in coloration.

Treatment:

No treatment is necessary as it has no malignant potential.

2. WHITE SPONGE NEVUS

(Leukoedema exfoliativum mucosae oris, Familial white folded mucosal dysplasia, Hereditary leukokeratosis, Cannon's disease , Pachydermia oralis , White folded gingivostomatosis**)**

Introduction:

White sponge nevus (WSN), is a relatively rare mucosal disorder.[27] It is an autosomal dominant disorder that involves a mutation in mucosal keratin which predominantly affects non-keratinized stratified-squamous epithelia.

Epidemiology and aetiopathogenesis:

White sponge nevus has been listed as a rare disorder, with a prevalence < 1 in 200,000.[28] It is seen commonly at birth or in early childhood with no gender or racial predilection.

White sponge nevus is an autosomal dominant disorder resulting from point mutation of either keratin 4 or keratin 13 genes.[29] These mutations result in defective keratinization of the oral mucosa, with alterations also seen in nasal, esophageal, laryngeal, and anogenital mucosa.The disease is characterized by a wide variability and high penetrance, but with a benign clinical course.

Clinical features:

White sponge nevus presents as bilateral, soft, white and "spongy" plaques. The surface of the plaque is thick, folded and may peel away from the underlying tissue. Lesions are asymptomatic and rough on palpation. Rare cases of mild discomfort due to secondary infections have been reported.[29]

The buccal mucosa is the most commonly affected site, followed by the soft palate, ventral tongue, labial mucosa, the alveolar ridges and the floor of the mouth. Gingival margin and dorsal aspect of tongue are usually spared.

Histopathology:

On microscopy, parakeratosis, marked epithelial thickening, and intracellular edema with perinuclear condensation of keratin is seen. Clear cell changes begin at the parabasalar layer and extend upto the surface.[27]

Diagnosis:

The clinical appearance is so distinctive that biopsy is usually unnecessary. The diagnosis is made more certain if there is a positive family history and other

mucous membranes are affected. In case of any suspicion, biopsy should be performed.

Differential diagnosis:

The differential diagnosis of white sponge nevus includes leukoplakia, chemical burns, trauma, syphilis, tobacco and betel nut use. White sponge nevus may also be confused with candidiasis, but fungal examination and response to antifungal agents will be the differentiating factors. Cheek- biting, lichen planus, lupus erythematosus should also be excluded. Lesions of panchyonychia congenita, Darier's disease and dyskeratosis congenita may resemble lesions of white sponge nevus. Except for lichen planus and lupus erythematosus which may be limited to the oral cavity, these disorders can be distinguished clinically from white sponge nevus by their associated extra oral lesions. Thus, concurrent skin lesions exclude the diagnosis of white sponge nevus.

Treatment:

Since WSN is a benign condition, reassurance is all that is required, although vitamin A, antifungal therapy, and tretinoin cream have been used. Antibiotic treatment with oral penicillin, ampicillin, and tetracycline has shown varying degrees of success.[30]

3. DYSKERATOSIS CONGENITA

Introduction:

Dyskeratosis congenita (DKC) is characterised by classic triad of skin pigmentation, nail dystrophy and oral leukoplakia. Patients with this disorder are

susceptible to develop bone marrow failure (aplastic anaemia) as well as malignant transformation of oral and skin lesions.[31]

Epidemiology and aetiopathogenesis:

The condition manifests itself during the first decade of life. It mainly occurs in males, inherited as X linked recessive disorder with male: female ratio of 13:1. Mutation of the DKC1 gene has been determined to be the cause of the X-linked form. Mutation in the RNA component of telomerase has also been implicated.[32]

Clinical features:

Oral lesions usually begin as bullae on affected surfaces like tongue, buccal and palatine mucosae, followed by erosion and finally leukoplakic plaques. Superimposed candidal infection is often seen. Discomfort may be associated with the consumption of spicy and hot foods. The oral lesions are considered to be premalignant and may transform to malignancy over a 10- to 30-year period.[33] Squamous cell carcinoma is the most common malignancy to arise in these lesions. The oral changes are associated with dystrophic nails and a reticular hyperpigmentation of the skin of the face and neck which increases with age.[31] The most significant clinical manifestation of the disease is bone marrow failure. By the second decade of life patients typically develop anemia, and 94% of patients develop bone marrow failure by the age of 40 years.[32]

Histopathology:

Early oral lesions show epithelial atrophy and as the lesion progresses, epithelial dysplasia and squamous cell carcinoma develops.

Differential diagnosis:

Leukoplakia associated with skin and nail changes differentiates DKC from other causes of white lesions in oral cavity like lichen planus, white sponge naevus and early squamous cell carcinoma.

Treatment:

The oral lesions are managed symptomatically. Periodic examination of oral lesions to monitor for malignant change and avoidance of smoking and drinking are of utmost importance.[33]

4. FORDYCE SPOTS

(Fordyce's granules)

Introduction:

Fordyce's spots are heterotopic sebaceous glands, containing neutral lipids similar to those found in skin sebaceous glands, lacking an association with hair follicle.[34]

Epidemiology and aetiopathogenesis:

Even though the sebaceous glands are present since birth, this condition is not common before puberty (although they can be demonstrated histologically). The incidence continues to increase with age and the prevalence in adults is 70% to 80%, with a slight male predominance.[34]

The pathophysiology of Fordyce's spots has not been elucidated. It may be due to ectopic disposition of sebaceous glands during embryonic development, which is considered as a variation of normal anatomy.

Clinical features:

Fordyce spots appear as multiple 0.1 to 1-mm yellow to yellow-white papules often occurring bilaterally, and they may occasionally form plaques. It is seen most commonly on the lips adjacent to the vermilion border, buccal mucosa, particularly inside the commissures, and sometimes in the retromolar regions.[34]

Histopathology:

These are normal sebaceous glands, consisting of a group of mature sebaceous lobes surrounding small ducts that emerge directly at the epithelium surface.[35]

Treatment:

No treatment is indicated, other than reassurance. Treatment of Fordyce spots is for cosmetic purposes only. Oral isotretinoin has been used with mild improvement seen, with recurrence of spots on stoppage of treatment. Bi-chloro acetic acid (BCA), CO2 laser and 5-aminolaevulinic acid-photodynamic therapies have been also used.[35, 36]

B. REACTIVE/INFLAMMATORY:

1. LINEA ALBA.

(Horizontal bite line)

Introduction:

Linea alba is a common benign alteration of the buccal mucosa.

Aetiopathogenesis:

The horizontal alignment of the line, and its presence only in patients who are dentulous, suggests that the linea alba is caused by a combination of frictional irritation and mild sucking trauma along the facial surfaces of the teeth and along the opposing occlusal surfaces.

Clinical feature:

Linea alba presents as a distinct white line that is usually bilateral on the buccal mucosa at the level of the occlusal plane of the adjacent teeth.[37] The line varies in prominence from barely visible to highly prominent. This horizontal line becomes more pronounced distally towards the posterior teeth.[38]

Histopathology:

Hyperkeratosis with mild chronic inflammatory infiltrate is seen.

Diagnosis:

The clinical picture is pathognomonic to establish a diagnosis. No biopsy is required.

Treatment:

Bite splints worn at night may protect the cheek mucosa from involuntary biting.[38]

2. MORSICATIO BUCCARUM ET LABIORUM

(chronic cheek and lip biting)

Introduction:

Morsicatio buccarum is a physical reaction to chronic trauma caused by chronic nibbling.[39]

Morsicatio comes from the Latin word “morsus”, meaning bite. Chronic nibbling of the cheek produces lesions that are located more frequently on the buccal mucosa but sometimes the lingual mucosa (morsicatio labiorum) and lateral border of tongue (morsicatio linguarum) can also be affected.[39]

Epidemiology and Aetiopathogenesis:

Lesions are commonly seen in individuals over the age of 35 years with female preponderance. It is postulated to result from chronic irritation due to sucking, nibbling or chewing. Cheek chewing is most commonly seen in people who are under stress or who exhibit psychological conditions.[39]

Though the patients are aware of their habit but many deny the self-inflicted injury or perform the act subconsciously.

Clinical features:

Morsicatio presents as thickened, shredded white areas bilaterally on buccal mucosa which can be peeled off by the patient. Intervening zones of erythema, erosions, or focal traumatic ulcerations can also be seen. It is more pronounced along the occlusal plane and in the anterior one third of the buccal mucosa. When the lips are affected, it is the lower lip that is typically more severely affected than the upper lip.[39]

Histopathology:

Hyperparakeratosis with numerous keratin projections colonized by bacterial organisms are characteristic of morsicatio. Clusters of vacuolated keratinocytes may be present in the superficial layers of the spinous cell layer.

Diagnosis:

The clinical presentation and location of lesions are characteristic.

Differential diagnosis:

The clinical findings on the lateral border of the tongue and the histologic findings may resemble oral hairy leukoplakia. However bacterial colonization of white plaque is diagnostic of Morsicatio buccarum.

Superficial erosions that alternate with irregular white flakes are present in lesions of habitual cheek-biting whereas areas of leukoedema are usually smooth and grayish-white in coloration.

Treatment:

Instructing the patient to avoid cheek biting is important. If the habit is uncontrollable, an acrylic shield that covers the facial surfaces of the teeth may be beneficial. Medications to control the habit may be used as adjunct therapy.[27]

3. FRICTIONAL, CHEMICAL, AND THERMAL KERATOSES

Introduction:

Keratoses are characterized by white plaques that arise as a result of an identifiable source which usually resolve once the causative factor is eliminated. The implicated causative factors are friction, chemicals and heat.

Epidemiology and aetiopathogenesis:

Frictional keratosis is commonly seen in young adults. The sources of friction resulting in hyperkeratosis may be an ill-fitting denture, malocclusion, para-functional habits, or poor brushing techniques.[27]

Chemicals causing burning of the mucosa and resultant hyperkeratosis include aspirin, sodium hypochlorite, hydrogen peroxide, formocresol, paraformaldehyde, cavity varnish, or mouthwashes, to name a few.[40]

Thermal keratosis can be due to thermal burns in the oral cavity caused by excessively hot (microwaved) foods or heat generated from smoking. Lesions are commonly seen on the tongue and palate.[40]

In tobacco-related form of keratosis (Nicotine stomatitis) both chemical and thermal factors play a part.[39]

Clinical features:

Frictional keratosis is typically characterized by a poorly demarcated rough area, which can be peeled off occasionally, leaving focal areas of pink mucosa. Lips, lateral surface of tongue, and buccal mucosa are commonly affected sites.

Persistent masticatory trauma often results in thick white corrugated lesions on the retromolar pad areas.

Chemical keratosis is characterized by variably symptomatic white, irregularly shaped plaques typically located on the mucobuccal fold or the gingival mucosa.

Thermal keratosis is characterized by a white lesion with focal areas of ulceration associated with mild to moderate pain.[27, 39]

Histopathology:

Frictional keratotic lesions exhibit hyperkeratosis and acanthosis with fraying and shredding of the keratin layers. Epithelial dysplasia is not seen.

Chemical and thermal keratoses display a superficial pseudomembrane composed of necrotic tissue and an inflammatory exudate.

Differential diagnosis:

Thermal and chemically induced lesions are almost always painful. The keratotic plaque has to be differentiated from white lesions of Morsicatio buccarum. In Morsicatio buccarum, lesions are asymptomatic with bacterial colonization of the plaque.

The white lesions of leukoedema do not rub off and disappearance of the opalescence on stretching of the oral mucosa is diagnostic. It should also be

differentiated from leukoplakia, candidiasis, white sponge nevus, oral hairy leukoplakia, and squamous cell carcinoma.

Treatment:

Removal of the causative factor leads to resolution of the lesions. No active intervention is needed as these lesions do not show any malignant potential.[41]

4. NICOTINIC STOMATITIS

(smoker's palate)

Introduction:

Nicotinic stomatitis is a benign process with no malignant potential.

Aetiopathogenesis:

Nicotinic stomatitis occurs almost exclusively in heavy pipe smokers and rarely in cigarette or cigar smokers. It is also observed in reverse smokers (lit end placed in the mouth) suggesting thermal effect as the cause of clinical changes.[42]

Clinical features:

Nicotinic stomatitis is always confined to the hard palate and begins as erythema of the palate. Later the palate assumes a grayish white and nodular appearance. The characteristic finding is the appearance of multiple red dots. The lesions are asymptomatic and discovered during an oral examination.[43]

Histopathology:

Light microscopy shows significant dysplasia and epithelial atypia.

Treatment:

Resolution of the changes occurs within several months after the cessation of smoking.[39, 42]

5. TOBACCO POUCH KERATOSIS

(Smokeless tobacco pouch)

Introduction:

It is estimated that 5% of the population is currently engaged in chewing tobacco or dipping snuff, especially among white men aged 15 to 34 years. [44]

Clinical features:

Asymptomatic lesions characteristically have a wrinkled surface that ranges from opaque white to translucent which develops on the mucosal surface that is in contact with the tobacco products. The mucosal surface has a velvety texture often with cobblestone appearance. Longstanding lesions may become thickened and verrucous.[45]

Histopathology:

Nonspecific features like acanthosis, orthokeratosis, and marked parakeratosis are seen. Dysplasia is uncommon.

Treatment:

Lesions usually resolve within 6 weeks of cessation of tobacco use. Around 2 to 6% of lesions undergo malignant change over a period of 5 to 10 years. Hence, regular follow-up is required. [39, 45]

C. INFECTIVE AETIOLOGY:

1. CANDIDOSIS

(candidiasis, moniliasis, thrush)

Introduction:

Oral candidosis is one of the common fungal infection affecting the oral mucosa caused predominantly by Candida albicans. C. albicans is a frequent, but not invariable, normal commensal of the gastrointestinal tract, vagina and moist intertriginous areas of skin.

Oral candidiasis can also be a frequent and significant source of oral discomfort, pain, loss of taste, and aversion to food.[46]

Epidemiology and aetiopathogenesis:

Oral candidal colonization has been reported to range from approximately 40% to 70% of healthy children and adults, with higher rates observed among children with carious teeth and older adults wearing dentures. Candida carriage rate has been shown to also increase with age, smoking, cancer radiation therapy, diabetes, and HIV infection.[46]

Most cases of oral candidiasis are caused by Candida albicans, although a large number of other yeast species maybe found intraorally. These include C. tropicalis, C. krusei, C. parapsilosis, and C. guilliermondii. In oral candidosis, C. albicans generally accounts for around 50% of cases. [46]

Changes in the oral environment that predisposes or precipitates oral candidiasis include: [47]

Local host factors	**Systemic host factors**
• Denture wearing • Steroid inhaler use • Reduced salivary flow (xerostomia) • High sugar diet	• Extremes of age • Endocrine disorders (e.g. diabetes) • Immunosuppression • Receipt of broad spectrum antibiotics • Nutritional deficiencies

The epidemiology of oral candidal infection is complex in insulin-treated diabetes mellitus patients. The development of oral candidosis is not the result of a single entity, but rather, a combination of risk factors like glycaemic control, sex, age, smoking and wearing of dentures.

In HIV patients, oral candidosis is the most common opportunistic infection occurring in as many as 90% of patients at some point during the course of HIV infection. It is a marker for increased rate of progression to AIDS.[48]

Though the reported prevalence of oral candidosis in patients receiving systemic steroids is 30-35%, the relationship between candidal carriage or infection and systemic steroid therapy is not clear.[49]

Some soreness in the epithelium in the denture-bearing area is said to affect nearly one-quarter of all denture wearers and most, if not all cases appear to be caused by candidosis. Elimination of *Candida* alone does not usually result in complete recovery, and it is likely that other factors such as chronic mechanical irritation and bacterial colonization have a role in the pathogenesis.

Clinical features:

Oral candidosis manifests in various clinical forms: [39]

1. Pseudomembranous candidosis
2. Acute atrophic-erythematous candidosis
3. Chronic atrophic candidosis
4. Angular cheilitis. (perle`che)
5. Chronic hypertrophic-hyperplastic candidosis (Candida leukoplakia)
6. Median rhomboid glossitis
7. Chronic nodular candidosis.

Acute pseudomembranous candidosis (oral thrush) presents with sharply defined superficial curd like white patches covered by pseudomembrane, which, when wiped off leaves an erythematous base. The buccal mucosa, gums or palate may be affected with extension to the pharynx or esophagus seen in severe cases. In immunocompromised patients, the tongue may be affected as well. The condition occurs most commonly in the first weeks of life with preterm infant being susceptible.[47]

Chronic pseudomembranous candidosis is seen in immunocompromised patients.

Acute erythematous candidosis (acute atrophic oral candidiasis; antibiotic sore tongue) is characterised by marked soreness and focal or diffuse areas of denuded atrophic erythematous mucosa, particularly on the dorsum of the tongue. It is especially associated with antibiotic therapy. It may also develop in HIV-positive subjects and patients taking inhaled steroids.[50]

Chronic erythematous candidosis (chronic atrophic candidiasis; denture sore mouth; denture stomatitis) presents as a variable bright-red or dusky area of erythema

with a pebbly or velvet surface confined to the upper denture-bearing area, the palate and gums. There is often an associated angular cheilitis.[51]

Angular cheilitis presents as fissures or erosions, and crusting with underlying erythema developing at the commissures associated with soreness. Predisposing factors include ill-fitting dentures with over closure, drooling at the corners of the mouth, lip-licking habits, and thumb sucking habits.[52]

Chronic hyperplastic candidosis (candidal leukoplakia) appears as firm, well-demarcated, white, thick, or verrucus plaques commonly on the cheek or the tongue that cannot be rubbed off easily. Symptoms are mild with slight soreness noticed. It is commonly seen in males over the age of 30 years with smokers particularly prone to develop this form of oral candidosis.[53]

Chronic nodular candidosis is a rare form, where the clinical appearance that usually affects the tongue is cobbled. It is most often seen in certain patients with chronic mucocutaneous candidosis.

Median rhomboid glossitis appears as an asymptomatic diamond- or oval-shaped erythematous de-papillated area on the posterior dorsum of the tongue. The surface is smooth or lobulated. It occurs more frequently in AIDS patients.[54]

Chronic mucocutaneous form of candidosis is a heterogenous group that presents as persistent Candida infection of the mouth, the skin and the nails, refractory to conventional topical therapy. Several types are familial and can present during early childhood. It can also form a part of the autoimmune polyendocrinopathy candida ectodermal dystrophy syndrome (APECED). Oral lesions start as pseudomembranous candidiasis, and then proceeds to become chronic hyperplastic candidiasis.[55, 56]

Diagnosis:

The diagnosis of this condition is by positive direct microscopy. On 10% potassium hydroxide mount, pseudohyphae or budding cells consistent with the candida morphology can be demonstrated.

A cytologic smear or biopsy can also be stained with periodic acid– Schiff. This method stains the abundant carbohydrates in the fungal cell walls. The organisms are identified easily by their bright magenta color.

Definitive identification of the fungi is performed by culture on Sabouraud's dextrose agar.[39]

Treatment:

The main stay of treatment in oral candidosis is identification and treatment of underlying predisposing factors; frequent toilet in the seriously ill, and denture hygiene in other patients.

Topical antifungal therapy alone is sufficient to treat in majority of cases.

In infants, suspensions of nystatin, amphotericin or miconazole gel applied several times a day are usually adequate for treating oral thrush. In the adult patient, removal of the dentures with careful hygiene at night is important. Regular amphotericin lozenges, nystatin or amphotericin tablets or oral nystatin suspension are effective in non-immunocompromised patients. In acute cases, 10-14 days of treatment is adequate. Angular stomatitis usually responds to treatment of the primary oral condition, although a topical antifungal applied to the area may speed recovery.[56, 57]

Systemic treatment is indicated in unresponsive and chronic cases, such as those with hyperplastic candidosis, patients with AIDS or chronic mucocutaneous candidosis. Combination antiretroviral therapy in AIDS patients improves the

therapeutic outcome significantly. Triazoles, fluconazole and itraconazole are commonly used for systemic treatment. The usual daily doses are itraconazole 100–200 mg and fluconazole 100–400 mg.[56]

For the treatment of oral candidosis in patients with AIDS or CMC, if possible, therapy should be given intermittently if there is a recurrence, because of the risk of resistance developing with continuous therapy. Treatment is usually given until there is symptomatic recovery.[57, 58]

In patients with chronic oral candidosis, a biopsy may be justified to exclude leukoplakia.

2. ORAL HAIRY LEUKOPLAKIA

Introduction:

Oral hairy leukoplakia (OHL) is one of the most common, virally-induced, oral diseases of individuals with HIV infection. It is commonly seen in severe immune-compromised state, and occasionally in apparently immune-competent individuals.[59]

Epidemiology and aetiopathogenesis:

The prevalence of OHL in HIV seropositive patients varies considerably from 13%-46% in different regions.[59]

Epstein- Barr virus is implicated in aetiology of OHL. The oral site of predilection for HL appears to relate to the presence of EBV receptors only on the parakeratinized mucosae such as the lateral margin of the tongue. OHL has also been reported in HIV-seronegative patients who were severely, chronically, and iatrogenically immune-suppressed because of bone marrow, renal, heart, and liver transplants or cytotoxic chemotherapy for acute leukaemia, suggesting that OHL is

not a specific lesion associated to the HIV-infection, but may be a sign of immune-suppression in general. [59, 60]

Lesions very similar to OHL both clinically and histologically have very rarely been reported in immune-competent individuals and have been termed pseudo oral hairy leukoplakia. These latter lesions are negative for EBV DNA, however.

Clinical features:

Oral hairy leukoplakia is usually an asymptomatic poorly demarcated white plaque with irregular corrugated surface typically seen on the lateral borders of the tongue. Lesions seen on the ventral surface of the tongue may be flat.

These plaques cannot be scraped off. Rarely, other sites in the oral cavity like buccal mucosa, floor of the mouth, and soft palate can be involved.[60]

Histopathology:

Severe hyperkeratosis and irregular acanthosis is usually seen. Virally affected epithelial cells (koilocytes) with margination of the nuclear chromatin (nuclear beading) is a characteristic feature.

Diagnosis:

EC-Clearinghouse- WHO diagnostic criteria for OHL: [60]

1. Typically, asymptomatic, non-removable, corrugated white patches present on the lateral borders and ventral aspect of the tongue.
2. Histologically, the lesion shows irregular hyperparakeratosis and acanthosis with clusters or bands of ballooned keratinocytes in the stratum spinosum. These ballooned cells show nuclear peripheral beading, ground glass nuclei, and Cowdry-type A intranuclear inclusion bodies. Inflammatory reaction is minimal and atypia absent.
3. Electron microscopically, the herpesvirus nucleocapsids present in ballooned

keratinocytes have been identified as the Epstein- Barr virus by immunohistochemistry and DNA in situ hybridization.

Presumptive diagnosis of OHL is made on presence of clinical features with lack of response to antifungal treatment. The definitive diagnosis requires demonstration of EBV within the lesion using in situ hybridization, PCR, Southern blot or electron microscopy.[61]

Differential diagnosis:

OHL should be differentiated from hyperplastic candidiasis, leukoplakia, lichen planus, lupus erythematosus and white sponge nevus.

Treatment:

None is required because it is an asymptomatic lesion with no malignant potential. The use of antivirals (acyclovir, gancyclovir, desicyclovir, ziduvudine) usually resolves the condition but the lesions reappear once the medication is discontinued. Topical podophyllin with or without acyclovir cream has also been shown to be effective in treating the lesions.[62]

Surgical excisions of the symptomatic lesions have resulted in temporary relief but, with recurrences. Detecting and managing the cause of immune-suppression is the most important factor in the treatment of this condition.[39, 63]

3. WARTS

Introduction:

Common (verruca vulgaris) and venereal warts (condyloma acuminatum) are caused by human papilloma virus (HPV).[39]

Epidemiology and aetiopathogenesis:

Warts are infrequent in oral cavity but are commonly seen in HIV individuals.[64]

Oral verruca vulgaris are more frequent in children than in adults. The lesions develop in oral cavity following auto- inoculation from hands and fingers.

Condyloma acuminatum is the most common sexually transmitted disease and arises in the oral mucosa because of autoinoculation or more commonly by orogenital sexual transmission. It is common in HIV patients, with a striking increase seen on starting highly active antiretroviral therapy. [64]

Clinical features:

Verruca vulgaris appear as solitary or multiple, asymptomatic, exophytic growths with roughened or verrucous surface identical to cutaneous warts. Lesions are either pedunculated or sessile and range in color from pink to white. Individual lesions usually achieve an average size of about 0.5 to 1 cm. The lesions develop in sites of inoculation, mainly the labial mucosa, tongue, and gingiva.

Condyloma acuminate lesions are frequently present on the labial mucosa, followed by lingual frenum, soft palate, and gingiva. They present as asymptomatic, pink, sessile, less frequently pedunculated, exophytic cauliflowerlike growths. They are multiple rather than single. They are usually larger than verruca vulgaris, ranging from 1 to 3 cm. [64]

Histopathology:

Warts are characterized by a proliferation of hyperkeratotic stratified squamous epithelium arranged into finger-like projections with connective tissue cores. The converging or ‘‘cupping’’ arrangement of the peripheral rete ridges and a prominent granular cell layer with coarse, clumped keratohyaline granules is

characteristic. Numerous koilocytes with pyknotic nuclei and perinuclear vacuoles are present.

Diagnosis:

The diagnosis of wart is confirmed by histopathology of the suspected lesion. Electron microscopy, immunoperoxidase staining, or in situ hybridization can detect HPV viral particles in the biopsy samples.

Treatment:

Lesions can be removed by surgical excision, cryosurgery, electrosurgery, and laser therapy. Imiquimod and 20% podophyllin solution in tincture of benzoin have been used with some success.[64]

4. SYPHILIS MUCOUS PATCHES

Introduction:

Mucous patches are an oral manifestation of secondary syphilis. Roughly 30% of patients with secondary syphilis present with mucous patches.[65]

Aetiology:

Syphilis is caused by the spirochete Treponema pallidum.

Clinical features:

Painless, oval plaques covered with white or gray membrane are found on the tongue, lips, buccal mucosa, and palate. The surface membrane can be removed easily to reveal an underlying raw area. These patches heal spontaneously, but with a high incidence of recurrence.[65]

Other associated findings include papulosquamous eruptions with prominent coppery-colored scaly plaques involving the palms and soles; a moth-eaten alopecia;

and condylomata lata lesions, lymphadenopathy, hepatosplenomegaly, and a residual chancre.[65, 66]

Histopathology:

Histopathologic features are nonspecific. The epithelium may be either ulcerated or hyperplastic. The lamina propria may have increased vascular channels and chronic inflammatory reaction. This inflammatory perivascular infiltrate is principally comprised of lymphocytes and plasma cells.

Diagnosis:

The most specific test is demonstration of the spirochete from the mucous patch on dark-field microscopy. False-positive results are possible in the oral cavity because of morphologically similar bacteria like T. microdentium, T. macrodentium, and T. mucosum.

Confirmation of syphilis should be performed with serology. The serologic tests in secondary syphilis are usually positive. Serologic tests, which are nonspecific and but highly sensitive, include the Venereal Disease Research Laboratory and the rapid plasma reagin. Specific and highly sensitive serologic test for syphilis include the fluorescent treponemal antibody absorption test. This test becomes positive shortly after the development of primary chancre and thereafter is positive for life. [65]

Treatment:

The treatment of choice for syphilis is benzathine penicillin G, 2.4 million units in a single intramuscular dose. Patients should have follow-up serologic titers at 3 and 6 months to ensure a fourfold decline in titers.[39, 65]

D. SYSTEMIC CAUSE:

UREMIC STOMATITIS

Introduction:

Uremic stomatitis is a rare oral manifestation of advanced renal failure, typically characterized by an abrupt onset of adherent white plaques on the ventral and dorsal surfaces of the tongue, floor of the mouth, buccal and labial mucosa and gingiva.[67]

Aetiopathogenesis:

The aetiology is still unclear but it has been suggested that salivary urease enzyme hydrolyzes urea in saliva to ammonia and its compounds, which in turn cause mucosal irritation and burn thereby resulting in oral lesions.

Clinical features:

Patients complain of severe burning pain in the lips and tongue, and an unpleasant taste. Patients' breath may be laced with the smell of urea and ammonia. An abrupt onset of adherent white plaques, anywhere in the oral mucosa is characteristic.[39]

Four forms have been described:

- Erythemopultaceous (characterized by the formation of a pseudomembrane),
- Ulcerative,
- Hemorrhagic, and
- Hyperkeratotic.[67, 68]

Histopathology:

Hyperkeratosis type lesions demonstrate hyperkeratosis and acanthosis of the epithelial layer. Ballooning keratinocytes are also seen with minimal inflammatory infiltrate in the underlying connective tissue. Ulcerative-type lesions demonstrate

epithelial necrosis and a dense inflammatory infiltrate in the underlying connective tissue.

Differential diagnosis:

Frictional keratosis, leukoplakia, carcinoma and oral hairy leukoplakia.[39]

Treatment:

Lesions resolve with the lowering of blood urea nitrogen (BUN) levels and management of renal failure. Scaling of teeth may help as calculus contain urease enzyme. Hydrogen peroxide mouthwashes have also shown to resolve the lesions.[67, 68]

E. DERMATOLOGICAL CAUSES.

1. ORAL LICHEN PLANUS:

Introduction:

The word, lichen planus (LP) is derived from the Greek word "leichen" meaning tree moss and the Latin word "planus" meaning flat. The true cause of lichen planus remains obscure. Treatment is generally geared to alleviating symptoms. Oral lesions are chronic, rarely remissive, and are frequently the source of morbidity.[69]

Epidemiology and aetiology:

Lichen Planus has a varied prevalence based on different geographic regions, but it generally affects approximately 1% to 2% of the world's population.[70] Oral lichen planus constitutes 9% of all white lesions affecting the oral cavity.[71] In India, the prevalence of oral lichen planus ranges between 0.5% and 3% of all white lesions affecting oral cavity. Genital LP is associated with approximately 20% of OLP, whereas cutaneous LP is associated with approximately 15% of oral lichen planus.

However, some studies suggest that the association between cutaneous LP and oral lichen planus is closer to 70% to 77%.[69]

Women are affected more commonly than men.[72] Typically OLP affects individuals in the age group of 30-60years. It is rare in children, but a higher prevalence of OLP is reported in Indian population, suggesting differences in the genetic and\or environmental factors.[70]

Although OLP patients do not seem to have an increased risk of diabetes and hypertension, an association between OLP, diabetes mellitus, and hypertension has been described, the triad being termed the Grinspan syndrome.[73]

The exact aetiology of OLP is unknown. Oral lichen planus is classified as an immunologically mediated disorder, but the origin of putative antigen (endogenous or exogenous) triggering the inflammatory response is unclear.[74]

Genetics, familial clustering, and human leukocyte antigen association, although initially implicated to play a role in the pathogenesis of OLP, are no longer considered critical factors. Polymorphisms and genetic variations in the expression of cytokines have been linked with the risk of developing lesions of OLP and govern whether lesions are limited to the oral cavity (INF- ϒ), or skin (TNF-α).[75]

Various viruses like Varicella zoster virus, Epstein-Barr virus, cytomegalovirus, human herpes virus, human papilloma virus, and hepatitis C virus (HCV) have been implicated in development of OLP, but only the role of HCV has been extensively studied. The definite pathogenic role of HCV in the development of OLP is still not clear.[74] It is believed that the immune reaction mediated by HCV replication may cause damage to the basal layer cells and result in OLP lesions. Some studies suggest that the hepatitis C virus exerts an indirect effect, possibly mediated

by the modulation of cytokines and lymphokines in the pathogenesis of oral erosive LP.[76]

Even though the association of dental amalgam with increased risk of OLP is reported, the exact mechanism leading to development of OLP is not clear; allergic and/or irritant reaction to mercury in amalgam is postulated.[77]

Stress, anxiety and depression are known to significantly influence the development of OLP.[78]

Pathogenesis:

The triggering factors and pathogenic mechanism of OLP are still not conclusively identified. Most data suggest that OLP is a CD8+ T cell–mediated autoimmune disease. However, there seems to be no definite role of B cells, plasma cells, immunoglobulins, or complements in the mediation of LP.[74] These CD8+ T cells are believed to induce keratinocyte apoptosis and cause epithelial basal cell layer damage via several possible suggested mechanisms: (1) secretion of tumor necrosis factor-α (TNF- α), which binds the TNF- α receptor 1 on the keratinocyte surface; (2) the binding of CD95 (Fas) on the keratinocyte surface with CD95L, which is expressed on the T cell surface; and (3) entry and assimilation of granzyme B secreted by T cells into the keratinocytes by perforin-induced membrane pores.[79]

A variety of factors are believed to trigger the cytotoxicity of CD8+ T cells. One is the expression of major histocompatibility complex class (MHC) II presented by the langerhans cells and keratinocytes, which secrete interleukin-12 (IL-12) thus activating the CD4+ T cells. This activation of CD4+ T cells and subsequent expression of interleukin-2 (IL-2) and interferon- ɤ (INF- ɤ), in association with the MHC class I, which are associated with basal keratinocytes, promotes cytotoxic

CD8+ T cell induction of keratinocytes apoptosis.[74] The immunologic abnormality leads to a delay in the growth of mucosal epithelium that is responsible for hyperkeratosis.[80]

Another nonspecific mechanism in the development of OLP is believed to be the degranulation of mastocytes and activation of matrix metalloproteinases, which degrades components of the extracellular matrix and basal membrane and also participates in the migration of lymphocytes through the epithelium. OLP lesions have more than 60% of degranulated mastocytes in comparison with normal mucosa.[69]

Clinical features:

The oral mucosa may be involved alone or in association with lesions on skin or other mucosa, and oral lesions may precede, accompany or follow lesions elsewhere.[81]

The clinical presentation oral lichen planus is nearly always in a bilateral, symmetric pattern. Lesions are often asymptomatic but may cause soreness. The buccal mucosa, tongue, and gingiva are the most common affected sites, whereas palatal lesions are uncommon.[82]

Clinically, 6 subtypes of OLP are seen individually or in combination: papular, reticular, plaquelike, atrophic, erosive, and bullous.[15] The more common of these are the reticular, erosive, and plaquelike subtypes.[82]

Reticular subtype:

This is the most common form of lichen planus. Characteristically, it presents as a network of small, raised, whitish-gray, lacy lesions known as Wickham striae, which may be surrounded by a discrete erythematous border. The buccal mucosa is the site most commonly involved. They may also be seen on the lateral border of tongue and less often on the gingiva and the lips.

Papular subtype:

This form presents as small white pinpoint papules about 0.5 mm in size. It is rarely seen and being small possibly overlooked during routine oral examination.

Plaque subtype:

This lesion resembles oral leukoplakia and occurs as homogenous white patches. The plaque like form may range from a slightly elevated and smooth to an irregular form and may be multifocal. The primary sites are the dorsum of the tongue and the buccal mucosa.

Atrophic subtype:

The atrophic type is diffuse, red area with white striae at the margins that radiate peripherally. The gingiva is often involved and the condition is commonly referred to as `chronic de squamative gingivitis'. This condition can cause burning sensation particularly when in contact with certain foods.

Bullous subtype:

Appears as small bullae or vesicles that tend to rupture easily leaving behind an ulcerated painful surface. The bullae or vesicles range from a few millimeters to several centimeters in diameter. The bullous form is commonly seen on the buccal mucosa, particularly in the postero-inferior areas adjacent to the second or third molar teeth. The next most common site is the lateral margin of the tongue.

Erosive subtype:

This is the second most common type. The erosions are often large, slightly depressed or raised with a yellow slough, and have an irregular outline. The surrounding mucosa is often erythematous and glazed in appearance. The periphery of the lesion is usually surrounded by reticular or finely radiating keratotic striae.

Erosive LP frequently affects the dorsum and lateral borders of the tongue or the buccal mucosae on both sides.[82]

Modified WHO diagnostic criteria of OLP and oral lichenoid lesions[83]
Clinical criteria: -Presence of bilateral, more or less symmetric lesions -Presence of a lacelike network of slightly raised gray-white lines (reticular pattern) - Erosive, atrophic, bullous, and plaque-type lesions are only accepted as a subtype in the presence of reticular lesions elsewhere in the oral mucosa In all other lesions that resemble OLP but do not complete the aforementioned criteria, the term "clinically compatible with" should be used.
Histopathologic criteria: - Presence of a well-defined, bandlike zone of cellular infiltration that is confined to the superficial part of the connective tissue, consisting mainly of lymphocytes - Signs of liquefaction degeneration in the basal cell layer - Absence of epithelial dysplasia When the histopathologic features are less obvious, the term "histopathologically compatible with" should be used. Final diagnosis of OLP or oral lichenoid lesions: To achieve a final diagnosis, clinical as well as histopathologic criteria should be included.

Oral lichenoid reactions have similar features, clinically and Histologically to OLP, but have a less characteristic morphology.

Histopathology:

Definite diagnostic histologic findings include liquefactive degeneration of the basal cells, colloid bodies (Civatte, hyaline, cytoid), homogeneous infiltrate of lymphocytes in a dense, bandlike pattern along the epithelium-connective tissue interface in the superficial dermis, cytologically normal maturation of the epithelium, sawtooth rete ridges, and hyperkeratosis (orthokeratosis or parakeratosis). In addition, the surface epithelium may show signs of ulceration, typically seen in erosive LP.[71] Several histologic criteria that are considered as exclusionary in diagnosing OLP include the absence of basal cell liquefaction degeneration, polyclonal inflammatory infiltrate, abnormal cytology suggestive of dysplasia, abnormal keratinization, flat rete ridges, and absence of colloid bodies.[84]

Diagnosis:

Biopsy with immunofluorescence is often indicated to exclude keratosis, lichen sclerosus, lupus erythematosus, malignancy and other disorders. Direct immunofluorescence studies of OLP have shown a linear pattern and intense positive fluorescence with antifibrogen outlining the basement membrane zone and cytoidlike bodies with positive Ig M labeling.[85, 69]

Treatment:

OLP does not have a cure, largely because the cause remains unknown. Thus treatment is only supportive and palliative.

The primary goal of OLP management is to alleviate symptoms and to prevent and screen for malignant transformation.[15] Asymptomatic reticular lesions may require simple observation without any medical intervention.

Multiple treatment modalities available for the treatment of OLP are corticosteroids, topical and systemic retinoids, calcineurin inhibitors (cyclosporin,

tacrolimus, pimecrolimus), azathioprine, phototherapy, griseofulvin, hydroxyquinone, dapsone, mycophenolate, thalidomide, low-molecular-weight heparin and CO_2 laser.[74] The treatment modality for OLP depends on factors such as severity of symptoms, location and extent of the lesions in the oral cavity and the patient's overall health, precipitating psychological factors, possible drug interactions, and compliance of the patient.[86]

The most widely used treatment for OLP is topical steroids, which is often required for a prolonged period because of multiple symptomatic episodes. Among topical steroids, clobetasol propionate has been reported to have good efficacy; alternatively, triamcinolone and fluocinonide acetonide, are also effective.[71] It is critical to have contact between the mucosal surface and the steroid drug for a few minutes, and therefore formulations such as an oral rinse or adhesive paste are often recommended.[15] Depending on the extent of oral involvement and access to OLP lesions, elixirs containing triamcinolone, dexamethasone, or clobetasol, or topical steroids in adhesive bases are used. Gingival lesions respond better to topical corticosteroids delivered in occlusive customised vinyl carriers as this method of drug delivery increases contact time of the topical agent to the gingiva. The patient should be advised to refrain from eating or drinking for 1 hour after use of any formulation of topical steroids.[71]

The use of intralesional steroids has been reported, but their efficacy is not well documented.[15]

Systemic steroids are used only for short-term alleviation of acute or refractory flares of OLP, or for widespread LP when other mucosal sites are also affected.[71] Depending on the severity of the lesion and the patient's weight and response to treatment, short courses of high-dose corticosteroids, such as prednisone

0.5 to 1.0 mg/kg/d are used. Prednisone 40 to 80 mg daily is usually effective in bringing about a response, and once a therapeutic response is achieved the steroid should be gradually tapered by reducing the dosage to 5 to 10 mg/d.[69]

Tacrolimus 0.1% ointment has been reported to show efficacy in the treatment of OLP in cases refractory to topical steroids.[15] Although Tacrolimus has proved to have potentially better clinical outcomes, it can cause local irritation, transient taste alterations, possible lesional flare-up after drug withdrawal, and mucosal pigmentation.

Pimecrolimus 1% cream has also been found to be effective in the management of OLP. [87]

Topical retinoids for treatment of OLP have shown less effectiveness than 0.1% Fluocinolone acetonide in orabase. Unclear results have been reported with systemic use.[88]

Extracorporeal photochemotherapy has been tried for treatment of severe refractory erosive OLP.

Surgical removal of OLP, especially isolated plaques or nonhealing erosions, has been performed but limited data exist to advocate this procedure.[71] Cryosurgery and laser surgery have been used to treat OLP, but more studies are needed to prove their efficacy.

Patient education and measures for reducing provoking factors such as mechanical trauma (sharp tooth, ill-fitting prosthesis, amalgam dental fillings), chemical irritation (acidic, spicy food or beverages), and good oral hygiene to reduce bacterial plaque can help in alleviating symptoms of OLP. Tobacco and alcohol use should also be discouraged.[69, 71]

2. Keratosis follicularis

(Darier's disease or Darier-White disease)

Introduction:

Keratosis follicularis is a condition characterized by symmetric waxy, dirty keratotic papules involving the scalp, face, trunk, and flexures of the extremities (seborrheic distribution). As the disease progresses, the neck, shoulders, trunk, buttocks, genitals and oral cavity may be affected.

Aetiopathogenesis:

Keratosis follicularis is an autosomal-dominant genodermatosis. Defects in the tonofilament-desmosomal complex are reported. A defect in the gene encoding the SERCA2 (Ca (2+)-ATPase (ATP2A2) gene at chromosome 12q24.1 has been found as the causative mutation in keratosis follicularis.[89]

Clinical features:

The distinctive lesion of Darier's disease is a firm, rough papule, which is skin coloured, yellow–brown or brown. Seborrhoeic areas of the trunk and face, particularly the scalp margins, temples, ears and scalp, are most often involved. Lesions of the mucous membranes are uncommon, but white umbilicate or cobblestone papules on the palate resembling nicotinic stomatitis may be seen.[90] Intraoral involvement occurs on the dorsal surface of the tongue. Small pebbly keratotic white papules are present on keratinized mucosa of the gingiva and hard palate. Confluent buccal lesions may simulate leukoplakia.[39,90]

Histopathology:

Perivascular infiltration in the dermis and submucosa is typically seen on histologic evaluation. Protrusion of dermal villi into the epidermis, with suprabasal

detachment of the spinous layer forming lacunae containing acantholytic cells is seen. Dyskeratotic round epidermal cells and grains of parakeratotic cells ('corps ronds') are also seen within a hyperkeratotic horny layer of the stratum corneum.[91]

Diagnosis:

A complete physical evaluation permits differentiation from other disorders.

3. DISCOID LUPUS ERYTHEMATOSUS (DLE)

Introduction:

Lupus erythematosus (LE) is an autoimmune condition with a broad spectrum of disease manifestations. Chronic cutaneous LE (DLE) primarily affects the skin but the oral mucosa can also be affected.[92]

Clinical features:

Distinctive oral lesions of DLE appear as circumscribed erythematous plaques surrounded by white, radiating striations ("sunburst" appearance). Telangiectasias at the peripheral border may be noted. Scale is not found in the oral cavity.[93] Discoid LE lesions may be painful, particularly when acidic or salty foods are ingested.

Although any mucosal surface may be involved, the buccal mucosa, the vermilion borders, the gingiva, and the labial mucosa are affected in decreasing order of frequency.[94]

The oral lesions can get secondarily infected with Candida. DLE may predispose to oral carcinoma.[39]

Histopathology:

Oral DLE lesions reveal hyperkeratosis, vacuolar degeneration of the basal cell layer, and a thickened basement membrane. An interface mucositis with a mild to

moderate perivascular infiltrate can be seen. Patchy deposits of periodic acid–Schiff–positive material in the basement membrane are noted.

Diagnosis:

Clinical diagnosis is confirmed by histopathology and immunofluorescence. Direct immunofluorescence testing of oral tissue may reveal a granular band of immunoreactants (IgG, IgM, and IgA), complement (C3), and fibrinogen along the basement membrane of long-standing lesions. The presence of anti-ssDNA occurs with widespread active disease.[93]

Differential diagnosis:

Oral DLE plaques may resemble erosive lichen planus. It can be very difficult to distinguish from LP of the lips, both clinically and by histology.[94] Oral DLE plaques, however, are less likely to be symmetric and more frequently are associated with lesions on the vermilion or facial skin. Oral DLE should also be differentiated from leukoplakia.

Treatment:

Topical corticosteroids may expedite the resolution of oral LE lesions. If patients have painful discoid lesions, intralesional corticosteroids are recommended and, if these treatments are unsuccessful, patients may require systemic medications.[93, 94]

4. ORAL MUCOSAL VITILIGO

Introduction:

Vitiligo is an acquired mucocutaneous pigmentary disorder with progressive loss of melanocytes**.** Oral mucosal vitiligo can occur as a part of generalized vitiligo or as an isolated condition.[95]

Epidemiology:

The exact incidence of vitiligo of oral mucosa is not known. Various studies in different populations report an incidence between 10-70%. Oral mucosal vitiligo can occur at any age and affects both sexes equally.[96]

Clinical features:

Oral mucosal vitiligo classically presents with uniformly white macules or patches. Commonly, vitiligo affects the vermilion zone and spares the wet labial mucosa. Other uncommon presentations are sparing of vermilion and band-like involvement of the labial mucosa and involvement of only the most lateral part of the lips.[96]

Histopathology:

Histopathologic evaluation helps to confirm the diagnosis of vitiligo. Lesions typically appear unremarkable with only scant inflammatory cell infiltrate and few or no melanocytes.[97]

Diagnosis:

Diagnosis of oral mucosal vitiligo is made clinically. Diascopy and Wood's lamp examination are helpful in detecting clinically subtle macules of vitiligo.

Differential diagnosis:

This condition needs to be differentiated from recurrent herpes induced depigmentation occurring after attacks of herpes labialis on and around the lips with resulting depigmentation. Depigmentation corresponds to the area of appearance of vesicles.[98]

Treatment:

Depigmentation of the lips and labial mucosa is cosmetically embarrassing and socially stigmatizing in pigmented individuals. Mucosal vitiligo is more resistant to medical therapies. Therefore, treatment is an arduous challenge as the medical management of lip vitiligo often results in a sluggish or poor response.

In early vitiligo, topical tacrolimus and pimecrolimus are effective.

The success rate of various surgical procedures for lip vitiligo varies widely. The cosmetic outcome with individual procedures also varies significantly. Micropigmentation (tattooing) gives immediate results and excellent colour matching has been reported in various studies, especially in dark individuals. Punch grafting has been found to be effective, but it is associated with cobble stoning. Similarly, thin split thickness grafts may be associated with thickened edges and milia formation. Recently, autologous melanocytes transfer via epidermal graft has been found to be an effective and safe therapeutic option for stable vitiligo of the lips.[97, 99]

F. PREMALIGNANT LESIONS :

1. Oral Submucosal Fibrosis

Introduction:

Oral submucosal fibrosis (OSMF) is a progressive, chronic, and premalignant condition characterized by fibroelastic changes and inflammation in the mucosa.[100]The aetiology is still unclear, but a strong correlation exists with consumption of spicy food, chilies, and/or areca nuts, as well as vitamin B deficiency and protein malnutrition. A genetic predisposition involving human lymphocytic antigen (HLA) A10, DR3, DR7, and probably B7 has been found. High prevalence is seen in populations of the Indian subcontinent, affecting persons of all ages and both genders.[101]

Clinical features:

Oral submucosal fibrosis develops insidiously, often presenting with burning sensation while eating hot or spicy foods and a non-specific stomatitis.[102] Later there may be symmetrical fibrosis of the cheeks, lips or palate, which may be symptomless and noted only as bands running through the mucosa. More advanced lesions demonstrate palpable fibrous bands leading to significant restriction in opening of mouth, speech, swallowing, and decrease in salivary flow.[100] Oral submucous fibrosis may predispose to the development of oral carcinoma, which occurs in 2–10% of patients over a period of 10 years.[103]

Histopathology:

Early findings include presence of chronic inflammatory cells, with several eosinophils in the lamina propria. Epithelial atrophy, hyalinized subepithelial

collagen, and loss of vascularity is seen in established cases. Fibrosis of minor salivary glands is also evident.[104]

Diagnosis:

The diagnosis can be confirmed by biopsy.

Differential diagnosis:

Oral submucous fibrosis should be differentiated from amyloidosis, generalized fibromatosis, scleroderma, and oral lichen planus.

Treatment:

Management is difficult and treatment focuses on improving mouth movement and relieving symptoms. Sub-mucosal injections of corticosteroids and collagenases, as well as exercises may be useful in the early stages. Severe fibrosis needs surgical intervention. Pentoxyfylline and lycopene have been used with some effect. Patients require close follow-up because of the high potential of malignant transformation.[104, 105, 106]

2. LEUKOPLAKIA

Introduction:

Leukoplakia is the most common and studied premalignant lesion. The WHO working group defined leukoplakia as "a keratotic white patch or plaque that cannot be scraped off and cannot be characterized clinically or pathologically as any other disease".[8] Therefore, a process of exclusion establishes the diagnosis of the disease.

Epidemiology:

The estimated global prevalence of oral leukoplakia is approximately 2%.[107] In India, a striking variation has been observed with 0.2% in Bihar, 4.9% in Andhra Pradesh[108]and 11.7% in Gujarat.[109]This variation is due to different high risk practices

like smoking and tobacco or gutka chewing. Most cases are seen in the 50–70 age group.[109]Male are affected three times more frequently than females.[110]

Aetiopathogenesis:

The exact aetiology of leukoplakia remains unknown. Many physical agents have been implicated, including tobacco, alcohol, chronic friction, electro-galvanic reaction between unlike restorative metals, and ultraviolet radiation.[111] Tobacco smoking is by far the most accepted factor and smokers are six times more prone to leukoplakia than nonsmokers. There are conflicting results related to the possible role of human papilloma virus infection.

Clinical features:

Leukoplakias vary in size. Oral leukoplakia can present clinically in different morphological patterns:

1. Homogeneous type of leukoplakia is a white patch with variable appearance, the surface may be traversed by small cracks or fissures. Common in the buccal (cheek) mucosa and usually of low premalignant potential, and Speckled or nodular type(non-homogenous type):
2. Non-homogeneous leukoplakias are nodular, verrucous and speckled that consist of white patches or nodules in a red, often eroded, area of mucosa. They have a high risk of malignant transformation.[112]

Proliferative verrucous leukoplakia (PVL) is a subtype of verrucous leukoplakia, being characterized by multifocal presentation, resistance to treatment and a high rate of malignant transformation.[113]

Leukoplakias are known to occur at almost all places in oral cavity. However, they are most frequent in buccal mucosa and mandibular mucosa. Two-third of the oral leukoplakias occurs at the vermillion, buccal mucosa and gingival surface.

High-risk sites for malignant transformation include the soft palate, ventrolateral tongue and floor of the mouth.[112]

Histopathology:

To fulfill a diagnosis of leukoplakia, no other definable lesion should be observed microscopically. Benign lesions display hyperkeratosis with or without acanthosis. A variable number of chronic inflammatory cells is seen in the underlying connective tissue. Epithelial dysplasia is commonly found in nonhomogeneous lesions. [114]

Diagnosis:

There are no signs or symptoms that reliably predict whether a leukoplakia will undergo malignant change, and thus histology must be used to detect dysplasia.[111]

Scalpel or punch biopsy is therefore generally indicated and is mandatory for those leukoplakias that exhibit the following characteristics:

• Found in patients with previous or concurrent head and neck cancer

• are non-homogeneous, i.e. have red areas and/or are verrucous and/or are indurated

• in a high-risk site such as floor of mouth or tongue

• focal

• with symptoms

• without obvious aetiological factors.

Differential diagnosis:

Lichen planus, cheek biting, frictional keratosis, smokeless tobacco-induced keratosis, nicotinic stomatitis, leukoedema, white sponge nevus, candidiasis, and lupus.[112]

Prognosis and malignant transformation:

The prognosis of leukoplakia varies. There is clear evidence of the malignant potential of some oral leukoplakias. Overall, around 2–5% of leukoplakias become malignant in 10 years and 5–20% of leukoplakias are dysplastic. Of leukoplakias with dysplasia, 10–35% proceed to carcinoma.[111, 112]

Malignant transformation of leukoplakias depends on multiple factors:

- Female gender (more in females)
- Long duration of leukoplakia
- Leukoplakia in nonsmokers (idiopathic leukoplakia)
- Location on the tongue and/or floor of the mouth
- Size > 200 mm^2
- Nonhomogeneous type
- Presence of Candida albicans
- Presence of epithelial dysplasia.

At present, it is not possible to reliably predict which dysplastic lesions will progress to carcinoma and which will regress.[115] Over the recent past, much effort has gone into identifying tissue markers of malignant potential,[116] in particular the genetic changes that underlie oral carcinoma, resulting in the identification of biomarkers such as DNA ploidy,p53, and chromosome 3 and 9 changes that might predict neoplastic change in potentially malignant lesions.[117]

Treatment:

Leukoplakias have a relatively low risk of malignant transformation. Hence, the recommended treatment should produce the fewest adverse effects.

Initial treatment involves the elimination of all possible known risk factors, following which the patient should be re-examined 3 months later. If the lesion regresses, no further treatment is indicated. Persistent lesions warrant a biopsy.

"Benign" biopsy diagnosis may over time undergo dysplastic changes; therefore regular follow-up of these lesions is of utmost importance.

Surgery (scalpel or laser excision) is an obvious option for the management of leukoplakias with a high predisposition to malignant transformation.

Other treatment modalities include cryosurgery, retinoids, b-carotene, bleomycin, calcipotriol, photodynamic therapy, and vitamin A.

No definite measures have been devised for the prevention of development of leukoplakia or oral carcinoma. Avoidance of smoking and alcohol, and consumption of fresh fruits and vegetables may have a protective effect. Oral cancer screening programmes can help in early diagnosis of these lessons, and improve the prognosis and treatment success.[118, 119]

G. MALIGNANCY.

SQUAMOUS CELL CARCINOMA

Introduction:

More than 90% of malignant neoplasms in the mouth are squamous cell carcinomas. Oral cavity squamous cell carcinoma (OCSCC) accounts for 2% to 3% of all malignancies.[120]

Epidemiology:

There is marked inter-country and intra-country ethnic differences in incidence and mortality from OSCC.[121] In many countries there is evidence for an

increase in oral squamous cell carcinoma (OSCC) over recent years,[122] especially in young persons. In most regions of the world, about 40% of head and neck cancers are known to be squamous cell carcinomas developing in the oral cavity. Similarly, in Asia, 80% of head and neck cancers are usually found in the oral cavity and oropharynx.[120]

Oral squamous cell carcinoma mainly afflicts patients older than 40 years of age, whereas the tumour remains very uncommon among young adults.[123]

A plethora of lifestyle and environmental factors has been identified as the risk factor for oral cancers. However Tobacco and alcohol are the two most important known risk factors for the development of OSCC. Cofactors include dietary factors, immunodeficiency and micro-organisms like candida and HPV 16/18.[122]

Premalignant conditions that can progress to OSCC include:[124, 125]

- Erythroplakia
- leukoplakia
- lichen planus—there are also cases of dysplasia with a lichenoid appearance (lichenoid dysplasia)
- HPV infection
- discoid lupus erythematosus
- submucous fibrosis
- atypia in immunocompromised patients
- dyskeratosis congenita
- Fanconi anaemia
- Paterson–Kelly syndrome (sideropenic dysphagia, Plummer–Vinson syndrome).

Clinical features:

OSCC may present as the following.[121, 122]

- A red lesion (erythroplasia)
- A granular ulcer with fissuring or raised exophytic margins
- A white or mixed white and red lesion
- A lump sometimes with abnormal supplying blood vessels
- An indurated lump/ulcer, i.e. a firm infiltration beneath the mucosa
- A non-healing extraction socket
- A lesion fixed to deeper tissues or to overlying skin or mucosa
- Cervical lymph node enlargement, especially if there is hardness in a lymph node or fixation.

Nearly 30% of all squamous cell carcinomas affect the lip; some 25% affect the tongue, the most common intraoral site.[121] Most intraoral cancers involve the posterolateral border of the tongue and/or the floor of the mouth (the 'graveyard' area). In betel chewing, the buccal mucosa is a common site for carcinoma.[122]

Histopathology:

Findings range from well-differentiated (lowgrade) lesions, in which the tumors resemble normal epithelium, to poorly differentiated or anaplastic (high-grade) lesions, where the tumor cells lose their resemblance to the epithelial tissues.[126]

Tumour consists of irregular masses of epidermal cells that proliferate downward into the dermis. The invading tumor masses are composed in varying proportions of normal squamous cells and of atypical (anaplastic) squamous cells. The number of atypical squamous cells is higher in the more poorly differentiated tumors. Atypicality of squamous cells expresses itself in such changes as great variation in the size and shape of the cells, hyperplasia and hyperchromasia of the nuclei, absence of

intercellular bridges, keratinization of individual cells, and the presence of atypical mitotic figures. Keratinization often takes place in the form of horn pearls, which are very characteristic structures composed of concentric layers of squamous cells showing gradually increasing keratinization toward the center. The center shows usually incomplete and only rarely complete keratinization.[127]

Diagnosis:

Early diagnosis is important since it improves prognosis and minimizes the extent of interventions.[127] There should be a high index of suspicion, especially of a solitary lesion present for over 3 weeks: biopsy is invariably indicated. Scalpel biopsy is required and toluidine blue staining may help highlight the most appropriate area for biopsy.[128]

The whole oral mucosa should be examined. Frank tumours should be inspected and palpated to determine extent of spread; for tumours in the posterior tongue, examination under general anaesthesia may facilitate this. OSCC should be staged according to the TNM classification of the International Union against Cancer.

Treatment:

The prognosis of OSCC is around 30% survival at 5 years. The treatment of oral cancer involves one or a combination of radiotherapy, surgery and, very occasionally, chemotherapy. Serious consideration must be given to the complications of the various modalities and the quality of life achieved. [129, 130, 131]

H. MISCELLANEOUS:

MUCOCELE.

(• Mucous retention cyst • Ranula • Mucocele • Myxoid cyst of lip)

Mucoceles are commonly seen on lower labial mucosa, usually resulting from the escape of mucus into the lamina propria from a damaged minor salivary gland duct.[132]

Mucoceles appear as painless dome-shaped, translucent, whitish blue papules or nodules.[133]

The cysts can be excised but they also respond well to cryosurgery, using a single freeze–thaw cycle.[134]

MATERIALS AND METHODS

MATERIALS AND METHODS

The study was carried out from January 2011 to September 2012. All patients coming to Dermatology OPD at R.L.JALLAPA HOSPITAL & RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR were examined and evaluated for white lesions of the oral mucosa.

Patients with oral white lesions were enrolled in the study. A detailed history of all such patients was taken including general status of the patient, systemic diseases, medications used, alcohol and tobacco consumption, habits (trauma) and prosthetic or other appliances use. Complete clinical and a thorough oral cavity examination was performed. During the clinical examination the following elements were analyzed: morphology of the lesion, anatomical location and extension.

The clinical diagnosis was established and classified. Correlation, if any, with aetiological factors was assessed. In relevant cases, necessary investigations to establish the definitive diagnosis and to evaluate the risk factors, if any, were done. The data collected was documented in the prescribed proforma.

Criteria for selection:

a. **Inclusion criteria:**

Patients with oral white patches and/or plaques belonging to all age groups.

b. **Exclusion criteria**:

Patients with oral ulcers and erosive lesions were excluded.

OBSERVATIONS AND RESULTS

OBSERVATIONS AND RESULTS

A total of 197 cases having oral white lesions fulfilling inclusion criteria attending to dermatology OPD at R.L. Jalappa Hospital and Research centre, Tamaka, Kolar district, Karnataka during the period of January 2011- September 2012 were enrolled in this clinical study.

Prevalence of oral white lesions:

Table 1. Prevalence of oral white lesions

Total number of patients screened. no.	Patients with oral white lesions. no.	Prevalence (%)
18000	197	1.09%

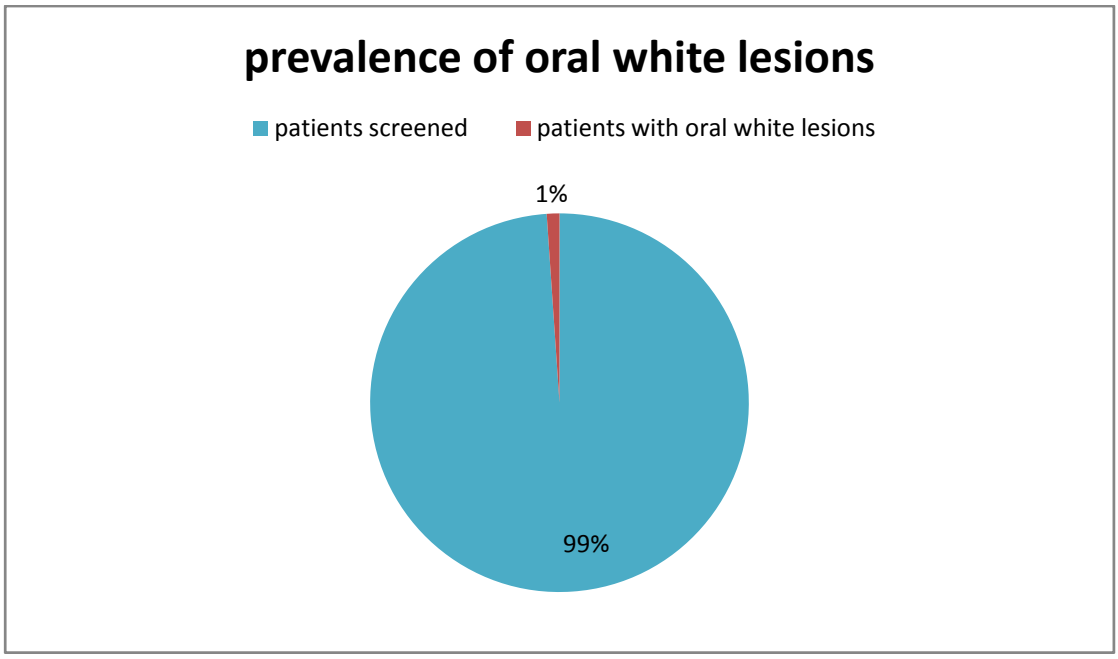

Diagram.1. Prevalence of oral white lesions.

- Out of the 18000 consecutive patients attending our out- patient department, 197 patients had oral white lesions, with a prevalence of 1.09%.

AGE DISTRIBUTION:

Table. 2. Age wise distribution of patients with oral white lesions. (no.)

Oral white lesions	<20years	20-40years	41-60years	>60years	Total (%)
OLP	0	22	16	2	**40(20.3%)**
Candidosis	0	3	20	10	**33(16.7%)**
Mucosal vitiligo	9	11	7	5	**32(16.2%)**
Fordyces spots	5	15	8	2	**30(15.2%)**
Tobacco pouch keratosis	0	9	3	3	**15(7.6%)**
Morsicatio buccarum	0	8	2	0	**10(5.1%)**
OSCC	0		3	4	**7(3.5%)**
Frictional keratosis	0	2	2	1	**5(2.5%)**
Retention cyst	3	2	0	0	**5(2.5%)**
Leukoplakia	0	1	2	2	**5(2.5%)**
Warts			2	2	**4(2.03%)**
Dariers disease	0	3	0	0	**3(1.5%)**
WSN	0	2	0	0	**2(1.01%)**
OSF	0	2	0	0	**2(1.01%)**
Leukoedema	0	1	1	0	**2(1.01%)**
DKC	0	1	0	0	**1(0.5%)**
OHL	0	0	1	0	**1(0.5%)**
Total	**17(8.6%)**	**82(41.6%)**	**67(34.1%)**	**31(15.7%)**	**197 (100%)**

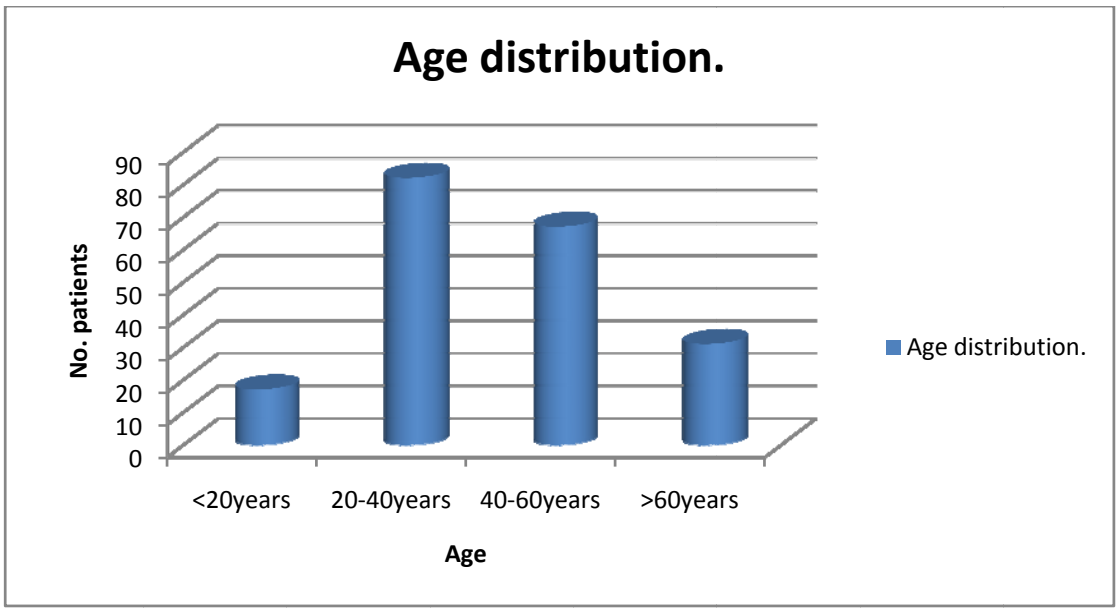

Diagram.2- Age wise distribution of oral white lesions.

- Majority of the patients, 82(41.6%) were in the age group of 20-40 years, followed by 58 cases (29.4%) in the age group 40-60years and 27 cases (13.6%) in the age group > 60years. The youngest patient was 7years and the oldest was 75years of age.

Sex distribution:

Table 3. Sex wise distribution of patients with oral white lesions.

Sex	Total (no.)	Percentage (%)
Males	108	54.8%
Female	89	45.2%
Total	**197**	**100%**

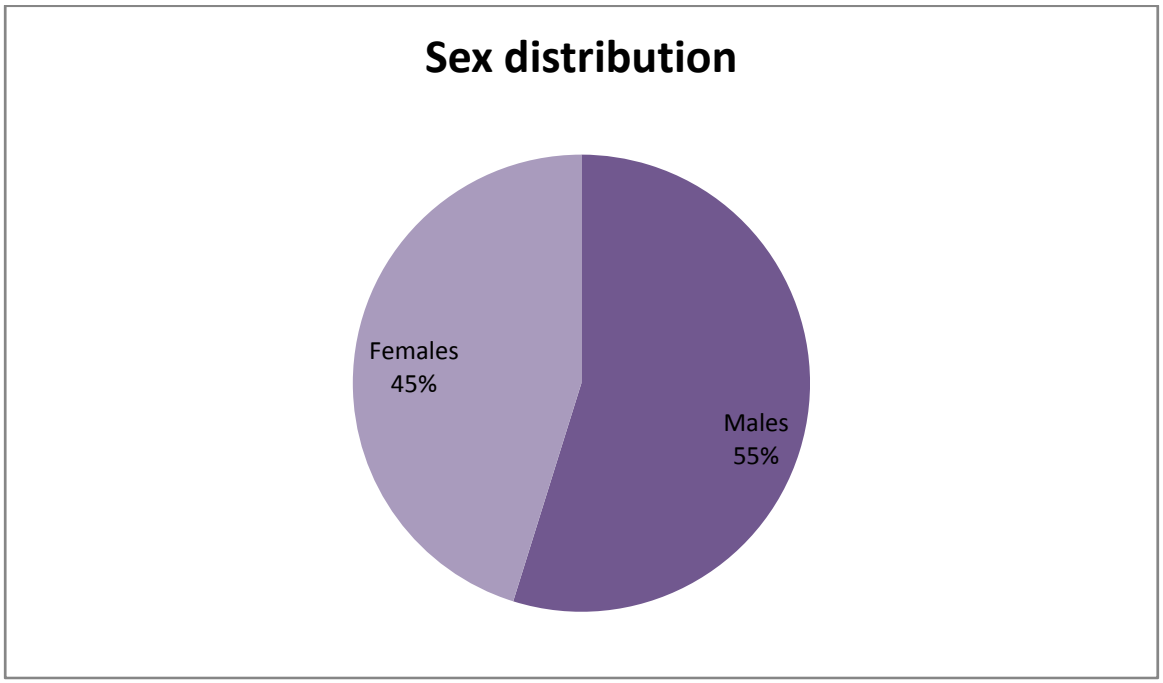

Diagram.3- Sex wise distribution of patients with oral white lesions

- Males (54.8%) were affected more than females (45.2%) in our study.

Table 4. **Distribution of various oral white lesions according to age and sex.**

Oral white lesion	<20 yrs		20-40 yrs		41-60 yrs		>60 yrs		Total
	M	F	M	F	M	F	M	F	
OLP	0	0	7	15	6	10	0	2	**40(20.3%)**
Candidosis	0	0	3	0	13	7	7	3	**33(16.7%)**
Mucosal vitiligo	3	6	5	6	2	5	3	2	**32(16.2%)**
Fordyces spots	4	1	11	4	6	2	2	0	**30(15.2%)**
Tobacco pouch keratosis	0	0	4	5	2	1	3	0	**15(7.6%)**
Morsicatio buccarum	0	0	3	5	0	2	0	0	**10(5.1%)**
OSCC	0	0	0	0	2	1	2	2	**7(3.5%)**
Frictional keratosis	0	0	0	2	1	1	0	1	**5(2.5%)**
Retention cyst	1	2	0	2	0	0	0	0	**5(2.5%)**
Leukoplakia	0	0	1	0	2	0	1	1	**5(2.5%)**
Warts	0	0	0	0	2	0	2	0	**4(2.03%)**
Darier's disease	0	0	2	1	0	0	0	0	**3(1.5%)**
WSN	0	0	2	0	0	0	0	0	**2(1.01%)**
OSF	0	0	2	0	0	0	0	0	**2(1.01%)**
Leukoedema	0	0	1	0	1	0	0	0	**2(1.01%)**
DKC	0	0	1	0	0	0	0	0	**1(0.5%)**
OHL	0	0	0	0	1	0	0	0	**1(0.5%)**
Total	8	9	42	40	38	29	20	11	
Total	17(8.6%)		82(41.6%)		67(34.1%)		31(15.7%)		**197**

- More percentage of females (53.1%) were affected in the age-group < 20 years as compared to males (46.9%), whereas in all other age-groups, males were more in number.

Presenting symptoms:

Table 5. Presenting symptoms of oral white lesions.

Presenting symptoms	Patients*(n=197)	Percentage(%)
Burning sensation	16	8.1%
Discoloration	59	29.9%
Discomfort	48	24.3%
Swelling	14	7.1%
No symptoms	60	30.4%

* Some patients presented with multiple symptoms associated with oral white lesions.

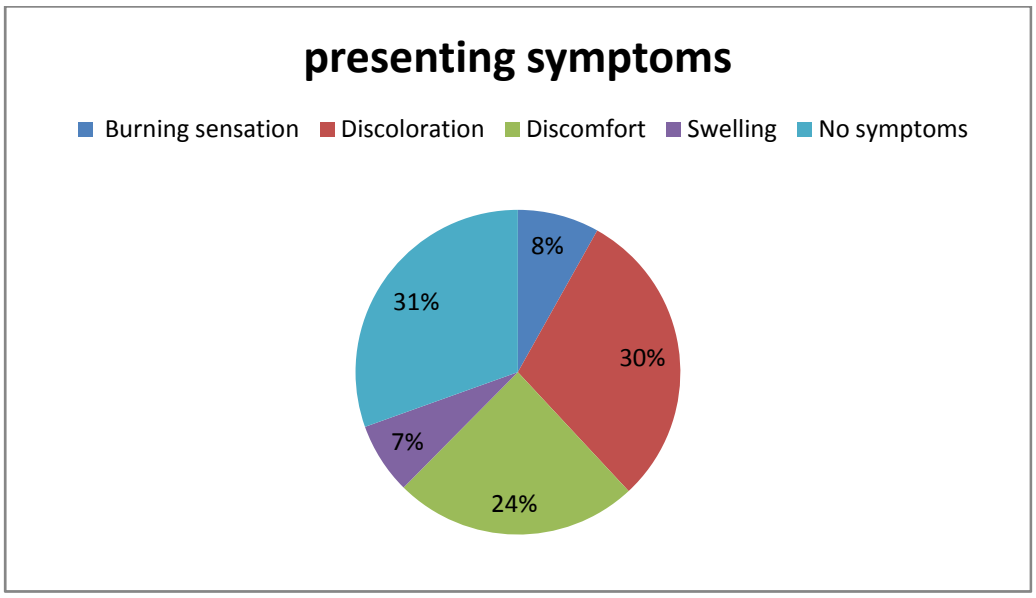

Diagram .4 Presenting symptoms.

- Out of 197 cases, 60 patients (30.4%) were asymptomatic but had oral white lesions on clinical examination. Discoloration of mucosa was the main presenting complaint in 59 patients (29.9%), next commonest were discomfort in 48 patients (24.3%) and burning in 16 patients (8.1%).

Duration of disease:

Table 6. Distribution of oral white lesions according to duration.

Duration	Patients (n=197)	Percentage (%)
Since childhood	2	1.01%
<6weeks	150	76.1%
>6weeks	45	22.8%
Total	**197**	**100%**

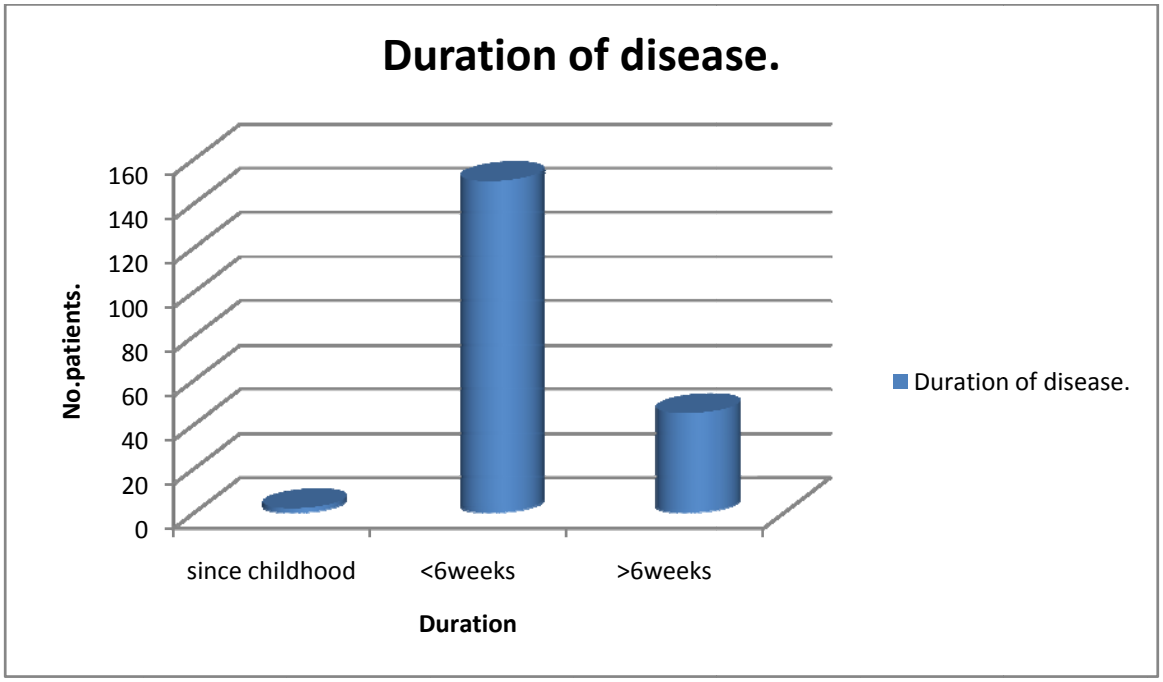

Diagram.5 Duration of disease.

- Most of the patients in the study, 150(76.1%) had symptoms of less than six weeks duration. Only 2 patients (1.01%) had oral white lesions since childhood.

Risk factors associated with oral white lesions:

Table. 7. Associated risk factors with oral white lesions. no.(%)

Risk factors	Males (%)	Females (%)	Total (%)
Smoking	83	00	83(42.1%)
Alcohol	66	04	70 (35.5%)
Tobacco	58	46	104 (52.7%)
Betel and areca nut	36	54	90 (45.6)
Dentures/ amalgam	7	12	19 (9.6%)
Stress	38	52	90 (45.6%)
Underlying disease	27	15	42 (21.3%)

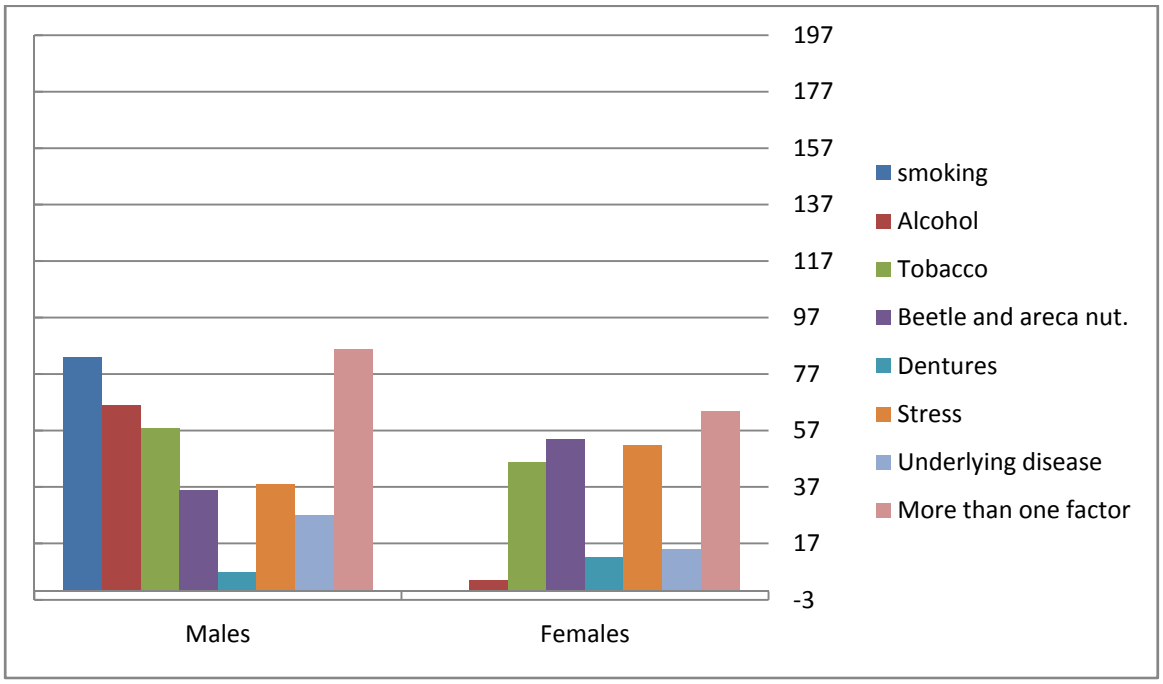

Diagram.6- Risk factors associated with oral white lesions.

- Most of the patients had more than one risk habit for the development of white lesions in oral cavity. In 83(42.1%) males, smoking was the most common individual risk factor. But in females, betel and areca nut (60%) chewing followed by other forms of tobacco (44%) usage and stress (57.7%) were the common associated risk factors elicited.

Distribution of white lesions in oral cavity:

Table 8. Distribution of white lesions in oral cavity.

Sites affected	Number of cases* (n=197)	Percentage (%)
Buccal mucosa	99	50.2%
Labial mucosa	36	18.2%
Tongue	33	16.7%
Lips	22	11.1%
Hard palate	7	3.5%
Total	**197**	**100%**

*>1 site may be involved.

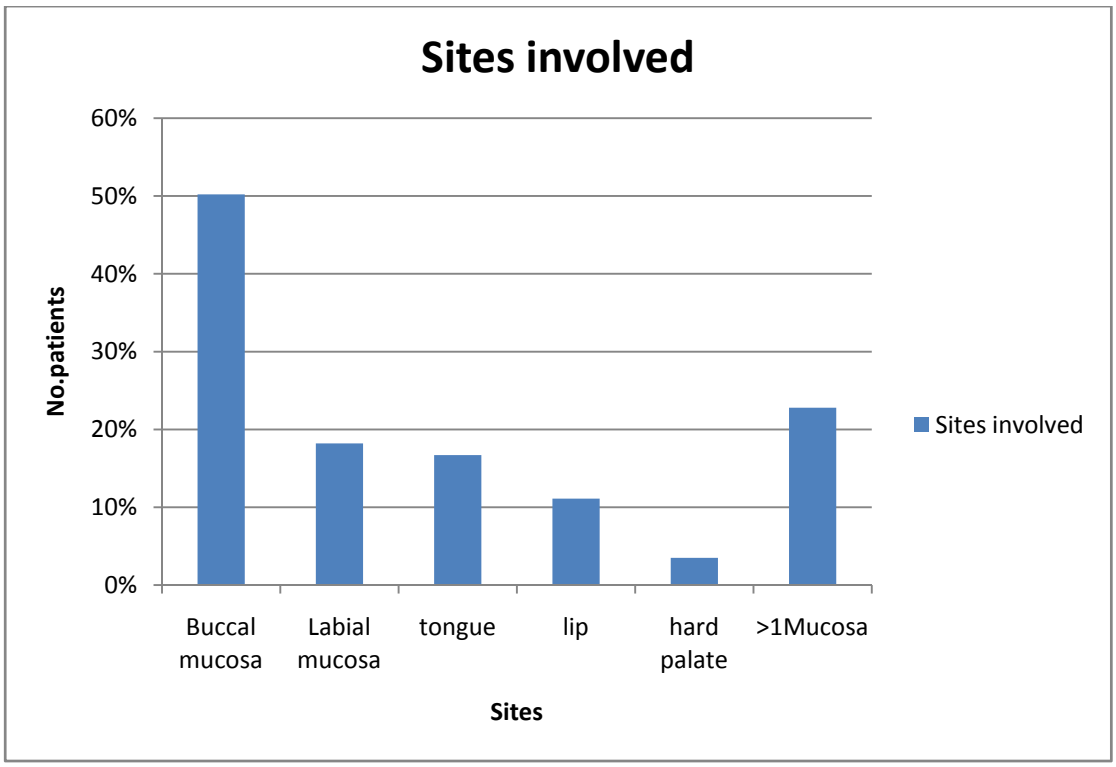

Diagram .7 Distribution of oral white lesions in oral cavity.

- White lesions were more common on buccal mucosa as seen in 99 patients (50.0%), followed by labial mucosa in 36 patients (18.2%) and tongue in 33 patients (16.7%). In 45 patients (22.8%) having oral white lesions, multiple sites were affected.

Morphology of lesions:

Table. 9. Morphology of oral white lesions

Morphology.	Males no	Females no	Total No. (%)
Plaques	39	24	63 (31.9%)
Patches	12	08	20 (10.1%)
Macules	13	16	29 (14.7%)
Papules	18	12	30 (15.2%)
Swelling	4	3	7(3.5%)
Atrophy	6	2	8 (4.06%)
More than one morphology	24	16	40 (20.3%)
Total	**116**	**81**	**197(100%)**

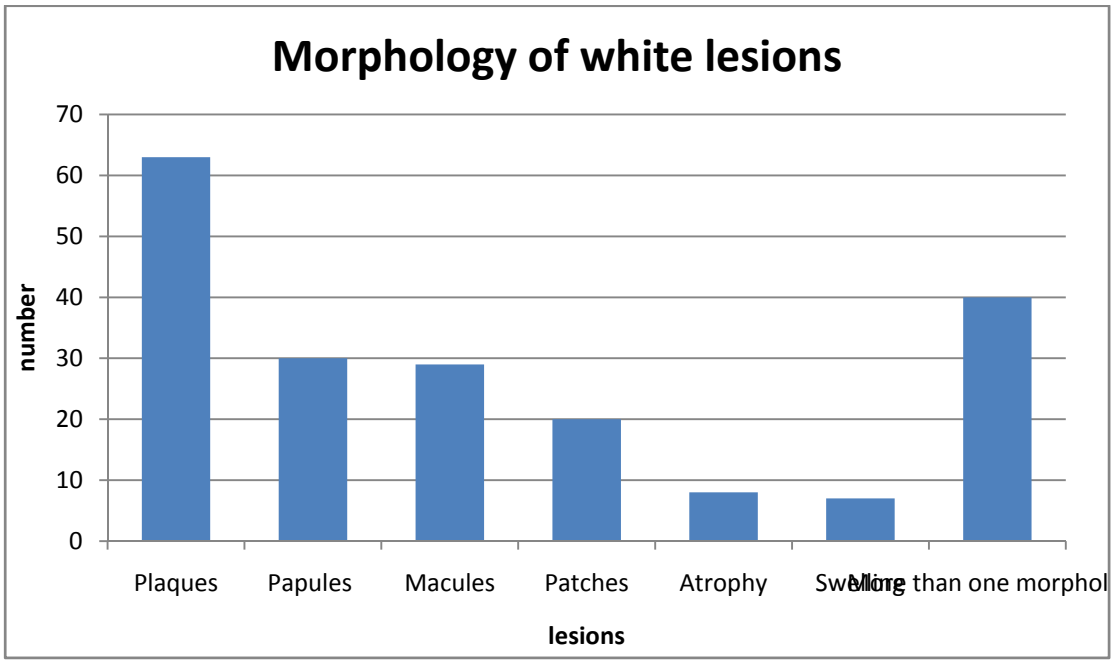

Diagram .8 Morphology of oral white lesions.

- White lesions of different morphology were seen. The predominant lesions were plaques in 63 patients (31.9%), followed by papules in 30 patients (16.7%) and macules in 29 patients (15.7%).

Aetiological classification of oral white lesions:

Table .10. Aetiological classification of oral white lesions.

Aetiology	Total patients. no. (%)	Percentage (%)
Developmental	34	17.2%
Inflammatory	31	15.7%
Infective	38	19.2%
Oral manifestation of dermatological condition	75	38.07%
Premalignant	7	3.5%
Malignant	7	3.5%
Miscellaneous	5	2.5%
Total	**197**	**100%**

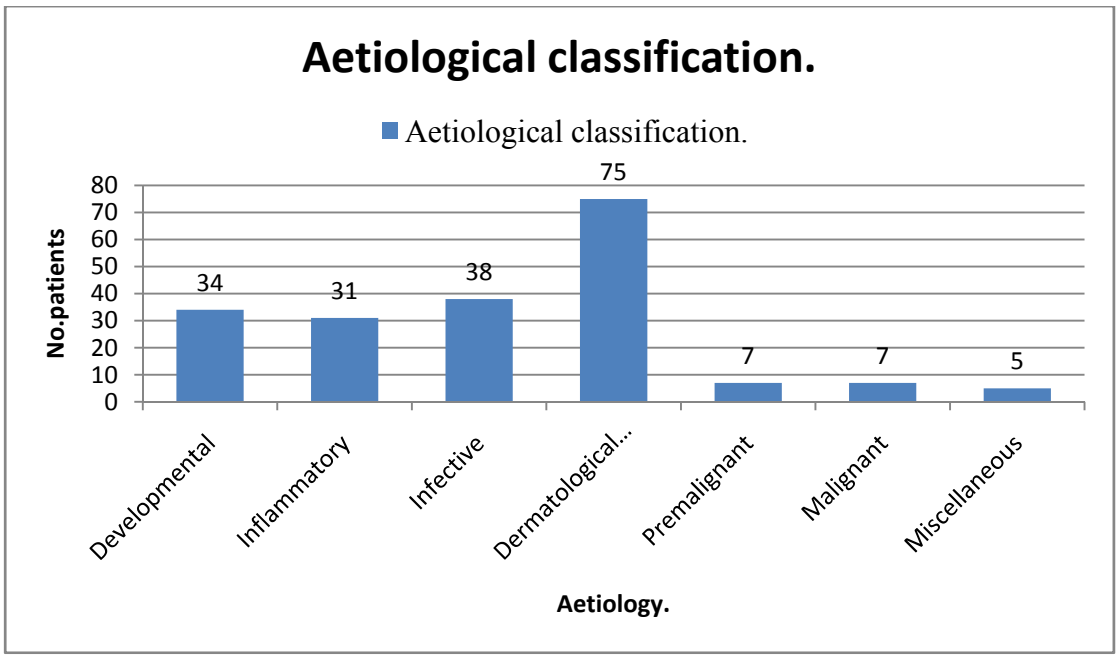

Diagram . 9 Aetiological classification of oral white lesions.

- Oral white lesions secondary to dermatological (38.1%) conditions were the most common aetiology followed by infective (19.2%), developmental (17.2%) and inflammatory (15.7%).

Clinical types of oral white lesions:

Table 11. Clinical types of oral white lesions.

Clinical types of oral white lesions	Number (n=197)	Percentage	Prevalence*
Oral lichen planus	40	20.3%	0.22%
Candidosis	33	16.7%	0.18%
Mucosal vitiligo	32	16.2%	0.17%
Fordyce spots	30	15.2%	0.16%
Tobacco pouch keratosis	15	7.6%	0.08%
Morsicatio buccarum	10	5.1%	0.05%
OSCC	7	3.5%	0.03%
Frictional keratosis	5	2.5%	0.02%
Mucosal retention cyst	5	2.5%	0.02%
Leukoplakia	5	2.5%	0.027%
Warts	4	2.1%	0.022%
Dariers disease	3	1.5%	0.016%
White sponge naevi	2	1.1%	0.011%
OSF	2	1.1%	0.011%
Leukoedema	2	1.1%	0.011%
DKC	1	0.5%	0.005%
OHL	1	0.5%	0.005%

*prevalence calculated based on total number of patients screened 18000

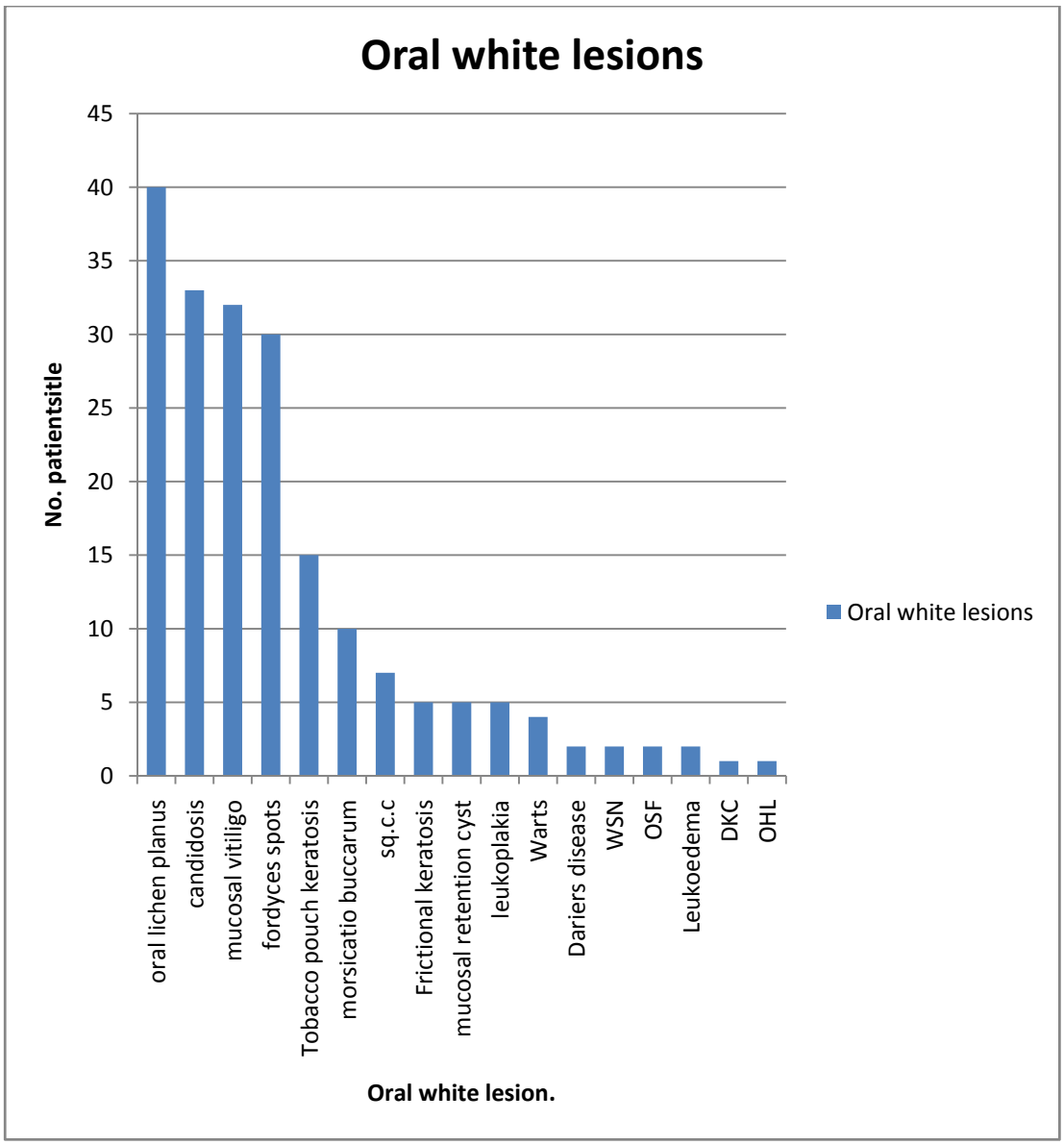

Diagram.10 Clinical types of oral white lesions.

- A total of seventeen clinical types were diagnosed. The most common of which was lichen planus seen in 40 patients (20.3%), followed in decreasing order by candidosis (16.7%), mucosal vitiligo (16.2%), Fordyce spots (15.2%), tobacco pouch keratosis (7.6%) and Morsicatio buccarum (5.1%).

Oral lichen planus

Table 12 Demographic and disease characteristics of oral lichen planus.

	Male (%) n=13	Female (%)n=27	Total n=40 (%)
Age group			
<20yrs	00	00	00 (0)
20-40yrs	07	15	22(55%)
41-60yrs	06	10	16(40%)
>60yrs	00	02	02(5%)
Subtype			
Reticular type	07	15	22(55%)
Plaque type	04	08	12(30%)
Atrophic type	02	04	06(15%)
Risk factor*			
Smoking	08	00	08(20%)
Alcohol	03	01	04(10%)
Betel and areca nut	06	16	22(55%)
Amalgam	04	18	22(55%)
Stress	06	15	21(52.5%)
Site*			
Buccal mucosa	07	14	21(52.5%)
Labial mucosa	03	06	09(22.5%)
Tongue	05	09	14(35%)

* >1 factor and site

- The prevalence of oral lichen planus was 0.22% in the present study.

- Age range of our patients was 20 to 65 years, with the highest prevalence seen in the age group of 20-40 years.
- It was more frequently observed in females (67.5%) in comparison to males (32.5%). Females showed significantly higher prevalence in the age groups of 20-40(37.5%) and 40-60(25%). Males were affected almost equally between the ages of 20-40(17.5%) and 40-60(15%) years.
- In both males and females, reticular (55%) subtype predominated followed by the plaque (30%) and atrophic(15%) subtypes.
- Betel and areca nut, amalgam and stress were the predominant (55%) risk factors associated with OLP.
- The buccal mucosa was predominately involved in 52.5%. The tongue and the labial mucosa were affected in 35 % and 22.5% respectively.

Oral candidosis:

Table. 13. Demographic and disease characteristics of candidosis

	Male (n=23)	Female (n=10)	Total (n=33)(%)
Age			
<20 years	0	00	00
20-40 years	03	00	03(9.1%)
40-60 years	13	07	20(60.6%)
>60 years	07	03	10(30.3%)
Subtypes			
Pseudomembranous	18	08	26(78.7%)
Plaque type	05	02	07(21.2%)
Species			
C.albicans	12	06	18(54.5%)
C.tropicalis	03	01	04(12.1%)
Site *			
Tongue	18	10	28(84.8%)
Buccal mucosa	03	00	03(9.1%)
Risk factors#			
Medical illness	20	08	28(84.8%)
Smoking	15	00	15(45.4%)
Alcohol	11	00	11(33.3%)
Betel and areca nut	08	07	15(45.4%)
Dentures	04	05	09(27.2%)
Stress	04	02	06(18.1)

*>1 site can be involved

#>1 risk factor can be present

- The prevalence of oral candidosis in our study population was 0.18 %.
- Pseudomembranous candidosis was the most common subtype (78.7%).
- C.albicans was isolated in 54.5% and C.tropicalis in 12.1% cases.
- It was more frequently observed in males (69.2%) than in females (30.7%).
- Candidosis was more in the age group of 40-60 (60.6%) years.
- Tongue (84.8%) was the most common site affected.
- Medical illness (84.8%) was the common underlying predisposing factor for oral candidosis.

Oral mucosal vitiligo:

The prevalence of oral mucosal vitiligo was 0.17 % and was observed more in females (59.37%) compared to males (40.6%). The most frequent site of involvement was lips and labial mucosa (43%) followed by buccal mucosa (40%). Oral involvement was a part of vitiligo vulgaris (71.8%) in majority of cases.

Fordyce's spots:

The prevalence of Fordyce's spots was (0.16%). It was more observed in 20-40 years age group, with male preponderance (76.6%). Lip and Labial mucosa (40%) was the most frequent site affected.

Tobacco pouch keratosis:

In our study, the prevalence of tobacco pouch keratosis was (0.08%). It was found more in adults (80%) and elderly (20%) population, with male (60%) preponderance.

Morsicatio buccarum:

The prevalence of morsicatio buccarum in our study was 0.05%. Females (70%) were affected more than males (30%), especially in the age group of 20-40 (80%) years.

Others:

Squamous cell carcinoma (0.03%), leukoplakia (0.0027%), frictional keratosis (0.02%), retention cyst (0.02%), warts (0.022%), genodermatoses (0.033%), oral submucosal fibrosis (0.011%), leukoedema (0.011%) and oral hairy leukoplakia (0.011%) constituted less frequently seen oral white lesions.

.

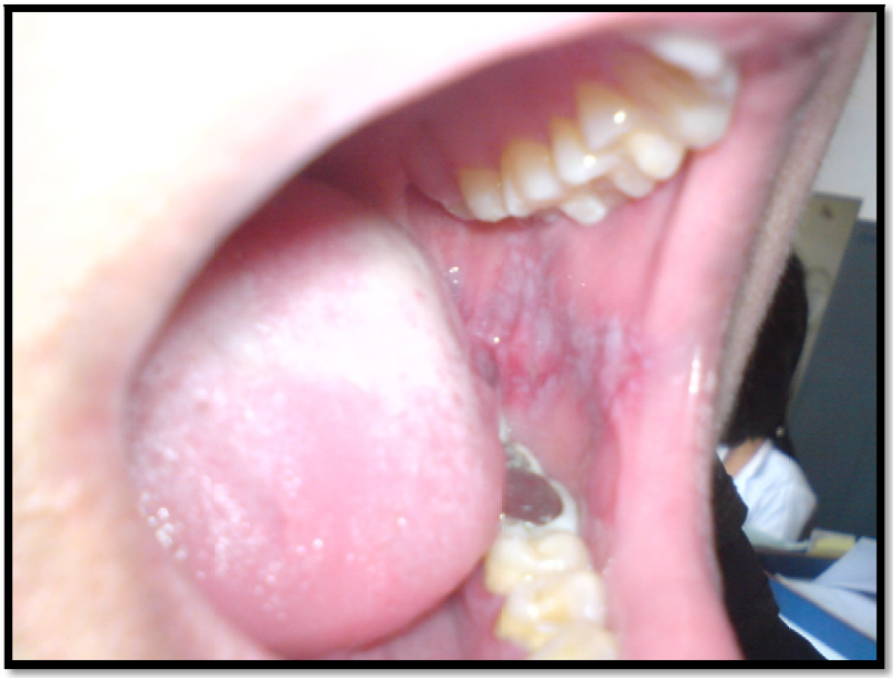

Fig. 1 Reticular type of oral lichen planus seen over the buccal mucosa. Note amalgam fillings of the teeth

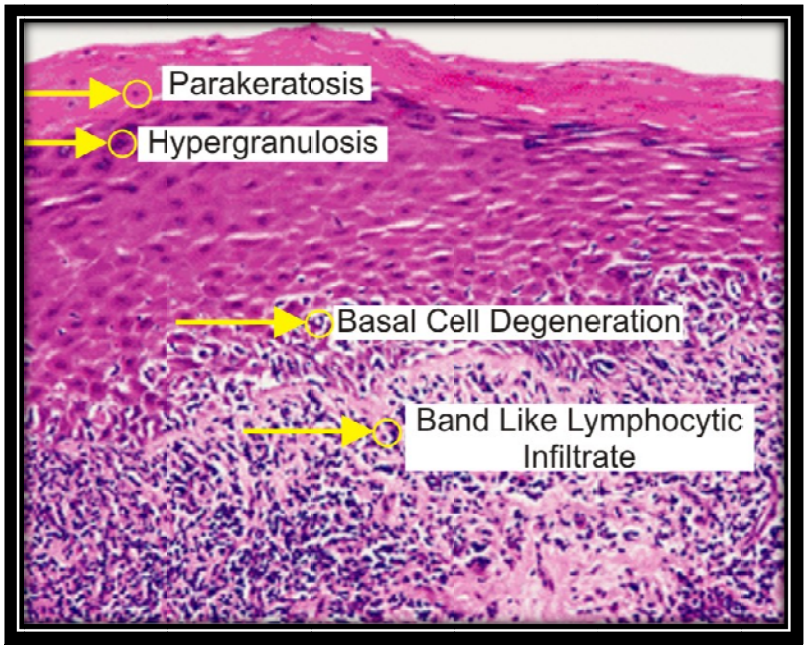

Fig.2: Oral lichen planus histopathology (H& E).

Showing parakeratosis, hypergranulosis, degeneration of basal epidermal cells and band like lymphocytic infiltrate in the upper dermis.

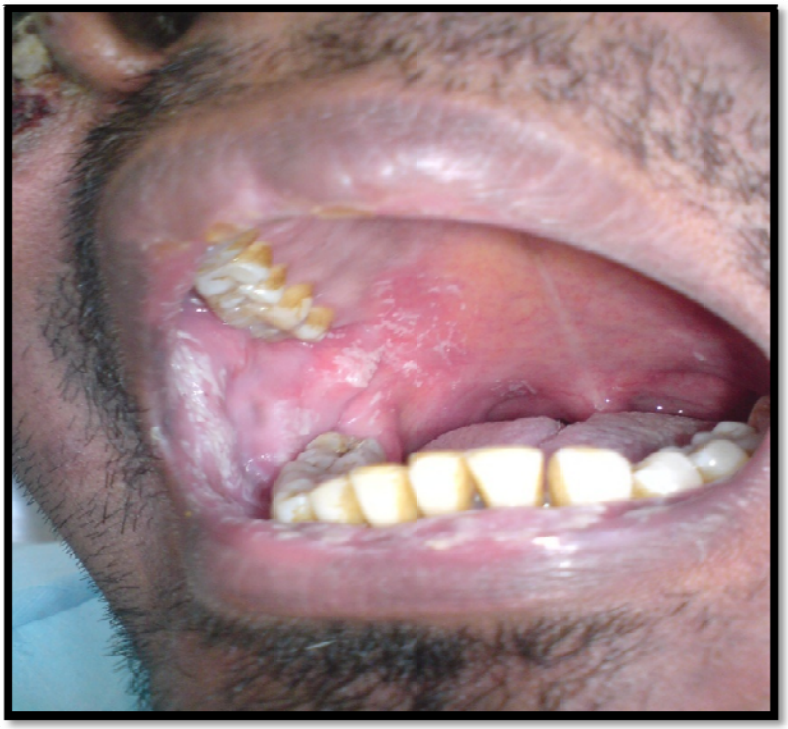

Fig.3- Candidosis. Oral thrush involving buccal mucosa extending on to hard palate

Fig.4: Growth of Candida albicans and Candida tropicalis on chrome agar.

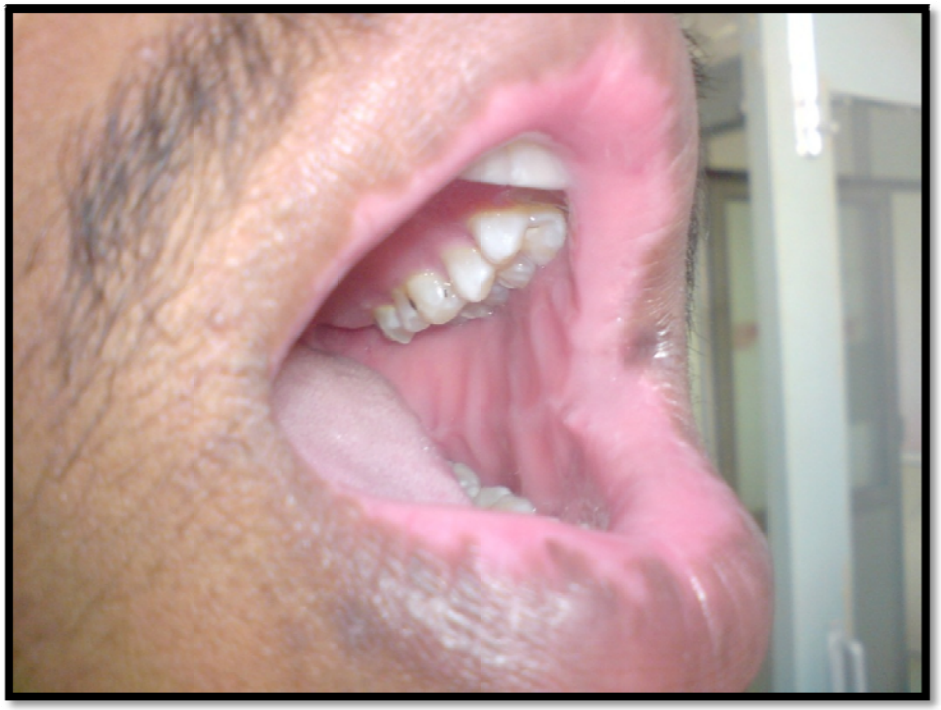

Fig.5- Mucosal vitiligo of buccal mucosa and lips.

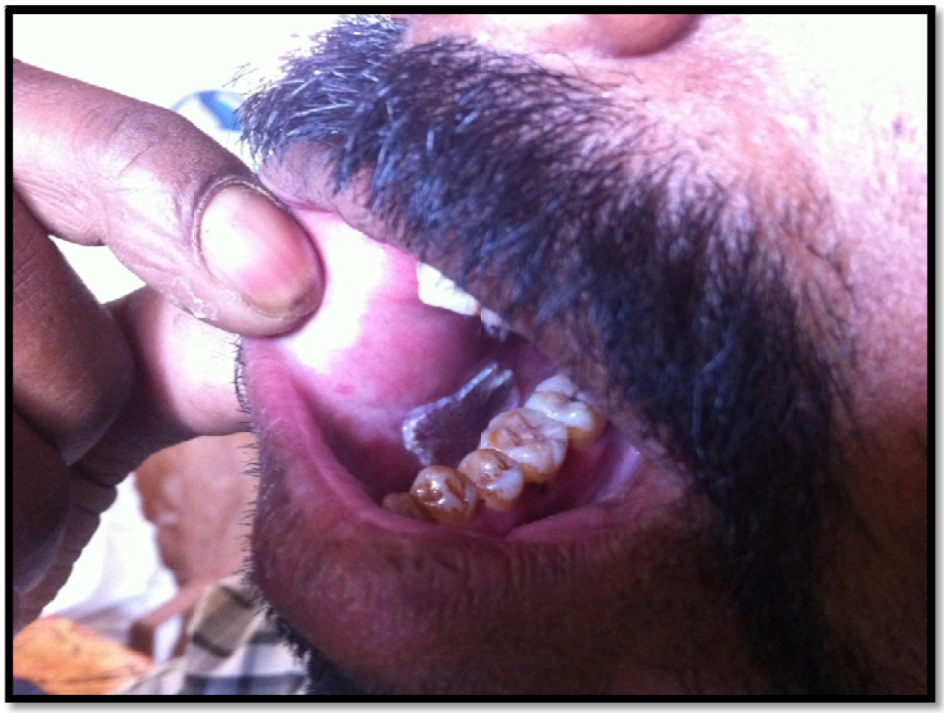

Fig. 6- Leukoplakia.whitish plaque over the buccal mucosa.

Fig.7- Darier's disease. Cobble- stone appearance of hard palate Note- keartotic papules over dorsum of hand.

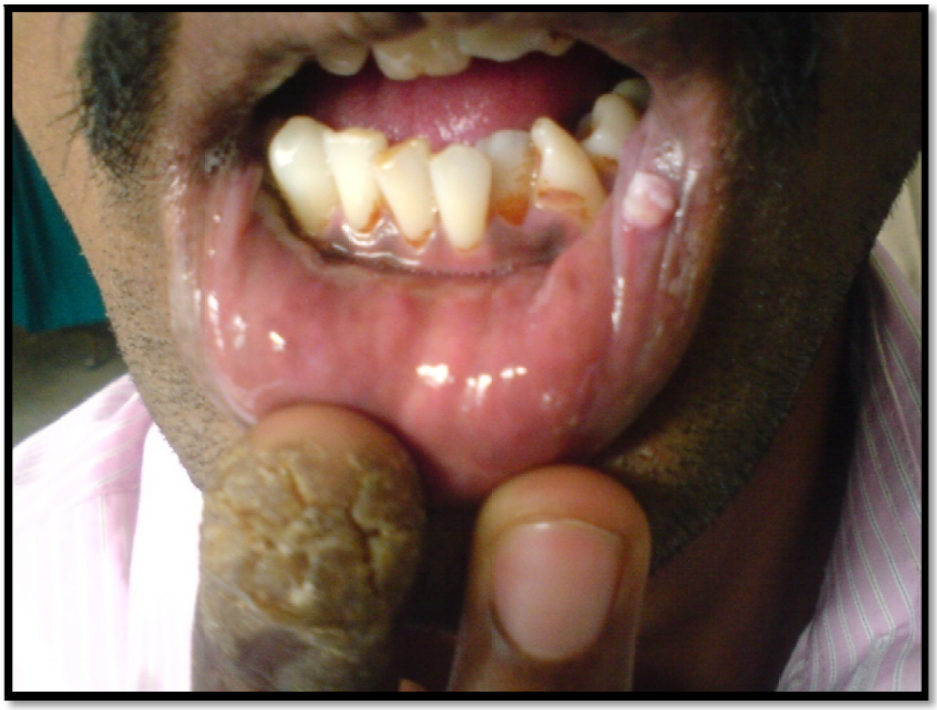

Fig.8- Oral verruca involving labial mucosa. Note verruca over finger.

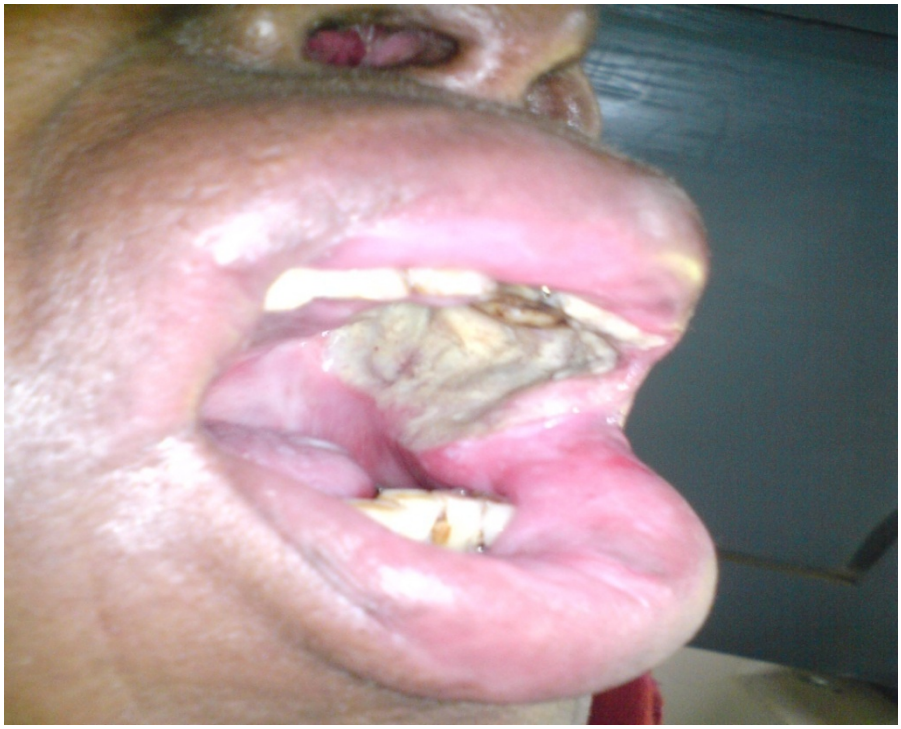

Fig.9- Oral squamous cell carcinoma involving buccal mucosa extending on to hard palate.

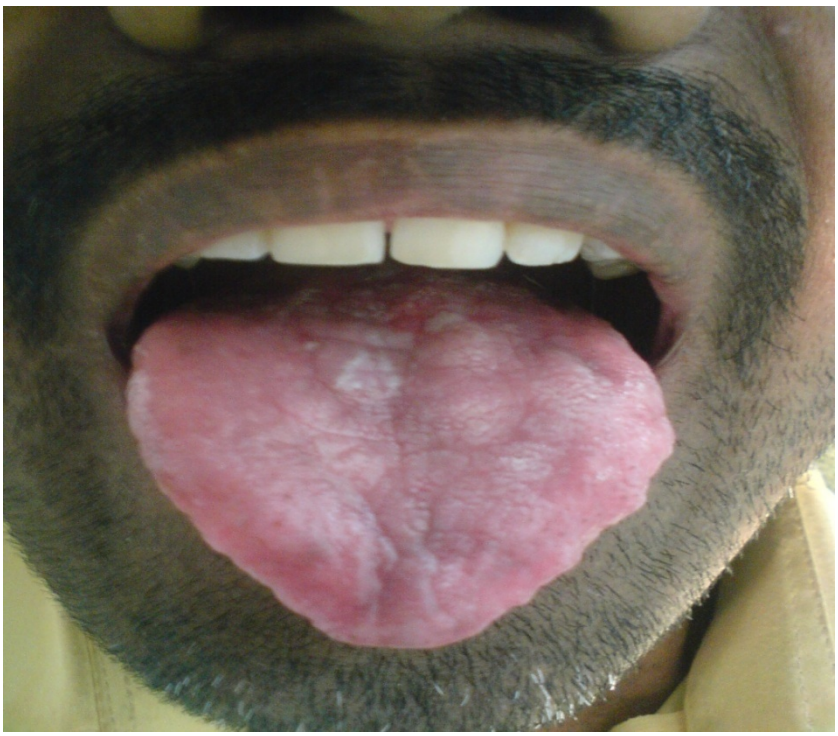

Fig.10- White sponge naevi. Velvety white lesion over dorsum of tongue.

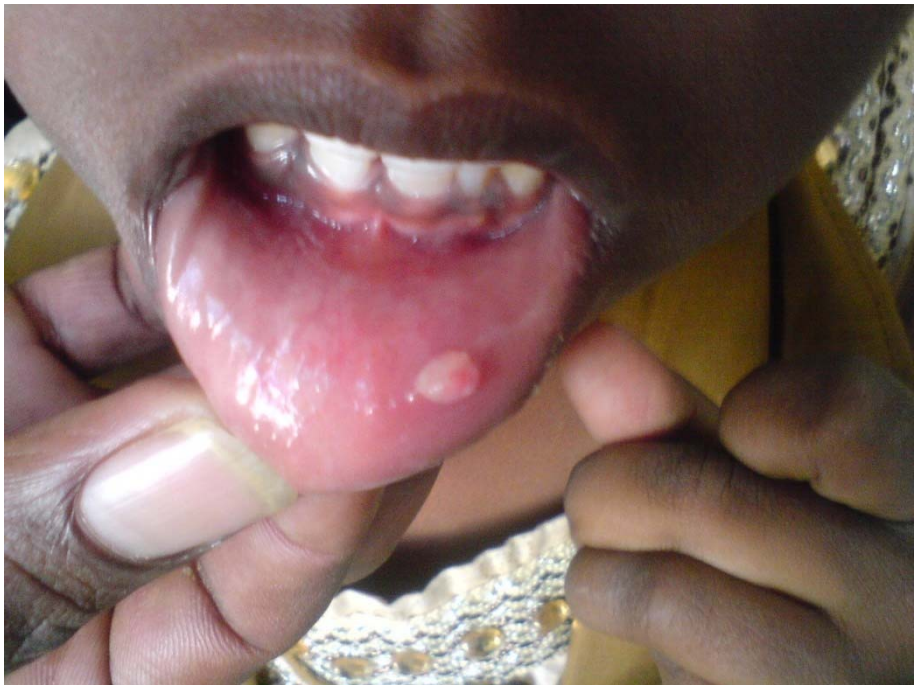

Fig.11 Mucocele . dome shaped papule over the labial mucosa.

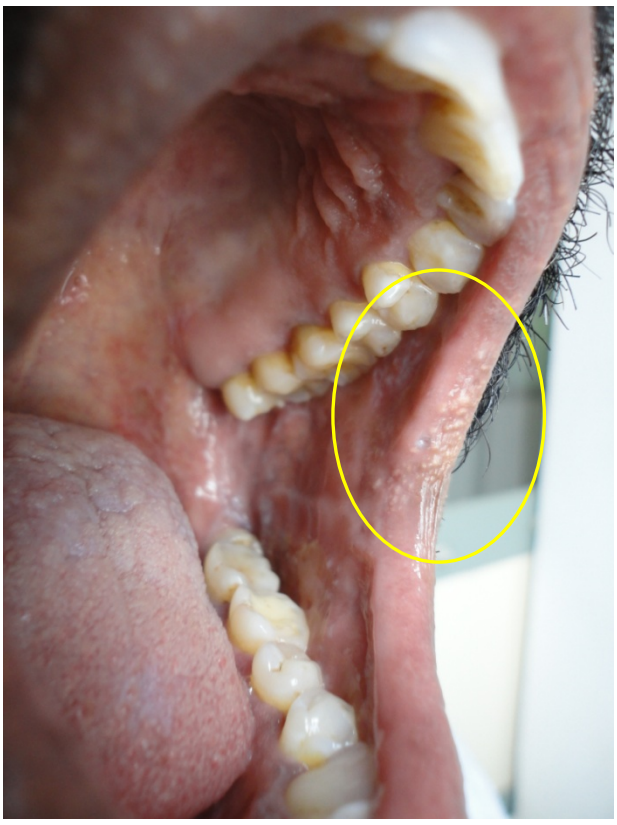

Fig.12 Fordyce's spots. Whitish-yellow papules over the vermilion.

DISCUSSION

DISCUSSION

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma.

Though the prevalence of oral lesions in general population has been documented based on clinical evaluation in other parts of the world like Turkey,[135] Cambodia,[136] Japan,[137]and Sweden[138]only limited information is available in rural or semi-urban population of India.[139, 140]

The present study includes a total of 197 clinically diagnosed cases of oral white lesions.

In our study the prevalence of oral white lesions was 1.09%, which was less than the prevalence in Turkish population (2.2%).[135] Such variations in the prevalence rates of oral white lesions may be the result of geographical differences, socio-demographic characteristics of the study populations, risk habits and genetic factors.

Majority of the patients, 41.6% were in the age group of 20-40years in the present study. Our study results are in concordance with other studies from Japan, [137] Malaysia and Turkey[141] which showed higher prevalence in the age group of 30-60 years.

In concordance with various other studies,[139, 142] a male preponderance of 54.8% was also seen in our study. Sex differences in the occurrence of oral white lesions might be attributed to the higher prevalence of deleterious oral habits among males in our study population.

The common presenting complaints in our study were asymptomatic oral white lesions (30.4%) and mucosal discoloration (29.9%). The less reported symptoms were discomfort (24.3%) and burning sensation (8.1%) associated with oral white lesions. These findings were different from a study done at Vidisha in Central India,[139] where discomfort and difficulty in opening the mouth were the common presenting symptoms. This discrepancy may be due to the lifestyle related factors.

Majority of the patients in the study, 76.1% had symptoms of less than six weeks duration, as infective and inflammatory aetiologies were more common in our study population.

In the present study, majority of the patients had more than one risk habit for the development of white lesions in oral cavity. Smoking habit was more prevalent in men (83%), whereas betel and areca nut chewing was common in women (60%). Alcohol consumption was more common in males (94%), whereas stress was elicited more frequently in females (57%).These findings are comparable to the prevalence of risk factors in other studies.[140, 143,144]

Buccal mucosa (39.5%) was the most common affected site in the present study. This was followed by involvement of labial mucosa (18.2%), tongue (16.7%) and lips (11.1%). These findings are in concordance with other studies.[139, 140, 135]

Various morphological types of oral white lesions were observed in our study with plaques (31.9%) and papules (15.2%) being the predominant morphological types.

In our study, normal anatomical variant was seen in 17.2% of patients with oral white lesions, which was comparable to Turkish study.[135]

Fordyce's spots accounted for 15.2% of the oral white lesions. This prevalence is higher than that found in studies conducted in Turkey[145] (1.3%) and India[140] (6.5%), but lower than that reported in studies carried out in Thailand (57.7%), Mexico[146] (55.0%) and Malaysia[141] (61.8%). This presence of Fordyce's spots was not significantly associated with any independent variables evaluated in the present study. It was more frequently observed on lip and labial (40%) mucosae. Majority of the patients were in the age group of 20-40years (50%) with male preponderance (76.6%); these findings are in concordance with observations of other studies.[140]

In our study population leukoedema (1.01%), white sponge naevus (1.01%), and Dyskeratosis congenita (0.5%) were rarely observed.

Dermatological disorders (38%), followed by infective (19.2%) and inflammatory (15.7%) conditions were the common aetiological causes for oral white lesions in our study population.

The prevalence of OLP in this study was 0.22% which is comparable to the rates in few other population based studies. (5,6) In our present study, OLP was significantly more common among women (67.5%) as compared to men (32.5%), which is in agreement with findings from other previous studies.[139140,142,] Majority of our patients with OLP were in the age group of 20-60years (62.5%), which is in agreement with other studies.[140, 147,148] Among the clinical subtypes of OLP in this study, the reticular type (55%) was the most common, followed by plaque (30%) and atrophic (15%) types. This is in

accordance with findings of other studies. [147,148, 149] Buccal mucosa was the commonly affected site (52.5%), which was also observed in other studies.[148]

The prevalence of oral mucosal vitiligo was 0.17 % in our study population and was observed more in females (59.3%) compared to males (40.6%). The most frequent site of involvement was lips and labial mucosa (43%) followed by buccal mucosa (40%). Oral involvement was a part of vitiligo vulgaris (71.8%) in majority of cases. These observations are in concordance with other studies.[150, 151]

Candidal infection constituted one of the most common infective aetiology of oral white lesions (16.7%) in our study, with a prevalence of 0.18%. It was predominantly observed in males (69.2%) and was more commonly found in the age group of 40-60 years (60.6%), which is comparable to the findings of other studies.[136, 142] Pseudo-membranous candidosis was the most frequently observed subtype (78.7%) in our study, which is in agreement with other studies.[136, 140, 142]Majority of the patients (84.8%) were having underlying immune-suppression.

Other infections causing oral white lesions like warts (2.0%) and OHL (0.5%) were rarely encountered in our study. These conditions have not been reported in any of the previous studies.

Inflammatory and/or reactive conditions were seen in 15.7% of our study population. These included tobacco pouch keratosis (7.6%), morsicatio buccarum (5.1%), frictional, chemical and thermal keratosis (2.5%), which can be explained by high prevalence of risk habits.

The prevalence of morsicatio buccarum in our study was 5.1%. Females (66.6%) were affected more than males (33.3%) especially in the age group of 20-40years (86.6%). This is in contrast to observations in Copenhagen study, [152] where no gender discordance and affection of younger age group (15-19years) were seen.

Tobacco pouch keratosis and frictional keratosis were more commonly observed in males (60%) which is comparable to other studies.[140, 143]This observation can be attributed to high use of tobacco products in men.

Premalignant lesions such as leukoplakia and OSF were observed in 2.5% and 1.01% of patients, respectively. These conditions were more frequently observed in men (80%) and in the age group 20-60years (71%). Buccal mucosa was the most frequent site of involvement (57.1%). These findings are in concordance with other studies.[136, 138, 140]

Squamous cell carcinoma constituted 3.5% of our cases. Males (57.1%) had a higher predilection than females (42.8%); it was observed more often in >60years age group (57.1%). Main site of involvement was buccal mucosa (85.7%). These findings are similar to other studies.[140]

Mucosal retention cyst was seen in 2.5% of our cases and it was found more in females (80%). This is in conflict with other study in South India which showed male preponderance.[140]

CONCLUSION

CONCLUSION

Though oral white lesions constitute only a small minority of pathological conditions, they are enormously troublesome to patients, thus diminishing their quality of life. It represents a wide spectrum of conditions, ranging from benign physiological entities to malignancies. Many of these lesions are harmless and do not require any treatment other than reassurance.

Local risk factors like consumption of multiple addictive substances and stress are important in development of oral white lesions. Hence, awareness and education programmes are necessary to reduce and eliminate the modifiable risk factors. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients. Community based programmes should also be undertaken to educate the population to get screened for oral-mucosal lesions.

SUMMARY

SUMMARY

A total of 197 patients with oral white lesions who presented to our department of dermatology at R.L. Jalappa hospital and research centre, attached to Sri Devaraj Urs Medical College, Tamaka, Kolar were studied. The findings are summarised below:

- White lesions in the oral cavity are less common, with the prevalence of 1.09%.
- It can be seen from childhood to old age, with majority being in 3rd and 4th decades.
- Female (45.2%) preponderance was observed.
- Discoloration of oral mucosa (29.9%) was the common presenting complaint.
- Majority of the patients presented with acute history of oral white lesions.
- Tobacco consumption (52.7%) in various forms was the predominant risk factor associated with oral white lesions in both sexes.
- Buccal mucosa (50.2%) was the common site to be affected.
- Plaques (31.9%) were the common morphological presentation of oral white lesions.
- Oral white lesions can be classified based on aetiology as

    1. Developmental/ congenital
    2. Inflammatory/ reactive
    3. Infective
    4. Oral manifestations of dermatological conditions
    5. Oral manifestations of systemic disorders
    6. Premalignant and Malignant
    7. Miscellaneous

- Oral white lesions secondary to dermatological (38.1%) conditions like Lichen planus, vitiligo, etc. and infective (19.2%) aetiology like candidosis were common.
- Oral lichen planus (20.3%) accounted for majority of oral white lesions.
- Pre-malignant and malignant conditions were infrequent causes for oral white lesions.

BIBLIOGRAPHY

BIBILIOGRAPHY

1. Messadi DV, Wiabel JS, Mirowski GW. White lesions of oral cavity. Dermatol clin 2003; 21: 63-64.
2. Lee KH, Polonowita AD. Oral white lesions: pitfalls of diagnosis. Med J Aus 2009; 190: 274- 277.
3. Axéll T. Occurrence of leukoplakia and some other oral white lesions among 20,333 adult Swedish people. Community Dent Oral Epidemiol 1987; 15: 46-51.
4. Scully C, Porter S. Orofacial disease- white lesions. Dent update 1999; 28: 123-129.
5. Silverman S, Gorsky M, Lozada F. Oral Leukoplakia and malignant transformamtion. A follow up study of 257 patients. Cancer 1984; 53: 563-568.
6. Bouquot JE, Whitaker SB. Oral leukoplakia-rationale for diagnosis and prognosis of its clinical subtypes or "phases". Quintessence Int 1994; 25: 133-140.
7. Nair DR, Pruthy R, Pawar U, Chaturvedi P. Oral cancer: Premalignant conditions and screening - an update. J Can Res Ther 2012; 8: 57-66.
8. Kramer IR, Lucas RB, Pindborg JJ, Sobin LH. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. Oral Surg Oral Med Oral Pathol 1978; 46: 518-539.
9. Banoczy J. Oral leukoplakia and other white lesions of oral mucosa related to dermatological disorders. J Cutan Pathol 1983; 10: 238-256.
10. Kabani S, Greenspan D, DeSouza Y. Oral hairy leukoplakia with extensive oral mucosal involvement. Report of two cases. Oral Surg Oral Med Oral Pathol 1989; 67: 411–415.
11. Lee JH, Lee JH, Kwon NH. Clinico-pathological manifestation of patients with Fordyce's Spots. Ann Dermatol 2012; 24: 103-106.

12. Sandstead HR, Lowe JW. Leukoedema and keratosis in relation to leukoplakia of the buccal mucosa in man. J Natl Cancer Inst 1953; 14: 423-427.

13. Cannon AB. White spone nevus of the mucosa. Arch Dermat Syph 1935; 31: 365-370.

14. Zinsser F. Atrophia cutis reticularis cum pigmentatione, dystrophia et leukoplakia oris.Ikonogr Dermatol 1910; 5: 219-223.

15. Farhi D, Dupin N. Pathophysiology, etiologic factors, and clinical management of oral lichen planus: facts and controversies. Clin Dermatol 2010; 28: 100-108.

16. Shklar G. Lichen planus as an oral ulcerative disease. Oral Surg Oral Med Oral Pathol 1972; 33: 376-388.

17. Parashar P. Oral Lichen Planus. Otolaryngol Clin N Am 2011; 44: 89–107.

18. Sehgal VN, Srivastava G. Vitiligo: Compendium of clinico-epidemiological features.Indian J Dermatol Venereol Leprol 2007; 73: 149-156.

19. Rao PK. Oral candidiasis: a review. Scholarly J Med 2012; 2: 26-30.

20. Glick M, Siegel MA, Brightman VJ. Evaluation of the dental patient: diagnosis and medical risk assessment. In: Burket LW, Greenberg MS, Glick M, editors. Burket's oral medicine: diagnosis and treatment. 10th ed. Hamilton (Ontario): BC Decker; 2003 .p.15-17.

21. Kumar V, Fausto N, Abbas A. Robbins & Cotran pathologic basis of disease.7th ed. Philadelphia: W.B. Saunders Company; 2004. p.1230.

22. Parker J, Lee L. The Oral Cavity: A Study of the Development, Anatomy and Histology of the Oral Cavity. MedEdPORTAL; 2011. Available from: www.mededportal.org/publication/8428.

23. Mashberg A, Samit A. Early diagnosis of asymptomatic oral and oropharyngeal squamous cancers. CA Cancer J Clin 1995; 45: 328–351.

24. Adkins K. Diagnosis of white lesions of oral mucosa. Aus Dent J 1996; 11: 227-232.

25.Martin JL. Leukoedema: a review of the literature. J Natl Med Assoc 1992; 84: 938–940.

26. Axell T, Henricsson V. Leukoedema-an epidemiologic study with special reference to the influence of tobacco habits. Community Dent Oral Epidemiol 1981; 9: 142–146.

27. Neville BW, Damm DD, Allen CM. In: Oral and maxillofacial pathology. 3rdEd, St Louis: Saunders Elsevier ; 2009. p. 46–47.

28 .Shibuya Y, Zhang J, Yokoo S, Umeda M, Komori T. Constitutional mutation of keratin 13 gene in familial white sponge nevus. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003; 96: 561-565.

29. Terrinoni A, Candi E, Oddi S, Melino G, Felix DH, Munro CS, et al. A glutamine insertion in the 1A alpha helical domain of the keratin 4 gene in a familial case of white sponge nevus. J Invest Dermatol 2000; 114: 388-391.

30. Dadlani C, Mengden S, Kerr AR. White sponge nevus. Dermatol Online J 2008; 14: 16.

31. Handley TP, Ogden GR. Dyskeratosis congenita: oral hyperkeratosis in association with lichenoid reaction. J Oral Pathol Med 2006; 35: 508-512.

32. Dokal I. Dyskeratosis congenita in all its forms. Br J Haematol. 2000; 110: 768 779.

33. Bhattacharyya I, Chehal HK. White Lesions.Otolaryngol Clin N Am 2011; 44: 109–131.

34. Woo SB. Disorders of oral mucosa. In: Barnhill RL, Crowson AN, editors. Textbook of dermatopathology. 2nd ed. New York: Mc- Graw-Hill; 2004. p. 999–1016.

35. Ocampo-Candiani J, Billarreal-Rodriguez A, Quinone-Fernandez AG, Herz-Ruelas ME, Ruiz-Esparza J. Treatment of Fordyce spots with CO2 laser. Dermatol Surg 2003; 29: 869-871.

36. Kim YJ, Kang HY, Lee ES, Kim YC. Treatment of Fordyce spots with 5-aminolaevulinic acid-photodynamic therapy. Br J Dermatol 2007; 156: 399-400.

37. Parlak AH, Koybasi S, Yavuz T, Yesildal N, Anul H, Aydogan I, et al. Prevalence of oral lesions in 13- to 16-year old students in Duzce, Turkey. Oral Dis 2006; 12: 553-558.

38. Seoane Leston JM, Aguado Santos A, Varela-Centelles PI, Vazquez-Garcia J, Romero MA, Pias-Villamor L. Oral mucosa: variations from normalcy, part I. Cutis 2002; 69: 131–134.

39. Messadi DV, Waibel JS, Mirowski JW. White lesions of the oral cavity. Dermatol Clin 2003; 21: 63–78.

40. Bouquot JE, Gorlin RJ. Leukoplakia, lichen planus, and other oral keratoses in 23,616 white Americans over the age of 35 years. Oral Surg Oral Med Oral Pathol 1986; 61: 373–381.

41. Rossie KM, Guggenheimer J. Thermally induced ‘nicotine’ stomatitis. A case report. Oral Surg Oral Med Oral Pathol 1990; 70: 597–599.

42. Mirbod SM, Ahing SI. Tobacco associated lesions of the oral cavity. Part I. Nonmalignant lesions. J Can Dent Assoc 2000; 66: 252– 256.

43. Rossie KM, Guggenheimer J. Thermally induced ‘nicotine’ stomatitis. A case report. Oral Surg Oral Med Oral Pathol 1990; 70: 597–599.

44. Eisen D, Lynch DP. The mouth: diagnosis and treatment. St. Louis: Mosby; 1998. p. 58–91.

45. Martin GC, Brown JP, Eifler CW, Houston GD. Oral leukoplakia status six weeks after cessation of smokeless tobacco use. J Am Dent Assoc 1999; 130: 945–954.

46. Scully C, el-Kabir M, Samaranyake LP. Candida and oral candidosis: A review. Crit Rev Oral Biol Med 1994; 5: 125-157.

47. Cawson RA. Thrush in adult outpatients. Dent Pract Dent Rec 1965; 15: 361–364.

48. Khongkunthian P, Grote M, Isaratanan W. Oral manifestations in 45 HIV-positive children from Northern Thailand. J Oral Pathol Med 2001; 30: 549–552.

49. Hardy JR, Rees E, Ling J, Burman R, Feuer D, Broadley K, et al. A prospective survey of the use of dexamethasone on a palliative care unit. Palliat Med 2001; 15: 3–8.

50. Dreizen S. Oral candidiasis. Am J Med 1984; 30: 28–33.

51. Budtz-Jorgensen E. The significance of Candida albicans in denture stomatitis. Scand J Dent Res 1974; 82: 151–190.

52. Ohman SC, Dahlen G, Moller A, Ohman A. Angular cheilitis: a clinical and microbial study. J Oral Pathol 1985; 15: 213–217.

53. Holmstrup P, Bessermann M. Clinical, therapeutic and pathogenic aspects of chronic oral multifocal candidiasis. Oral Surg Oral Med Oral Pathol 1983; 56: 388–395.

54. Cooke BED. Median rhomboid glossitis: candidiasis and not a developmental anomaly. Br J Dermatol 1975; 93: 399–405.

55. Collins SM, Dominguez M, Ilmarinen T, Costigan C, Irvine AD. Dermatological manifestations of autoimmune polyendocrinopathy-candidiasis-ectodermal dystrophy syndrome. Br J Dermatol 2006; 154: 1088–1093.

56. Wells RS. Chronic mucocutaneous candidiasis: a clinical classification. Proc R Soc Med 1973; 66: 801–802.

57. Clayton YM, Connor BL. Comparison of clotrimazole cream, Whitfield's ointment and nystatin ointment for the topical treatment of ringworm infections, pityriasis versicolor, erythrasma and candidiasis. Br J Dermatol 1973; 89: 297-303.

58. Appleton SS. Candidiasis: pathogenesis, clinical characteristics, and treatment. Calif Dent Assoc J 2000; 28: 942–94 8.

59. Reichart PA, Langford A, Gelderblom HR, Pohle HD, Becker J, Wolf H; Oral hairy leukoplakia; observations in 95 cases and review of the literature. J Oral Pathol Med 1989; 18; 410-415.

60. Triantos D, Porter SR, Scully C. Oral hairy leukoplakia: clinicopathologic features, pathogenesis, diagnosis, and clinical significance. Clin Infect Dis 1997; 25: 1392–1396.

61. Hille JJ, Webster-Cyriaque J, Palefski JM, Raab-Traub N. Mechanisms of expression of HHV8, EBV & HPV in selected HIV-associated oral lesions. Oral Dis 2002; 8: 161-168.

62. Moura MD, Guimaraes TR, Fonseca LM, de Almeida Pordeus I, Mesquita RA. A random clinical trial study to assess the efficiency of topical applications of podophyllin resin (25%) versus podophyllin resin (25%) together with acyclovir cream (5%) in the treatment of oral hairy leukoplakia. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007; 103: 64–71.

63. Herbst JS, Morgan J, Raab-Traub N, Resnick L. Comparison of the efficacy of surgery and acyclovir therapy in oral hairy leukoplakia. J Am Acad Dermatol 1989; 21: 753-756.

64. Greenspan D, Canchola AJ, MacPhail LA, Cheikh B, Greenspan JS. Effect of highly active antiretroviral therapy on frequency of oral warts. Lancet 2001; 357: 1411–1412.

65. Leão JC, Gueiros LA, Porter SR. Oral Manifestations of syphilis. Clinics (Sao Paulo) 2006; 61: 161-166.

66. Scott CM, Flini SR. Oral syphilis-re-emergence of an old disease with oral manifestations. Int J Oral Maxillofac Surg 2005; 34: 58-63.

67. Leao JC, Gueiros LA, Segundo AV, Carvalho AA, Barrett W, Porter SR. Uremic stomatitis in chronic renal failure. Clinics (Sao Paulo) 2005; 60: 259–262.

68. Kellett M. Oral white plaques in uraemic patients. Br Dent J 1983; 154: 366–368.

69. Parashar P. Oral Lichen Planus. Otolaryngol Clin N Am 2011; 44: 89–107.

70. Carbone M., Arduino P.G., Carrozzo M., Gandolfo S, Argiolas MR, Bertolusso G, et al. Course of oral lichen planus: a retrospective study of 808 northern Italian patients. Oral Dis 2009;15: 35-243.

71. Scully C, Carrozzo M. Oral mucosal disease: lichen planus. Br J Oral Maxillofac Surg 2008; 46: 15-21.

72. Nagao T, Ikeda N, Fukano H, Hashimoto S, Shimozato K. Incidence rates for oral leukoplakia and lichen planus in a Japanese population. J Oral Pathol Med 2005; 34: 532-539.

73. Bagan JV, Donat JS, Penarrocha M. Oral lichen planus and diabetes mellitus. A clinico- pathological study. Bull Group Int Rech Sci Stomatol Odontol 1993; 36: 3-6.

74. Sugerman PB, Savage NW. Oral lichen planus: causes, diagnosis and management. Aust Dent J 2002; 47: 290-297.

75. Carrozzo M, Uboldi de Capei M, Dametto E, Fasano ME, Arduino P, Brocoletti

R,et al. Tumor necrosis factor-alpha and interferon-gamma polymorphisms contribute to susceptibility to oral lichen planus. J Invest Dermatol 2004; 122: 87-94.

76. Nagao Y, Sata M, Noguchi S, Seno'o T, Kinoshita M, Kameyama T, et al. Detection of hepatitis C virus RNA in oral lichen planus and oral cancer tissues. J Oral Pathol Med 2000; 29: 259-266.

77. Dunsche A, Kästel A, Terheyden H, Springer IN, Christophers E, Brasch J. Oral lichenoid reations associated with amalgam: improvement after amalgam removal. Br J Dermatol 2003; 148: 70–76.

78. Vallejo MJ, Huerta G, Cerero R, Seoane JM. Anxiety and depression as risk factors for oral lichen planus. Dermatology 2001; 203: 303–307.

79. Simark MC, Jontell M, Bergenholtz G, Heyden M, Dahlgren UI. Distribution of interferon-gamma mRNA- positive cells in oral lichen planus lesions. J Oral Pathol Med 1998; 27: 483-488.

80. Thongprasom K., Dhanuthai K.Steroids in the treatment of lichen planus: a review. J Oral Sci 2008; 50: 377-385.

81. Eisen D. The clinical features, malignant potential, and systemic associations of oral lichen planus: a study of 723 patients. J Am Acad Dermatol 2002; 46: 207-214.

82. Rajendran R. Oral lichen planus. J Oral Maxillofac Pathol 2005; 9: 3-5.

83. Van der Meij EH, van der Waal I. Lack of clinicopathologic correlation in the diagnosis of oral lichen planus based on the presently available diagnostic criteria and suggestions for modifications. J Oral Pathol Med 2003; 32: 510.

84. Ismail SB, Kumar SK, Zain RB.Oral lichen planus and lichenoid reactions: etiopathogenesis, diagnosis, management and malignant transformation. J Oral Sci 2007; 49: 89-106.

85. Ebner H, Gebhart W. Light and electron microscopic studies on colloid and other cytoid bodies. Clin Exp Dermatol 1977; 2: 311–322.

86. Carbone M, Goss E, Carrozzo M, Castellano J and Conrotto D. Systemic and topical corticosteroid treatment of oral lichen planus: a comparative study with long-term follow-up. J Oral Pathol Med 2003; 32: 323-329.

87. Johani KA, Hegarty AM, Porter SR, Fedele S. Calcineurin inhibitors in oral medicine. J Am Acad Dermatol 2009; 61: 829-840.

88. Gorsky M., Raviv M. Efficacy of etretinate (Tigason) in symptomatic oral lichen planus. Oral Surg Oral Med Oral Pathol 1992; 73: 52-55.

89. Munro CS, Mastana SS, Papiha SS. Mapping of the Darier's disease gene by serogenetic markers: results in two large British kindreds. Ann Genet 1992; 35: 157–160.

90. Ferris T, Lamey PJ, Rennie JS. Darier's disease: oral features and genetic aspects. Br Dent J 1990; 168: 71–73.

91. Macleod RI, Munro CS. The incidence and distribution of oral lesions in patients with Darier's disease. Br Dent J 1991; 171: 133–136.

92. Jorizzo JL, Salisbury PL, Rogers III RS, Goldsmith SM, Shar GG, Callen JP, et al. Oral lesions in systemic lupus erythematosus: do ulcerative lesions represent a necrotizing vasculitis? J Am Acad Dermatol 1992; 27: 389–394.

93. Burge SM, Frith PA, Juniper RP, Wojnarowska F. Mucosal involvement in systemic and chronic cutaneous lupus erythematosus. Br J Dermatol 1989; 121: 727-741.

94. Schiodt M. Oral manifestations of lupus erythematosus. Int J Oral Surg 1984; 13: 101-147.

95. Al-Mutairi N, Sharma AK. Profile of vitiligo in Farwaniya region in Kuwait. Kuwait Med J 2006; 38: 128–131.

96. Dummet CO. The oral tissues in vitiligo. Oral Surg Oral Med Oral Pathol 1959 ;12: 1073–1079.

97. Alikhan Ali, Felsten LM. Vitiligo: A comprehensive overview. J Am Acad Dermatol 2011; 65: 473-491.

98. Coondoo A, Sen N, Panja RK. Leucoderma of the lips. Indian J Dermatol 1976 ;21: 29-33.

99. Malakar S, Lahiri K. Punch grafting in lip leucoderma. Dermatology 2004 ;208: 125-128.

100. Murti PR, Bhonsle RB, Pindborg JJ, Daftary DK, Gupta PC, Mehta FS. Malignant transformation rate in oral submucous fibrosis over a 17-year period. Community Dent Oral Epidemiol 1985; 13: 340–341.

101. Canniff JP, Harvey W, Harris M. Oral submucous fibrosis: its pathogenesis and management. Br Dent J 1986; 160: 429–434.

102. Caniff JP, Harvey W. The aetiology of oral submucous fibrosis: the stimulation of collagen synthesis by extracts of areca nut. Int J Oral Surg 1981; 10: 163-167.

103. Zhang X, Reichert PA. A review of betel quid chewing, oral cancer and precancer in Mainland China. Oral Oncol 2007; 43: 424–430.

104. Mehrotra D, Pradhan R, Gupta S. Retrospective comparison of surgical treatment modalities in 100 patients with oral submucous fibrosis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: e1–10.

105. Rajendran R, Rani V, Shaikh S. Pentoxifylline therapy: a new adjunct in the treatment of oral submucous fibrosis. Indian J Dent Res 2006; 17: 190–198.

106. Yen DJ. Surgical treatment of submucous fibrosis. Oral Surg 1982; 54: 269–272.

107. Petti S. Pooled estimate of world leukoplakia prevalence: A systematic review. Oral Oncol 2003; 39: 770-780.

108. Mehta FS, Pindborg JJ, Gupta PC, Daftary DK. Epidemiologic and histologic study of oral cancer and leukoplakia among 50,915 villagers in India. Cancer 1969; 24: 832-849.

109. Mishra M, Mohanty J, Sengupta S, Tripathy S. Epidemiological and clinicopathological study of oral leukoplakia. Indian J Dermatol Venereol Leprol 2005 ;71: 161–165.

110. Roosaar A, Yin L, Johannsen AL. A long-term follow-up study on the natural course of oral leukoplakia in a Swedish population-based sample. J Oral Pathol Med 2007; 36: 78–82.

111. Banoczy J. Follow up studies in oral leukoplakia. J Maxillofac Surg 1977; 5: 69-75.

112. World Health Organization Collaborating Centre for Oral Precancerous Lesions. Definitions of leucoplakia and related lesions. Oral Surg 1978; 45: 518–539.

113. Cabay RJ, Morton TH, Epstein JB. Proliferative verrucous leukoplakia and its progression to oral carcinoma: A review of the literature. J Oral Pathol Med 2007 ; 36: 255-261.

114. Kaugars GE, Burns JC, Gunsolley JC. Epithelial dysplasia of the oral cavity and lips. Cancer 1988; 62: 2166–2170.

115. Karabulut A, Reibel J, Therkildsen MH, Praetorius F, Nielsen HW, Dabelsteen E.Observer variability in the histology assessment of oral premalignant lesions. J Oral Pathol Med 1995; 24: 198–200.

116. Brennan M, Miglatori CA, Lockhart PB. Management of oral epithelial dysplasia: a review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007; 103: S19.e1–12.

117. Takeda T, Sugihara K, Hirayama Y, Hirano M, Tanuma JI, Semba I. Immunohistological evaluation of Ki-67, p63, CK19 and p53 expression in oral epithelial dysplasias. J Oral Pathol Med 2006; 35: 369–375.

118. Marley JJ, Linden GJ, Cowan CG, Lamey PJ, Johnson NW, Warnakulasuriya KA, et al. A comparison of the management of potentially malignant oral mucosal lesions by oral medicine practitioners and oral & maxillofacial surgeons in the UK. J Oral Pathol Med 1998; 27: 489–495.

119. Lippman SM, Sudbo J, Hong WK. Oral cancer prevention and the evolution of molecular-targeted drug development. J Clin Oncol 2005; 23: 346–356.

120. Gillison ML. Current topics in the epidemiology of oral cavity and oropharyngeal cancers. Head Neck 2007; 29: 779–792.

121. MacFarlane GJ, Evstifeeva TV, Robertson C, Boyle P, Scully C. Trends of oral cancer mortality among females worldwide. Cancer Causes Control 1994; 5: 255–258.

122. Conway DI, Stockton DL, Warnakulasuriya KA, Ogden G, MacPherson LM. Incidence of oral and oropharyngeal cancer in United Kingdom (1990–1999): recent trends and regional variation. Oral Oncol 2006; 42: 586–592.

123. Mallet Y, Avalos N, Ridant LA, Gangloff P, Moriniere S, Rame J, et al: Head and Neck cancer in young people: a series of 52 SCCs of the oral tongue in patients aged 35 years or less. Acta Otolaryngol 2009; 129: 1503–1508.

124. Scully C, Cawson RA. Oral potentially malignant lesions. J Epidemiol Biostat 1996; 1: 3–12.

125. Mithani SK, Midlarz WK, Grumbine FL, Smith IM, Califano JA. Molecular genetics of premalignant oral lesions. Oral Dis 2007; 13: 126–133.

126. Silverman S. Oral cancer. Semin Dermatol 1994; 13: 132–137.

127. Sciubba JJ. Oral cancer. The importance of early diagnosis and treatment. Am J Clin Dermatol 2001; 2: 239–251.

128. Scully C. Clinical diagnostic methods for the detection of premalignant and early malignant oral lesions. Community Dent Health 1993; 1: 43–52.

129. Kujan O, Glenny AM, Oliver RJ, Thakker N, Sloan P. Screening programmes for the early detection and prevention of oral cancer. Cochrane Database Syst Rev 2006; 3: CD004150.

130. Chiesa F, Mauri S, Tradati N, Calabrese L, Guigliano G, Ansarin. M. Surfing prognostic factors in head and neck cancer at the Millennum. Oral Oncol 1999; 35: 590–596.

131. Lung T, Tascau OC, Almasen HA, Muresan O. Head and neck cancer, treatment, evolution and post therapeutic survival. Part 2: A decade's results 1993–2002. J Craniomaxillofac Surg 2007; 35: 126–131.

132. Lattanand A, Johnson WC. Mucous cyst (mucocele): a clinico-pathologic and histochemical study. Arch Dermatol 1970; 101: 673–678.

133. Baurmash MD. Mucoceles and ranulas. J Oral Maxillofac Surg 2003; 61: 369–378.

134. Twetman S, Isaacson S. Cryosurgical treatment of mucocele in children. Am J Dent 1990; 3: 175–176.

135. Cebeci AR İ, Gülşahı A, Kamburoğlu K, Orhan BK, Öztaş B. Prevalence and distribution of oral mucosal lesions in an adult turkish population. Med Oral Patol Oral Cir Bucal. 2009; 14: E272-277.

136. Ikeda N, Handa Y, Khim SP, Durward C, Axéll T, Mizuno T, et al. Prevalence study of oral mucosal lesions in a selected Cambodian population. Community Dent Oral Epidemiol 1995; 23: 49–54.

137. Nagao T, Ikeda N, Fukano H. Incidence rates for oral leukoplakia and lichen planus in a Japanese population. J Oral Pathol Med 2005; 34: 532-539.

138. Axéll T. Occurrence of leukoplakia and some other oral white lesions among 20,333 adult Swedish people. Community Dent Oral Epidemiol 1987 ;15: 46-51.

139. Byakodi R, Shipurkar A, Byakodi S. Prevalence of oral soft tissue lesions in sangli,India. J Community Health 2011; 36: 756-759.

140. Mathew AL, Pai KM, Sholapurkar AA, Vengal M. The prevalence of oral mucosal lesions in patients visiting a dental school in Southern India. Indian J Dent Res 2008; 19: 99-103.

141. Axell T, Zain RB, Siwamogstham P, Tantiniran D, Thampipit J. Prevalence of oral soft tissue lesions in out-patients at two Malaysian and Thai dental schools. Community Dent Oral Epidemiol 1990; 18: 95-99.

142. Axell T, Rundquist L. Oral Lichen planus a demographic study. Community Dent Oral Epidemiol 1987; 15: 52-56.

143. Saraswathi TR, Ranganathan K, Shanmugam S, Sowmya R, Narasimhan PD, Gunaseelan R. Prevalence of oral lesions in relation to habits: Cross-sectional study in South India. Indian J Dent Res 2006; 17: 121

144. Maheshwari UTN, Gnanasundaram N. Stress related oral disease- A research study. Int J Pharma Bioscien 2010; 1: 1-10.

145. Mumcu G, Cimilli H, Sur H, Hayran O, Atalay T. Prevalence and distribution of oral lesions: a cross-sectional study in Turkey. Oral Dis 2005; 11: 81-87.

146. Cornejo AD, Huerta ERL, Bravo SP, Barrios BA, Riviera DQ, Yañez AB, et al. Distribucuión de condiciones y lesiones de la mucosa bucal en pacientes adultos mexicanos. Rev Cubana Estomatol 2007; 44: 181-189.

147. Abdullah M, AlDosari, Shawaf M. Clinical evaluation of 150 saudi patients with lichen planus. Saud Dent J 1997; 9: 62-65.

148. Bratic MB, Picuric I. The prevalence of precancerous oral lesions: Oral lichen planus. Arch Onco 2001; 9: 107-109.

149. Pindborg JJ, Mehta FS, Deftary DK, Gupta PC, Bhonsle RB. Prevalence of oral lichen planus among 7,639 India villages in Kerala, South India. Acta Dermatol Venereol(Stokholm) 1972; 52: 216-220.

150. Coondoo A, Sen N, Panja RK. Leucoderma of the lips. Indian J Dermatol 1976; 21: 29–33.

151. Sehgal VN. A clinical evaluation of 202 cases of vitiligo. Cutis 1974; 14: 439-445.

152. Sewerin I. A clinical and epidemiologic study morsicatio buccarum/labiorum. Eur J Oral Sci 197; 79: 73–80.

ANNEXURES

CONSENT FORM:

I Mr. / Mrs./ Ms. _____

Age_____years,

R/O_____

Hereby give consent to Dr.Harish Prasad BR, for performing the procedures related to the study as previously explained to me and any other procedures necessary or advisable to complete the study include the use of local anaesthesia.

I have completely understood the purpose of the procedure. I also agree to co-operative with him.

I have carefully understood the procedure and possible complications and agree to do it by my own free will and in complete consciousness without any influence.

I shall in no way hold the doctor responsible for any of the procedures or their consequences whatsoever.

Signature of Doctor Signature of Patient

Date :

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY & LEPROSY.

R.L. JALAPPA HOSPITAL AND RESEARCH CENTRE, KOLAR.

WHITE LESIONS OF ORAL MUCOSA CLINICAL PROFORMA.

PATIENT PARTICULARS: **CASE NUMBER:**

NAME : OP/ IP No :

AGE & SEX : DATE :

OCCUPATION : RELIGION :

MARITAL STATUS:

ADDRESS & PHONE NUMBER:

CHIEF COMPLAINTS:

1. oral lesions- flat/ elevated
2. discomfort/ burning sensation/ pain/ difficulty in opening mouth

HISTORY OF PRESENTING ILLNESS:

-Onset: acute/ insidious

-Duration: since childhood /<6 weeks/ >6weeks/

-Site: cheek/ tongue/ lips/ gums/ palate

-Progression: slow/ rapid

-Risk factors:

Smoking/ alcohol/ betel and areca chewing/ other forms of tobacco chewing

Stress-

Dentures-

Medications- Antibiotics/ steroids/ immunosuppressive drugs

Associated medical illness- diabetes/ TB/ HIV/ Other skin conditions

PAST HISTORY

-any medications

-any other systemic illness:

PERSONAL HISTORY

-Food habits- vegetarian/ non-vegetarian

-Sleep- sound/ disturbed

-Bowel and bladder regular/ altered

FAMILY HISTORY

-similar complaints:

-other skin problems:

-consanguinity:

EXAMINATION:

General physical examination:

-Built and Nourishment:

-pallor/ icterus/ clubbing/ cyanosis/ lymphadenopathy/ edema

-Pulse:

-Blood pressure:

-RR:

Examination of Oral cavity

-Sites:

-Lips -Dorsum of tongue

-Labial mucosa -Palate and fauces

-Buccal mucosa -Gingivae

-Floor of mouth and ventrum of tongue

-Morphology of lesion: macule/ plaque/ patch/ nodule.

-Surrounding area: pale/erythematous/ induration.

-Secondary changes: erosion/ atrophy/ ulceration.

-Teeth: dentulous/ edentulous/ amalgam fillings/ dentures

-Other mucosa: ocular/ anogenital

Cutaneous examination:

-Morphology of lesions

-Distribution

Hair and nail examination:

Systemic examination:

CVS

RS

PER ABDOMEN

CNS

Provisional diagnosis:

Investigations:

-Complete haemogram:

-KOH mount:

-Grams stain:

-Biopsy: Histopathology findings

-Serology:

-Others if any:

FINAL DIAGNOSIS:

-Treatment:

KEY TO MASTER CHART

1. Serial number:

2. IP/OP number:

3. Age: **A -**<20 years. **C-**41-60years

B-20-40years **D-**>60years

4. Sex: **M-**Male

F-Female

5. Symptoms: **1-** Burning

2-Discomfort

3-Change of colour

4-Asymptomatic

6. duration**:** **1-** since birth

2- <6 wks

3- >6wks

7. Site: **1-**Buccal mucosa **4-**Vermillion

2-Tongue **5-**Hard palate

3-Labial mucosa **6-**Soft palate

7- >1sites

8.Risk factors: Smoking: **1**-present **0**-absent

Alcohol: **1**-present **0**-absent

Tobacco: **1**-present **0**-absent

Beetle nut: **1**-present **0**-absent

Dentures: **1**-present **0**-absent

Stress: **1**-present **0**-absent

Underlying illness: **1**-present **0**-absent

9. Morphology: **1**- plaque **3**-papule

2-patch **4**-macule

10. Extra oral lesions: **1**-present **0**-absent

11.White lesions

Lichen planus : **1**

Candidiasis: **2**

Vitiligo: **3**

Fordyce spots: **4**

Tobacco pouch keratosis: **5**

Morsicatio buccarum: **6**

Sq.c.c: **7**

Frictional keratosis: **8**

Mucosal retention cyst: **9**

Leukoplakia: **10**

Verruca: **11**

Darier's disease: **12**

White sponge naevus: **13**

Leukoedema: **14**

DKC: **15**

OSF: **16**

OHL: **17**

MASTER CHART

Sl.no	Op.no	Age.	Sex	sym	Duration	Site	smoking	Alchohol	beetle nut	Dentures	Stress	underlying disease	Morphology	extra oral lesion	white lesions
1	696244	A	M	3	2	7	0	0	0	0	0	0	3	1	3
2	698073	B	M	5	3	1	1	1	0	0	0	0	2	0	4
3	517004	B	M	2	3	1	1	0	1	0	0	0	1	0	15
4	520838	B	F	1	3	1	0	0	1	0	0	0	1	0	5
5	509184	B	M	2	2	1	1	1	0	0	0	0	1	0	1
6	526705	D	M	2	3	1	1	1	1	0	0	0	1	0	10
7	593569	C	F	1	2	2	0	0	0	1	0	1	1	0	2
8	520862	B	F	1	2	1	0	0	0	0	1	0	1	0	6
9	552756	C	F	2	2	1	0	0	1	1	1	0	1	0	1
10	546570	A	M	3	2	1	0	0	0	0	0	0	3	0	3
11	710141	B	M	2	3	7	0	0	0	0	0	1	2	0	4
12	604592	C	F	2	3	1	0	0	1	1	1	0	1	0	1
13	686426	C	F	1	2	2	0	0	1	1	0	0	1	0	2
14	509448	B	M	5	2	2	0	0	0	1	0	0	1	0	1
15	744984	B	M	3	2	1	1	1	0	0	0	0	2	0	4
16	579971	B	M	2	2	1	1	1	1	0	0	0	1	0	15
17	510481	B	F	1	2	1	0	0	0	0	1	0	1	0	6
18	514726	B	M	5	3	7	0	0	1	0	0	0	7	0	1
19	609781	B	M	3	3	4	0	0	1	0	1	0	2	0	4
20	492512	C	M	1	2	2	1	0	0	0	0	1	1	0	2
21	582232	B	F	5	2	3	0	0	0	0	1	0	1	0	6
22	530329	B	M	5	3	3	0	0	1	0	1	0	1	1	1
23	710354	B	M	3	3	4	0	0	1	0	0	0	2	0	4
24	538698	C	M	1	2	2	0	0	1	1	0	0	1	0	2
25	656178	D	M	1	3	1	1	1	1	0	0	0	1	0	5
26	698595	B	M	3	2	2	0	0	1	0	1	1	1	1	2
27	468417	B	F	1	2	1	0	1	1	0	0	0	1	0	6
28	502574	C	M	1	2	2	1	0	0	1	0	0	1	0	2
29	534421	D	M	4	3	7	1	1	1	0	0	0	6	1	7
30	429919	A	M	3	2	7	0	0	0	0	0	0	3	1	3
31	491854	D	M	4	3	1	1	1	1	0	0	0	6	1	7
32	549623	D	M	5	3	1	0	0	0	0	0	0	2	0	4
33	504009	B	M	3	2	2	1	0	1	0	0	1	1	0	2
34	605881	D	M	4	2	3	1	1	1	0	0	1	1	0	11
35	580497	B	F	5	3	3	0	0	1	0	0	0	2	0	4
36	532249	B	F	1	2	1	0	0	0	0	1	0	1	0	6
37	513665	C	M	1	2	2	1	0	0	0	0	1	1	0	2

38	562591	D	M	4	2	4	1	1	1	0	1	0	1	1	11
39	562174	D	F	2	2	1	0	0	1	1	1	0	1	0	8
40	536294	C	F	1	2	2	0	0	1	0	1	1	1	0	2
41	518234	A	M	5	3	4	0	0	0	0	0	0	2	0	4
42	521049	B	F	5	2	4	0	0	0	0	0	0	2	0	4
43	530541	C	M	1	2	2	1	1	0	0	0	1	1	0	2
44	533178	B	M	2	2	3	0	0	0	0	0	0	1	0	6
45	510481	C	M	1	2	2	1	1	1	0	0	1	1	0	2
46	560856	B	M	3	3	27	0	0	0	0	1	0	7	1	16
47	494563	C	F	5	2	2	0	0	0	0	0	0	1	1	1
48	531983	B	F	1	2	1	0	0	1	0	1	0	1	0	8
49	563344	B	M	3	2	1	1	1	0	0	1	1	1	0	2
50	536840	C	F	2	2	7	0	0	1	1	1	0	1	0	1
51	521401	B	F	2	2	3	0	0	0	1	0	0	1	1	1
52	582313	B	F	4	2	3	0	0	0	0	1	0	6	0	9
53	562831	B	M	3	2	1	1	0	1	0	0	0	1	0	10
54	532343	B	F	1	2	1	0	0	1	0	1	0	1	0	8
55	530881	C	M	2	2	7	0	0	0	1	1	0	5	1	1
56	542994	A	M	5	3	1	0	0	0	0	0	0	2	0	4
57	540701	C	M	2	2	1	1	0	0	0	0	0	1	0	1
58	496301	B	M	2	2	1	0	0	0	0	1	0	1	0	14
59	520411	C	M	5	3	1	0	0	0	0	1	0	1	1	1
60	708514	B	M	3	2	1	0	0	0	0	0	0	3	0	3
61	582172	C	M	5	3	1	0	0	1	1	0	0	1	1	1
62	524597	C	M	5	2	2	1	1	1	1	0	1	4	1	2
63	553304	B	M	2	3	5	1	0	0	0	0	0	1	1	12
64	581124	B	F	1	2	3	0	1	1	0	1	1	1	1	1
65	527410	C	F	1	2	2	0	0	0	1	1	0	1	0	2
66	513024	D	F	3	2	1	0	0	1	0	0	1	4	1	3
67	580933	B	F	1	2	7	0	1	1	1	0	0	4	0	1
68	581857	B	F	4	2	3	0	0	0	0	1	0	6	0	9
69	544857	C	M	1	2	1	1	1	1	0	1	0	4	1	1
70	578645	A	M	5	2	4	0	0	0	0	0	0	2	0	4
71	526671	C	M	5	2	2	1	1	1	0	1	1	1	0	2
72	573121	D	F	4	2	7	0	1	1	0	1	0	6	0	7
73	518824	B	F	2	2	1	0	0	1	0	1	0	1	1	1
74	582444	B	F	2	3	5	0	0	0	0	0	0	1	1	12
75	493573	C	M	1	2	3	0	0	1	1	1	0	1	1	1
76	513024	B	M	5	3	5	0	0	0	0	1	0	7	1	12
77	546546	C	M	1	2	2	0	0	0	0	1	1	4	0	2

78	493173	A	M	3	2	4	0	0	0	0	0	0	3	0	4
79	581071	B	F	2	3	7	0	0	1	1	1	0	1	0	1
80	530131	D	M	1	2	7	1	1	1	0	0	1	1	0	2
81	520862	D	F	2	3	1	0	0	1	0	0	0	1	0	10
82	687163	B	M	3	2	4	0	1	0	0	1	1	3	1	3
83	593569	D	M	5	3	2	0	0	1	0	0	0	2	0	4
84	635961	D	M	1	2	2	0	0	0	0	0	1	1	0	2
85	537199	BB	M	2	3	17	1	0	0	0	1	1	3	1	3
86	606700	D	M	5	2	2	1	1	1	0	1	1	1	0	2
87	552217	B	F	1	3	3	0	0	0	0	0	0	1	1	1
88	547990	A	M	4	2	3	0	0	0	0	0	0	6	0	9
89	528023	D	M	5	2	2	1	1	1	0	1	1	1	0	2
90	494863	B	F	3	2	1	0	0	0	0	1	0	4	1	3
91	744102	C	F	2	3	3	0	0	1	1	1	0	1	0	1
92	539656	B	M	1	2	1	1	0	0	0	1	0	1	0	6
93	526368	C	M	1	2	2	0	0	0	0	0	1	1	0	2
94	547119	C	F	5	2	2	0	0	0	0	0	0	5	1	1
95	517053	B	M	2	2	1	1	1	0	1	1	0	1	0	6
96	537983	C	M	1	2	2	1	1	0	1	0	0	1	0	2
97	581221	B	F	2	3	1	0	0	1	1	1	0	1	1	1
98	546732	A	F	3	3	4	0	0	0	0	0	0	3	1	3
99	691717	B	M	5	3	1	1	1	1	0	0	0	1	0	5
100	581987	C	M	2	2	1	0	0	1	0	0	1	4	0	2
101	583694	C	M	3	3	1	1	1	0	0	0	1	4	1	3
102	753031	C	F	5	2	2	0	0	0	0	0	0	3	1	1
103	598233	A	F	3	2	1	0	0	0	0	0	0	3	0	3
104	515040	B	M	5	2	1	0	0	0	0	0	0	2	0	4
105	496304	C	M	2	2	7	1	1	0	1	0	1	1	0	2
106	529335	C	F	2	3	1	0	0	1	1	1	0	1	0	1
107	555684	B	F	5	2	2	0	0	0	1	1	0	1	0	1
108	509259	C	F	2	2	1	0	0	1	1	1	0	1	0	8
109	530492	C	F	2	2	7	0	0	1	1	1	0	1	0	1
110	536584	C	F	1	3	1	0	0	1	0	0	0	1	0	5
111	524932	C	F	1	2	1	0	0	1	0	1	0	1	0	6
112	599629	A	F	3	3	7	0	0	0	0	0	0	3	1	3
113	533809	C	F	4	2	7	0	1	1	0	1	0	6	0	7
114	531388	C	F	1	2	2	0	0	1	0	0	1	1	0	2
115	581371	B	F	3	2	1	0	0	1	0	1	0	4	1	3
116	511890	C	M	4	3	7	1	1	1	0	0	0	6	1	7
117	522194	C	F	1	2	1	0	0	0	1	1	0	1	0	6

118	520487	B	F	5	2	1	0	0	0	0	0	0	5	1	1
119	519963	A	F	3	2	1	0	0	0	0	0	0	3	0	3
120	741253	C	F	2	2	2	0	0	1	1	1	0	1	0	1
121	528101	B	F	3	2	4	0	0	0	0	0	0	3	0	3
122	729864	C	M	2	2	1	1	1	0	0	1	0	4	0	14
123	518846	BB	F	5	2	1	0	0	1	1	1	0	5	0	1
124	523150	B	F	3	3	1	0	0	1	0	1	1	4	1	3
125	667121	C	M	2	2	1	1	0	0	1	1	0	1	0	8
126	676180	C	M	5	2	1	1	1	1	0	0	0	1	0	10
127	738922	C	M	5	2	2	1	1	0	0	0	1	1	1	17
128	595427	A	F	3	3	1	0	0	0	0	0	0	3	1	3
129	531199	B	F	2	2	2	0	0	1	0	0	0	1	1	1
130	724016	C	M	4	2	3	1	1	1	0	0	1	1	0	11
131	524932	C	F	3	3	1	0	0	1	0	1	0	4	1	3
132	530508	B	F	3	3	1	0	0	0	0	0	0	4	1	3
133	696244	C	M	2	3	1	1	1	1	0	0	0	1	0	10
134	531388	C	F	3	2	1	0	0	1	0	0	1	4	1	3
135	719297	C	M	4	2	4	1	1	1	0	1	0	1	1	11
136	526427	C	M	5	2	4	1	1	0	0	0	0	2	0	4
137	533809	D	M	5	2	2	1	1	1	0	1	1	1	0	2
138	546796	A	F	3	3	1	0	0	0	0	0	0	3	0	3
139	475695	C	F	1	2	2	0	0	1	0	0	1	1	0	2
140	528823	C	M	1	3	1	1	1	1	0	0	0	1	0	5
141	408011	C	M	2	3	1	1	0	1	0	0	0	1	0	5
142	583745	C	M	3	2	7	1	1	1	0	0	0	3	1	3
143	549835	B	M	5	3	57	1	0	0	0	1	0	1	1	13
144	546169	C	M	5	3	1	0	0	0	0	0	0	2	0	4
145	539160	C	M	4	3	7	1	1	1	0	1	1	6	0	7
146	570928	B	F	3	3	7	0	0	0	0	1	0	3	1	3
147	517010	C	F	1	2	2	0	0	1	1	0	0	1	0	2
148	575129	A	F	5	2	4	0	0	0	0	0	0	2	0	4
149	510578	D	M	1	2	2	0	0	0	0	0	1	1	0	2
150	573031	B	F	5	2	4	0	0	0	0	0	0	2	0	4
151	512693	D	M	1	2	2	1	1	0	0	0	0	1	0	2
152	563344	B	M	3	3	7	1	0	1	0	1	1	3	1	3
153	537189	B	F	2	2	2	0	0	1	1	1	0	1	0	1
154	604006	D	M	3	2	7	1	0	0	0	0	0	3	0	3
155	536281	C	M	5	3	2	1	1	0	0	0	0	2	0	4
156	641048	A	F	4	2	3	0	0	0	0	0	0	6	0	9
157	708514	B	M	5	3	1	0	0	0	0	0	0	2	0	4

158	547119	C	F	3	3	4	0	0	0	0	0	0	4	1	3
159	529335	D	M	1	2	7	1	1	1	0	0	1	1	0	2
160	659015	B	M	3	3	7	1	1	0	0	0	0	2	0	4
161	528023	C	F	3	2	1	0	0	1	0	1	0	4	1	3
162	510118	D	M	1	3	1	1	1	1	0	0	0	1	0	5
163	532323	C	F	5	2	4	0	0	0	0	0	0	2	0	4
164	555892	B	F	5	2	2	0	0	0	0	0	0	3	1	1
165	570475	B	M	2	3	1	1	1	1	0	0	0	1	0	5
166	641990	A	F	4	2	3	0	0	0	0	0	0	6	0	9
167	581832	B	F	3	3	1	0	0	0	0	0	0	2	0	4
168	520862	C	F	3	3	7	0	0	0	0	1	1	4	1	3
169	638535	C	F	5	2	4	0	0	0	0	0	0	2	0	4
170	583989	C	M	3	2	4	0	0	1	0	0	0	2	0	4
171	634567	B	M	1	2	1	1	1	0	0	0	0	1	1	1
172	581966	B	F	5	2	1	0	0	1	0	0	0	1	0	5
173	790064	B	M	2	3	4	1	0	1	0	0	0	2	0	4
174	511036	B	F	1	2	7	0	0	1	0	0	0	1	0	5
175	606700	D	M	3	2	1	1	0	1	0	0	1	3	1	3
176	518477	B	F	1	2	1	0	0	1	1	0	1	1	1	1
177	851632	BB	M	1	2	1	1	0	1	0	1	1	1	0	5
178	581931	B	F	2	2	1	0	0	1	0	0	0	1	0	5
179	510481	C	M	5	3	1	0	0	0	0	0	0	2	0	4
180	530492	D	M	3	2	7	1	1	1	0	0	0	3	1	3
181	645290	B	M	1	2	2	1	0	0	0	1	0	5	1	1
182	708023	B	M	3	2	1	0	0	0	0	0	0	2	0	4
183	571721	B	M	2	3	2 7	0	0	0	0	1	1	1	1	13
184	519950	D	F	1	2	2	0	0	1	0	0	1	1	0	2
185	510932	B	F	2	3	1	0	0	1	0	0	0	1	0	5
186	861684	D	F	1	2	2	0	0	1	1	0	0	1	0	2
187	488824	B	M	2	2	7	1	0	0	0	0	0	1	1	1
188	583953	C	M	5	3	2	0	0	1	0	0	0	2	0	4
189	520487	B	F	5	2	1	0	0	0	1	0	0	1	1	1
190	709688	B	M	5	3	1	0	0	0	0	0	0	2	0	4
191	545121	B	M	2	3	3	0	0	1	0	0	0	1	0	5
192	475695	D	F	1	2	2	0	0	0	0	0	1	1	1	2
193	537199	D	F	3	3	1	0	0	1	0	1	0	4	1	3
194	601502	D	M	1	3	1	1	1	1	0	0	0	1	0	5
195	597267	D	F	4	2	7	0	1	1	0	1	0	6	0	7
196	522194	D	F	2	3	3	0	0	1	1	1	0	1	0	1
197	517010	D	F	5	2	2	0	0	0	0	0	0	3	1	1

INTRODUCTION

INTRODUCTION

Diseases of the oral cavity constitute only a small minority of pathological conditions. But they are enormously troublesome to patients, impacting their ability to communicate and to interact socially and in the workplace, thus diminishing their quality of life.[1]

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma.

The prevalence of these lesions in U.S. adults was 27.9%,[2] whereas the prevalence of oral white lesions in hospital based studies varied from 19.1% -22.4%.[3]

White lesions of the oral mucosa obtain their characteristic appearance from the scattering of light due to[4]

→Increased thickness of surface epithelium or epithelial maturation products

→Presence of superficial debris on oral mucosa

→Blanching caused by reduced vascularity

→Loss of pigmentation due to acquired causes.

Many of these lesions are harmless and do not require any treatment other than reassurance. But still a small minority, roughly 4% are potentially dangerous if left unattended.[5] Suspicious looking lesions can be pursued and a definitive diagnosis made through biopsy. Identifying and recognizing a premalignant lesion or a frank malignancy in the early stages will go a long way in facilitating early diagnosis, treatment and prevention of possible malignancy. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients.

As not much data is available in India on white lesions of oral mucosa, this study will help us to characterize the different clinical patterns and frequency of white lesions of oral mucosa in our population.

AIMS AND OBJECTIVES

AIMS OF THE STUDY

1. To know the frequency of oral white lesions in patients attending Dermatology out- patient department
2. To identify various morphological patterns of oral white lesions
3. To determine possible aetiological factors of oral white lesions**.**

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORICAL ASPECTS:

The first serious suggestion of an association between a oral mucosal lesion and the subsequent development of oral malignancy was reported in the mid-nineteenth century. Sir James Paget of London wondered in 1851 about the cancer-producing potential of pipe smoker's palate or "leukokeratosis," and in 1870 he clearly implied that oral "ichthyosis" (white keratotic plaque) was a significant precursor to lingual carcinoma.[6]

The latter association was independently advanced in 1877 by Hungarian dermatologist Ernst Schwimmer, [7] who is credited with coining the term "leukoplakia" for white tongue changes seen prior to lingual cancer development in tertiary syphilis.

In 1978, World Health Organisation (WHO) working group defined leukoplakia as "a keratotic white patch or plaque that cannot be scraped off and cannot be characterized clinically or pathologically as any other disease."[8]

Hornstein[9] in 1977 classified leukoplakia aetiologically and nosologically into two groups: 1) leukoplakia in the broad sense (so called hereditary and endogenous leukoplakia) and 2) leukoplakia in the narrow sense (so-called exogenous-irritative and precancerous leukoplakia).

Pindborg[9] and others in 1963 differentiated two main groups according to clinical appearance as homogeneous type and speckled or nodular type.

In 1984, Greenspan[10] and co-workers first described oral hairy leukoplakia (OHL) among male homosexuals in San Francisco.

In 1896, Fordyce[11] described whitish spots on the vermilion border of the lips, oral mucosa and, rarely, genital mucosa. Leukoedema was first described by

Sandstead and Lowe in 1953.[12] Hyde reported the first case of WSN in 1909.[13] Dyskeratosis congenita (DKC) is a rare genodermatosis which was first described by Zinsser in 1906.[14]

Erasmus Wilson first described Lichen planus in 1869,[15] as a chronic disease affecting the skin, scalp, nails, and mucosa, with possible rare malignant degeneration. Francois Henri Hallopeau reported the first case of oral lichen planus (OLP)–related carcinoma in 1910.[15] .The histologic features of OLP were first described by Dubreuill in 1906 which was later revised by Shklar[16] in 1972. Andreasen in 1968 classified oral lichen planus into six types: reticular, papular, plaque-like, erosive, atrophic, and bullous.[17] The WHO developed a set of histopathological criteria for OLP in 1978,[8] which was further modified in 2003.

Vitiligo is an ancient malady and a historical background will facilitate continuity with current research. The earliest authentic reference of vitiligo can be traced back to the period of Aushooryan (2200 BC), in the classic Tarikh-e- Tib-e-Iran.[18]

Oral thrush is perhaps one of the earliest oral diseases documented, which may be found in Hippocrate's "Epidemics" from the fourth century B.C. Rosen von Rosenstein (1771) was the first to attempt to divide the disease into categories based on the severity and distribution of the lesions. The fungus now known as Candida albicans was isolated by Bennett (1844) from the sputum of a tuberculosis patient, by Wilkinson (1849) from vaginal candidiasis.[19]

Anatomy of oral cavity: [20, 21, 22, 23]

The oral cavity consists of two parts.

I. An outer vestibule, which is bounded by lips and cheeks.

II. The oral cavity proper, separated by an alveolus bearing gingiva and the teeth.

Oral mucosa is a moist lining of the oral cavity. Generally, oral mucosa appears pale pink, as the epithelium and connective tissue of lamina propria are relatively translucent and allow red light to reflect from blood in the underlying capillary bed.

The oral cavity is lined by epithelium derived from both the ectoderm and endoderm. The regions of the oral cavity lined with the epithelium of ectodermal origin include the gingiva, the mucosa lining the cheeks, hard and soft palates. The structures derived from the endoderm are the tongue, the floor of the mouth, the pharynx and the epiglottis.

Oral mucosa is composed of:

a. Epithelial tissue which is a stratified squamous epithelium analogous to epidermis of the skin.

b. The underlying loose connective tissue component called lamina proporia analogous to dermis of skin. A basal lamina - basement membrane complex separates the epithelium from the lamina propria.

c. Sub mucosa.

The epithelial tissues of gingiva and hard palate are keratinized, although in many individuals the gingival epithelium is para keratinized. The cheek, faucial and the sub lingual tissues are non- keratinized.

Lamina propria is composed of cells, fibres and amorphous ground substance. It also contains blood vessels and nerves.

Sub mucosa lies beneath the lamina propria. It consists of connective tissue of varying thickness, minor salivary glands, blood vessels, nerves and adipose tissue. Lymphoid nodules are found at the base of tongue.

Aetiology of oral white lesions:

White lesions of oral mucosa are a common clinical finding in oral cavity examination with problems in differential diagnosis. These lesions represent a wide spectrum of diseases, which can be classified as follows,

Classification of white lesions in oral cavity[4, 24]

A. Developmental or Congenital

- Leukoedema
- White sponge naevus
- Dyskeratosis congenita
- Fordyces spots

B. Inflammatory/Reactive:

- Morsicatio buccarum et labiorum
- Frictional,chemical and thermal keratosis
- Tobacco pouch keratosis

C. Infective

- Candidosis
- Oral hairy leukoplakia
- Warts
- Syphilitic mucous patches

D. Oral manifestation of Systemic disorders

- Uremic stomatitis

E. Oral manifestation of Dermatological disorders

- Lichen planus
- Keratosis follicularis
- Discoid lupus erythematosus
- Mucosal vitiligo

F. Premalignant

- Oral submucosal fibrosis
- Proliferative verrucous leukoplakia
- Florid oral papillomatosis
- Leukoplakia

G. Malignant

- Squamous cell carcinoma.

H. Miscellaneous

- Mucosal retention cyst
- Graft versus host disease
- Drugs

A. DEVELOPMENTAL OR CONGENITAL:

1. LEUKOEDEMA

Introduction:

Leukoedema is a common mucosal alteration that represents a variation of a normal condition rather than a true pathologic change.

Epidemiology and aetiopathogenesis:

Prevalence rates vary greatly in different countries and in different ethnic groups. A higher prevalence (90%) is seen in black adults compared to whites (10-90%). In Indian population prevalence ranges between 1.6%- 4.3%. [25]

It is more prevalent in the age group of 40-60years with no sex predilection.

It has been proposed that leukoedema is an acquired benign lesion that develops as a result of repeated subclinical insults to the oral mucosa by certain low-grade irritants (eg, accumulated oral debris, tobacco, and food spices). Some reports have suggested that leukoedema is more severe in smokers and lessens with cessation.[26]

Clinical features:

Leukoedema is characterized by a diffuse, grayish white opalescent appearance, occurring bilaterally on the buccal mucosa; it may also be noted on the floor of the mouth and palatopharyngeal tissues. The surface appears folded, resulting in wrinkling of the mucosa. It cannot be scrapped off and it diminishes or disappears with the stretching and eversion of the oral mucosa.[25]

Histopathology:

Oral lesions of leukoedema show parakeratosis and an increase in thickness of the oral mucosa epithelium with intracellular edema of the spinous layer. The cells of

the spinous layer are large with pyknotic nuclei. Rete ridges may be elongated. No evidence of dysplasia is seen.

Diagnosis:

The white lesions of leukoedema do not rub off. Stretching of the oral mucosa and the resultant disappearance of the opalescence in the mucosa is diagnostic.

Differential diagnosis:

Areas exhibiting leukoedema will either disappear or persist upon stretching, whereas lesions of lichen planus will become more pronounced. In White sponge nevus buccal mucosa appears thickened and folded"[27] Superficial erosions that alternate with irregular white flakes are present in lesions of habitual cheek-biting whereas areas of leukoedema are usually smooth and grayish-white in coloration.

Treatment:

No treatment is necessary as it has no malignant potential.

2. WHITE SPONGE NEVUS

(Leukoedema exfoliativum mucosae oris, Familial white folded mucosal dysplasia, Hereditary leukokeratosis, Cannon's disease , Pachydermia oralis , White folded gingivostomatosis**)**

Introduction:

White sponge nevus (WSN), is a relatively rare mucosal disorder.[27] It is an autosomal dominant disorder that involves a mutation in mucosal keratin which predominantly affects non-keratinized stratified-squamous epithelia.

Epidemiology and aetiopathogenesis:

White sponge nevus has been listed as a rare disorder, with a prevalence < 1 in 200,000.[28] It is seen commonly at birth or in early childhood with no gender or racial predilection.

White sponge nevus is an autosomal dominant disorder resulting from point mutation of either keratin 4 or keratin 13 genes.[29] These mutations result in defective keratinization of the oral mucosa, with alterations also seen in nasal, esophageal, laryngeal, and anogenital mucosa.The disease is characterized by a wide variability and high penetrance, but with a benign clinical course.

Clinical features:

White sponge nevus presents as bilateral, soft, white and "spongy" plaques. The surface of the plaque is thick, folded and may peel away from the underlying tissue. Lesions are asymptomatic and rough on palpation. Rare cases of mild discomfort due to secondary infections have been reported.[29]

The buccal mucosa is the most commonly affected site, followed by the soft palate, ventral tongue, labial mucosa, the alveolar ridges and the floor of the mouth. Gingival margin and dorsal aspect of tongue are usually spared.

Histopathology:

On microscopy, parakeratosis, marked epithelial thickening, and intracellular edema with perinuclear condensation of keratin is seen. Clear cell changes begin at the parabasalar layer and extend upto the surface.[27]

Diagnosis:

The clinical appearance is so distinctive that biopsy is usually unnecessary. The diagnosis is made more certain if there is a positive family history and other

mucous membranes are affected. In case of any suspicion, biopsy should be performed.

Differential diagnosis:

The differential diagnosis of white sponge nevus includes leukoplakia, chemical burns, trauma, syphilis, tobacco and betel nut use. White sponge nevus may also be confused with candidiasis, but fungal examination and response to antifungal agents will be the differentiating factors. Cheek- biting, lichen planus, lupus erythematosus should also be excluded. Lesions of panchyonychia congenita, Darier's disease and dyskeratosis congenita may resemble lesions of white sponge nevus. Except for lichen planus and lupus erythematosus which may be limited to the oral cavity, these disorders can be distinguished clinically from white sponge nevus by their associated extra oral lesions. Thus, concurrent skin lesions exclude the diagnosis of white sponge nevus.

Treatment:

Since WSN is a benign condition, reassurance is all that is required, although vitamin A, antifungal therapy, and tretinoin cream have been used. Antibiotic treatment with oral penicillin, ampicillin, and tetracycline has shown varying degrees of success.[30]

3. DYSKERATOSIS CONGENITA

Introduction:

Dyskeratosis congenita (DKC) is characterised by classic triad of skin pigmentation, nail dystrophy and oral leukoplakia. Patients with this disorder are

susceptible to develop bone marrow failure (aplastic anaemia) as well as malignant transformation of oral and skin lesions.[31]

Epidemiology and aetiopathogenesis:

The condition manifests itself during the first decade of life. It mainly occurs in males, inherited as X linked recessive disorder with male: female ratio of 13:1. Mutation of the DKC1 gene has been determined to be the cause of the X-linked form. Mutation in the RNA component of telomerase has also been implicated.[32]

Clinical features:

Oral lesions usually begin as bullae on affected surfaces like tongue, buccal and palatine mucosae, followed by erosion and finally leukoplakic plaques. Superimposed candidal infection is often seen. Discomfort may be associated with the consumption of spicy and hot foods. The oral lesions are considered to be premalignant and may transform to malignancy over a 10- to 30-year period.[33] Squamous cell carcinoma is the most common malignancy to arise in these lesions. The oral changes are associated with dystrophic nails and a reticular hyperpigmentation of the skin of the face and neck which increases with age.[31] The most significant clinical manifestation of the disease is bone marrow failure. By the second decade of life patients typically develop anemia, and 94% of patients develop bone marrow failure by the age of 40 years.[32]

Histopathology:

Early oral lesions show epithelial atrophy and as the lesion progresses, epithelial dysplasia and squamous cell carcinoma develops.

Differential diagnosis:

Leukoplakia associated with skin and nail changes differentiates DKC from other causes of white lesions in oral cavity like lichen planus, white sponge naevus and early squamous cell carcinoma.

Treatment:

The oral lesions are managed symptomatically. Periodic examination of oral lesions to monitor for malignant change and avoidance of smoking and drinking are of utmost importance.[33]

4. FORDYCE SPOTS

(Fordyce's granules)

Introduction:

Fordyce's spots are heterotopic sebaceous glands, containing neutral lipids similar to those found in skin sebaceous glands, lacking an association with hair follicle.[34]

Epidemiology and aetiopathogenesis:

Even though the sebaceous glands are present since birth, this condition is not common before puberty (although they can be demonstrated histologically). The incidence continues to increase with age and the prevalence in adults is 70% to 80%, with a slight male predominance.[34]

The pathophysiology of Fordyce's spots has not been elucidated. It may be due to ectopic disposition of sebaceous glands during embryonic development, which is considered as a variation of normal anatomy.

Clinical features:

Fordyce spots appear as multiple 0.1 to 1-mm yellow to yellow-white papules often occurring bilaterally, and they may occasionally form plaques. It is seen most commonly on the lips adjacent to the vermilion border, buccal mucosa, particularly inside the commissures, and sometimes in the retromolar regions.[34]

Histopathology:

These are normal sebaceous glands, consisting of a group of mature sebaceous lobes surrounding small ducts that emerge directly at the epithelium surface.[35]

Treatment:

No treatment is indicated, other than reassurance. Treatment of Fordyce spots is for cosmetic purposes only. Oral isotretinoin has been used with mild improvement seen, with recurrence of spots on stoppage of treatment. Bi-chloro acetic acid (BCA), CO2 laser and 5-aminolaevulinic acid-photodynamic therapies have been also used.[35, 36]

B. REACTIVE/INFLAMMATORY:

1. LINEA ALBA.

(Horizontal bite line)

Introduction:

Linea alba is a common benign alteration of the buccal mucosa.

Aetiopathogenesis:

The horizontal alignment of the line, and its presence only in patients who are dentulous, suggests that the linea alba is caused by a combination of frictional irritation and mild sucking trauma along the facial surfaces of the teeth and along the opposing occlusal surfaces.

Clinical feature:

Linea alba presents as a distinct white line that is usually bilateral on the buccal mucosa at the level of the occlusal plane of the adjacent teeth.[37] The line varies in prominence from barely visible to highly prominent. This horizontal line becomes more pronounced distally towards the posterior teeth.[38]

Histopathology:

Hyperkeratosis with mild chronic inflammatory infiltrate is seen.

Diagnosis:

The clinical picture is pathognomonic to establish a diagnosis. No biopsy is required.

Treatment:

Bite splints worn at night may protect the cheek mucosa from involuntary biting.[38]

2. MORSICATIO BUCCARUM ET LABIORUM

(chronic cheek and lip biting)

Introduction:

Morsicatio buccarum is a physical reaction to chronic trauma caused by chronic nibbling.[39]

Morsicatio comes from the Latin word “morsus”, meaning bite. Chronic nibbling of the cheek produces lesions that are located more frequently on the buccal mucosa but sometimes the lingual mucosa (morsicatio labiorum) and lateral border of tongue (morsicatio linguarum) can also be affected.[39]

Epidemiology and Aetiopathogenesis:

Lesions are commonly seen in individuals over the age of 35 years with female preponderance. It is postulated to result from chronic irritation due to sucking, nibbling or chewing. Cheek chewing is most commonly seen in people who are under stress or who exhibit psychological conditions.[39]

Though the patients are aware of their habit but many deny the self-inflicted injury or perform the act subconsciously.

Clinical features:

Morsicatio presents as thickened, shredded white areas bilaterally on buccal mucosa which can be peeled off by the patient. Intervening zones of erythema, erosions, or focal traumatic ulcerations can also be seen. It is more pronounced along the occlusal plane and in the anterior one third of the buccal mucosa. When the lips are affected, it is the lower lip that is typically more severely affected than the upper lip.[39]

Histopathology:

Hyperparakeratosis with numerous keratin projections colonized by bacterial organisms are characteristic of morsicatio. Clusters of vacuolated keratinocytes may be present in the superficial layers of the spinous cell layer.

Diagnosis:

The clinical presentation and location of lesions are characteristic.

Differential diagnosis:

The clinical findings on the lateral border of the tongue and the histologic findings may resemble oral hairy leukoplakia. However bacterial colonization of white plaque is diagnostic of Morsicatio buccarum.

Superficial erosions that alternate with irregular white flakes are present in lesions of habitual cheek-biting whereas areas of leukoedema are usually smooth and grayish-white in coloration.

Treatment:

Instructing the patient to avoid cheek biting is important. If the habit is uncontrollable, an acrylic shield that covers the facial surfaces of the teeth may be beneficial. Medications to control the habit may be used as adjunct therapy.[27]

3. FRICTIONAL, CHEMICAL, AND THERMAL KERATOSES

Introduction:

Keratoses are characterized by white plaques that arise as a result of an identifiable source which usually resolve once the causative factor is eliminated. The implicated causative factors are friction, chemicals and heat.

Epidemiology and aetiopathogenesis:

Frictional keratosis is commonly seen in young adults. The sources of friction resulting in hyperkeratosis may be an ill-fitting denture, malocclusion, para-functional habits, or poor brushing techniques.[27]

Chemicals causing burning of the mucosa and resultant hyperkeratosis include aspirin, sodium hypochlorite, hydrogen peroxide, formocresol, paraformaldehyde, cavity varnish, or mouthwashes, to name a few.[40]

Thermal keratosis can be due to thermal burns in the oral cavity caused by excessively hot (microwaved) foods or heat generated from smoking. Lesions are commonly seen on the tongue and palate.[40]

In tobacco-related form of keratosis (Nicotine stomatitis) both chemical and thermal factors play a part.[39]

Clinical features:

Frictional keratosis is typically characterized by a poorly demarcated rough area, which can be peeled off occasionally, leaving focal areas of pink mucosa. Lips, lateral surface of tongue, and buccal mucosa are commonly affected sites.

Persistent masticatory trauma often results in thick white corrugated lesions on the retromolar pad areas.

Chemical keratosis is characterized by variably symptomatic white, irregularly shaped plaques typically located on the mucobuccal fold or the gingival mucosa.

Thermal keratosis is characterized by a white lesion with focal areas of ulceration associated with mild to moderate pain.[27, 39]

Histopathology:

Frictional keratotic lesions exhibit hyperkeratosis and acanthosis with fraying and shredding of the keratin layers. Epithelial dysplasia is not seen.

Chemical and thermal keratoses display a superficial pseudomembrane composed of necrotic tissue and an inflammatory exudate.

Differential diagnosis:

Thermal and chemically induced lesions are almost always painful. The keratotic plaque has to be differentiated from white lesions of Morsicatio buccarum. In Morsicatio buccarum, lesions are asymptomatic with bacterial colonization of the plaque.

The white lesions of leukoedema do not rub off and disappearance of the opalescence on stretching of the oral mucosa is diagnostic. It should also be

differentiated from leukoplakia, candidiasis, white sponge nevus, oral hairy leukoplakia, and squamous cell carcinoma.

Treatment:

Removal of the causative factor leads to resolution of the lesions. No active intervention is needed as these lesions do not show any malignant potential.[41]

4. NICOTINIC STOMATITIS

(smoker's palate)

Introduction:

Nicotinic stomatitis is a benign process with no malignant potential.

Aetiopathogenesis:

Nicotinic stomatitis occurs almost exclusively in heavy pipe smokers and rarely in cigarette or cigar smokers. It is also observed in reverse smokers (lit end placed in the mouth) suggesting thermal effect as the cause of clinical changes.[42]

Clinical features:

Nicotinic stomatitis is always confined to the hard palate and begins as erythema of the palate. Later the palate assumes a grayish white and nodular appearance. The characteristic finding is the appearance of multiple red dots. The lesions are asymptomatic and discovered during an oral examination.[43]

Histopathology:

Light microscopy shows significant dysplasia and epithelial atypia.

Treatment:

Resolution of the changes occurs within several months after the cessation of smoking.[39, 42]

5. TOBACCO POUCH KERATOSIS

(Smokeless tobacco pouch)

Introduction:

It is estimated that 5% of the population is currently engaged in chewing tobacco or dipping snuff, especially among white men aged 15 to 34 years. [44]

Clinical features:

Asymptomatic lesions characteristically have a wrinkled surface that ranges from opaque white to translucent which develops on the mucosal surface that is in contact with the tobacco products. The mucosal surface has a velvety texture often with cobblestone appearance. Longstanding lesions may become thickened and verrucous.[45]

Histopathology:

Nonspecific features like acanthosis, orthokeratosis, and marked parakeratosis are seen. Dysplasia is uncommon.

Treatment:

Lesions usually resolve within 6 weeks of cessation of tobacco use. Around 2 to 6% of lesions undergo malignant change over a period of 5 to 10 years. Hence, regular follow-up is required. [39, 45]

C. INFECTIVE AETIOLOGY:

1. CANDIDOSIS

(candidiasis, moniliasis, thrush)

Introduction:

Oral candidosis is one of the common fungal infection affecting the oral mucosa caused predominantly by Candida albicans. C. albicans is a frequent, but not invariable, normal commensal of the gastrointestinal tract, vagina and moist intertriginous areas of skin.

Oral candidiasis can also be a frequent and significant source of oral discomfort, pain, loss of taste, and aversion to food.[46]

Epidemiology and aetiopathogenesis:

Oral candidal colonization has been reported to range from approximately 40% to 70% of healthy children and adults, with higher rates observed among children with carious teeth and older adults wearing dentures. Candida carriage rate has been shown to also increase with age, smoking, cancer radiation therapy, diabetes, and HIV infection.[46]

Most cases of oral candidiasis are caused by Candida albicans, although a large number of other yeast species maybe found intraorally. These include C. tropicalis, C. krusei, C. parapsilosis, and C. guilliermondii. In oral candidosis, C. albicans generally accounts for around 50% of cases. [46]

Changes in the oral environment that predisposes or precipitates oral candidiasis include: [47]

Local host factors	**Systemic host factors**
• Denture wearing • Steroid inhaler use • Reduced salivary flow (xerostomia) • High sugar diet	• Extremes of age • Endocrine disorders (e.g. diabetes) • Immunosuppression • Receipt of broad spectrum antibiotics • Nutritional deficiencies

The epidemiology of oral candidal infection is complex in insulin-treated diabetes mellitus patients. The development of oral candidosis is not the result of a single entity, but rather, a combination of risk factors like glycaemic control, sex, age, smoking and wearing of dentures.

In HIV patients, oral candidosis is the most common opportunistic infection occurring in as many as 90% of patients at some point during the course of HIV infection. It is a marker for increased rate of progression to AIDS.[48]

Though the reported prevalence of oral candidosis in patients receiving systemic steroids is 30-35%, the relationship between candidal carriage or infection and systemic steroid therapy is not clear.[49]

Some soreness in the epithelium in the denture-bearing area is said to affect nearly one-quarter of all denture wearers and most, if not all cases appear to be caused by candidosis. Elimination of *Candida* alone does not usually result in complete recovery, and it is likely that other factors such as chronic mechanical irritation and bacterial colonization have a role in the pathogenesis.

Clinical features:

Oral candidosis manifests in various clinical forms: [39]

1. Pseudomembranous candidosis
2. Acute atrophic-erythematous candidosis
3. Chronic atrophic candidosis
4. Angular cheilitis. (perle`che)
5. Chronic hypertrophic-hyperplastic candidosis (Candida leukoplakia)
6. Median rhomboid glossitis
7. Chronic nodular candidosis.

Acute pseudomembranous candidosis (oral thrush) presents with sharply defined superficial curd like white patches covered by pseudomembrane, which, when wiped off leaves an erythematous base. The buccal mucosa, gums or palate may be affected with extension to the pharynx or esophagus seen in severe cases. In immunocompromised patients, the tongue may be affected as well. The condition occurs most commonly in the first weeks of life with preterm infant being susceptible.[47]

Chronic pseudomembranous candidosis is seen in immunocompromised patients.

Acute erythematous candidosis (acute atrophic oral candidiasis; antibiotic sore tongue) is characterised by marked soreness and focal or diffuse areas of denuded atrophic erythematous mucosa, particularly on the dorsum of the tongue. It is especially associated with antibiotic therapy. It may also develop in HIV-positive subjects and patients taking inhaled steroids.[50]

Chronic erythematous candidosis (chronic atrophic candidiasis; denture sore mouth; denture stomatitis) presents as a variable bright-red or dusky area of erythema

with a pebbly or velvet surface confined to the upper denture-bearing area, the palate and gums. There is often an associated angular cheilitis.[51]

Angular cheilitis presents as fissures or erosions, and crusting with underlying erythema developing at the commissures associated with soreness. Predisposing factors include ill-fitting dentures with over closure, drooling at the corners of the mouth, lip-licking habits, and thumb sucking habits.[52]

Chronic hyperplastic candidosis (candidal leukoplakia) appears as firm, well-demarcated, white, thick, or verrucus plaques commonly on the cheek or the tongue that cannot be rubbed off easily. Symptoms are mild with slight soreness noticed. It is commonly seen in males over the age of 30 years with smokers particularly prone to develop this form of oral candidosis.[53]

Chronic nodular candidosis is a rare form, where the clinical appearance that usually affects the tongue is cobbled. It is most often seen in certain patients with chronic mucocutaneous candidosis.

Median rhomboid glossitis appears as an asymptomatic diamond- or oval-shaped erythematous de-papillated area on the posterior dorsum of the tongue. The surface is smooth or lobulated. It occurs more frequently in AIDS patients.[54]

Chronic mucocutaneous form of candidosis is a heterogenous group that presents as persistent Candida infection of the mouth, the skin and the nails, refractory to conventional topical therapy. Several types are familial and can present during early childhood. It can also form a part of the autoimmune polyendocrinopathy candida ectodermal dystrophy syndrome (APECED). Oral lesions start as pseudomembranous candidiasis, and then proceeds to become chronic hyperplastic candidiasis.[55, 56]

Diagnosis:

The diagnosis of this condition is by positive direct microscopy. On 10% potassium hydroxide mount, pseudohyphae or budding cells consistent with the candida morphology can be demonstrated.

A cytologic smear or biopsy can also be stained with periodic acid– Schiff. This method stains the abundant carbohydrates in the fungal cell walls. The organisms are identified easily by their bright magenta color.

Definitive identification of the fungi is performed by culture on Sabouraud's dextrose agar.[39]

Treatment:

The main stay of treatment in oral candidosis is identification and treatment of underlying predisposing factors; frequent toilet in the seriously ill, and denture hygiene in other patients.

Topical antifungal therapy alone is sufficient to treat in majority of cases.

In infants, suspensions of nystatin, amphotericin or miconazole gel applied several times a day are usually adequate for treating oral thrush. In the adult patient, removal of the dentures with careful hygiene at night is important. Regular amphotericin lozenges, nystatin or amphotericin tablets or oral nystatin suspension are effective in non-immunocompromised patients. In acute cases, 10-14 days of treatment is adequate. Angular stomatitis usually responds to treatment of the primary oral condition, although a topical antifungal applied to the area may speed recovery.[56, 57]

Systemic treatment is indicated in unresponsive and chronic cases, such as those with hyperplastic candidosis, patients with AIDS or chronic mucocutaneous candidosis. Combination antiretroviral therapy in AIDS patients improves the

therapeutic outcome significantly. Triazoles, fluconazole and itraconazole are commonly used for systemic treatment. The usual daily doses are itraconazole 100–200 mg and fluconazole 100–400 mg.[56]

For the treatment of oral candidosis in patients with AIDS or CMC, if possible, therapy should be given intermittently if there is a recurrence, because of the risk of resistance developing with continuous therapy. Treatment is usually given until there is symptomatic recovery.[57, 58]

In patients with chronic oral candidosis, a biopsy may be justified to exclude leukoplakia.

2. ORAL HAIRY LEUKOPLAKIA

Introduction:

Oral hairy leukoplakia (OHL) is one of the most common, virally-induced, oral diseases of individuals with HIV infection. It is commonly seen in severe immune-compromised state, and occasionally in apparently immune-competent individuals.[59]

Epidemiology and aetiopathogenesis:

The prevalence of OHL in HIV seropositive patients varies considerably from 13%-46% in different regions.[59]

Epstein- Barr virus is implicated in aetiology of OHL. The oral site of predilection for HL appears to relate to the presence of EBV receptors only on the parakeratinized mucosae such as the lateral margin of the tongue. OHL has also been reported in HIV-seronegative patients who were severely, chronically, and iatrogenically immune-suppressed because of bone marrow, renal, heart, and liver transplants or cytotoxic chemotherapy for acute leukaemia, suggesting that OHL is

not a specific lesion associated to the HIV-infection, but may be a sign of immune-suppression in general. [59, 60]

Lesions very similar to OHL both clinically and histologically have very rarely been reported in immune-competent individuals and have been termed pseudo oral hairy leukoplakia. These latter lesions are negative for EBV DNA, however.

Clinical features:

Oral hairy leukoplakia is usually an asymptomatic poorly demarcated white plaque with irregular corrugated surface typically seen on the lateral borders of the tongue. Lesions seen on the ventral surface of the tongue may be flat.

These plaques cannot be scraped off. Rarely, other sites in the oral cavity like buccal mucosa, floor of the mouth, and soft palate can be involved.[60]

Histopathology:

Severe hyperkeratosis and irregular acanthosis is usually seen. Virally affected epithelial cells (koilocytes) with margination of the nuclear chromatin (nuclear beading) is a characteristic feature.

Diagnosis:

EC-Clearinghouse- WHO diagnostic criteria for OHL: [60]

1. Typically, asymptomatic, non-removable, corrugated white patches present on the lateral borders and ventral aspect of the tongue.
2. Histologically, the lesion shows irregular hyperparakeratosis and acanthosis with clusters or bands of ballooned keratinocytes in the stratum spinosum. These ballooned cells show nuclear peripheral beading, ground glass nuclei, and Cowdry-type A intranuclear inclusion bodies. Inflammatory reaction is minimal and atypia absent.
3. Electron microscopically, the herpesvirus nucleocapsids present in ballooned

keratinocytes have been identified as the Epstein- Barr virus by immunohistochemistry and DNA in situ hybridization.

Presumptive diagnosis of OHL is made on presence of clinical features with lack of response to antifungal treatment. The definitive diagnosis requires demonstration of EBV within the lesion using in situ hybridization, PCR, Southern blot or electron microscopy.[61]

Differential diagnosis:

OHL should be differentiated from hyperplastic candidiasis, leukoplakia, lichen planus, lupus erythematosus and white sponge nevus.

Treatment:

None is required because it is an asymptomatic lesion with no malignant potential. The use of antivirals (acyclovir, gancyclovir, desicyclovir, ziduvudine) usually resolves the condition but the lesions reappear once the medication is discontinued. Topical podophyllin with or without acyclovir cream has also been shown to be effective in treating the lesions.[62]

Surgical excisions of the symptomatic lesions have resulted in temporary relief but, with recurrences. Detecting and managing the cause of immune-suppression is the most important factor in the treatment of this condition.[39, 63]

3. WARTS

Introduction:

Common (verruca vulgaris) and venereal warts (condyloma acuminatum) are caused by human papilloma virus (HPV).[39]

Epidemiology and aetiopathogenesis:

Warts are infrequent in oral cavity but are commonly seen in HIV individuals.[64]

Oral verruca vulgaris are more frequent in children than in adults. The lesions develop in oral cavity following auto- inoculation from hands and fingers.

Condyloma acuminatum is the most common sexually transmitted disease and arises in the oral mucosa because of autoinoculation or more commonly by orogenital sexual transmission. It is common in HIV patients, with a striking increase seen on starting highly active antiretroviral therapy. [64]

Clinical features:

Verruca vulgaris appear as solitary or multiple, asymptomatic, exophytic growths with roughened or verrucous surface identical to cutaneous warts. Lesions are either pedunculated or sessile and range in color from pink to white. Individual lesions usually achieve an average size of about 0.5 to 1 cm. The lesions develop in sites of inoculation, mainly the labial mucosa, tongue, and gingiva.

Condyloma acuminate lesions are frequently present on the labial mucosa, followed by lingual frenum, soft palate, and gingiva. They present as asymptomatic, pink, sessile, less frequently pedunculated, exophytic cauliflowerlike growths. They are multiple rather than single. They are usually larger than verruca vulgaris, ranging from 1 to 3 cm. [64]

Histopathology:

Warts are characterized by a proliferation of hyperkeratotic stratified squamous epithelium arranged into finger-like projections with connective tissue cores. The converging or ‘‘cupping’’ arrangement of the peripheral rete ridges and a prominent granular cell layer with coarse, clumped keratohyaline granules is

characteristic. Numerous koilocytes with pyknotic nuclei and perinuclear vacuoles are present.

Diagnosis:

The diagnosis of wart is confirmed by histopathology of the suspected lesion. Electron microscopy, immunoperoxidase staining, or in situ hybridization can detect HPV viral particles in the biopsy samples.

Treatment:

Lesions can be removed by surgical excision, cryosurgery, electrosurgery, and laser therapy. Imiquimod and 20% podophyllin solution in tincture of benzoin have been used with some success.[64]

4. SYPHILIS MUCOUS PATCHES

Introduction:

Mucous patches are an oral manifestation of secondary syphilis. Roughly 30% of patients with secondary syphilis present with mucous patches.[65]

Aetiology:

Syphilis is caused by the spirochete Treponema pallidum.

Clinical features:

Painless, oval plaques covered with white or gray membrane are found on the tongue, lips, buccal mucosa, and palate. The surface membrane can be removed easily to reveal an underlying raw area. These patches heal spontaneously, but with a high incidence of recurrence.[65]

Other associated findings include papulosquamous eruptions with prominent coppery-colored scaly plaques involving the palms and soles; a moth-eaten alopecia;

and condylomata lata lesions, lymphadenopathy, hepatosplenomegaly, and a residual chancre.[65, 66]

Histopathology:

Histopathologic features are nonspecific. The epithelium may be either ulcerated or hyperplastic. The lamina propria may have increased vascular channels and chronic inflammatory reaction. This inflammatory perivascular infiltrate is principally comprised of lymphocytes and plasma cells.

Diagnosis:

The most specific test is demonstration of the spirochete from the mucous patch on dark-field microscopy. False-positive results are possible in the oral cavity because of morphologically similar bacteria like T. microdentium, T. macrodentium, and T. mucosum.

Confirmation of syphilis should be performed with serology. The serologic tests in secondary syphilis are usually positive. Serologic tests, which are nonspecific and but highly sensitive, include the Venereal Disease Research Laboratory and the rapid plasma reagin. Specific and highly sensitive serologic test for syphilis include the fluorescent treponemal antibody absorption test. This test becomes positive shortly after the development of primary chancre and thereafter is positive for life. [65]

Treatment:

The treatment of choice for syphilis is benzathine penicillin G, 2.4 million units in a single intramuscular dose. Patients should have follow-up serologic titers at 3 and 6 months to ensure a fourfold decline in titers.[39, 65]

D. SYSTEMIC CAUSE:

UREMIC STOMATITIS

Introduction:

Uremic stomatitis is a rare oral manifestation of advanced renal failure, typically characterized by an abrupt onset of adherent white plaques on the ventral and dorsal surfaces of the tongue, floor of the mouth, buccal and labial mucosa and gingiva.[67]

Aetiopathogenesis:

The aetiology is still unclear but it has been suggested that salivary urease enzyme hydrolyzes urea in saliva to ammonia and its compounds, which in turn cause mucosal irritation and burn thereby resulting in oral lesions.

Clinical features:

Patients complain of severe burning pain in the lips and tongue, and an unpleasant taste. Patients' breath may be laced with the smell of urea and ammonia. An abrupt onset of adherent white plaques, anywhere in the oral mucosa is characteristic.[39]

Four forms have been described:

- Erythemopultaceous (characterized by the formation of a pseudomembrane),
- Ulcerative,
- Hemorrhagic, and
- Hyperkeratotic.[67, 68]

Histopathology:

Hyperkeratosis type lesions demonstrate hyperkeratosis and acanthosis of the epithelial layer. Ballooning keratinocytes are also seen with minimal inflammatory infiltrate in the underlying connective tissue. Ulcerative-type lesions demonstrate

epithelial necrosis and a dense inflammatory infiltrate in the underlying connective tissue.

Differential diagnosis:

Frictional keratosis, leukoplakia, carcinoma and oral hairy leukoplakia.[39]

Treatment:

Lesions resolve with the lowering of blood urea nitrogen (BUN) levels and management of renal failure. Scaling of teeth may help as calculus contain urease enzyme. Hydrogen peroxide mouthwashes have also shown to resolve the lesions.[67, 68]

E. DERMATOLOGICAL CAUSES.

1. ORAL LICHEN PLANUS:

Introduction:

The word, lichen planus (LP) is derived from the Greek word "leichen" meaning tree moss and the Latin word "planus" meaning flat. The true cause of lichen planus remains obscure. Treatment is generally geared to alleviating symptoms. Oral lesions are chronic, rarely remissive, and are frequently the source of morbidity.[69]

Epidemiology and aetiology:

Lichen Planus has a varied prevalence based on different geographic regions, but it generally affects approximately 1% to 2% of the world's population.[70] Oral lichen planus constitutes 9% of all white lesions affecting the oral cavity.[71] In India, the prevalence of oral lichen planus ranges between 0.5% and 3% of all white lesions affecting oral cavity. Genital LP is associated with approximately 20% of OLP, whereas cutaneous LP is associated with approximately 15% of oral lichen planus.

However, some studies suggest that the association between cutaneous LP and oral lichen planus is closer to 70% to 77%.[69]

Women are affected more commonly than men.[72] Typically OLP affects individuals in the age group of 30-60years. It is rare in children, but a higher prevalence of OLP is reported in Indian population, suggesting differences in the genetic and\or environmental factors.[70]

Although OLP patients do not seem to have an increased risk of diabetes and hypertension, an association between OLP, diabetes mellitus, and hypertension has been described, the triad being termed the Grinspan syndrome.[73]

The exact aetiology of OLP is unknown. Oral lichen planus is classified as an immunologically mediated disorder, but the origin of putative antigen (endogenous or exogenous) triggering the inflammatory response is unclear.[74]

Genetics, familial clustering, and human leukocyte antigen association, although initially implicated to play a role in the pathogenesis of OLP, are no longer considered critical factors. Polymorphisms and genetic variations in the expression of cytokines have been linked with the risk of developing lesions of OLP and govern whether lesions are limited to the oral cavity (INF- γ), or skin (TNF-α).[75]

Various viruses like Varicella zoster virus, Epstein-Barr virus, cytomegalovirus, human herpes virus, human papilloma virus, and hepatitis C virus (HCV) have been implicated in development of OLP, but only the role of HCV has been extensively studied. The definite pathogenic role of HCV in the development of OLP is still not clear.[74] It is believed that the immune reaction mediated by HCV replication may cause damage to the basal layer cells and result in OLP lesions. Some studies suggest that the hepatitis C virus exerts an indirect effect, possibly mediated

by the modulation of cytokines and lymphokines in the pathogenesis of oral erosive LP.[76]

Even though the association of dental amalgam with increased risk of OLP is reported, the exact mechanism leading to development of OLP is not clear; allergic and/or irritant reaction to mercury in amalgam is postulated.[77]

Stress, anxiety and depression are known to significantly influence the development of OLP.[78]

Pathogenesis:

The triggering factors and pathogenic mechanism of OLP are still not conclusively identified. Most data suggest that OLP is a CD8+ T cell–mediated autoimmune disease. However, there seems to be no definite role of B cells, plasma cells, immunoglobulins, or complements in the mediation of LP.[74] These CD8+ T cells are believed to induce keratinocyte apoptosis and cause epithelial basal cell layer damage via several possible suggested mechanisms: (1) secretion of tumor necrosis factor-α (TNF- α), which binds the TNF- α receptor 1 on the keratinocyte surface; (2) the binding of CD95 (Fas) on the keratinocyte surface with CD95L, which is expressed on the T cell surface; and (3) entry and assimilation of granzyme B secreted by T cells into the keratinocytes by perforin-induced membrane pores.[79]

A variety of factors are believed to trigger the cytotoxicity of CD8+ T cells. One is the expression of major histocompatibility complex class (MHC) II presented by the langerhans cells and keratinocytes, which secrete interleukin-12 (IL-12) thus activating the CD4+ T cells. This activation of CD4+ T cells and subsequent expression of interleukin-2 (IL-2) and interferon- ɾ (INF- ɾ), in association with the MHC class I, which are associated with basal keratinocytes, promotes cytotoxic

CD8+ T cell induction of keratinocytes apoptosis.[74] The immunologic abnormality leads to a delay in the growth of mucosal epithelium that is responsible for hyperkeratosis.[80]

Another nonspecific mechanism in the development of OLP is believed to be the degranulation of mastocytes and activation of matrix metalloproteinases, which degrades components of the extracellular matrix and basal membrane and also participates in the migration of lymphocytes through the epithelium. OLP lesions have more than 60% of degranulated mastocytes in comparison with normal mucosa.[69]

Clinical features:

The oral mucosa may be involved alone or in association with lesions on skin or other mucosa, and oral lesions may precede, accompany or follow lesions elsewhere.[81]

The clinical presentation oral lichen planus is nearly always in a bilateral, symmetric pattern. Lesions are often asymptomatic but may cause soreness. The buccal mucosa, tongue, and gingiva are the most common affected sites, whereas palatal lesions are uncommon.[82]

Clinically, 6 subtypes of OLP are seen individually or in combination: papular, reticular, plaquelike, atrophic, erosive, and bullous.[15] The more common of these are the reticular, erosive, and plaquelike subtypes.[82]

Reticular subtype:

This is the most common form of lichen planus. Characteristically, it presents as a network of small, raised, whitish-gray, lacy lesions known as Wickham striae, which may be surrounded by a discrete erythematous border. The buccal mucosa is the site most commonly involved. They may also be seen on the lateral border of tongue and less often on the gingiva and the lips.

Papular subtype:

This form presents as small white pinpoint papules about 0.5 mm in size. It is rarely seen and being small possibly overlooked during routine oral examination.

Plaque subtype:

This lesion resembles oral leukoplakia and occurs as homogenous white patches. The plaque like form may range from a slightly elevated and smooth to an irregular form and may be multifocal. The primary sites are the dorsum of the tongue and the buccal mucosa.

Atrophic subtype:

The atrophic type is diffuse, red area with white striae at the margins that radiate peripherally. The gingiva is often involved and the condition is commonly referred to as `chronic de squamative gingivitis'. This condition can cause burning sensation particularly when in contact with certain foods.

Bullous subtype:

Appears as small bullae or vesicles that tend to rupture easily leaving behind an ulcerated painful surface. The bullae or vesicles range from a few millimeters to several centimeters in diameter. The bullous form is commonly seen on the buccal mucosa, particularly in the postero-inferior areas adjacent to the second or third molar teeth. The next most common site is the lateral margin of the tongue.

Erosive subtype:

This is the second most common type. The erosions are often large, slightly depressed or raised with a yellow slough, and have an irregular outline. The surrounding mucosa is often erythematous and glazed in appearance. The periphery of the lesion is usually surrounded by reticular or finely radiating keratotic striae.

Erosive LP frequently affects the dorsum and lateral borders of the tongue or the buccal mucosae on both sides.[82]

Modified WHO diagnostic criteria of OLP and oral lichenoid lesions[83]

Clinical criteria:

-Presence of bilateral, more or less symmetric lesions

-Presence of a lacelike network of slightly raised gray-white lines (reticular pattern)

- Erosive, atrophic, bullous, and plaque-type lesions are only accepted as a subtype in the presence of reticular lesions elsewhere in the oral mucosa

In all other lesions that resemble OLP but do not complete the aforementioned criteria, the term "clinically compatible with" should be used.

Histopathologic criteria:

- Presence of a well-defined, bandlike zone of cellular infiltration that is confined to the superficial part of the connective tissue, consisting mainly of lymphocytes

- Signs of liquefaction degeneration in the basal cell layer

- Absence of epithelial dysplasia

When the histopathologic features are less obvious, the term "histopathologically compatible with" should be used.

Final diagnosis of OLP or oral lichenoid lesions: To achieve a final diagnosis, clinical as well as histopathologic criteria should be included.

Oral lichenoid reactions have similar features, clinically and Histologically to OLP, but have a less characteristic morphology.

Histopathology:

Definite diagnostic histologic findings include liquefactive degeneration of the basal cells, colloid bodies (Civatte, hyaline, cytoid), homogeneous infiltrate of lymphocytes in a dense, bandlike pattern along the epithelium-connective tissue interface in the superficial dermis, cytologically normal maturation of the epithelium, sawtooth rete ridges, and hyperkeratosis (orthokeratosis or parakeratosis). In addition, the surface epithelium may show signs of ulceration, typically seen in erosive LP.[71] Several histologic criteria that are considered as exclusionary in diagnosing OLP include the absence of basal cell liquefaction degeneration, polyclonal inflammatory infiltrate, abnormal cytology suggestive of dysplasia, abnormal keratinization, flat rete ridges, and absence of colloid bodies.[84]

Diagnosis:

Biopsy with immunofluorescence is often indicated to exclude keratosis, lichen sclerosus, lupus erythematosus, malignancy and other disorders. Direct immunofluorescence studies of OLP have shown a linear pattern and intense positive fluorescence with antifibrogen outlining the basement membrane zone and cytoidlike bodies with positive Ig M labeling.[85, 69]

Treatment:

OLP does not have a cure, largely because the cause remains unknown. Thus treatment is only supportive and palliative.

The primary goal of OLP management is to alleviate symptoms and to prevent and screen for malignant transformation.[15] Asymptomatic reticular lesions may require simple observation without any medical intervention.

Multiple treatment modalities available for the treatment of OLP are corticosteroids, topical and systemic retinoids, calcineurin inhibitors (cyclosporin,

tacrolimus, pimecrolimus), azathioprine, phototherapy, griseofulvin, hydroxyquinone, dapsone, mycophenolate, thalidomide, low-molecular-weight heparin and CO_2 laser.[74] The treatment modality for OLP depends on factors such as severity of symptoms, location and extent of the lesions in the oral cavity and the patient's overall health, precipitating psychological factors, possible drug interactions, and compliance of the patient.[86]

The most widely used treatment for OLP is topical steroids, which is often required for a prolonged period because of multiple symptomatic episodes. Among topical steroids, clobetasol propionate has been reported to have good efficacy; alternatively, triamcinolone and fluocinonide acetonide, are also effective.[71] It is critical to have contact between the mucosal surface and the steroid drug for a few minutes, and therefore formulations such as an oral rinse or adhesive paste are often recommended.[15] Depending on the extent of oral involvement and access to OLP lesions, elixirs containing triamcinolone, dexamethasone, or clobetasol, or topical steroids in adhesive bases are used. Gingival lesions respond better to topical corticosteroids delivered in occlusive customised vinyl carriers as this method of drug delivery increases contact time of the topical agent to the gingiva. The patient should be advised to refrain from eating or drinking for 1 hour after use of any formulation of topical steroids.[71]

The use of intralesional steroids has been reported, but their efficacy is not well documented.[15]

Systemic steroids are used only for short-term alleviation of acute or refractory flares of OLP, or for widespread LP when other mucosal sites are also affected.[71] Depending on the severity of the lesion and the patient's weight and response to treatment, short courses of high-dose corticosteroids, such as prednisone

0.5 to 1.0 mg/kg/d are used. Prednisone 40 to 80 mg daily is usually effective in bringing about a response, and once a therapeutic response is achieved the steroid should be gradually tapered by reducing the dosage to 5 to 10 mg/d.[69]

Tacrolimus 0.1% ointment has been reported to show efficacy in the treatment of OLP in cases refractory to topical steroids.[15] Although Tacrolimus has proved to have potentially better clinical outcomes, it can cause local irritation, transient taste alterations, possible lesional flare-up after drug withdrawal, and mucosal pigmentation.

Pimecrolimus 1% cream has also been found to be effective in the management of OLP. [87]

Topical retinoids for treatment of OLP have shown less effectiveness than 0.1% Fluocinolone acetonide in orabase. Unclear results have been reported with systemic use.[88]

Extracorporeal photochemotherapy has been tried for treatment of severe refractory erosive OLP.

Surgical removal of OLP, especially isolated plaques or nonhealing erosions, has been performed but limited data exist to advocate this procedure.[71] Cryosurgery and laser surgery have been used to treat OLP, but more studies are needed to prove their efficacy.

Patient education and measures for reducing provoking factors such as mechanical trauma (sharp tooth, ill-fitting prosthesis, amalgam dental fillings), chemical irritation (acidic, spicy food or beverages), and good oral hygiene to reduce bacterial plaque can help in alleviating symptoms of OLP. Tobacco and alcohol use should also be discouraged.[69, 71]

2. Keratosis follicularis

(Darier's disease or Darier-White disease)

Introduction:

Keratosis follicularis is a condition characterized by symmetric waxy, dirty keratotic papules involving the scalp, face, trunk, and flexures of the extremities (seborrheic distribution). As the disease progresses, the neck, shoulders, trunk, buttocks, genitals and oral cavity may be affected.

Aetiopathogenesis:

Keratosis follicularis is an autosomal-dominant genodermatosis. Defects in the tonofilament-desmosomal complex are reported. A defect in the gene encoding the SERCA2 (Ca (2+)-ATPase (ATP2A2) gene at chromosome 12q24.1 has been found as the causative mutation in keratosis follicularis.[89]

Clinical features:

The distinctive lesion of Darier's disease is a firm, rough papule, which is skin coloured, yellow–brown or brown. Seborrhoeic areas of the trunk and face, particularly the scalp margins, temples, ears and scalp, are most often involved. Lesions of the mucous membranes are uncommon, but white umbilicate or cobblestone papules on the palate resembling nicotinic stomatitis may be seen.[90] Intraoral involvement occurs on the dorsal surface of the tongue. Small pebbly keratotic white papules are present on keratinized mucosa of the gingiva and hard palate. Confluent buccal lesions may simulate leukoplakia.[39,90]

Histopathology:

Perivascular infiltration in the dermis and submucosa is typically seen on histologic evaluation. Protrusion of dermal villi into the epidermis, with suprabasal

detachment of the spinous layer forming lacunae containing acantholytic cells is seen. Dyskeratotic round epidermal cells and grains of parakeratotic cells (‘corps ronds’) are also seen within a hyperkeratotic horny layer of the stratum corneum.[91]

Diagnosis:

A complete physical evaluation permits differentiation from other disorders.

3. DISCOID LUPUS ERYTHEMATOSUS (DLE)

Introduction:

Lupus erythematosus (LE) is an autoimmune condition with a broad spectrum of disease manifestations. Chronic cutaneous LE (DLE) primarily affects the skin but the oral mucosa can also be affected.[92]

Clinical features:

Distinctive oral lesions of DLE appear as circumscribed erythematous plaques surrounded by white, radiating striations (“sunburst” appearance). Telangiectasias at the peripheral border may be noted. Scale is not found in the oral cavity.[93] Discoid LE lesions may be painful, particularly when acidic or salty foods are ingested.

Although any mucosal surface may be involved, the buccal mucosa, the vermilion borders, the gingiva, and the labial mucosa are affected in decreasing order of frequency.[94]

The oral lesions can get secondarily infected with Candida. DLE may predispose to oral carcinoma.[39]

Histopathology:

Oral DLE lesions reveal hyperkeratosis, vacuolar degeneration of the basal cell layer, and a thickened basement membrane. An interface mucositis with a mild to

moderate perivascular infiltrate can be seen. Patchy deposits of periodic acid–Schiff–positive material in the basement membrane are noted.

Diagnosis:

Clinical diagnosis is confirmed by histopathology and immunofluorescence. Direct immunofluorescence testing of oral tissue may reveal a granular band of immunoreactants (IgG, IgM, and IgA), complement (C3), and fibrinogen along the basement membrane of long-standing lesions. The presence of anti-ssDNA occurs with widespread active disease.[93]

Differential diagnosis:

Oral DLE plaques may resemble erosive lichen planus. It can be very difficult to distinguish from LP of the lips, both clinically and by histology.[94] Oral DLE plaques, however, are less likely to be symmetric and more frequently are associated with lesions on the vermilion or facial skin. Oral DLE should also be differentiated from leukoplakia.

Treatment:

Topical corticosteroids may expedite the resolution of oral LE lesions. If patients have painful discoid lesions, intralesional corticosteroids are recommended and, if these treatments are unsuccessful, patients may require systemic medications.[93, 94]

4. ORAL MUCOSAL VITILIGO

Introduction:

Vitiligo is an acquired mucocutaneous pigmentary disorder with progressive loss of melanocytes**.** Oral mucosal vitiligo can occur as a part of generalized vitiligo or as an isolated condition.[95]

Epidemiology:

The exact incidence of vitiligo of oral mucosa is not known. Various studies in different populations report an incidence between 10-70%. Oral mucosal vitiligo can occur at any age and affects both sexes equally.[96]

Clinical features:

Oral mucosal vitiligo classically presents with uniformly white macules or patches. Commonly, vitiligo affects the vermilion zone and spares the wet labial mucosa. Other uncommon presentations are sparing of vermilion and band-like involvement of the labial mucosa and involvement of only the most lateral part of the lips.[96]

Histopathology:

Histopathologic evaluation helps to confirm the diagnosis of vitiligo. Lesions typically appear unremarkable with only scant inflammatory cell infiltrate and few or no melanocytes.[97]

Diagnosis:

Diagnosis of oral mucosal vitiligo is made clinically. Diascopy and Wood's lamp examination are helpful in detecting clinically subtle macules of vitiligo.

Differential diagnosis:

This condition needs to be differentiated from recurrent herpes induced depigmentation occurring after attacks of herpes labialis on and around the lips with resulting depigmentation. Depigmentation corresponds to the area of appearance of vesicles.[98]

Treatment:

Depigmentation of the lips and labial mucosa is cosmetically embarrassing and socially stigmatizing in pigmented individuals. Mucosal vitiligo is more resistant to medical therapies. Therefore, treatment is an arduous challenge as the medical management of lip vitiligo often results in a sluggish or poor response.

In early vitiligo, topical tacrolimus and pimecrolimus are effective.

The success rate of various surgical procedures for lip vitiligo varies widely. The cosmetic outcome with individual procedures also varies significantly. Micropigmentation (tattooing) gives immediate results and excellent colour matching has been reported in various studies, especially in dark individuals. Punch grafting has been found to be effective, but it is associated with cobble stoning. Similarly, thin split thickness grafts may be associated with thickened edges and milia formation. Recently, autologous melanocytes transfer via epidermal graft has been found to be an effective and safe therapeutic option for stable vitiligo of the lips.[97, 99]

F. PREMALIGNANT LESIONS :

1. Oral Submucosal Fibrosis

Introduction:

Oral submucosal fibrosis (OSMF) is a progressive, chronic, and premalignant condition characterized by fibroelastic changes and inflammation in the mucosa.[100]The aetiology is still unclear, but a strong correlation exists with consumption of spicy food, chilies, and/or areca nuts, as well as vitamin B deficiency and protein malnutrition. A genetic predisposition involving human lymphocytic antigen (HLA) A10, DR3, DR7, and probably B7 has been found. High prevalence is seen in populations of the Indian subcontinent, affecting persons of all ages and both genders.[101]

Clinical features:

Oral submucosal fibrosis develops insidiously, often presenting with burning sensation while eating hot or spicy foods and a non-specific stomatitis.[102] Later there may be symmetrical fibrosis of the cheeks, lips or palate, which may be symptomless and noted only as bands running through the mucosa. More advanced lesions demonstrate palpable fibrous bands leading to significant restriction in opening of mouth, speech, swallowing, and decrease in salivary flow.[100] Oral submucous fibrosis may predispose to the development of oral carcinoma, which occurs in 2–10% of patients over a period of 10 years.[103]

Histopathology:

Early findings include presence of chronic inflammatory cells, with several eosinophils in the lamina propria. Epithelial atrophy, hyalinized subepithelial

collagen, and loss of vascularity is seen in established cases. Fibrosis of minor salivary glands is also evident.[104]

Diagnosis:

The diagnosis can be confirmed by biopsy.

Differential diagnosis:

Oral submucous fibrosis should be differentiated from amyloidosis, generalized fibromatosis, scleroderma, and oral lichen planus.

Treatment:

Management is difficult and treatment focuses on improving mouth movement and relieving symptoms. Sub-mucosal injections of corticosteroids and collagenases, as well as exercises may be useful in the early stages. Severe fibrosis needs surgical intervention. Pentoxyfylline and lycopene have been used with some effect. Patients require close follow-up because of the high potential of malignant transformation.[104, 105, 106]

2. LEUKOPLAKIA

Introduction:

Leukoplakia is the most common and studied premalignant lesion. The WHO working group defined leukoplakia as "a keratotic white patch or plaque that cannot be scraped off and cannot be characterized clinically or pathologically as any other disease".[8] Therefore, a process of exclusion establishes the diagnosis of the disease.

Epidemiology:

The estimated global prevalence of oral leukoplakia is approximately 2%.[107] In India, a striking variation has been observed with 0.2% in Bihar, 4.9% in Andhra Pradesh[108]and 11.7% in Gujarat.[109]This variation is due to different high risk practices

like smoking and tobacco or gutka chewing. Most cases are seen in the 50–70 age group.[109]Male are affected three times more frequently than females.[110]

Aetiopathogenesis:

The exact aetiology of leukoplakia remains unknown. Many physical agents have been implicated, including tobacco, alcohol, chronic friction, electro-galvanic reaction between unlike restorative metals, and ultraviolet radiation.[111] Tobacco smoking is by far the most accepted factor and smokers are six times more prone to leukoplakia than nonsmokers. There are conflicting results related to the possible role of human papilloma virus infection.

Clinical features:

Leukoplakias vary in size. Oral leukoplakia can present clinically in different morphological patterns:

1. Homogeneous type of leukoplakia is a white patch with variable appearance, the surface may be traversed by small cracks or fissures. Common in the buccal (cheek) mucosa and usually of low premalignant potential, and Speckled or nodular type(non-homogenous type):
2. Non-homogeneous leukoplakias are nodular, verrucous and speckled that consist of white patches or nodules in a red, often eroded, area of mucosa. They have a high risk of malignant transformation.[112]

Proliferative verrucous leukoplakia (PVL) is a subtype of verrucous leukoplakia, being characterized by multifocal presentation, resistance to treatment and a high rate of malignant transformation.[113]

Leukoplakias are known to occur at almost all places in oral cavity. However, they are most frequent in buccal mucosa and mandibular mucosa. Two-third of the oral leukoplakias occurs at the vermillion, buccal mucosa and gingival surface.

High-risk sites for malignant transformation include the soft palate, ventrolateral tongue and floor of the mouth.[112]

Histopathology:

To fulfill a diagnosis of leukoplakia, no other definable lesion should be observed microscopically. Benign lesions display hyperkeratosis with or without acanthosis. A variable number of chronic inflammatory cells is seen in the underlying connective tissue. Epithelial dysplasia is commonly found in nonhomogeneous lesions. [114]

Diagnosis:

There are no signs or symptoms that reliably predict whether a leukoplakia will undergo malignant change, and thus histology must be used to detect dysplasia.[111]

Scalpel or punch biopsy is therefore generally indicated and is mandatory for those leukoplakias that exhibit the following characteristics:

• Found in patients with previous or concurrent head and neck cancer

• are non-homogeneous, i.e. have red areas and/or are verrucous and/or are indurated

• in a high-risk site such as floor of mouth or tongue

• focal

• with symptoms

• without obvious aetiological factors.

Differential diagnosis:

Lichen planus, cheek biting, frictional keratosis, smokeless tobacco-induced keratosis, nicotinic stomatitis, leukoedema, white sponge nevus, candidiasis, and lupus.[112]

Prognosis and malignant transformation:

The prognosis of leukoplakia varies. There is clear evidence of the malignant potential of some oral leukoplakias. Overall, around 2–5% of leukoplakias become malignant in 10 years and 5–20% of leukoplakias are dysplastic. Of leukoplakias with dysplasia, 10–35% proceed to carcinoma.[111, 112]

Malignant transformation of leukoplakias depends on multiple factors:

- Female gender (more in females)
- Long duration of leukoplakia
- Leukoplakia in nonsmokers (idiopathic leukoplakia)
- Location on the tongue and/or floor of the mouth
- Size > 200 mm^2
- Nonhomogeneous type
- Presence of Candida albicans
- Presence of epithelial dysplasia.

At present, it is not possible to reliably predict which dysplastic lesions will progress to carcinoma and which will regress.[115] Over the recent past, much effort has gone into identifying tissue markers of malignant potential,[116] in particular the genetic changes that underlie oral carcinoma, resulting in the identification of biomarkers such as DNA ploidy,p53, and chromosome 3 and 9 changes that might predict neoplastic change in potentially malignant lesions.[117]

Treatment:

Leukoplakias have a relatively low risk of malignant transformation. Hence, the recommended treatment should produce the fewest adverse effects.

Initial treatment involves the elimination of all possible known risk factors, following which the patient should be re-examined 3 months later. If the lesion regresses, no further treatment is indicated. Persistent lesions warrant a biopsy.

"Benign" biopsy diagnosis may over time undergo dysplastic changes; therefore regular follow-up of these lesions is of utmost importance.

Surgery (scalpel or laser excision) is an obvious option for the management of leukoplakias with a high predisposition to malignant transformation.

Other treatment modalities include cryosurgery, retinoids, b-carotene, bleomycin, calcipotriol, photodynamic therapy, and vitamin A.

No definite measures have been devised for the prevention of development of leukoplakia or oral carcinoma. Avoidance of smoking and alcohol, and consumption of fresh fruits and vegetables may have a protective effect. Oral cancer screening programmes can help in early diagnosis of these lessons, and improve the prognosis and treatment success.[118, 119]

G. MALIGNANCY.

SQUAMOUS CELL CARCINOMA

Introduction:

More than 90% of malignant neoplasms in the mouth are squamous cell carcinomas. Oral cavity squamous cell carcinoma (OCSCC) accounts for 2% to 3% of all malignancies.[120]

Epidemiology:

There is marked inter-country and intra-country ethnic differences in incidence and mortality from OSCC.[121] In many countries there is evidence for an

increase in oral squamous cell carcinoma (OSCC) over recent years,[122] especially in young persons. In most regions of the world, about 40% of head and neck cancers are known to be squamous cell carcinomas developing in the oral cavity. Similarly, in Asia, 80% of head and neck cancers are usually found in the oral cavity and oropharynx.[120]

Oral squamous cell carcinoma mainly afflicts patients older than 40 years of age, whereas the tumour remains very uncommon among young adults.[123]

A plethora of lifestyle and environmental factors has been identified as the risk factor for oral cancers. However Tobacco and alcohol are the two most important known risk factors for the development of OSCC. Cofactors include dietary factors, immunodeficiency and micro-organisms like candida and HPV 16/18.[122]

Premalignant conditions that can progress to OSCC include:[124, 125]

- Erythroplakia
- leukoplakia
- lichen planus—there are also cases of dysplasia with a lichenoid appearance (lichenoid dysplasia)
- HPV infection
- discoid lupus erythematosus
- submucous fibrosis
- atypia in immunocompromised patients
- dyskeratosis congenita
- Fanconi anaemia
- Paterson–Kelly syndrome (sideropenic dysphagia, Plummer–Vinson syndrome).

Clinical features:

OSCC may present as the following.[121, 122]

- A red lesion (erythroplasia)
- A granular ulcer with fissuring or raised exophytic margins
- A white or mixed white and red lesion
- A lump sometimes with abnormal supplying blood vessels
- An indurated lump/ulcer, i.e. a firm infiltration beneath the mucosa
- A non-healing extraction socket
- A lesion fixed to deeper tissues or to overlying skin or mucosa
- Cervical lymph node enlargement, especially if there is hardness in a lymph node or fixation.

Nearly 30% of all squamous cell carcinomas affect the lip; some 25% affect the tongue, the most common intraoral site.[121] Most intraoral cancers involve the posterolateral border of the tongue and/or the floor of the mouth (the 'graveyard' area). In betel chewing, the buccal mucosa is a common site for carcinoma.[122]

Histopathology:

Findings range from well-differentiated (lowgrade) lesions, in which the tumors resemble normal epithelium, to poorly differentiated or anaplastic (high-grade) lesions, where the tumor cells lose their resemblance to the epithelial tissues.[126]

Tumour consists of irregular masses of epidermal cells that proliferate downward into the dermis. The invading tumor masses are composed in varying proportions of normal squamous cells and of atypical (anaplastic) squamous cells. The number of atypical squamous cells is higher in the more poorly differentiated tumors. Atypicality of squamous cells expresses itself in such changes as great variation in the size and shape of the cells, hyperplasia and hyperchromasia of the nuclei, absence of

intercellular bridges, keratinization of individual cells, and the presence of atypical mitotic figures. Keratinization often takes place in the form of horn pearls, which are very characteristic structures composed of concentric layers of squamous cells showing gradually increasing keratinization toward the center. The center shows usually incomplete and only rarely complete keratinization.[127]

Diagnosis:

Early diagnosis is important since it improves prognosis and minimizes the extent of interventions.[127] There should be a high index of suspicion, especially of a solitary lesion present for over 3 weeks: biopsy is invariably indicated. Scalpel biopsy is required and toluidine blue staining may help highlight the most appropriate area for biopsy.[128]

The whole oral mucosa should be examined. Frank tumours should be inspected and palpated to determine extent of spread; for tumours in the posterior tongue, examination under general anaesthesia may facilitate this. OSCC should be staged according to the TNM classification of the International Union against Cancer.

Treatment:

The prognosis of OSCC is around 30% survival at 5 years. The treatment of oral cancer involves one or a combination of radiotherapy, surgery and, very occasionally, chemotherapy. Serious consideration must be given to the complications of the various modalities and the quality of life achieved. [129, 130, 131]

H. MISCELLANEOUS:

MUCOCELE.

(• Mucous retention cyst • Ranula • Mucocele • Myxoid cyst of lip)

Mucoceles are commonly seen on lower labial mucosa, usually resulting from the escape of mucus into the lamina propria from a damaged minor salivary gland duct.[132]

Mucoceles appear as painless dome-shaped, translucent, whitish blue papules or nodules.[133]

The cysts can be excised but they also respond well to cryosurgery, using a single freeze–thaw cycle.[134]

MATERIALS AND METHODS

MATERIALS AND METHODS

The study was carried out from January 2011 to September 2012. All patients coming to Dermatology OPD at R.L.JALLAPA HOSPITAL & RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR were examined and evaluated for white lesions of the oral mucosa.

Patients with oral white lesions were enrolled in the study. A detailed history of all such patients was taken including general status of the patient, systemic diseases, medications used, alcohol and tobacco consumption, habits (trauma) and prosthetic or other appliances use. Complete clinical and a thorough oral cavity examination was performed. During the clinical examination the following elements were analyzed: morphology of the lesion, anatomical location and extension.

The clinical diagnosis was established and classified. Correlation, if any, with aetiological factors was assessed. In relevant cases, necessary investigations to establish the definitive diagnosis and to evaluate the risk factors, if any, were done. The data collected was documented in the prescribed proforma.

Criteria for selection:

a. Inclusion criteria:

Patients with oral white patches and/or plaques belonging to all age groups.

b. Exclusion criteria:

Patients with oral ulcers and erosive lesions were excluded.

OBSERVATIONS AND RESULTS

OBSERVATIONS AND RESULTS

A total of 197 cases having oral white lesions fulfilling inclusion criteria attending to dermatology OPD at R.L. Jalappa Hospital and Research centre, Tamaka, Kolar district, Karnataka during the period of January 2011- September 2012 were enrolled in this clinical study.

Prevalence of oral white lesions:

Table 1. Prevalence of oral white lesions

Total number of patients screened. no.	Patients with oral white lesions. no.	Prevalence (%)
18000	197	1.09%

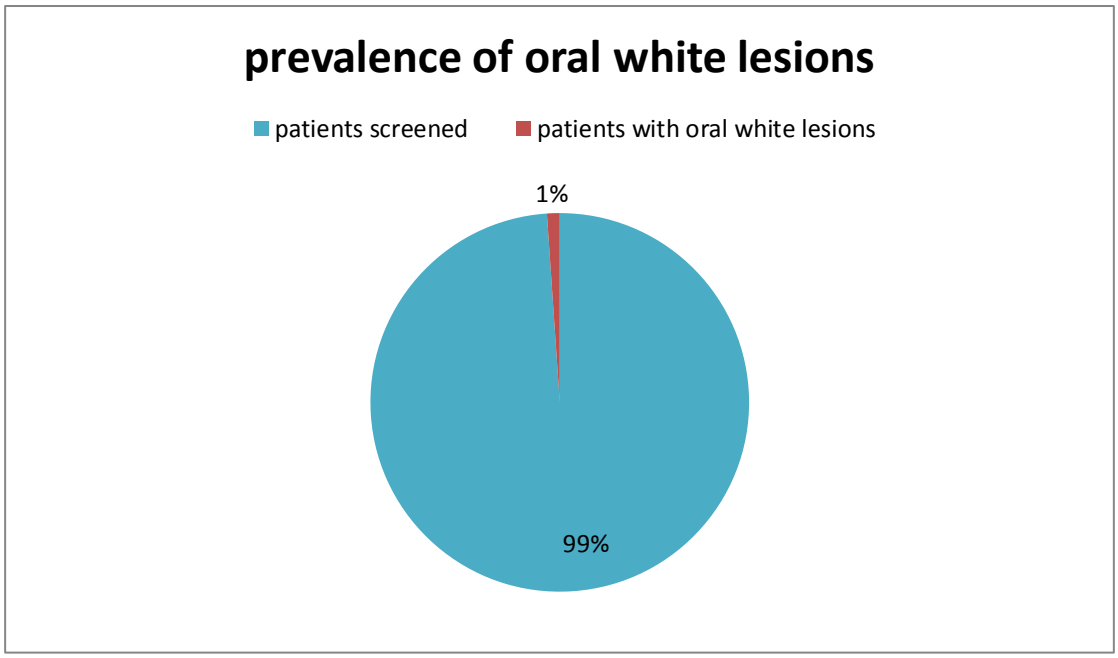

Diagram.1. Prevalence of oral white lesions.

- Out of the 18000 consecutive patients attending our out- patient department, 197 patients had oral white lesions, with a prevalence of 1.09%.

AGE DISTRIBUTION:

Table. 2. Age wise distribution of patients with oral white lesions. (no.)

Oral white lesions	<20years	20-40years	41-60years	>60years	Total (%)
OLP	0	22	16	2	**40(20.3%)**
Candidosis	0	3	20	10	**33(16.7%)**
Mucosal vitiligo	9	11	7	5	**32(16.2%)**
Fordyces spots	5	15	8	2	**30(15.2%)**
Tobacco pouch keratosis	0	9	3	3	**15(7.6%)**
Morsicatio buccarum	0	8	2	0	**10(5.1%)**
OSCC	0		3	4	**7(3.5%)**
Frictional keratosis	0	2	2	1	**5(2.5%)**
Retention cyst	3	2	0	0	**5(2.5%)**
Leukoplakia	0	1	2	2	**5(2.5%)**
Warts			2	2	**4(2.03%)**
Dariers disease	0	3	0	0	**3(1.5%)**
WSN	0	2	0	0	**2(1.01%)**
OSF	0	2	0	0	**2(1.01%)**
Leukoedema	0	1	1	0	**2(1.01%)**
DKC	0	1	0	0	**1(0.5%)**
OHL	0	0	1	0	**1(0.5%)**
Total	**17(8.6%)**	**82(41.6%)**	**67(34.1%)**	**31(15.7%)**	**197 (100%)**

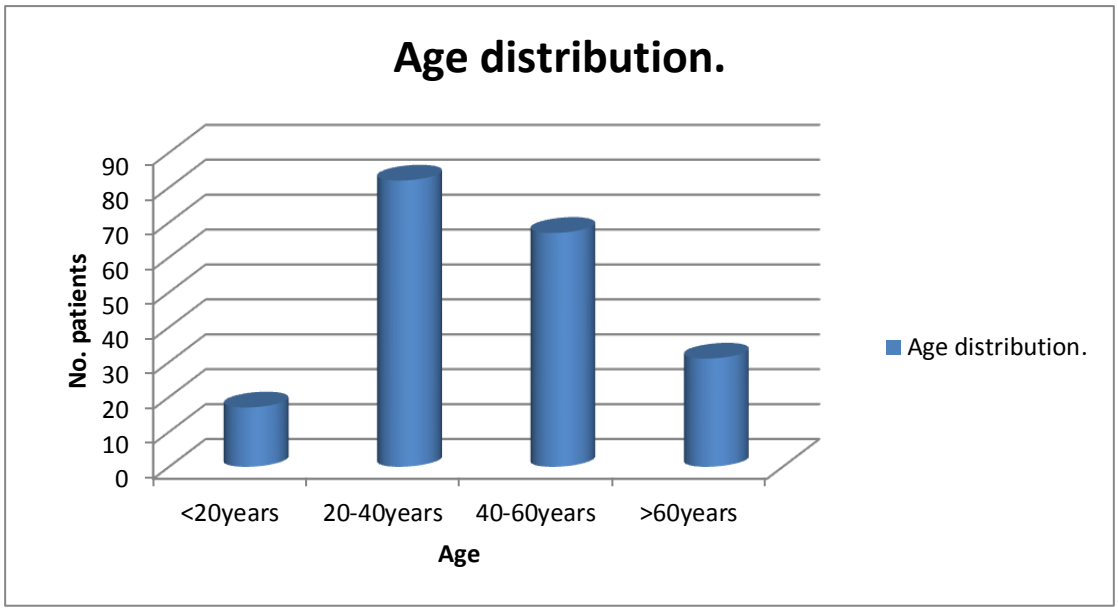

Diagram.2- Age wise distribution of oral white lesions.

- Majority of the patients, 82(41.6%) were in the age group of 20-40 years, followed by 58 cases (29.4%) in the age group 40-60years and 27 cases (13.6%) in the age group > 60years. The youngest patient was 7years and the oldest was 75years of age.

Sex distribution:

Table 3. Sex wise distribution of patients with oral white lesions.

Sex	Total (no.)	Percentage (%)
Males	108	54.8%
Female	89	45.2%
Total	**197**	**100%**

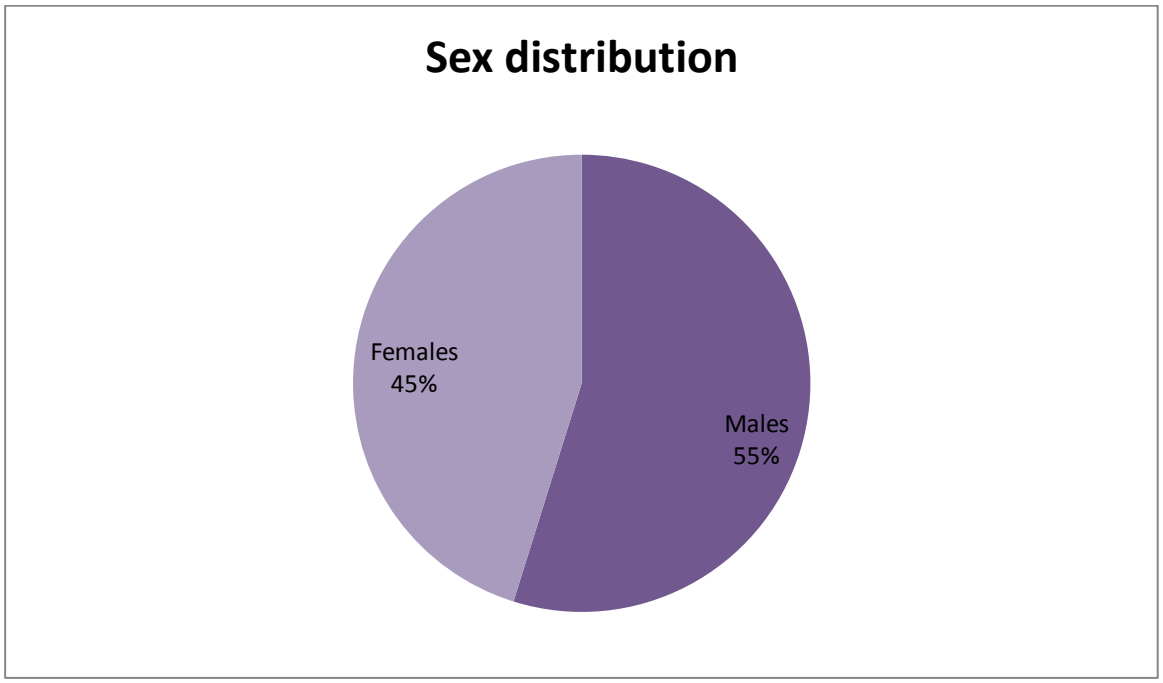

Diagram.3- Sex wise distribution of patients with oral white lesions

- Males (54.8%) were affected more than females (45.2%) in our study.

Table 4. Distribution of various oral white lesions according to age and sex.

Oral white lesion	<20 yrs		20-40 yrs		41-60 yrs		>60 yrs		Total
	M	F	M	F	M	F	M	F	
OLP	0	0	7	15	6	10	0	2	**40(20.3%)**
Candidosis	0	0	3	0	13	7	7	3	**33(16.7%)**
Mucosal vitiligo	3	6	5	6	2	5	3	2	**32(16.2%)**
Fordyces spots	4	1	11	4	6	2	2	0	**30(15.2%)**
Tobacco pouch keratosis	0	0	4	5	2	1	3	0	**15(7.6%)**
Morsicatio buccarum	0	0	3	5	0	2	0	0	**10(5.1%)**
OSCC	0	0	0	0	2	1	2	2	**7(3.5%)**
Frictional keratosis	0	0	0	2	1	1	0	1	**5(2.5%)**
Retention cyst	1	2	0	2	0	0	0	0	**5(2.5%)**
Leukoplakia	0	0	1	0	2	0	1	1	**5(2.5%)**
Warts	0	0	0	0	2	0	2	0	**4(2.03%)**
Darier's disease	0	0	2	1	0	0	0	0	**3(1.5%)**
WSN	0	0	2	0	0	0	0	0	**2(1.01%)**
OSF	0	0	2	0	0	0	0	0	**2(1.01%)**
Leukoedema	0	0	1	0	1	0	0	0	**2(1.01%)**
DKC	0	0	1	0	0	0	0	0	**1(0.5%)**
OHL	0	0	0	0	1	0	0	0	**1(0.5%)**
Total	8	9	42	40	38	29	20	11	
Total	17(8.6%)		82(41.6%)		67(34.1%)		31(15.7%)		**197**

- More percentage of females (53.1%) were affected in the age-group < 20 years as compared to males (46.9%), whereas in all other age-groups, males were more in number.

Presenting symptoms:

Table 5. Presenting symptoms of oral white lesions.

Presenting symptoms	Patients*(n=197)	Percentage(%)
Burning sensation	16	8.1%
Discoloration	59	29.9%
Discomfort	48	24.3%
Swelling	14	7.1%
No symptoms	60	30.4%

* Some patients presented with multiple symptoms associated with oral white lesions.

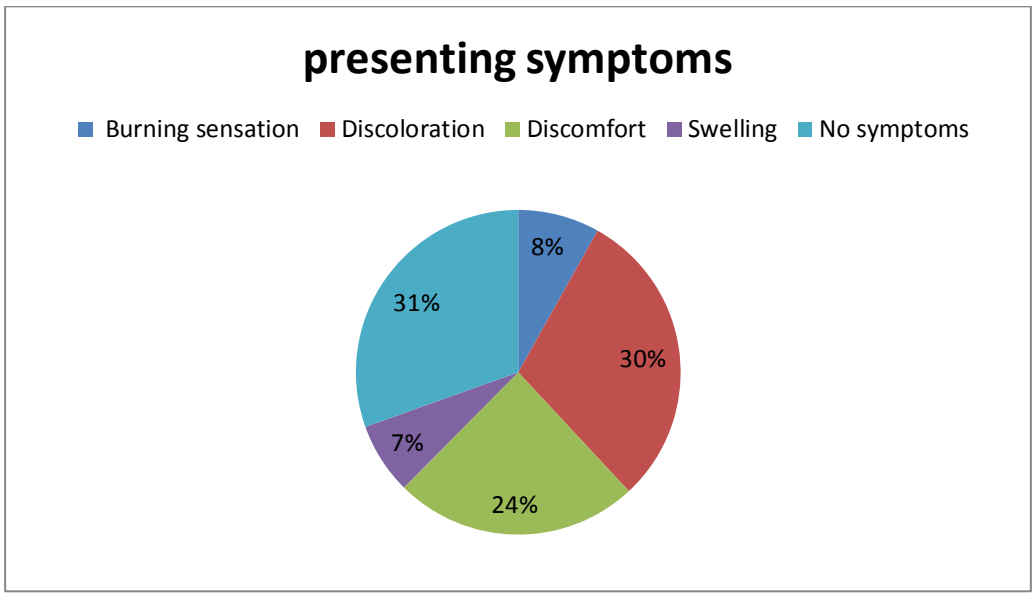

Diagram .4 Presenting symptoms.

- Out of 197 cases, 60 patients (30.4%) were asymptomatic but had oral white lesions on clinical examination. Discoloration of mucosa was the main presenting complaint in 59 patients (29.9%), next commonest were discomfort in 48 patients (24.3%) and burning in 16 patients (8.1%).

Duration of disease:

Table 6. Distribution of oral white lesions according to duration.

Duration	Patients (n=197)	Percentage (%)
Since childhood	2	1.01%
<6weeks	150	76.1%
>6weeks	45	22.8%
Total	**197**	**100%**

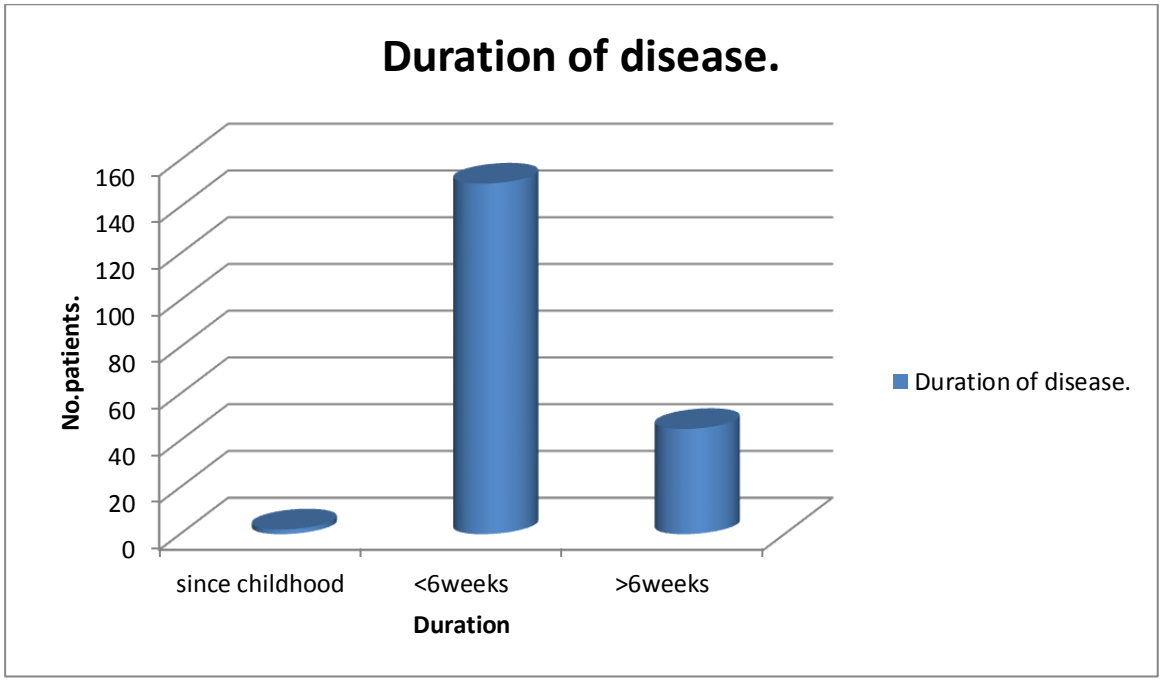

Diagram.5 Duration of disease.

- Most of the patients in the study, 150(76.1%) had symptoms of less than six weeks duration. Only 2 patients (1.01%) had oral white lesions since childhood.

Risk factors associated with oral white lesions:

Table. 7. Associated risk factors with oral white lesions. no.(%)

Risk factors	Males (%)	Females (%)	Total (%)
Smoking	83	00	83(42.1%)
Alcohol	66	04	70 (35.5%)
Tobacco	58	46	104 (52.7%)
Betel and areca nut	36	54	90 (45.6)
Dentures/ amalgam	7	12	19 (9.6%)
Stress	38	52	90 (45.6%)
Underlying disease	27	15	42 (21.3%)

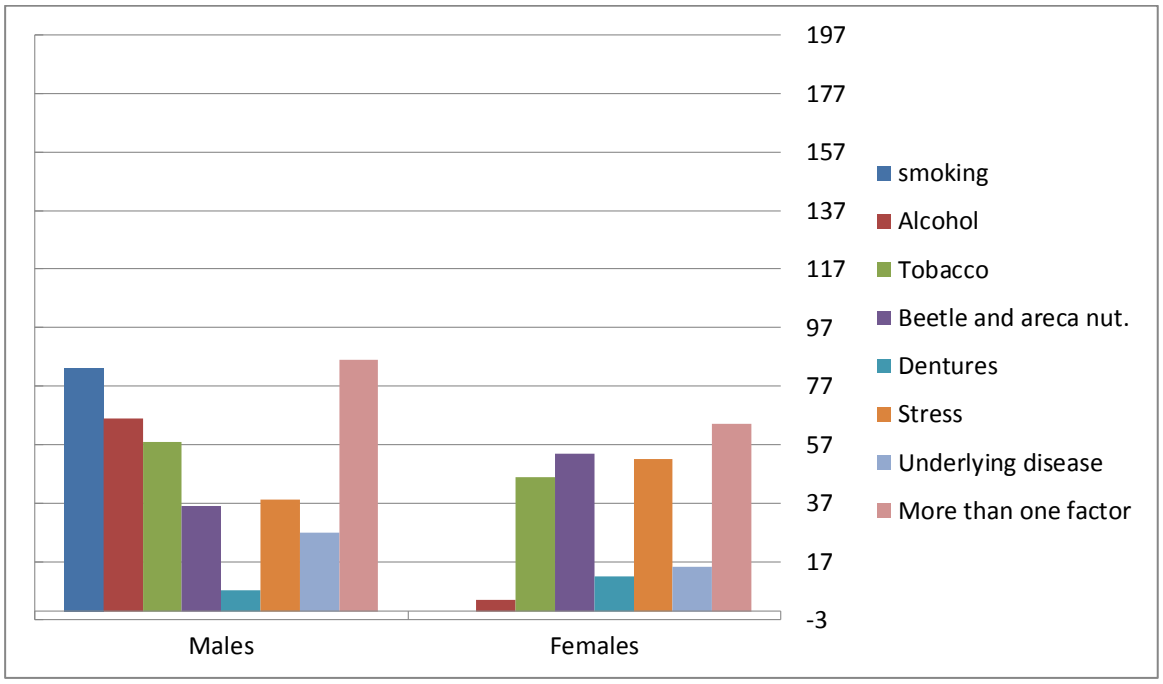

Diagram.6- Risk factors associated with oral white lesions.

- Most of the patients had more than one risk habit for the development of white lesions in oral cavity. In 83(42.1%) males, smoking was the most common individual risk factor. But in females, betel and areca nut (60%) chewing followed by other forms of tobacco (44%) usage and stress (57.7%) were the common associated risk factors elicited.

Distribution of white lesions in oral cavity:

Table 8. Distribution of white lesions in oral cavity.

Sites affected	Number of cases* (n=197)	Percentage (%)
Buccal mucosa	99	50.2%
Labial mucosa	36	18.2%
Tongue	33	16.7%
Lips	22	11.1%
Hard palate	7	3.5%
Total	**197**	**100%**

*>1 site may be involved.

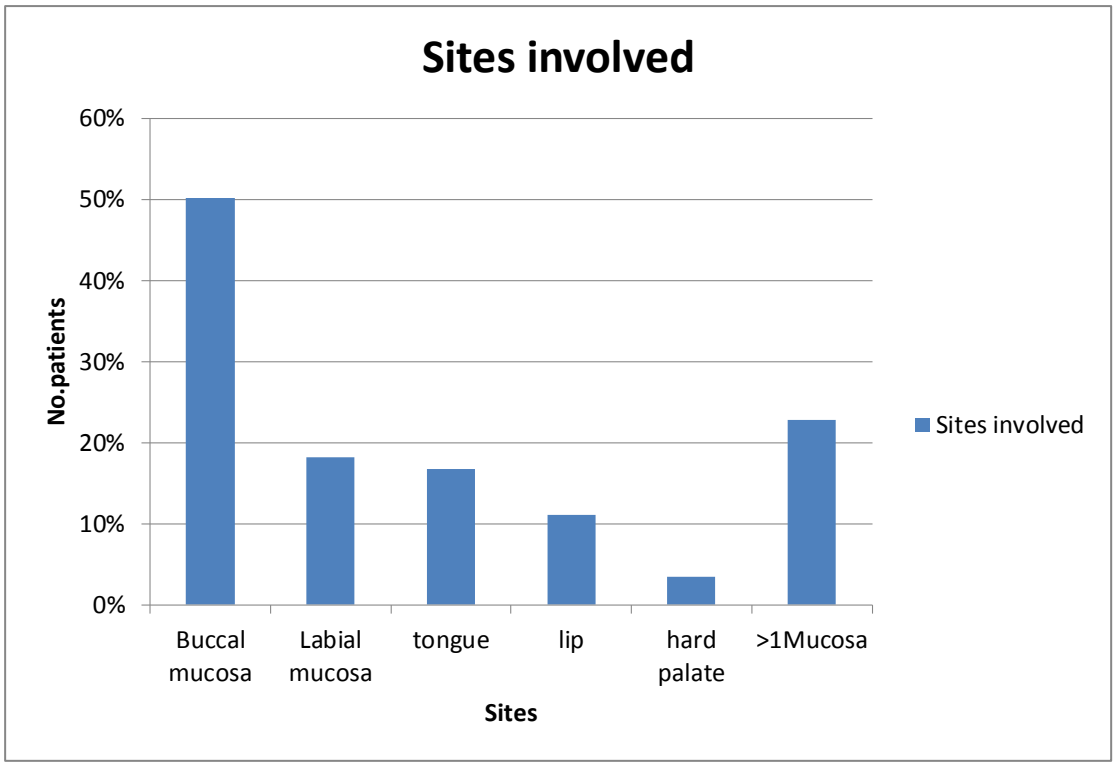

Diagram .7 Distribution of oral white lesions in oral cavity.

- White lesions were more common on buccal mucosa as seen in 99 patients (50.0%), followed by labial mucosa in 36 patients (18.2%) and tongue in 33 patients (16.7%). In 45 patients (22.8%) having oral white lesions, multiple sites were affected.

Morphology of lesions:

Table. 9. Morphology of oral white lesions

Morphology.	Males no	Females no	Total No. (%)
Plaques	39	24	63 (31.9%)
Patches	12	08	20 (10.1%)
Macules	13	16	29 (14.7%)
Papules	18	12	30 (15.2%)
Swelling	4	3	7(3.5%)
Atrophy	6	2	8 (4.06%)
More than one morphology	24	16	40 (20.3%)
Total	**116**	**81**	**197(100%)**

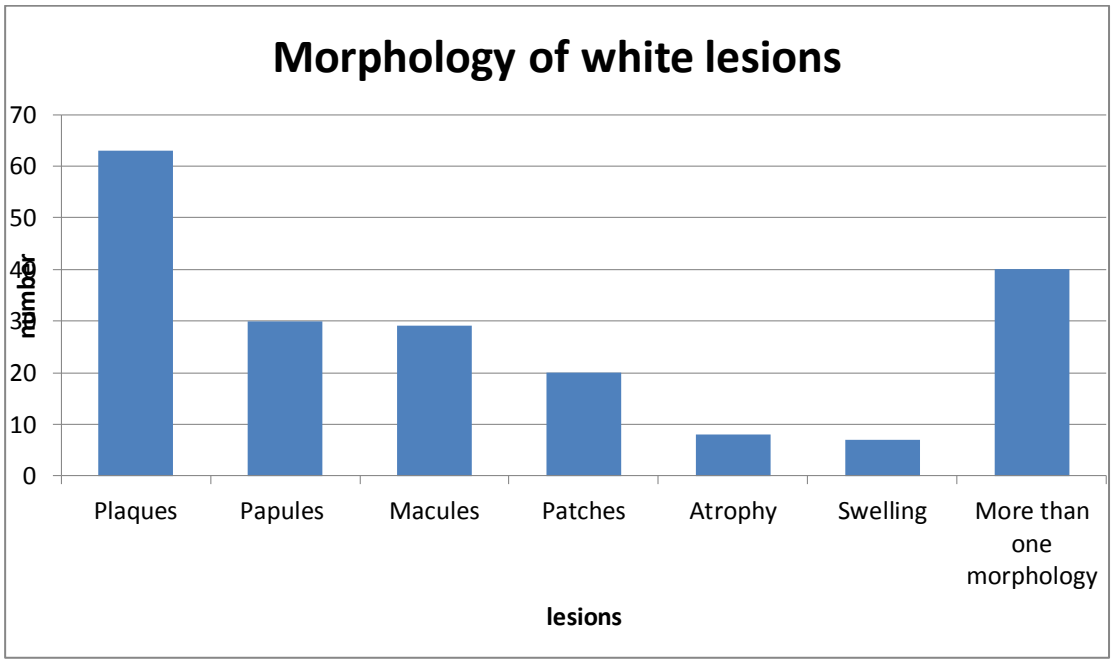

Diagram .8 Morphology of oral white lesions.

- White lesions of different morphology were seen. The predominant lesions were plaques in 63 patients (31.9%), followed by papules in 30 patients (16.7%) and macules in 29 patients (15.7%).

Aetiological classification of oral white lesions:

Table .10. Aetiological classification of oral white lesions.

Aetiology	Total patients. no. (%)	Percentage (%)
Developmental	34	17.2%
Inflammatory	31	15.7%
Infective	38	19.2%
Oral manifestation of dermatological condition	75	38.07%
Premalignant	7	3.5%
Malignant	7	3.5%
Miscellaneous	5	2.5%
Total	**197**	**100%**

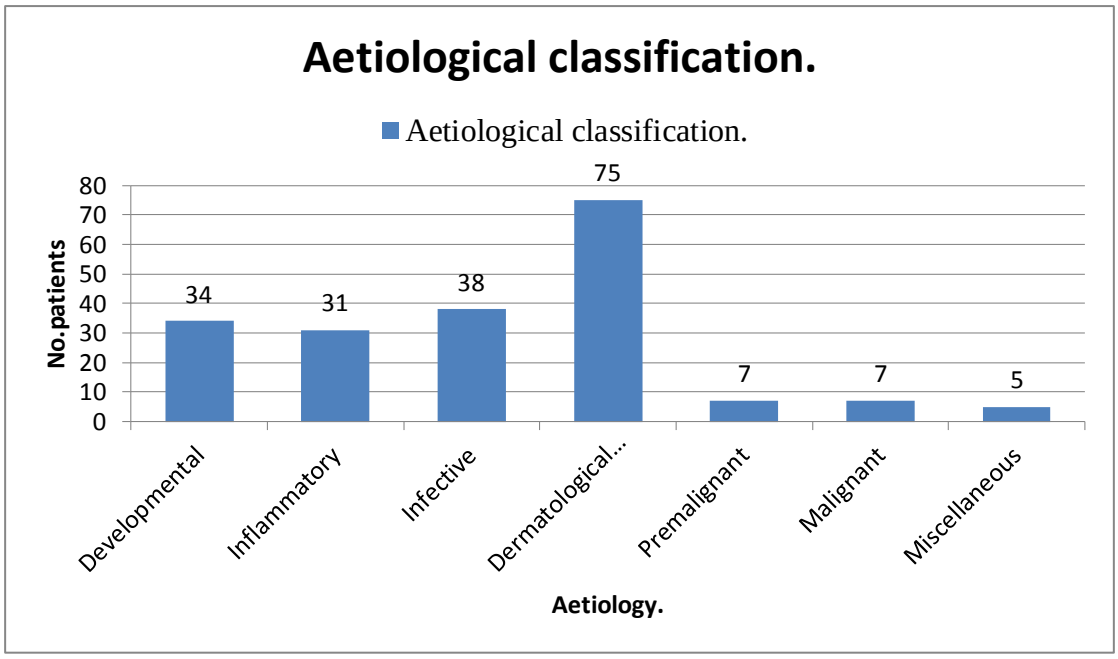

Diagram . 9 Aetiological classification of oral white lesions.

- Oral white lesions secondary to dermatological (38.1%) conditions were the most common aetiology followed by infective (19.2%), developmental (17.2%) and inflammatory (15.7%).

Clinical types of oral white lesions:

Table 11. Clinical types of oral white lesions.

Clinical types of oral white lesions	Number (n=197)	Percentage	Prevalence*
Oral lichen planus	40	20.3%	0.22%
Candidosis	33	16.7%	0.18%
Mucosal vitiligo	32	16.2%	0.17%
Fordyce spots	30	15.2%	0.16%
Tobacco pouch keratosis	15	7.6%	0.08%
Morsicatio buccarum	10	5.1%	0.05%
OSCC	7	3.5%	0.03%
Frictional keratosis	5	2.5%	0.02%
Mucosal retention cyst	5	2.5%	0.02%
Leukoplakia	5	2.5%	0.027%
Warts	4	2.1%	0.022%
Dariers disease	3	1.5%	0.016%
White sponge naevi	2	1.1%	0.011%
OSF	2	1.1%	0.011%
Leukoedema	2	1.1%	0.011%
DKC	1	0.5%	0.005%
OHL	1	0.5%	0.005%

*prevalence calculated based on total number of patients screened 18000

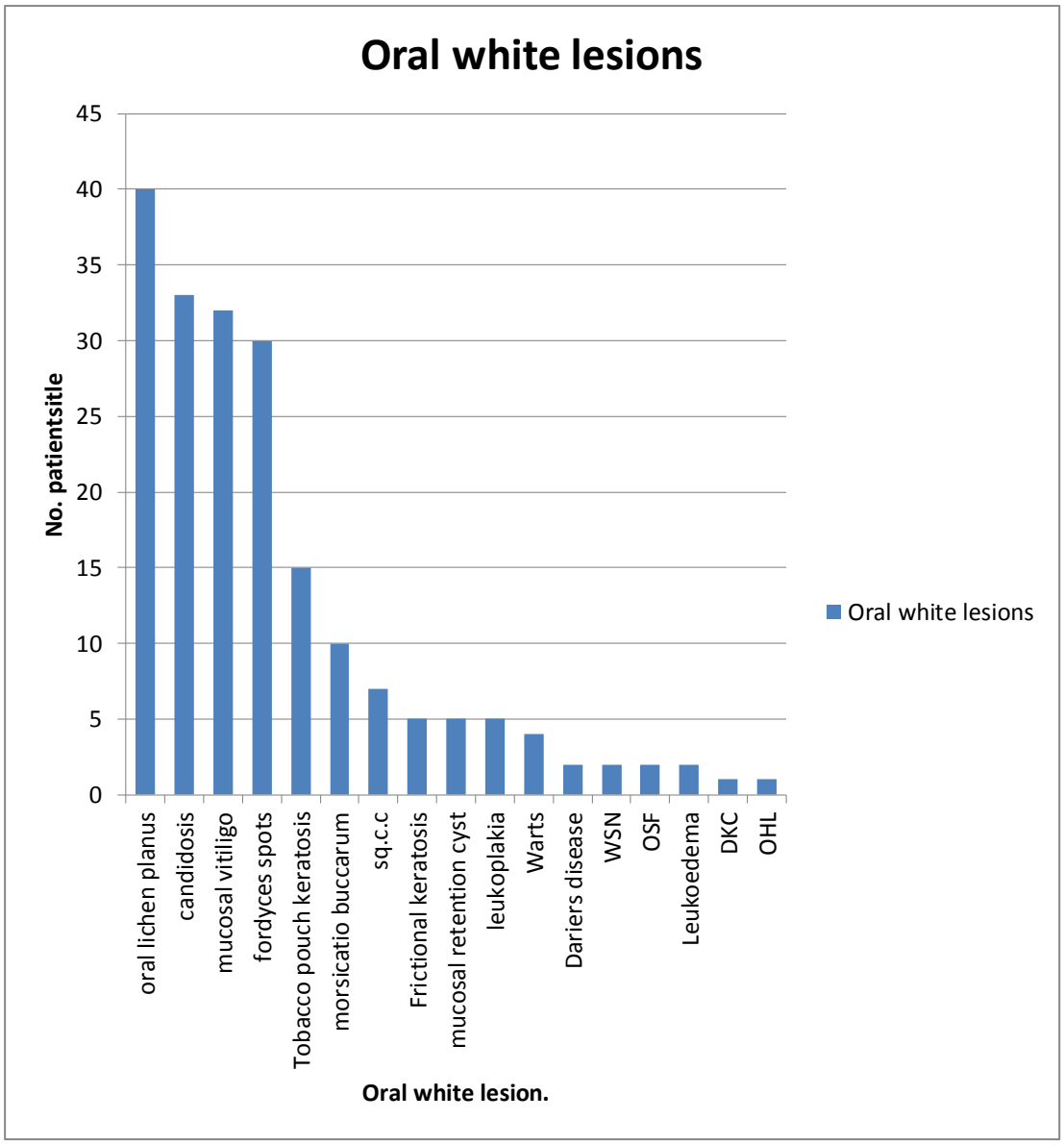

Diagram.10 Clinical types of oral white lesions.

- A total of seventeen clinical types were diagnosed. The most common of which was lichen planus seen in 40 patients (20.3%), followed in decreasing order by candidosis (16.7%), mucosal vitiligo (16.2%), Fordyce spots (15.2%), tobacco pouch keratosis (7.6%) and Morsicatio buccarum (5.1%).

Oral lichen planus

Table 12 Demographic and disease characteristics of oral lichen planus.

	Male (%) n=13	Female (%)n=27	Total n=40 (%)
Age group			
<20yrs	00	00	00 (0)
20-40yrs	07	15	22(55%)
41-60yrs	06	10	16(40%)
>60yrs	00	02	02(5%)
Subtype			
Reticular type	07	15	22(55%)
Plaque type	04	08	12(30%)
Atrophic type	02	04	06(15%)
Risk factor*			
Smoking	08	00	08(20%)
Alcohol	03	01	04(10%)
Betel and areca nut	06	16	22(55%)
Amalgam	04	18	22(55%)
Stress	06	15	21(52.5%)
Site*			
Buccal mucosa	07	14	21(52.5%)
Labial mucosa	03	06	09(22.5%)
Tongue	05	09	14(35%)

* >1 factor and site

- The prevalence of oral lichen planus was 0.22% in the present study.

- Age range of our patients was 20 to 65 years, with the highest prevalence seen in the age group of 20-40 years.
- It was more frequently observed in females (67.5%) in comparison to males (32.5%). Females showed significantly higher prevalence in the age groups of 20-40(37.5%) and 40-60(25%). Males were affected almost equally between the ages of 20-40(17.5%) and 40-60(15%) years.
- In both males and females, reticular (55%) subtype predominated followed by the plaque (30%) and atrophic(15%) subtypes.
- Betel and areca nut, amalgam and stress were the predominant (55%) risk factors associated with OLP.
- The buccal mucosa was predominately involved in 52.5%. The tongue and the labial mucosa were affected in 35 % and 22.5% respectively.

Oral candidosis:

Table. 13. Demographic and disease characteristics of candidosis

	Male (n=23)	Female (n=10)	Total (n=33)(%)
Age			
<20 years	0	00	00
20-40 years	03	00	03(9.1%)
40-60 years	13	07	20(60.6%)
>60 years	07	03	10(30.3%)
Subtypes			
Pseudomembranous	18	08	26(78.7%)
Plaque type	05	02	07(21.2%)
Species			
C.albicans	12	06	18(54.5%)
C.tropicalis	03	01	04(12.1%)
Site *			
Tongue	18	10	28(84.8%)
Buccal mucosa	03	00	03(9.1%)
Risk factors#			
Medical illness	20	08	28(84.8%)
Smoking	15	00	15(45.4%)
Alcohol	11	00	11(33.3%)
Betel and areca nut	08	07	15(45.4%)
Dentures	04	05	09(27.2%)
Stress	04	02	06(18.1)

*>1 site can be involved

#>1 risk factor can be present

- The prevalence of oral candidosis in our study population was 0.18 %.
- Pseudomembranous candidosis was the most common subtype (78.7%).
- C.albicans was isolated in 54.5% and C.tropicalis in 12.1% cases.
- It was more frequently observed in males (69.2%) than in females (30.7%).
- Candidosis was more in the age group of 40-60 (60.6%) years.
- Tongue (84.8%) was the most common site affected.
- Medical illness (84.8%) was the common underlying predisposing factor for oral candidosis.

Oral mucosal vitiligo:

The prevalence of oral mucosal vitiligo was 0.17 % and was observed more in females (59.37%) compared to males (40.6%). The most frequent site of involvement was lips and labial mucosa (43%) followed by buccal mucosa (40%). Oral involvement was a part of vitiligo vulgaris (71.8%) in majority of cases.

Fordyce's spots:

The prevalence of Fordyce's spots was (0.16%). It was more observed in 20-40 years age group, with male preponderance (76.6%). Lip and Labial mucosa (40%) was the most frequent site affected.

Tobacco pouch keratosis:

In our study, the prevalence of tobacco pouch keratosis was (0.08%). It was found more in adults (80%) and elderly (20%) population, with male (60%) preponderance.

Morsicatio buccarum:

The prevalence of morsicatio buccarum in our study was 0.05%. Females (70%) were affected more than males (30%), especially in the age group of 20-40 (80%) years.

Others:

Squamous cell carcinoma (0.03%), leukoplakia (0.0027%), frictional keratosis (0.02%), retention cyst (0.02%), warts (0.022%), genodermatoses (0.033%), oral submucosal fibrosis (0.011%), leukoedema (0.011%) and oral hairy leukoplakia (0.011%) constituted less frequently seen oral white lesions.

.

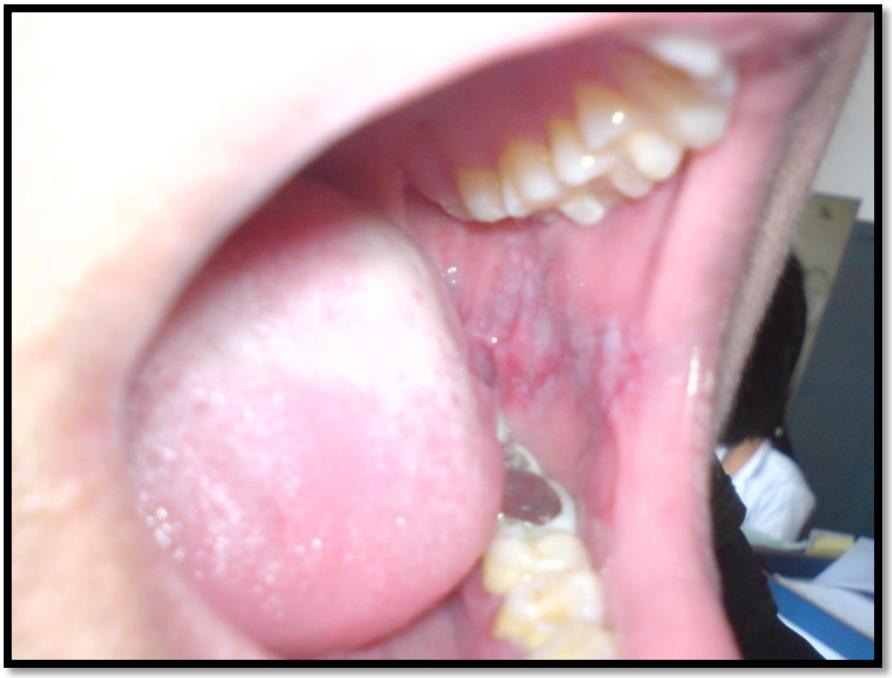

Fig. 1 Reticular type of oral lichen planus seen over the buccal mucosa. Note amalgam fillings of the teeth

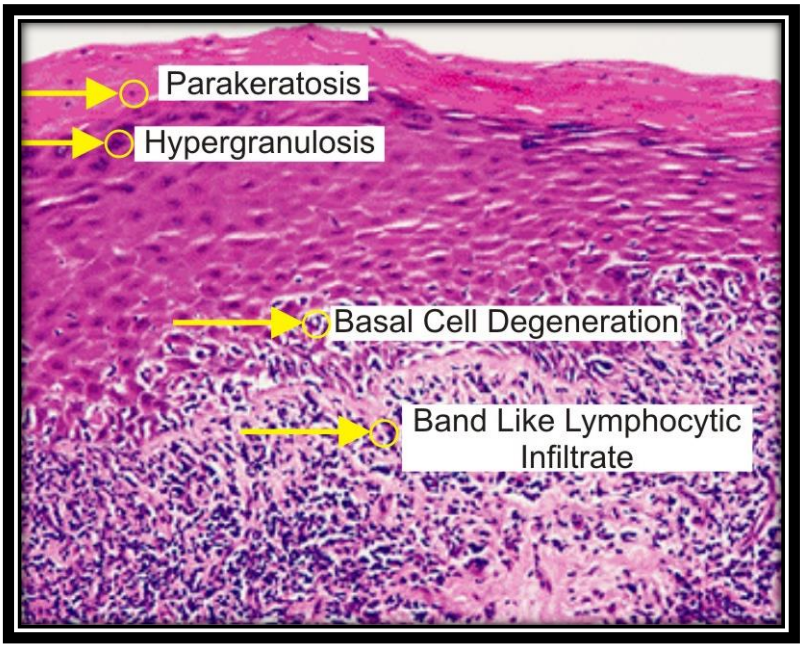

Fig.2: Oral lichen planus histopathology (H& E).

Showing parakeratosis, hypergranulosis, degeneration of basal epidermal cells and band like lymphocytic infiltrate in the upper dermis.

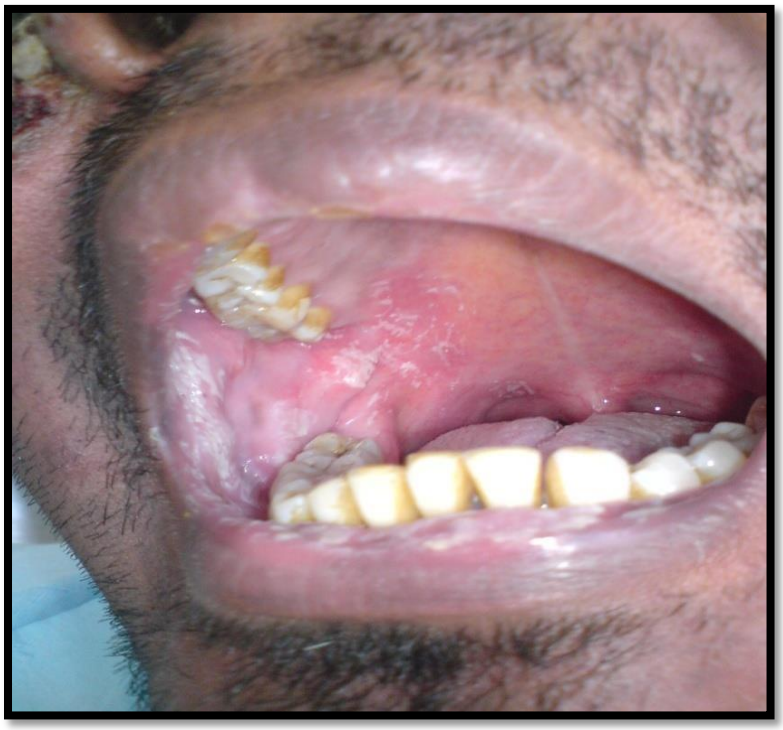

Fig.3- Candidosis. Oral thrush involving buccal mucosa extending on to hard palate

Fig.4: Growth of Candida albicans and Candida tropicalis on chrome agar.

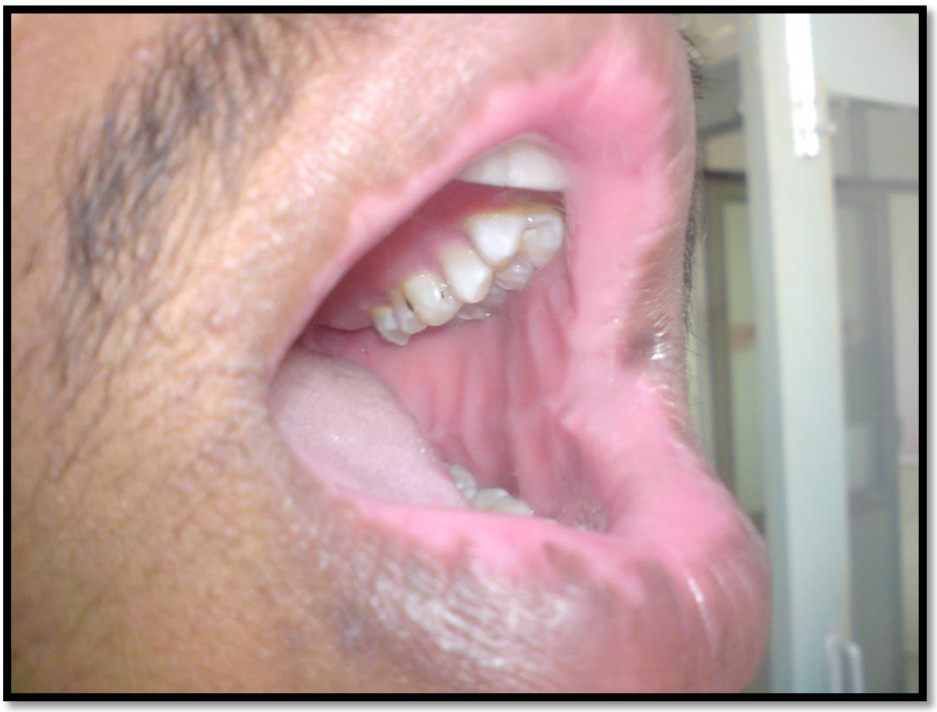

Fig.5- Mucosal vitiligo of buccal mucosa and lips.

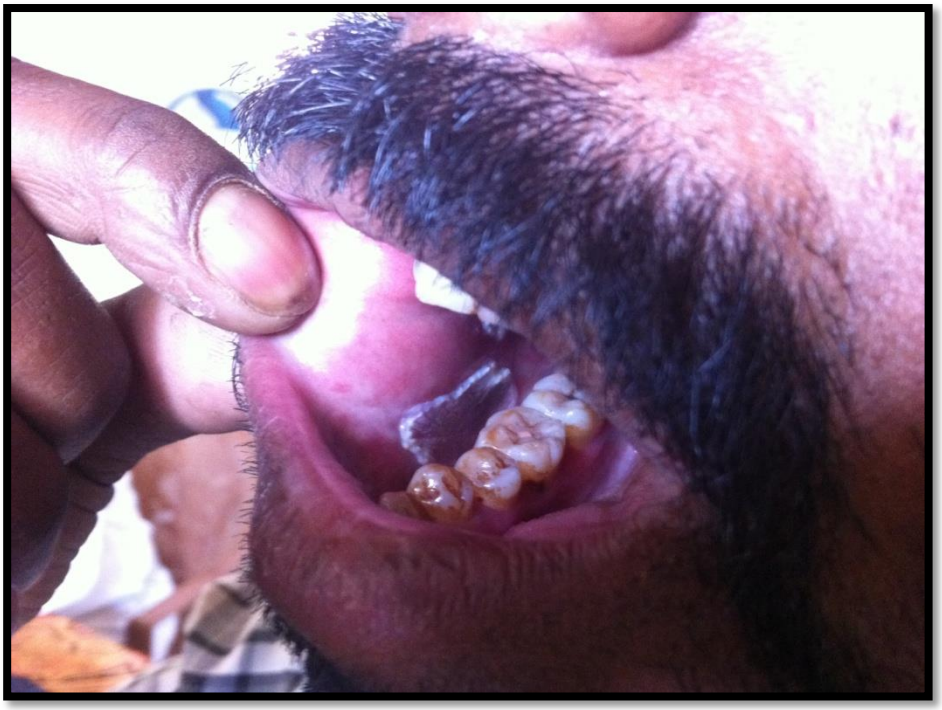

Fig. 6- Leukoplakia.whitish plaque over the buccal mucosa.

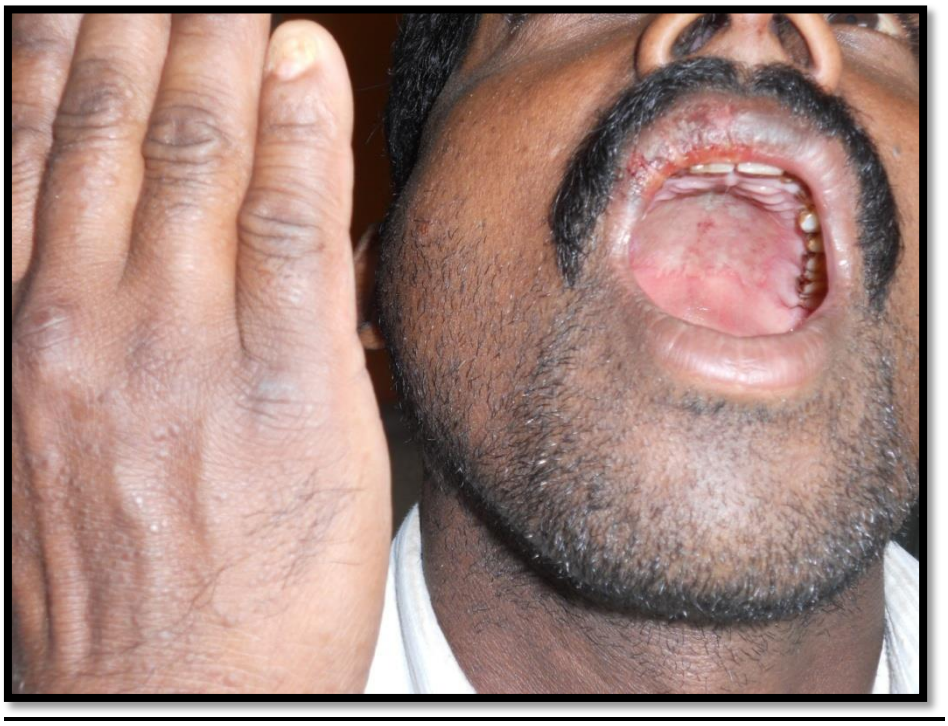

Fig.7- Darier's disease. Cobble- stone appearance of hard palate Note- keartotic papules over dorsum of hand.

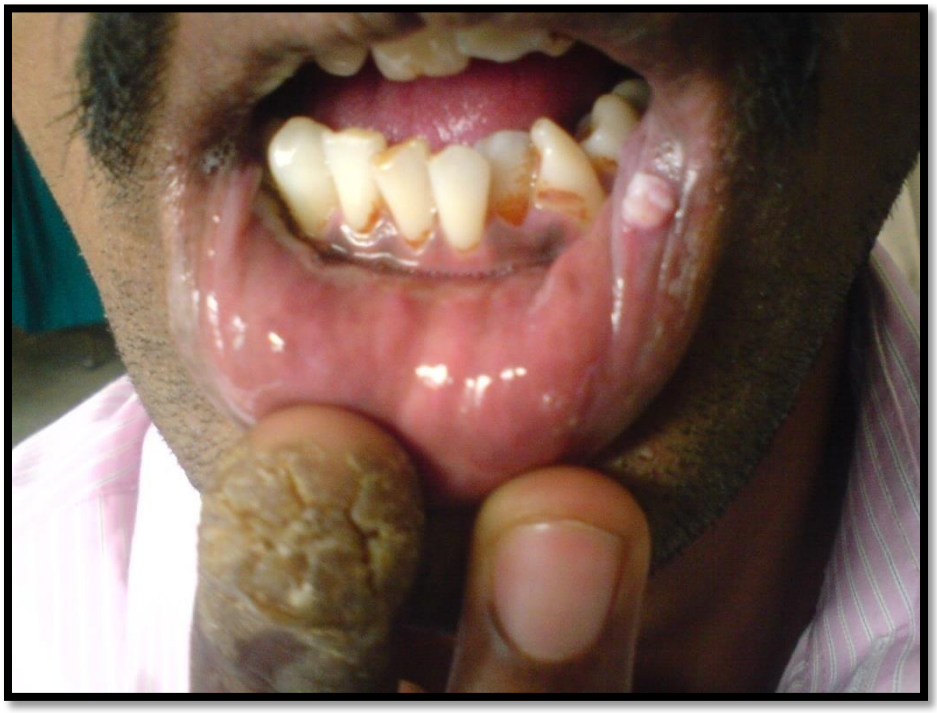

Fig.8- Oral verruca involving labial mucosa. Note verruca over finger.

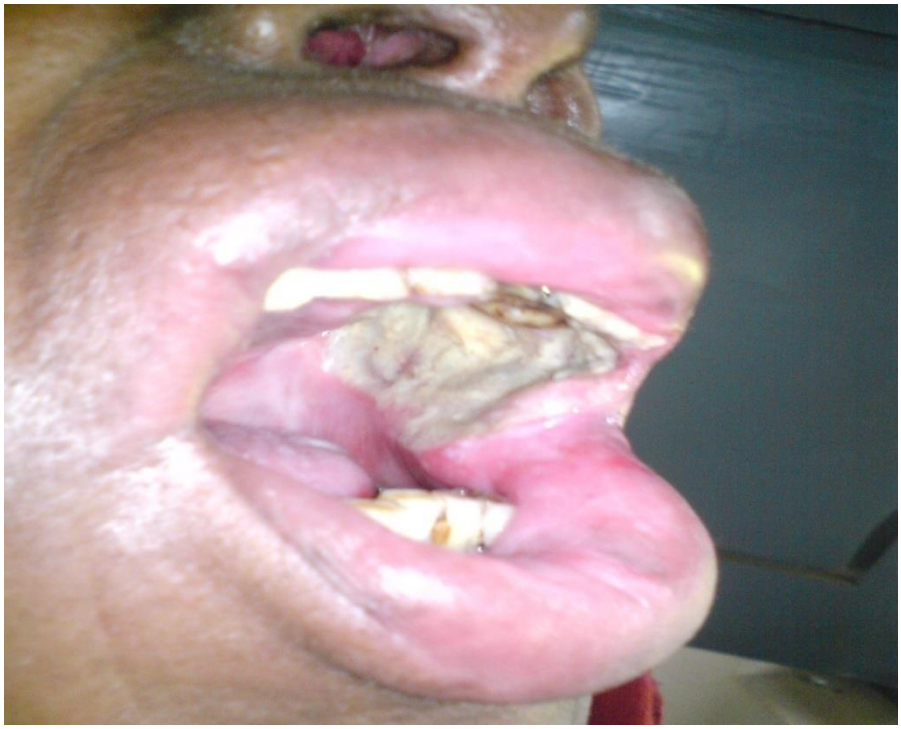

Fig.9- Oral squamous cell carcinoma involving buccal mucosa extending on to hard palate.

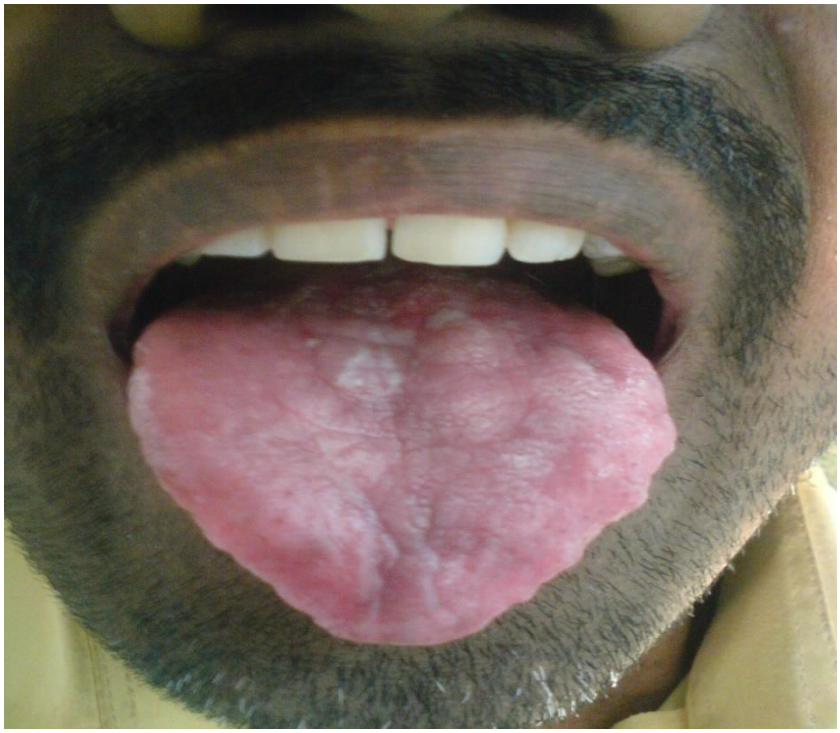

Fig.10- White sponge naevi. Velvety white lesion over dorsum of tongue.

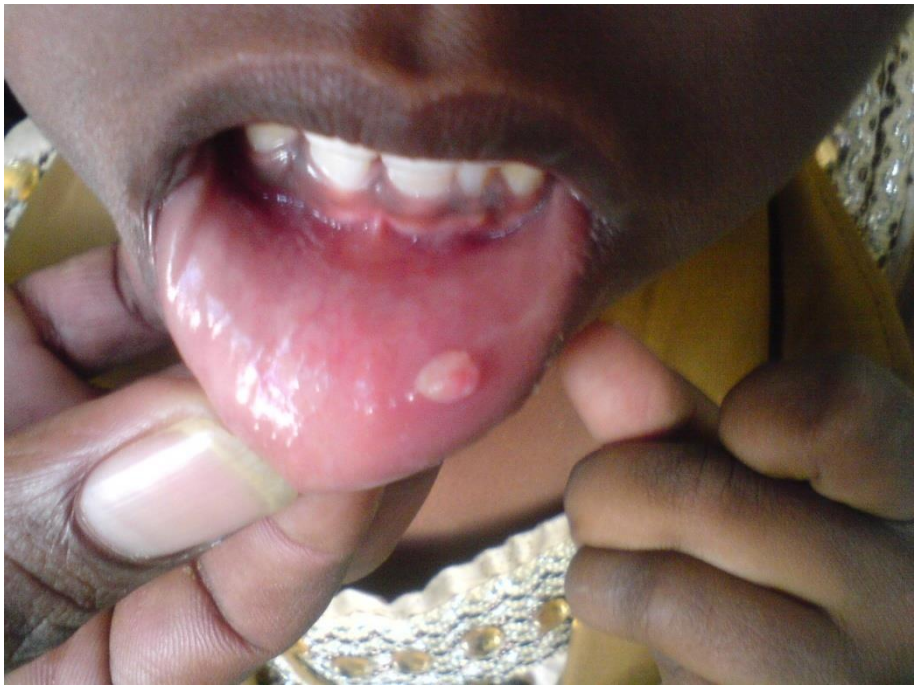

Fig.11 Mucocele . dome shaped papule over the labial mucosa.

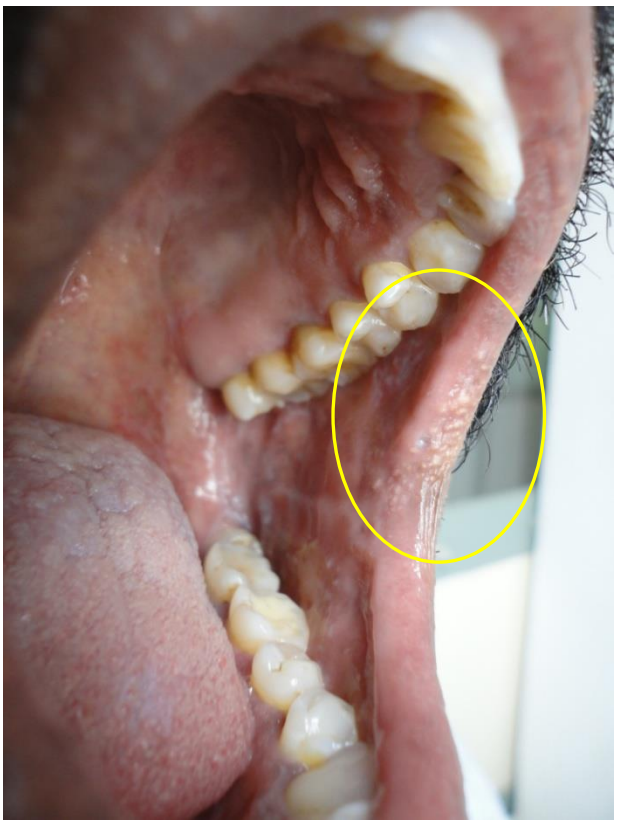

Fig.12 Fordyce's spots. Whitish-yellow papules over the vermilion.

DISCUSSION

DISCUSSION

Oral white lesions are a common clinical finding representing a wide spectrum of conditions of varying seriousness, ranging from benign physiological entities to dysplasia and squamous cell carcinoma.

Though the prevalence of oral lesions in general population has been documented based on clinical evaluation in other parts of the world like Turkey,[135] Cambodia,[136] Japan,[137]and Sweden[138]only limited information is available in rural or semi-urban population of India.[139, 140]

The present study includes a total of 197 clinically diagnosed cases of oral white lesions.

In our study the prevalence of oral white lesions was 1.09%, which was less than the prevalence in Turkish population (2.2%).[135] Such variations in the prevalence rates of oral white lesions may be the result of geographical differences, socio-demographic characteristics of the study populations, risk habits and genetic factors.

Majority of the patients, 41.6% were in the age group of 20-40years in the present study. Our study results are in concordance with other studies from Japan, [137] Malaysia and Turkey[141] which showed higher prevalence in the age group of 30-60 years.

In concordance with various other studies,[139, 142] a male preponderance of 54.8% was also seen in our study. Sex differences in the occurrence of oral white lesions might be attributed to the higher prevalence of deleterious oral habits among males in our study population.

The common presenting complaints in our study were asymptomatic oral white lesions (30.4%) and mucosal discoloration (29.9%). The less reported symptoms were discomfort (24.3%) and burning sensation (8.1%) associated with oral white lesions. These findings were different from a study done at Vidisha in Central India,[139] where discomfort and difficulty in opening the mouth were the common presenting symptoms. This discrepancy may be due to the lifestyle related factors.

Majority of the patients in the study, 76.1% had symptoms of less than six weeks duration, as infective and inflammatory aetiologies were more common in our study population.

In the present study, majority of the patients had more than one risk habit for the development of white lesions in oral cavity. Smoking habit was more prevalent in men (83%), whereas betel and areca nut chewing was common in women (60%). Alcohol consumption was more common in males (94%), whereas stress was elicited more frequently in females (57%).These findings are comparable to the prevalence of risk factors in other studies.[140, 143,144]

Buccal mucosa (39.5%) was the most common affected site in the present study. This was followed by involvement of labial mucosa (18.2%), tongue (16.7%) and lips (11.1%). These findings are in concordance with other studies.[139, 140, 135]

Various morphological types of oral white lesions were observed in our study with plaques (31.9%) and papules (15.2%) being the predominant morphological types.

In our study, normal anatomical variant was seen in 17.2% of patients with oral white lesions, which was comparable to Turkish study.[135]

Fordyce's spots accounted for 15.2% of the oral white lesions. This prevalence is higher than that found in studies conducted in Turkey[145] (1.3%) and India[140] (6.5%), but lower than that reported in studies carried out in Thailand (57.7%), Mexico[146] (55.0%) and Malaysia[141] (61.8%). This presence of Fordyce's spots was not significantly associated with any independent variables evaluated in the present study. It was more frequently observed on lip and labial (40%) mucosae. Majority of the patients were in the age group of 20-40years (50%) with male preponderance (76.6%); these findings are in concordance with observations of other studies.[140]

In our study population leukoedema (1.01%), white sponge naevus (1.01%), and Dyskeratosis congenita (0.5%) were rarely observed.

Dermatological disorders (38%), followed by infective (19.2%) and inflammatory (15.7%) conditions were the common aetiological causes for oral white lesions in our study population.

The prevalence of OLP in this study was 0.22% which is comparable to the rates in few other population based studies. (5,6) In our present study, OLP was significantly more common among women (67.5%) as compared to men (32.5%), which is in agreement with findings from other previous studies.[139140,142,] Majority of our patients with OLP were in the age group of 20-60years (62.5%), which is in agreement with other studies.[140, 147,148] Among the clinical subtypes of OLP in this study, the reticular type (55%) was the most common, followed by plaque (30%) and atrophic (15%) types. This is in

accordance with findings of other studies. [147,148, 149] Buccal mucosa was the commonly affected site (52.5%), which was also observed in other studies.[148]

The prevalence of oral mucosal vitiligo was 0.17 % in our study population and was observed more in females (59.3%) compared to males (40.6%). The most frequent site of involvement was lips and labial mucosa (43%) followed by buccal mucosa (40%). Oral involvement was a part of vitiligo vulgaris (71.8%) in majority of cases. These observations are in concordance with other studies.[150, 151]

Candidal infection constituted one of the most common infective aetiology of oral white lesions (16.7%) in our study, with a prevalence of 0.18%. It was predominantly observed in males (69.2%) and was more commonly found in the age group of 40-60 years (60.6%), which is comparable to the findings of other studies.[136, 142] Pseudo-membranous candidosis was the most frequently observed subtype (78.7%) in our study, which is in agreement with other studies.[136, 140, 142]Majority of the patients (84.8%) were having underlying immune-suppression.

Other infections causing oral white lesions like warts (2.0%) and OHL (0.5%) were rarely encountered in our study. These conditions have not been reported in any of the previous studies.

Inflammatory and/or reactive conditions were seen in 15.7% of our study population. These included tobacco pouch keratosis (7.6%), morsicatio buccarum (5.1%), frictional, chemical and thermal keratosis (2.5%), which can be explained by high prevalence of risk habits.

The prevalence of morsicatio buccarum in our study was 5.1%. Females (66.6%) were affected more than males (33.3%) especially in the age group of 20-40years (86.6%). This is in contrast to observations in Copenhagen study, [152] where no gender discordance and affection of younger age group (15-19years) were seen.

Tobacco pouch keratosis and frictional keratosis were more commonly observed in males (60%) which is comparable to other studies.[140, 143]This observation can be attributed to high use of tobacco products in men.

Premalignant lesions such as leukoplakia and OSF were observed in 2.5% and 1.01% of patients, respectively. These conditions were more frequently observed in men (80%) and in the age group 20-60years (71%). Buccal mucosa was the most frequent site of involvement (57.1%). These findings are in concordance with other studies.[136, 138, 140]

Squamous cell carcinoma constituted 3.5% of our cases. Males (57.1%) had a higher predilection than females (42.8%); it was observed more often in >60years age group (57.1%). Main site of involvement was buccal mucosa (85.7%). These findings are similar to other studies.[140]

Mucosal retention cyst was seen in 2.5% of our cases and it was found more in females (80%). This is in conflict with other study in South India which showed male preponderance.[140]

CONCLUSION

CONCLUSION

Though oral white lesions constitute only a small minority of pathological conditions, they are enormously troublesome to patients, thus diminishing their quality of life. It represents a wide spectrum of conditions, ranging from benign physiological entities to malignancies. Many of these lesions are harmless and do not require any treatment other than reassurance.

Local risk factors like consumption of multiple addictive substances and stress are important in development of oral white lesions. Hence, awareness and education programmes are necessary to reduce and eliminate the modifiable risk factors. The appreciation of subtle clinical findings associated with white lesions of the oral cavity permits physicians to provide better care for their patients. Community based programmes should also be undertaken to educate the population to get screened for oral-mucosal lesions.

SUMMARY

SUMMARY

A total of 197 patients with oral white lesions who presented to our department of dermatology at R.L. Jalappa hospital and research centre, attached to Sri Devaraj Urs Medical College, Tamaka, Kolar were studied. The findings are summarised below:

- White lesions in the oral cavity are less common, with the prevalence of 1.09%.
- It can be seen from childhood to old age, with majority being in 3rd and 4th decades.
- Female (45.2%) preponderance was observed.
- Discoloration of oral mucosa (29.9%) was the common presenting complaint.
- Majority of the patients presented with acute history of oral white lesions.
- Tobacco consumption (52.7%) in various forms was the predominant risk factor associated with oral white lesions in both sexes.
- Buccal mucosa (50.2%) was the common site to be affected.
- Plaques (31.9%) were the common morphological presentation of oral white lesions.
- Oral white lesions can be classified based on aetiology as

    1. Developmental/ congenital
    2. Inflammatory/ reactive
    3. Infective
    4. Oral manifestations of dermatological conditions
    5. Oral manifestations of systemic disorders
    6. Premalignant and Malignant
    7. Miscellaneous

- Oral white lesions secondary to dermatological (38.1%) conditions like Lichen planus, vitiligo, etc. and infective (19.2%) aetiology like candidosis were common.
- Oral lichen planus (20.3%) accounted for majority of oral white lesions.
- Pre-malignant and malignant conditions were infrequent causes for oral white lesions.

BIBLIOGRAPHY

BIBILIOGRAPHY

1. Messadi DV, Wiabel JS, Mirowski GW. White lesions of oral cavity. Dermatol clin 2003; 21: 63-64.
2. Lee KH, Polonowita AD. Oral white lesions: pitfalls of diagnosis. Med J Aus 2009; 190: 274- 277.
3. Axéll T. Occurrence of leukoplakia and some other oral white lesions among 20,333 adult Swedish people. Community Dent Oral Epidemiol 1987; 15: 46-51.
4. Scully C, Porter S. Orofacial disease- white lesions. Dent update 1999; 28: 123-129.
5. Silverman S, Gorsky M, Lozada F. Oral Leukoplakia and malignant transformamtion. A follow up study of 257 patients. Cancer 1984; 53: 563-568.
6. Bouquot JE, Whitaker SB. Oral leukoplakia-rationale for diagnosis and prognosis of its clinical subtypes or "phases". Quintessence Int 1994; 25: 133-140.
7. Nair DR, Pruthy R, Pawar U, Chaturvedi P. Oral cancer: Premalignant conditions and screening - an update. J Can Res Ther 2012; 8: 57-66.
8. Kramer IR, Lucas RB, Pindborg JJ, Sobin LH. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. Oral Surg Oral Med Oral Pathol 1978; 46: 518-539.
9. Banoczy J. Oral leukoplakia and other white lesions of oral mucosa related to dermatological disorders. J Cutan Pathol 1983; 10: 238-256.
10. Kabani S, Greenspan D, DeSouza Y. Oral hairy leukoplakia with extensive oral mucosal involvement. Report of two cases. Oral Surg Oral Med Oral Pathol 1989; 67: 411–415.
11. Lee JH, Lee JH, Kwon NH. Clinico-pathological manifestation of patients with Fordyce's Spots. Ann Dermatol 2012; 24: 103-106.

12. Sandstead HR, Lowe JW. Leukoedema and keratosis in relation to leukoplakia of the buccal mucosa in man. J Natl Cancer Inst 1953; 14: 423-427.
13. Cannon AB. White spone nevus of the mucosa. Arch Dermat Syph 1935; 31: 365-370.
14. Zinsser F. Atrophia cutis reticularis cum pigmentatione, dystrophia et leukoplakia oris.Ikonogr Dermatol 1910; 5: 219-223.
15. Farhi D, Dupin N. Pathophysiology, etiologic factors, and clinical management of oral lichen planus: facts and controversies. Clin Dermatol 2010; 28: 100-108.
16. Shklar G. Lichen planus as an oral ulcerative disease. Oral Surg Oral Med Oral Pathol 1972; 33: 376-388.
17. Parashar P. Oral Lichen Planus. Otolaryngol Clin N Am 2011; 44: 89–107.
18. Sehgal VN, Srivastava G. Vitiligo: Compendium of clinico-epidemiological features.Indian J Dermatol Venereol Leprol 2007; 73: 149-156.
19. Rao PK. Oral candidiasis: a review. Scholarly J Med 2012; 2: 26-30.
20. Glick M, Siegel MA, Brightman VJ. Evaluation of the dental patient: diagnosis and medical risk assessment. In: Burket LW, Greenberg MS, Glick M, editors. Burket's oral medicine: diagnosis and treatment. 10th ed. Hamilton (Ontario): BC Decker; 2003 .p.15-17.
21. Kumar V, Fausto N, Abbas A. Robbins & Cotran pathologic basis of disease.7th ed. Philadelphia: W.B. Saunders Company; 2004. p.1230.
22. Parker J, Lee L. The Oral Cavity: A Study of the Development, Anatomy and Histology of the Oral Cavity. MedEdPORTAL; 2011. Available from: www.mededportal.org/publication/8428.
23. Mashberg A, Samit A. Early diagnosis of asymptomatic oral and oropharyngeal squamous cancers. CA Cancer J Clin 1995; 45: 328–351.

24. Adkins K. Diagnosis of white lesions of oral mucosa. Aus Dent J 1996; 11: 227-232.

25.Martin JL. Leukoedema: a review of the literature. J Natl Med Assoc 1992; 84: 938–940.

26. Axell T, Henricsson V. Leukoedema-an epidemiologic study with special reference to the influence of tobacco habits. Community Dent Oral Epidemiol 1981; 9: 142–146.

27. Neville BW, Damm DD, Allen CM. In: Oral and maxillofacial pathology. 3rdEd, St Louis: Saunders Elsevier ; 2009. p. 46–47.

28 .Shibuya Y, Zhang J, Yokoo S, Umeda M, Komori T. Constitutional mutation of keratin 13 gene in familial white sponge nevus. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003; 96: 561-565.

29. Terrinoni A, Candi E, Oddi S, Melino G, Felix DH, Munro CS, et al. A glutamine insertion in the 1A alpha helical domain of the keratin 4 gene in a familial case of white sponge nevus. J Invest Dermatol 2000; 114: 388-391.

30. Dadlani C, Mengden S, Kerr AR. White sponge nevus. Dermatol Online J 2008; 14: 16.

31. Handley TP, Ogden GR. Dyskeratosis congenita: oral hyperkeratosis in association with lichenoid reaction. J Oral Pathol Med 2006; 35: 508-512.

32. Dokal I. Dyskeratosis congenita in all its forms. Br J Haematol. 2000; 110: 768 779.

33. Bhattacharyya I, Chehal HK. White Lesions.Otolaryngol Clin N Am 2011; 44: 109–131.

34. Woo SB. Disorders of oral mucosa. In: Barnhill RL, Crowson AN, editors. Textbook of dermatopathology. 2nd ed. New York: Mc- Graw-Hill; 2004. p. 999–1016.

35. Ocampo-Candiani J, Billarreal-Rodriguez A, Quinone-Fernandez AG, Herz-Ruelas ME, Ruiz-Esparza J. Treatment of Fordyce spots with CO2 laser. Dermatol Surg 2003; 29: 869-871.

36. Kim YJ, Kang HY, Lee ES, Kim YC. Treatment of Fordyce spots with 5-aminolaevulinic acid-photodynamic therapy. Br J Dermatol 2007; 156: 399-400.

37. Parlak AH, Koybasi S, Yavuz T, Yesildal N, Anul H, Aydogan I, et al. Prevalence of oral lesions in 13- to 16-year old students in Duzce, Turkey. Oral Dis 2006; 12: 553-558.

38. Seoane Leston JM, Aguado Santos A, Varela-Centelles PI, Vazquez-Garcia J, Romero MA, Pias-Villamor L. Oral mucosa: variations from normalcy, part I. Cutis 2002; 69: 131–134.

39. Messadi DV, Waibel JS, Mirowski JW. White lesions of the oral cavity. Dermatol Clin 2003; 21: 63–78.

40. Bouquot JE, Gorlin RJ. Leukoplakia, lichen planus, and other oral keratoses in 23,616 white Americans over the age of 35 years. Oral Surg Oral Med Oral Pathol 1986; 61: 373–381.

41. Rossie KM, Guggenheimer J. Thermally induced ‘nicotine’ stomatitis. A case report. Oral Surg Oral Med Oral Pathol 1990; 70: 597–599.

42. Mirbod SM, Ahing SI. Tobacco associated lesions of the oral cavity. Part I. Nonmalignant lesions. J Can Dent Assoc 2000; 66: 252– 256.

43. Rossie KM, Guggenheimer J. Thermally induced ‘nicotine’ stomatitis. A case report. Oral Surg Oral Med Oral Pathol 1990; 70: 597–599.

44. Eisen D, Lynch DP. The mouth: diagnosis and treatment. St. Louis: Mosby; 1998. p. 58–91.

45. Martin GC, Brown JP, Eifler CW, Houston GD. Oral leukoplakia status six weeks after cessation of smokeless tobacco use. J Am Dent Assoc 1999; 130: 945–954.

46. Scully C, el-Kabir M, Samaranyake LP. Candida and oral candidosis: A review. Crit Rev Oral Biol Med 1994; 5: 125-157.

47. Cawson RA. Thrush in adult outpatients. Dent Pract Dent Rec 1965; 15: 361–364.

48. Khongkunthian P, Grote M, Isaratanan W. Oral manifestations in 45 HIV-positive children from Northern Thailand. J Oral Pathol Med 2001; 30: 549–552.

49. Hardy JR, Rees E, Ling J, Burman R, Feuer D, Broadley K, et al. A prospective survey of the use of dexamethasone on a palliative care unit. Palliat Med 2001; 15: 3–8.

50. Dreizen S. Oral candidiasis. Am J Med 1984; 30: 28–33.

51. Budtz-Jorgensen E. The significance of Candida albicans in denture stomatitis. Scand J Dent Res 1974; 82: 151–190.

52. Ohman SC, Dahlen G, Moller A, Ohman A. Angular cheilitis: a clinical and microbial study. J Oral Pathol 1985; 15: 213–217.

53. Holmstrup P, Bessermann M. Clinical, therapeutic and pathogenic aspects of chronic oral multifocal candidiasis. Oral Surg Oral Med Oral Pathol 1983; 56: 388–395.

54. Cooke BED. Median rhomboid glossitis: candidiasis and not a developmental anomaly. Br J Dermatol 1975; 93: 399–405.

55. Collins SM, Dominguez M, Ilmarinen T, Costigan C, Irvine AD. Dermatological manifestations of autoimmune polyendocrinopathy-candidiasis-ectodermal dystrophy syndrome. Br J Dermatol 2006; 154: 1088–1093.

56. Wells RS. Chronic mucocutaneous candidiasis: a clinical classification. Proc R Soc Med 1973; 66: 801–802.

57. Clayton YM, Connor BL. Comparison of clotrimazole cream, Whitfield's ointment and nystatin ointment for the topical treatment of ringworm infections, pityriasis versicolor, erythrasma and candidiasis. Br J Dermatol 1973; 89: 297-303.

58. Appleton SS. Candidiasis: pathogenesis, clinical characteristics, and treatment. Calif Dent Assoc J 2000; 28: 942–94 8.

59. Reichart PA, Langford A, Gelderblom HR, Pohle HD, Becker J, Wolf H; Oral hairy leukoplakia; observations in 95 cases and review of the literature. J Oral Pathol Med 1989; 18; 410-415.

60. Triantos D, Porter SR, Scully C. Oral hairy leukoplakia: clinicopathologic features, pathogenesis, diagnosis, and clinical significance. Clin Infect Dis 1997; 25: 1392–1396.

61. Hille JJ, Webster-Cyriaque J, Palefski JM, Raab-Traub N. Mechanisms of expression of HHV8, EBV & HPV in selected HIV-associated oral lesions. Oral Dis 2002; 8: 161-168.

62. Moura MD, Guimaraes TR, Fonseca LM, de Almeida Pordeus I, Mesquita RA. A random clinical trial study to assess the efficiency of topical applications of podophyllin resin (25%) versus podophyllin resin (25%) together with acyclovir cream (5%) in the treatment of oral hairy leukoplakia. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007; 103: 64–71.

63. Herbst JS, Morgan J, Raab-Traub N, Resnick L. Comparison of the efficacy of surgery and acyclovir therapy in oral hairy leukoplakia. J Am Acad Dermatol 1989; 21: 753-756.

64. Greenspan D, Canchola AJ, MacPhail LA, Cheikh B, Greenspan JS. Effect of highly active antiretroviral therapy on frequency of oral warts. Lancet 2001; 357: 1411–1412.

65. Leão JC, Gueiros LA, Porter SR. Oral Manifestations of syphilis. Clinics (Sao Paulo) 2006; 61: 161-166.

66. Scott CM, Flini SR. Oral syphilis-re-emergence of an old disease with oral manifestations. Int J Oral Maxillofac Surg 2005; 34: 58-63.

67. Leao JC, Gueiros LA, Segundo AV, Carvalho AA, Barrett W, Porter SR. Uremic stomatitis in chronic renal failure. Clinics (Sao Paulo) 2005; 60: 259–262.

68. Kellett M. Oral white plaques in uraemic patients. Br Dent J 1983; 154: 366–368.

69. Parashar P. Oral Lichen Planus. Otolaryngol Clin N Am 2011; 44: 89–107.

70. Carbone M., Arduino P.G., Carrozzo M., Gandolfo S, Argiolas MR, Bertolusso G, et al. Course of oral lichen planus: a retrospective study of 808 northern Italian patients. Oral Dis 2009;15: 35-243.

71. Scully C, Carrozzo M. Oral mucosal disease: lichen planus. Br J Oral Maxillofac Surg 2008; 46: 15-21.

72. Nagao T, Ikeda N, Fukano H, Hashimoto S, Shimozato K. Incidence rates for oral leukoplakia and lichen planus in a Japanese population. J Oral Pathol Med 2005; 34: 532-539.

73. Bagan JV, Donat JS, Penarrocha M. Oral lichen planus and diabetes mellitus. A clinico- pathological study. Bull Group Int Rech Sci Stomatol Odontol 1993; 36: 3-6.

74. Sugerman PB, Savage NW. Oral lichen planus: causes, diagnosis and management. Aust Dent J 2002; 47: 290-297.

75. Carrozzo M, Uboldi de Capei M, Dametto E, Fasano ME, Arduino P, Brocoletti

R,et al. Tumor necrosis factor-alpha and interferon-gamma polymorphisms contribute to susceptibility to oral lichen planus. J Invest Dermatol 2004; 122: 87-94.

76. Nagao Y, Sata M, Noguchi S, Seno'o T, Kinoshita M, Kameyama T, et al. Detection of hepatitis C virus RNA in oral lichen planus and oral cancer tissues. J Oral Pathol Med 2000; 29: 259-266.
77. Dunsche A, Kästel A, Terheyden H, Springer IN, Christophers E, Brasch J. Oral lichenoid reations associated with amalgam: improvement after amalgam removal. Br J Dermatol 2003; 148: 70–76.
78. Vallejo MJ, Huerta G, Cerero R, Seoane JM. Anxiety and depression as risk factors for oral lichen planus. Dermatology 2001; 203: 303–307.
79. Simark MC, Jontell M, Bergenholtz G, Heyden M, Dahlgren UI. Distribution of interferon-gamma mRNA- positive cells in oral lichen planus lesions. J Oral Pathol Med 1998; 27: 483-488.
80. Thongprasom K., Dhanuthai K.Steroids in the treatment of lichen planus: a review. J Oral Sci 2008; 50: 377-385.
81. Eisen D. The clinical features, malignant potential, and systemic associations of oral lichen planus: a study of 723 patients. J Am Acad Dermatol 2002; 46: 207-214.
82. Rajendran R. Oral lichen planus. J Oral Maxillofac Pathol 2005; 9: 3-5.
83. Van der Meij EH, van der Waal I. Lack of clinicopathologic correlation in the diagnosis of oral lichen planus based on the presently available diagnostic criteria and suggestions for modifications. J Oral Pathol Med 2003; 32: 510.

84. Ismail SB, Kumar SK, Zain RB.Oral lichen planus and lichenoid reactions: etiopathogenesis, diagnosis, management and malignant transformation. J Oral Sci 2007; 49: 89-106.

85. Ebner H, Gebhart W. Light and electron microscopic studies on colloid and other cytoid bodies. Clin Exp Dermatol 1977; 2: 311–322.

86. Carbone M, Goss E, Carrozzo M, Castellano J and Conrotto D. Systemic and topical corticosteroid treatment of oral lichen planus: a comparative study with long-term follow-up. J Oral Pathol Med 2003; 32: 323-329.

87. Johani KA, Hegarty AM, Porter SR, Fedele S. Calcineurin inhibitors in oral medicine. J Am Acad Dermatol 2009; 61: 829-840.

88. Gorsky M., Raviv M. Efficacy of etretinate (Tigason) in symptomatic oral lichen planus. Oral Surg Oral Med Oral Pathol 1992; 73: 52-55.

89. Munro CS, Mastana SS, Papiha SS. Mapping of the Darier's disease gene by serogenetic markers: results in two large British kindreds. Ann Genet 1992; 35: 157–160.

90. Ferris T, Lamey PJ, Rennie JS. Darier's disease: oral features and genetic aspects. Br Dent J 1990; 168: 71–73.

91. Macleod RI, Munro CS. The incidence and distribution of oral lesions in patients with Darier's disease. Br Dent J 1991; 171: 133–136.

92. Jorizzo JL, Salisbury PL, Rogers III RS, Goldsmith SM, Shar GG, Callen JP, et al. Oral lesions in systemic lupus erythematosus: do ulcerative lesions represent a necrotizing vasculitis? J Am Acad Dermatol 1992; 27: 389–394.

93. Burge SM, Frith PA, Juniper RP, Wojnarowska F. Mucosal involvement in systemic and chronic cutaneous lupus erythematosus. Br J Dermatol 1989; 121: 727-741.

94. Schiodt M. Oral manifestations of lupus erythematosus. Int J Oral Surg 1984; 13: 101-147.

95. Al-Mutairi N, Sharma AK. Profile of vitiligo in Farwaniya region in Kuwait. Kuwait Med J 2006; 38: 128–131.

96. Dummet CO. The oral tissues in vitiligo. Oral Surg Oral Med Oral Pathol 1959 ;12: 1073–1079.

97. Alikhan Ali, Felsten LM. Vitiligo: A comprehensive overview. J Am Acad Dermatol 2011; 65: 473-491.

98. Coondoo A, Sen N, Panja RK. Leucoderma of the lips. Indian J Dermatol 1976 ;21: 29-33.

99. Malakar S, Lahiri K. Punch grafting in lip leucoderma. Dermatology 2004 ;208: 125-128.

100. Murti PR, Bhonsle RB, Pindborg JJ, Daftary DK, Gupta PC, Mehta FS. Malignant transformation rate in oral submucous fibrosis over a 17-year period. Community Dent Oral Epidemiol 1985; 13: 340–341.

101. Canniff JP, Harvey W, Harris M. Oral submucous fibrosis: its pathogenesis and management. Br Dent J 1986; 160: 429–434.

102. Caniff JP, Harvey W. The aetiology of oral submucous fibrosis: the stimulation of collagen synthesis by extracts of areca nut. Int J Oral Surg 1981; 10: 163-167.

103. Zhang X, Reichert PA. A review of betel quid chewing, oral cancer and precancer in Mainland China. Oral Oncol 2007; 43: 424–430.

104. Mehrotra D, Pradhan R, Gupta S. Retrospective comparison of surgical treatment modalities in 100 patients with oral submucous fibrosis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: e1–10.

105. Rajendran R, Rani V, Shaikh S. Pentoxifylline therapy: a new adjunct in the treatment of oral submucous fibrosis. Indian J Dent Res 2006; 17: 190–198.

106. Yen DJ. Surgical treatment of submucous fibrosis. Oral Surg 1982; 54: 269–272.

107. Petti S. Pooled estimate of world leukoplakia prevalence: A systematic review. Oral Oncol 2003; 39: 770-780.

108. Mehta FS, Pindborg JJ, Gupta PC, Daftary DK. Epidemiologic and histologic study of oral cancer and leukoplakia among 50,915 villagers in India. Cancer 1969; 24: 832-849.

109. Mishra M, Mohanty J, Sengupta S, Tripathy S. Epidemiological and clinicopathological study of oral leukoplakia. Indian J Dermatol Venereol Leprol 2005 ;71: 161–165.

110. Roosaar A, Yin L, Johannsen AL. A long-term follow-up study on the natural course of oral leukoplakia in a Swedish population-based sample. J Oral Pathol Med 2007; 36: 78–82.

111. Banoczy J. Follow up studies in oral leukoplakia. J Maxillofac Surg 1977; 5: 69-75.

112. World Health Organization Collaborating Centre for Oral Precancerous Lesions. Definitions of leucoplakia and related lesions. Oral Surg 1978; 45: 518–539.

113. Cabay RJ, Morton TH, Epstein JB. Proliferative verrucous leukoplakia and its progression to oral carcinoma: A review of the literature. J Oral Pathol Med 2007 ; 36: 255-261.

114. Kaugars GE, Burns JC, Gunsolley JC. Epithelial dysplasia of the oral cavity and lips. Cancer 1988; 62: 2166–2170.

115. Karabulut A, Reibel J, Therkildsen MH, Praetorius F, Nielsen HW, Dabelsteen E.Observer variability in the histology assessment of oral premalignant lesions. J Oral Pathol Med 1995; 24: 198–200.

116. Brennan M, Miglatori CA, Lockhart PB. Management of oral epithelial dysplasia: a review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007; 103: S19.e1–12.

117. Takeda T, Sugihara K, Hirayama Y, Hirano M, Tanuma JI, Semba I. Immunohistological evaluation of Ki-67, p63, CK19 and p53 expression in oral epithelial dysplasias. J Oral Pathol Med 2006; 35: 369–375.

118. Marley JJ, Linden GJ, Cowan CG, Lamey PJ, Johnson NW, Warnakulasuriya KA, et al. A comparison of the management of potentially malignant oral mucosal lesions by oral medicine practitioners and oral & maxillofacial surgeons in the UK. J Oral Pathol Med 1998; 27: 489–495.

119. Lippman SM, Sudbo J, Hong WK. Oral cancer prevention and the evolution of molecular-targeted drug development. J Clin Oncol 2005; 23: 346–356.

120. Gillison ML. Current topics in the epidemiology of oral cavity and oropharyngeal cancers. Head Neck 2007; 29: 779–792.

121. MacFarlane GJ, Evstifeeva TV, Robertson C, Boyle P, Scully C. Trends of oral cancer mortality among females worldwide. Cancer Causes Control 1994; 5: 255–258.

122. Conway DI, Stockton DL, Warnakulasuriya KA, Ogden G, MacPherson LM. Incidence of oral and oropharyngeal cancer in United Kingdom (1990–1999): recent trends and regional variation. Oral Oncol 2006; 42: 586–592.

123. Mallet Y, Avalos N, Ridant LA, Gangloff P, Moriniere S, Rame J, et al: Head and Neck cancer in young people: a series of 52 SCCs of the oral tongue in patients aged 35 years or less. Acta Otolaryngol 2009; 129: 1503–1508.

124. Scully C, Cawson RA. Oral potentially malignant lesions. J Epidemiol Biostat 1996; 1: 3–12.

125. Mithani SK, Midlarz WK, Grumbine FL, Smith IM, Califano JA. Molecular genetics of premalignant oral lesions. Oral Dis 2007; 13: 126–133.

126. Silverman S. Oral cancer. Semin Dermatol 1994; 13: 132–137.

127. Sciubba JJ. Oral cancer. The importance of early diagnosis and treatment. Am J Clin Dermatol 2001; 2: 239–251.

128. Scully C. Clinical diagnostic methods for the detection of premalignant and early malignant oral lesions. Community Dent Health 1993; 1: 43–52.

129. Kujan O, Glenny AM, Oliver RJ, Thakker N, Sloan P. Screening programmes for the early detection and prevention of oral cancer. Cochrane Database Syst Rev 2006; 3: CD004150.

130. Chiesa F, Mauri S, Tradati N, Calabrese L, Guigliano G, Ansarin. M. Surfing prognostic factors in head and neck cancer at the Millennum. Oral Oncol 1999; 35: 590–596.

131. Lung T, Tascau OC, Almasen HA, Muresan O. Head and neck cancer, treatment, evolution and post therapeutic survival. Part 2: A decade's results 1993–2002. J Craniomaxillofac Surg 2007; 35: 126–131.

132. Lattanand A, Johnson WC. Mucous cyst (mucocele): a clinico-pathologic and histochemical study. Arch Dermatol 1970; 101: 673–678.

133. Baurmash MD. Mucoceles and ranulas. J Oral Maxillofac Surg 2003; 61: 369–378.

134. Twetman S, Isaacson S. Cryosurgical treatment of mucocele in children. Am J Dent 1990; 3: 175–176.

135. Cebeci AR İ, Gülşahı A, Kamburoğlu K, Orhan BK, Öztaş B. Prevalence and distribution of oral mucosal lesions in an adult turkish population. Med Oral Patol Oral Cir Bucal. 2009; 14: E272-277.

136. Ikeda N, Handa Y, Khim SP, Durward C, Axéll T, Mizuno T, et al. Prevalence study of oral mucosal lesions in a selected Cambodian population. Community Dent Oral Epidemiol 1995; 23: 49–54.

137. Nagao T, Ikeda N, Fukano H. Incidence rates for oral leukoplakia and lichen planus in a Japanese population. J Oral Pathol Med 2005; 34: 532-539.

138. Axéll T. Occurrence of leukoplakia and some other oral white lesions among 20,333 adult Swedish people. Community Dent Oral Epidemiol 1987 ;15: 46-51.

139. Byakodi R, Shipurkar A, Byakodi S. Prevalence of oral soft tissue lesions in sangli,India. J Community Health 2011; 36: 756-759.

140. Mathew AL, Pai KM, Sholapurkar AA, Vengal M. The prevalence of oral mucosal lesions in patients visiting a dental school in Southern India. Indian J Dent Res 2008; 19: 99-103.

141. Axell T, Zain RB, Siwamogstham P, Tantiniran D, Thampipit J. Prevalence of oral soft tissue lesions in out-patients at two Malaysian and Thai dental schools. Community Dent Oral Epidemiol 1990; 18: 95-99.

142. Axell T, Rundquist L. Oral Lichen planus a demographic study. Community Dent Oral Epidemiol 1987; 15: 52-56.

143. Saraswathi TR, Ranganathan K, Shanmugam S, Sowmya R, Narasimhan PD, Gunaseelan R. Prevalence of oral lesions in relation to habits: Cross-sectional study in South India. Indian J Dent Res 2006; 17: 121

144. Maheshwari UTN, Gnanasundaram N. Stress related oral disease- A research study. Int J Pharma Bioscien 2010; 1: 1-10.

145. Mumcu G, Cimilli H, Sur H, Hayran O, Atalay T. Prevalence and distribution of oral lesions: a cross-sectional study in Turkey. Oral Dis 2005; 11: 81-87.

146. Cornejo AD, Huerta ERL, Bravo SP, Barrios BA, Riviera DQ, Yañez AB, et al. Distribucuión de condiciones y lesiones de la mucosa bucal en pacientes adultos mexicanos. Rev Cubana Estomatol 2007; 44: 181-189.

147. Abdullah M, AlDosari, Shawaf M. Clinical evaluation of 150 saudi patients with lichen planus. Saud Dent J 1997; 9: 62-65.

148. Bratic MB, Picuric I. The prevalence of precancerous oral lesions: Oral lichen planus. Arch Onco 2001; 9: 107-109.

149. Pindborg JJ, Mehta FS, Deftary DK, Gupta PC, Bhonsle RB. Prevalence of oral lichen planus among 7,639 India villages in Kerala, South India. Acta Dermatol Venereol(Stokholm) 1972; 52: 216-220.

150. Coondoo A, Sen N, Panja RK. Leucoderma of the lips. Indian J Dermatol 1976; 21: 29–33.

151. Sehgal VN. A clinical evaluation of 202 cases of vitiligo. Cutis 1974; 14: 439-445.

152. Sewerin I. A clinical and epidemiologic study morsicatio buccarum/labiorum. Eur J Oral Sci 197; 79: 73–80.

.

ANNEXURES

CONSENT FORM:

I Mr. / Mrs./ Ms. _____

Age_____years,

R/O_____

Hereby give consent to Dr.Harish Prasad BR, for performing the procedures related to the study as previously explained to me and any other procedures necessary or advisable to complete the study include the use of local anaesthesia.

I have completely understood the purpose of the procedure. I also agree to co-operative with him.

I have carefully understood the procedure and possible complications and agree to do it by my own free will and in complete consciousness without any influence.

I shall in no way hold the doctor responsible for any of the procedures or their consequences whatsoever.

Signature of Doctor Signature of Patient

Date :

DEPARTMENT OF DERMATOLOGY, VENEREOLOGY & LEPROSY.

R.L. JALAPPA HOSPITAL AND RESEARCH CENTRE, KOLAR.

WHITE LESIONS OF ORAL MUCOSA CLINICAL PROFORMA.

PATIENT PARTICULARS: **CASE NUMBER:**

NAME : OP/ IP No :

AGE & SEX : DATE :

OCCUPATION : RELIGION :

MARITAL STATUS:

ADDRESS & PHONE NUMBER:

CHIEF COMPLAINTS:

1. oral lesions- flat/ elevated
2. discomfort/ burning sensation/ pain/ difficulty in opening mouth

HISTORY OF PRESENTING ILLNESS:

-Onset: acute/ insidious

-Duration: since childhood /<6 weeks/ >6weeks/

-Site: cheek/ tongue/ lips/ gums/ palate

-Progression: slow/ rapid

-Risk factors:

Smoking/ alcohol/ betel and areca chewing/ other forms of tobacco chewing

Stress-

Dentures-

Medications- Antibiotics/ steroids/ immunosuppressive drugs

Associated medical illness- diabetes/ TB/ HIV/ Other skin conditions

PAST HISTORY

-any medications

-any other systemic illness:

PERSONAL HISTORY

-Food habits- vegetarian/ non-vegetarian

-Sleep- sound/ disturbed

-Bowel and bladder regular/ altered

FAMILY HISTORY

-similar complaints:

-other skin problems:

-consanguinity:

EXAMINATION:

General physical examination:

-Built and Nourishment:

-pallor/ icterus/ clubbing/ cyanosis/ lymphadenopathy/ edema

-Pulse:

-Blood pressure:

-RR:

Examination of Oral cavity

-Sites:

-Lips -Dorsum of tongue

-Labial mucosa -Palate and fauces

-Buccal mucosa -Gingivae

-Floor of mouth and ventrum of tongue

-Morphology of lesion: macule/ plaque/ patch/ nodule.

-Surrounding area: pale/erythematous/ induration.

-Secondary changes: erosion/ atrophy/ ulceration.

-Teeth: dentulous/ edentulous/ amalgam fillings/ dentures

-Other mucosa: ocular/ anogenital

Cutaneous examination:

-Morphology of lesions

-Distribution

Hair and nail examination:

Systemic examination:

CVS

RS

PER ABDOMEN

CNS

Provisional diagnosis:

Investigations:

-Complete haemogram:

-KOH mount:

-Grams stain:

-Biopsy: Histopathology findings

-Serology:

-Others if any:

FINAL DIAGNOSIS:

-Treatment:

KEY TO MASTER CHART

1. Serial number:

2. IP/OP number:

3. Age: **A -**<20 years. **C-**41-60years

B-20-40years **D-**>60years

4. Sex: **M-**Male

F-Female

5. Symptoms: **1**- Burning

2-Discomfort

3-Change of colour

4-Asymptomatic

6. duration**:** **1**- since birth

2- <6 wks

3- >6wks

7. Site: **1**-Buccal mucosa **4**-Vermillion

2-Tongue **5**-Hard palate

3-Labial mucosa **6**-Soft palate

7- >1sites

8.Risk factors: Smoking: **1**-present **0**-absent

Alcohol: **1**-present **0**-absent

Tobacco: **1**-present **0**-absent

Beetle nut: **1**-present **0**-absent

Dentures: **1**-present **0**-absent

Stress: **1**-present **0**-absent

Underlying illness: **1**-present **0**-absent

9. Morphology: **1**- plaque **3**-papule

2-patch **4**-macule

10. Extra oral lesions: **1**-present **0**-absent

11.White lesions

Lichen planus : **1**

Candidiasis: **2**

Vitiligo: **3**

Fordyce spots: **4**

Tobacco pouch keratosis: **5**

Morsicatio buccarum: **6**

Sq.c.c: **7**

Frictional keratosis: **8**

Mucosal retention cyst: **9**

Leukoplakia: **10**

Verruca: **11**

Darier's disease: **12**

White sponge naevus: **13**

Leukoedema: **14**

DKC: **15**

OSF: **16**

OHL: **17**

MASTER CHART