“A STUDY ON CLINICAL PATTERNS OF CUTANEOUS INFECTIONS AND INFESTATIONS IN SCHOOL GOING CHILDREN”

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LIST OF ABBREVIATIONS USED

LL	--	Lepromatous leprosy
PSGN	--	Post streptococcal glomerulonephritis
S. pyogenes	--	Streptococcus pyogenes
S. aureus	--	Staphylococcus aureus
GABHS	--	Group A –β hemolytic steptococci
TT	--	Tuberculoid leprosy
BT	--	Borderline Tuberculoid leprosy
HSV	--	Herpes simplex virus
HPV	--	Human papilloma virus
VZV	--	Varicella zoster virus
MC	--	Molluscum contagiosum
PV	--	Pityriasis versicolor
KOH	--	Potassium hydroxide
SES	--	Socio economic status
EBV	--	Ebstein Barr virus
M. Tuberculosis	--	Mycobacterium tuberculosis

ABSTRACT

"A STUDY ON CLINICAL PATTERNS OF CUTANEOUS INFECTIONS AND INFESTATIONS IN SCHOOL GOING CHILDREN"

BACKGROUND:

Skin infections in children accounts for approximately 30% of all visit to dermatology department. Infection and infestation are most common skin manifestations seen in children. Cutaneous illnesses in children fluctuate from one area to the next dependent on different components like lower education, financial status, ill practiced cleanliness, overcrowding, poor immunization, malnutrition, climatic changes, natural and wholesome variables, or conventional taboos.

Cutaneous infections and infestations are basic in children during school going age as there is expanded odds of cross transmission among themselves and to their families.

The greater part of these cutaneous dermatoses can be constrained by adequate counseling, appropriate sanitation, improving nourishment and giving legitimate condition and required medications at the grass root level.

OBJECTIVES:

1) To document the various clinical patterns of cutaneous infections and infestations among the children of school going age and to stress upon prevention of recurrences.
2) To describe the disease distribution according to various factors like age, sex, socioeconomic status and seasonal variations.

MATERIALS AND METHODS:

The present study was a cross sectional observational study carried out in the Department of Dermatology at R.L Jalappa Hospital attached to Sri Devaraj Urs Medical College, Tamaka,

Kolar from January 2018 to July 2019. One hundred and eighty eight patients with cutaneous infections or infestations who satisfied the inclusion criteria were included in the study. Written informed consent was taken from each patient enrolled in the study. Detailed history and thorough clinical examination was carried out. Relevant tests were done if required. Counseling regarding the maintenance of hygiene, nutrition, immunisation, and other environmental factors were given which helps in prevention of recurrences in future.

RESULTS:

Out of the total 188 cases, parasitic infestations (38.29%) were the most predominant among all infestations and infections followed by bacterial (21.80%), fungal (20.21%), and viral infections (19.68%). All types of infections were commoner in the age group of 10-14 years (38.29%). All cutaneous infections/infestations were commoner in male children. Majority of patients belonged to lower middle class (34.57%) according to Modified Kuppuswamys socioeconomic scale.

The bacterial infections (46.34%) were predominant in summer, fungal (36.84%) in monsoon, viral (37.83%) in winter, and parasitic infestations (47.22%) in summer. Statistically significant correlation was found between the individual's immune status and the incidence of infections / infestations. Impetigo contagiosa (34.14%) was the commonest type of bacterial infection. Among viral infections, the commonest was verruca (62.16%) followed by molluscum contagiosum (10.81%). The major component among fungal infections were dermatophytosis, in which tinea corporis formed a major contribution (50%). The most common parasitic infestation was scabies (94.44%).

CONCLUSION:

The clinical presentations of the cuteneous infections/infestations can vary according to the age, sex, season, socioeconomic status, immunisation, hygiene, nutrition, and other factors.

The family members of the child has to be properly counselled, and awareness has to be created among the same regarding above contributory factors to reduce the incidence of infections/infestations .

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INTRODUCTION

Skin conditions are a noteworthy medical problem in the pediatric age and are associated with increased morbidity. Skin infections involving children accounts upto 30% of all visits to dermatology department.[1]

Infection and infestation are the most common skin manifestations seen in children. They require an alternate view point from dermatoses of the older group as there is a huge difference in the clinical signs, treatment and prognosis between these two groups.[2]

Cutaneous illnesses in children fluctuate from one area to the next depending on different components. The skin appearances in rural zones might be totally not the same as those in urban territories because of elements like diminished awareness among the guardians, decreased education rates and low financial status of the family, ill-practised cleanliness, overcrowding, malnutrition, climatic changes, natural and wholesome variables, or conventional taboos.[3,4]

A proper understanding of the inclining components is fundamental to the well being of the society. The greater part of these cutaneous dermatoses can be constrained by adequate counseling, appropriate sanitation, improving nourishment and giving legitimate condition and required medications at the grass root level.

Few studies have been done about evaluating pediatric dermatoses all in all, yet just a couple have been done focussing on cutaneous infestations andinfections which are the most widely recognized reason among all the dermatoses in children.

Cutaneous infections and infestations are basic in children during school going age as there is expanded odds of cross-transmission among themselves and to their families.

There are differences in the distribution of the dermatoses in different parts of the nation,[5] however, there is no consistency in the transmission of cutaneous ailments and it can change from zone to zone and furthermore because of other contributing variables as referenced previously.

Hence , it was thought perfect to take up an examination focusing just on cutaneous infections and infestations in school going children in this provincial zone (Kolar) of Karnataka and to discover the most widely recognized causes prevalenthere and to see their relationship with the age, sex, socioeconomic status and climatic components.

AIMS AND OBJECTIVES

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1) To document the various clinical patterns of cutaneous infections and infestations among the children of school-going age and to stress upon prevention of recurrences.

2) To describe the disease distribution according to various factors like age, sex, socioeconomic status and seasonal variations.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Skin Infections & Infestations

Normal intact pediatric and adult skin is relatively resistant to infection and most infections occur when there is a disruption of skin barrier[6].

Some of these organisms live naturally on the body and do not normally cause disease unless they breach the skin barrier. Skin may also be infested by parasites.

There are multiple modes of entry of infectious micro organisms into the body. Natural openings, such as a hair follicle or sweat gland, or broken skin at the site of an insect bite or a cut may provide a gateway for bacteria.[7]

Warm and moist areas, such as the skin between the toes, are more susceptible to fungal infections. Some common viral skin infections, such as warts, can spread by autoinoculation from one person to another by direct skin contact.

Skin diseases are common in paediatric age group and their early diagnosis is of prime importance for proper treatment and prevention of unwanted complications. Communicable diseases like parasitic infestations, bacterial and fungal infections are more prevalent in the school going age group.

Different studies have been conducted across the globe to study about the paediatric dermatoses.

Few studies conducted in India were only focused on the trend of pediatric dermatoses in school children based on locality.

The pattern of cutaneous diseases in India is different across the states, locality and hilly areas.[8]This may be due to cultural differences, climatic variations and socio-economic factors. Infants are usually confined to their houses, whereas school going children are usually exposed to the neighbourhood, which suggests that the age of the children can be considered as an indicator for environmental risks.

Three main factors have been generallyimplicated in high prevalence and incidence of common skin diseases in developing areas; a low level of hygiene, including difficulties in access to water, climatic factors and overcrowding.[9]

ETIOLOGICAL FACTORS WITH EPIDEMOLOGICAL SIGNIFICANCE - SEASONAL VARIATIONS

It's a common knowledge that type and amount of disease in any community are affected directly or indirectly by climate.Various climatic factors that may predispose to the development of skin diseases are cold, heat, light, sun exposure and humidity. Also, difference in the rate of exposure to external factors and difference in the functional development of skin may give rise to differential prevalence of dermatoses among infants, toddlers and children.[10]

The environment has an unavoidable role in the prevalence of dermatoses. The exposure to environment varies in different age groups particularly so among the pediatric age group.

Seasonal alterations in pediatric dermatoses showed that in winter season, scabies and seborrhoeic dermatitis were more prevalent, while impetigo, furunculosis, and miliaria during summer and rainy seasons[9].

Pyoderma is contributed by predisposing factors like hot and humid climate. [9] In rural India, the major proportion of cases of pyoderma in health centers was during the summer, where the number of cases nearly tripled compared to in winter.[11]

Insects may be important vectors or causative agents of bacterial infection in the humid areas where they are common.

Poor hygiene - Role of water

Pyoderma is the skin disorder for which the role of hygiene appears to be best established. In children with a low level of hygiene, the incidence and prevalence of pyoderma were higher which also varied with climatic changes.[12]

A programme of free distribution of soap was associated with a trend in reducing the incidence of impetigo in children. Recently, in the same geographical area, a programme of intensive education combined with free soap distribution (in an area with easy access to water), resulted in a significant decrease in pyoderma.[13]

In children, the incidence of pyoderma was significantly correlated with low personal hygiene and with the presence of rubbish in the country yard of the family housing but not with the frequency of baths or with the use of soap.[14]

Low level of knowledge about hygiene practices were found to be associated with a higher prevalence of scabies, but this might be only a confounding factor.

OVER CROWDING

The main diseases considered here like pyodermas, impetigo, dermatophytoses, scabies are infectious and communicable diseases, which can be often contagious.

Interpersonal conveyance of pyoderma and the importance of this for dissemination are well established.[15]

One could incriminate the high level of interpersonal contact observed in many developing countries, where households are often overcrowded, as one major reason to explain some of the observed epidemiological pictures.[16]

However, this has been specifically studied only rarely in the current context and in general, did not take into account multiple possible biases in the interpretation of the available data.[16]

Overcrowding is the most common predisposing factor for the dissemination of contagious diseases, especially in scabies.[17]

Children have repeatedly been considered as main vectors of transmission of scabies in families.[18,19]

Role of other skin conditions

Certain dermatoses can be considered as a definite risk factor for pyoderma. This is especially true for scabies, which is commonly super infected and to a much lesser

extent tinea capitis. Scabies too is considered a major risk factor for pyoderma in patients due to secondary infection, but also in those without scabies, because of separate dissemination of pyoderma from super infected scabies[20].

The role of traumatic sores as a predisposing factor for pyoderma is also very common, common site being legs, in older children, and in girls,the site being ears (because of septic ear piercing) .[21]

As judged by clinical experience or anecdotal comments of authors, local reactions due to insects, either biting or not (e.g. mosquitoes, flies the form of - prurigo or popular urticaria), appear to be a common cause of secondary pyoderma in many tropical areas especially in hot and humid areas, although it appears difficult to quantify this[22].

Host-related factors

The striking frequency of pyoderma and/or scabies in certain limited groups of population suggests that immune factors might be important in certain cases.[23]

The epidemiological importance of HIV-infected individuals as a reservoir for wide dissemination of infectious disorders such as scabies or pyoderma, which are in fact more common in HIV-infected people has not been evaluated[23].

Child's skin and the adult's skin has a lot of differences too. Anatomically it is thinner, less cornified and less hairy physiologically, its sweat and sebaceous gland secretions are scantier, and apocrine sweat gland is absent or meager until puberty.

Chemically the composition of its glandular secretion particularly the composition of sebum is different from that of adults physically; it is more permeable to substances.

Immunodeficiencies with low immunoglobulins, neutropenia, reduced neutrophil migration or killing and disease caused by HIV may be associated with severe or refractory pyogenic infections.

Atopic dermatitis and symptoms with atopic like dermatitis are predisposed to bacterial infections[24].

Risk factors include antecedent cutaneous lesions, obesity, treatment with steroids and chemotherapeutic agents, dysglobulinemia, acquired or inherited immune dysfunction, hematologic, immunologic disease and malnutrition[25].

Age

Transmissible skin diseases increase with age. This might be due to the reason that children of school going ages are susceptible to newer risk factors as they grow older.

Parental care also decreases as the child becomes independent. Children above seven years age perform most of their daily self-care and hygienic activities independently while those below seven years depend on their parents for most of their hygiene and grooming activities[26].

As a result, hygienic practices by the child may be insufficient in maintaining good skin hygiene, in turn leading to increase in skin disease.

Gender

Gender based analysis showed increased prevalence of contagious skin disorders among girls. Pediculosis capitis was much more prevalent in girls as against boys.

One interesting observation was that majority of parents did not consider pediculosis infestations seriously[26]. Thus children, parents and teachers should be educated regarding timely detection and treatment of pediculosis infestation.

Socio economic class:

There was statistically significant differences in the frequency of skin disorders in students of different socio economic classes. The trend was nonspecific with both the highest and lowest prevalence in the lower socioeconomic classes (upper lower and lower).

Regarding transmissible diseases, the prevalence increased classically with decrease in the socio economic status[27].

Poor status in nutrition and hygiene, a poor immunization status, can be predisposed by a lower socioeconomic position of the family due to factors like overcrowding , reduced sanitation facilities or decreased awareness among the family members. These factors in turn can lead to the development of pyodermas[27].

Modified Kuppuswamy's socioeconomic scale was used to classify study subjects belonging to different socioeconomic classes.

BACTERIAL INFECTIONS

Bacterial skin infections are one of the common causes of childhood morbidity and constitute one among the prime causes of hospital attendance in children and constitutes 17% all clinical visits[29].

These include primary bacterial infections and secondary infections superimposed on other dermatoses and traumatic or post-surgical wounds.

Recurrent pyoderma is a problematic infection experienced by children with or without underlying dermatological disorders or immunodeficient states. Among this, impetigo is most predominant in infants and children worldwide[30].

Several Indian studies reported that highest incidence of pyoderma occurred in the first decade of life[31]. In a study by Upendra et al[32] in India, pyoderma was the most common among skin infections (7.5%) in children. The term pyoderma includes infections such as impetigo, ecthyma, folliculitis, furuncle, carbuncle, erysipelas, pediculosis capitis, infected insect bite reaction, scabies, and cellulitis[33]. Several studies from India reported Staphylococcus aureus and Streptococcus pyogenes as the commonest isolates from pyoderma lesions in children[34,35].

Pyoderma is common in tropics and higher incidence is associated with low socioeconomic conditions, overcrowding, poor personal hygiene, malnutrition, immune suppression, hot and humid weather and lack of availability of water[36].

Impetigo

Impetigo,the predominant bacterial infection in children, is a highly communicable superficial infection caused by either S. aureus or S. pyogenes or both[37].

The two classical forms of impetigo are non bullous and bullous impetigo.

Impetigo contagiosa

Impetigo contagiosa may be defined as an acute , superficial infection of the skin characterized by exudation and crusting, vesicular at the onset and crusted in development, which heals completely without scar formation. [38,39].

Most cases of impetigo are seen during the summer in temperate climates and throughout the year in warm, humid tropical regions world wide[40].

A less common complication of impetigo is post streptococcal glomerulonephritis (PSGN) which accounts for about 1%, which cannot be prevented from developing in spite of treatment of impetigo.

Bullous impetigo

Bullous impetigo is a distinct clinical entity caused exclusively by group 11 phage type 71 Staphylococcus aureus resulting from the elaboration of the epidermolytic toxin.

The blisters arise in the superficial epidermis due to loss of adhesion of keratinocytes in the granular layer[42]. The characteristic skin lesions are superficial, thin walled, fluid filled blisters of varying size ranging from 0.5 cm diameter, surrounded by erythematous margin[43].

Ecthyma

The term ecthyma is derived from a Greek word meaning pustule[44]. It is a subtype of impetigo that extends more deeply than classical impetigo, producing shallow ulcers that often heal with scarring[45].

Erysipelas

Erysipelas is a bacterial infection of the dermis and upper subcutaneous tissue with marked involvement of cutaneous lymphatic vessels, it's hallmark being a well defined, raised edge reflecting the more superficial (dermal) involvement[46].

Group A beta-hemolytic streptococci (GABHS) is the commonest etiologic agent. The lesion begins as a localized area of tender erythema and swelling and spreading rapidly with advancing margins[47].

Cellulitis

This condition is most common in the lower extremities. The reservoir for bacteria causing cellulitis is often toe webs and accordingly, colonization of these web spaces by S.aureus or beta hemolytic streptococci[48].

Bacterial infections of the hair follicles

Infection of hair follicle by coagulase-positive staphylococci resulting in local abscess formation causes folliculitis, furuncles and carbuncles. Folliculitis is a small abscess with limited surrounding tissue reaction where as furuncles have deeper nodules with more intense tissue reaction involving a single hair follicle[40].

Superficial Staphylococcal folliculitis

It is also known as follicular impetigo of Bockhart. It is usually presents as small, dome shaped pustules that appear at the ostium of hair follicles. Most common affected area in children is the scalp[49].

Deep Staphylococcal folliculitis

Inflammation of the entire hair follicle or deeper portion of the follicle appears as a swollen, red mass that eventually may point toward the surface. The pustule is larger and is often painful and may scar[49].

Furuncle

It is a painful, firm, fluctuant mass of walled off purulent material. The common sites of occurrence are hair-bearing skin subject to friction and maceration especially the face, scalp, buttocks and axillae.

Furuncles are relatively uncommon in early childhood and temperate climates except in atopic subjects, but increase rapidly in frequency with the approach of puberty.

Carbuncle

It is a deep infection of a group of contagious follicles with S.aureus, accompanied by intense inflammatory changes in the surrounding and underlying connective tissues, including the subcutaneous fat[49].

Blistering Distal Dactylitis

It is a distinctive infection localized to the volar fat pad of the distal phalanx of the finger characterized by a large blister filled with a thin white fluid.

Normal age range is 2 to16 years [46,49].

Staphylococcal scalded skin Syndrome (SSSS)

SSSS is the name used for a collection of skin diseases with blistering induced by the epidermolytic toxins of S.aureus. It mainly affects neonates and young children. Other susceptible individuals include adults with immune suppression, renal failure and malignancy[50].

Other bacterial infections

Scarlet fever, also known as scarlantina, is characterized by an erythematous rash throughout the body with subsequent desquamation. The organism responsible for classic Scarlet fever is Group A β hemolytic streptococci. It affects the age group of 3 to 8 years most commonly[40].

Necrotising fasciitis is defined as a rapidly progressing soft tissue infection with fulminant tissue destruction, rapid bacterial spread along tissue planes, thrombosis of blood vessels, systemic signs of toxicity and high rates of morbidity and mortality. All age groups including neonates can develop necrotising fasciitis[51].

MYCOBACTERIAL INFECTIONS

CUTANEOUS TUBERCULOSIS

Tuberculosis is a significant infection among communities around the world and children form a vulnerable group. Similar to adults, tuberculosis skin infections can present with varied manifestations in children.

The causative organism is M. tuberculosis, human and rarely bovine strains[52].

Clinical types of cutaneous tuberculosis are similar in children and adults, with few differences. The primary forms are commoner in children, lymph node involvement is more, lesions are more extensive compared to adults, and some forms of tuberculids like erythema induratum are almost never encountered in children[52].

Table 1 : Classification of cutaneous tuberculosis in children
A. Primary cutaneous tuberculosis in the non sensitized or without previous exposure : Miliary tuberculosis Tuberculous chancre
B. Secondary cutaneous tuberculosis in sensitized children with previous exposure : Lupus Vulgaris Scrofuloderma Tuberculosis Verrucosa Cutis Unusual forms of Tuberculosis
C. Tuberculids Lichen scrofulosorum Papulo necrotic tuberculid

Erythema nodosum
D. Dermatological complications of BCG vaccination

Leprosy

Spectrum of clinical presentation in children

Leprosy is a chronic infectious disease caused by Mycobacterium leprae, characterized by well recognized clinical, bacteriological and pathological changes[53].

Leprosy in children is important because of it's potential to cause progressive physical deformity with serious recognizably major factors of stigma associated with it and may impact psychological development in children[54]. Leprosy in the child reflects to some extent all the features of the disease in the adults; with some additional features of its own. The exposed parts in general and limbs in specific, are the commonest sites affected[55].

Children suffer from less severe disease form and their chances of developing deformities are also low, mainly due to less frequent involvement of nerve trunks[56]. Prevalence of various forms of disease in children is mostly derived from hospital based studies. BT is the commonest , the prevalence ranging from 55-78.7% , of all child cases in various studies. BL is seen in approximately 7.8% while LL rates are very low, ranging from 1.6-4.9%. Prevalence of indeterminate leprosy was estimated to be 10.1%[57].

VIRAL INFECTIONS

Pox viruses are complex DNA viruses that replicate in the cytoplasm of epidermal cells. Man is infected by three kinds of pox viruses: Ortho, Para and intermediate viruses[58].

Molluscum contagiosum

The disease is worldwide and it can occur at any age. It is common in younger ages and sexually active adults. The incidence in children is at its peak in age group less than 5 years, approximately accounting to 25%[58].

MC lesions are discrete dome shaped pearly white, waxy papules with central umbilication. Lesions can occur anywhere on the body but mostly on face, axillae, sides of the trunk and genitalia in children[58].

Human papilloma viruses

Most people will experience infection with HPV at some time in their life, generally in childhood for cutaneous types and in early adulthood for mucosal types by sexual transmission[59].

There are only very few studies available on epidemiology of verrucae in school children and the reported overall prevalence of warts range from 3% to 20%[60].

Among up to 10 percent of children and young adults, warts are estimated to appear. The highest incidence of warts occur between the ages of 12 and 16. The age of highest incidence in both sexes is estimated to be 13 years in females and 14.5 years in males[61].

Table 2 : Clinical infections of HPV sub types[58]	
Infection	**HPV Types**
Common wart	1,2,4, 7
Plantar warts, palmar warts	1,4
Flat warts	3,10, 28
Anogenital warts	6,11, 16, 18
Epidermodysplasiaverruciformis	3,5,8
Laryngeal papilloma	6,11
Heck‘s disease	13, 37
Verrucous carcinoma	16,18

HERPES VIRUSES[58]

Table 3 : Types of herpes viruses	
Alpha viruses	Herpes simplex virus Type 1 and 2 , Varicella zoster virus
Beta viruses	Cytomegalovirus
Gamma viruses	Epstein – Barr virus, Human herpes virus-6 , Human herpes virus-7, Human herpes virus-8

Clinical Presentations caused by HSV[58]

HSV produce an array of clinical manifestations in children

- Primary herpetic gingivostomatitis
- Primary herpetic lesions on skin
- Primary neonatal HSV infection
- Herpes genitalis
- Herpetic eye infection
- Herpetic whitlow
- Gingivostomatitis

This is most often seen in young children and infants. Children are febrile, irritable, refuse to eat and drink. Erythematous, painful, tense, superficial ulcerations, covered with exudates are seen[58].

Herpes simplex lesions on skin

Primary HSV lesions on skin are characterized by grouped vesicles or erosions on an erythematous base. The lesions are mostly seen on face and extremities[58].

Herpetic eye infection

HSV-1 is a major cause of keratoconjunctivitis with associated corneal opacity and visual loss[58].

Inoculation HSV infection

Herpetic whitlow, typically involves finger tips mostly in thumb suckers[58].

Herpes genitalis

Herpes genitalis occurring in children should be investigated for sexual abuse[58].

Varicella-zoster virus infections

The causative organism for the development of both varicella (chickenpox) and zoster(shingles) is the same organism, the varicella zoster virus (VZV).

Varicella zoster

Varicella is a contagious disease of childhood. 96% of susceptible children will have varicella with in one month of exposure. More than 90% of cases occur in children aged 1-14 years[58].

Herpes zoster (shingles)

Herpes zoster is due to reactivation of latent infection caused by V-Z virus. It may occur at all ages, and has a lower incidence in children[58].

The reactivation of the latent varicella zoster virus is the cause for development of herpes zoster and is usually a disease of the elderly. The occurrence of childhood herpes zoster is believed to be rare, though few cases were observed in some studies.

Though childhood herpes zoster accounted for less than 1% of the total zoster cases in the past, recent studies have shown an increase in the number of cases among apparently healthy children.

Gianotti-Crosti syndrome

Gianotti Crosti syndrome is typically a disease of children in 1-6 years age group and 90% occur before 4 years of age.

Clinical features: Monomorphic symmetric erythematous papules/papulovesicles in young children, distributed on the extensor aspect of extremities, face and buttocks. Lymphadenopathy is seen in1/3rd of the patients. Association with hepatits B and EBV infections is seen[63].

VIRAL EXANTHEMS

Exanthems in children are particularly common, and the expression ranges from non specific rashes to eruptions with distinct lesional morphology and/or distribution[63].

Table 4 : Classical viral exanthems

Traditional label	**Common clinical label**
First disease	Measles
Second disease	Scarlet fever
Third disease	Rubella
Fourth disease	Duke's disease
Fifth disease	Erythema infectiosum
Sixth disease	Roseola infantum

FUNGAL INFECTIONS

One of the most common disorders found in the dermatology OPD is fungal skin infection. The occurrence of the disease depends on the individual's age, geographic area, and immune status.

The presentations of fungal infection range from simple superficial mycoses to life-threatening disseminated or system infections[64].

Certain fungal infections predominantly involve children more than adults.

Clinically,there are four types of fungal infections, namely:

(1) Superficial including tinea versicolor, piedra, and tinea nigra.

(2) Cutaneous including onychomycosis, tinea capitis, tinea corporis, tinea barbae, tinea pedis and candidiasis of the skin, mucosa and nails.

(3) Subcutaneous, including mycetoma, sporotrichosis and chromoblastomycosis

(4) Systemic, including North American blastomycosis and cryptococcosis

Superficial fungal infections

Infections which are restricted to the stratum corneum, with little or no tissue reaction are known as superficial fungal infections[65]..

Pityriasis versicolor

It is a mild chronic superficial fungal infection characterized by scaly patches. The involved organism is Malassezia furfur or pityrosporum, a yeast like lipophilic fungus[66].

Most common site involved in children is face (39.9%), usually the only area affected in contrast to adults, the thigh and legs were also affected which is unusual in adults. The lesions of PV over the trunk is comparatively larger than those seen on face[67].

DERMATOPHYTOSIS

The fungal infection of keratinous tissues such as skin, hair and nail is termed as dermatophytosis. The causative fungi are called dermatophytes.

The morphology of the lesions, causative agent, predisposing factors and response to treatment differ in various types of tinea infections[64].

TINEA CAPITIS

Tinea capitis is the dermatophytic infection of skin and hairs of the scalp. The disease mostly occurs in children but may rarely affect infants and adults.

Boys are more likely than girls to be affected. There are three microscopic types of tinea capitis which are endothrix, ectothrix and favus.

Clinically two types of tinea capitis are present, inflammatory and non inflammatory. The former is caused by geophilic fungi and the latter by anthropophillic fungi[64].

Non inflammatory type

There are several forms of non inflammatory tinea capitis. These include gray patch, seborrheic dermatitis like and black dot type. The grey patch type presents as hyperkeratotic scaly, well demarcated area of hair loss and hairs in the region appear grey and lusterless.

Seborrheic dermatitis like tinea capitis is characterized by diffuse scaling without noticeable hair loss. Black dot type presents as ill- defined area of alopecia consisting

of multiple black dots resulting from break down of weakened hairs at the level of scalp[64].

Inflammatory type

The presentation of inflammatory tinea capitis ranges from pustular folliculitis to kerion. Another inflammatory type is favus is characterized by formation of cup shaped yellow crusts (scutula) involving multiple hairs. Sometimes it is accompanied by a peculiar mousy odour.

Tinea corporis

Tinea corporis is one among the common dermatophytic infections in kids. Non hairy areas of the body are involved. The etiological agent in young children is Microsporum canis. The parents with tinea pedis and tinea. unguium may act as source of infection.

Tinea cruris

Tinea cruris refers to dermatophytic infection of groins, which is common in adolescents and adults, and rare in children.

Tinea pedis

Tinea pedis refers to dermatophytic infection of feet, which is common in adolescents and adults, and rare in children.

Tinea mannum

Tinea mannum refers to dermatophytic infection of palms. This is common in post pubertal individuals.

Tinea unguium

The fungal infection of the nail caused by dermatophytes is called as tinea unguium[64].

CUTANEOUS CANDIDIASIS

Candidiasis is the infection of skin, mucous membrane and internal organs caused by yeast-like fungus belonging to the genus candida.

There are several species of candida .Candida albicans is the commonest, rarely C. parapsilosis, C. tropicalis, C. krusei, C.glabrata, etc.

Oral candidiasis

Oral candidiasis commonly occurs in infants and immunosuppressed patients. The different clinical variants of oral candidiasis include acute or chronic pseudo membranous, acute or chronic erythematous, hyperplastic and median rhomboid glossitis.

Intertrigo

Intertrigo is characterized by increased erythema , often accompanied with maceration in the skin folds. Satellite pustules or papules if present, indicate candidal infection.

Candidal vulvovaginitis

Candidal vulvovaginitis is common in adults but can occur in children and adolescents. Among children and adolescents, the disorder accounts for 62% of all gynecological complaints.

Perleche

Perleche is characterized by fissuring and inflammation of angles of mouth. The collection of secretions at the angles of mouth secondary to various predisposing factors is responsible for maceration and candidal infection.

Chronic paronychia and onychomycosis

The inflammation of nail folds is referred as paronychia. Chronic paronychia is commonly caused by C.albicans. Nail infection is always associated with paronychia. The presence of paronychia and erosion of distal nail plate are diagnostic of candidial onychomycosis.

Neonatal candidiasis

There are two types of candidiasis that occur in newborn period; congenital form in which skin lesions are present at birth; and neonatal form which is seen after the first week of life[64].

DEEP FUNGAL INFECTION

The deep fungal infections are consideredunder two groups; Subcutaneous fungal infections and Systemic fungal infections.

Subcutaneous Mycoses

They include mycetoma, chromoblastomycosis, phaeohyphomycosis, sporotrichosis, lobomycosis, rhinosporidiosis and subcutaneous zygomycosis.

Systemic Mycoses

The systemic mycoses can be considered under two subgroups; the endemic mycoses and the opportunistic mycoses.

Endemic Mycoses

They include histoplasmosis, blastomycosis, Coccidioidomycosis, and paracoccidioidomycosis.

Oppurtunistic Mycosis

The most common of these infections are cryptococcosis, systemic candidiasis, aspergillosis, zygomycosis, pencilliosis, and pneumocystosis[68].

INFESTATIONS

SCABIES

Scabies is a common ectoparasitic infestation of humans caused by Sarcoptes scabiei var hominis. This highly contagious disease is characterized by severe pruritus and typical distribution of skin lesions. The lesions in children unlike in adults can also occur on scalp, face, palms and soles.

It affects all ages. Although it involves children under the age of 5 commonly, there is a higher incidence in older children. In urban areas, it is more prevalent than in rural areas.

Close physical contact as in overcrowded schools, hugging and sleeping in crowded areas spread the disease. Fomites' role in the spread of scabies is controversial.

In infants and younger children palms, soles and face are also affected. Vesicles and bullae are common in infants and young children.

The lesions in older children are seen on the wrists, web spaces, elbows, axilla, umbilical area, and buttocks. Burrows are the pathognomonic lesions of scabies and

seen as grey or white serpiginous tracks. An imaginary circle called circle of Hebra covering the common areas affected- web spaces, wrists, elbows, axilla, periumbilical area and the genitalia have been described.

Complications include secondary bacterial infection, eczematization and acute glomerulonephritis which are commonly reported[70].

PEDICULOSIS

There are three types of pediculosis- pediculosis capitis caused by pediculus humanus var capitis, pediculosis corporis by pediculus humanus var corporis and pediculosis pubis by phthirus pubis.

Pediculosis has a distribution around the world. It is mostly seen in school age children (5-12 years). The prevalence varies from 4-50%. Girls are mostly affected than boys.

This female bias was reported in 1898 and still holds good. The long hair, poor grooming and sharing of combs are the probable factors for this. Whether the length of hair has a role is debatable.

School environment, prolonged close contact, overcrowding and large family are the reasons for its high incidence among children. All socio economic groups are equally affected[69].

METHODOLOGY

MATERIALS AND METHODS

SOURCE OF DATA

After obtaining ethical committee clearance, children from age 5-18 years diagnosed to be having a cutaneous infection/infestation presenting to Department of Dermatology, Venerology and Leprosy were included. This is a cross-sectional observational study.

a)METHOD OF DATA COLLECTION:

Data was collected after obtaining informed written consent from parent/ guardian. Children in age group 5-18 years diagnosed with cutaneous infection or infestation were evaluated based on a detailed clinical history including onset and evolution of lesion, socio-economic factors and environment in which the patient is living. Other factors like overcrowding, hygiene status, recurrent similar history etc were enquired.

A thorough clinical examination and relevant laboratory investigations were done wherever necessary. The data thus collected were entered into a specially designed Case Record Form and subjected to statistical analysis like proportion and Chi-square test.

b) SAMPLE SIZE

188 children of **5-18** years of age diagnosed to be having a cutaneous infection/infestation in outpatient clinic of Dermatology, Venereology and Leprosy in R L Jalappa Hospital and Research centre attached to Sri Devaraj Urs Medical College, Tamaka, Kolar from Jan 2018 to July 2019 were included.

INCLUSION CRITERIA:

Children of 5-18 years of ages diagnosed to be having a cutaneous infection or infestation were included in the study

EXCLUSION CRITERIA:

(1) Patients who were already diagnosed or on treatment for cutaneous infection/ infestation were excluded.

(2) Children with acquired immunosuppression presenting with cutaneous infection/ infestation were excluded.

Wherever necessary, the investigations mentioned below were carried out:

- Complete hemogram
- Urine routine
- KOH mount
- Tzanck smear
- Gram stain
- Bacterial culture
- Fungal culture
- Skin biopsy
- HIV testing if required

Methods of statistical analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of frequencies and

proportions. Chi-square test was used as test of significance. Continuous data was represented as mean and standard deviation.

Graphical representation of data:

MS Excel and MS Word was used to obtain various types of graphs such as bar diagram and pie diagram.

p value of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Study Design:

Hospital based observational cross-sectional study

Sample size calculation:

Sample size was estimated based on the major outcome of the prevalence of bacterial infections (33.8%) in a study by V S Reddy et al.[5]

$$\text{Sample size} = \frac{Z_{1-\alpha/2}{}^2 \, p(1-p)}{d^2}$$

Here

$Z_{1-\alpha/2}$ = Is standard normal variate (at 5% type 1 error ($P<0.05$) it is 1.96 and at 1% type 1 error ($P<0.01$) it is 2.58). As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in formula.

p = Expected proportion in population based on previous studies or pilot studies.

d = Absolute error or precision – Has to be decided by researcher.

Sample size for a frequency in a population

P= 33.8 or 0.338

q= 66.2 or 0.662

d= 10% or 0.10

Using the above values at 99% Confidence interval and 10% absolute error and considering a non –compliance of 10%, a sample size of minimum of 188 subjects with cutaneous infections and infestations were included in the study, estimated based on a major outcome of 33.8% patients with bacterial infection, according to a study by Reddy V S et al [5.]

p value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

RESULTS

A. GENERAL DESCRIPTION

Of the total 188 patients seen during the study period, 116(61.70%) patients had infective dermatoses and 72(38.29%) had infestations.

AGE

Table 5: Study subjects distribution according to age (n=188)

Age	Frequency	Percentage
5-9	63	33.51%
10-14	72	38.29%
15-18	53	28.19%
Total	188	100%

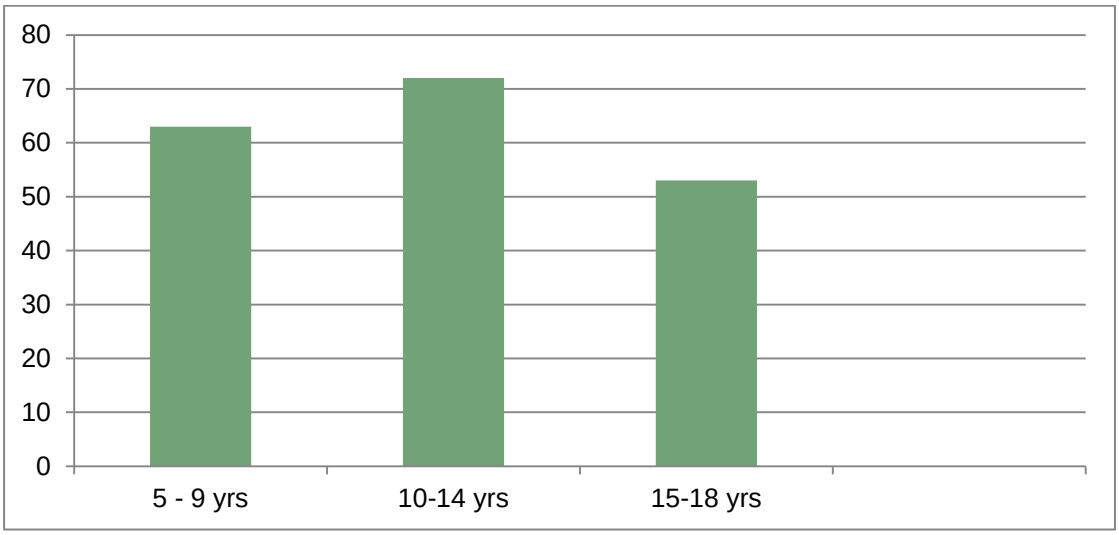

Figure1: Distribution of study subjects based on age

The most common age group involved was 10-14 years (38.29%) followed by 5-9 years (33.51%) and least involved age group was 15-18 years (28.19%), (Table 5 and Figure 1).

GENDER

Table 6 : Distribution of subjects according to gender (n=188)

Sex	Frequency	Percentage
Female	65	35.47%
Male	123	65.42%
Total	188	100%

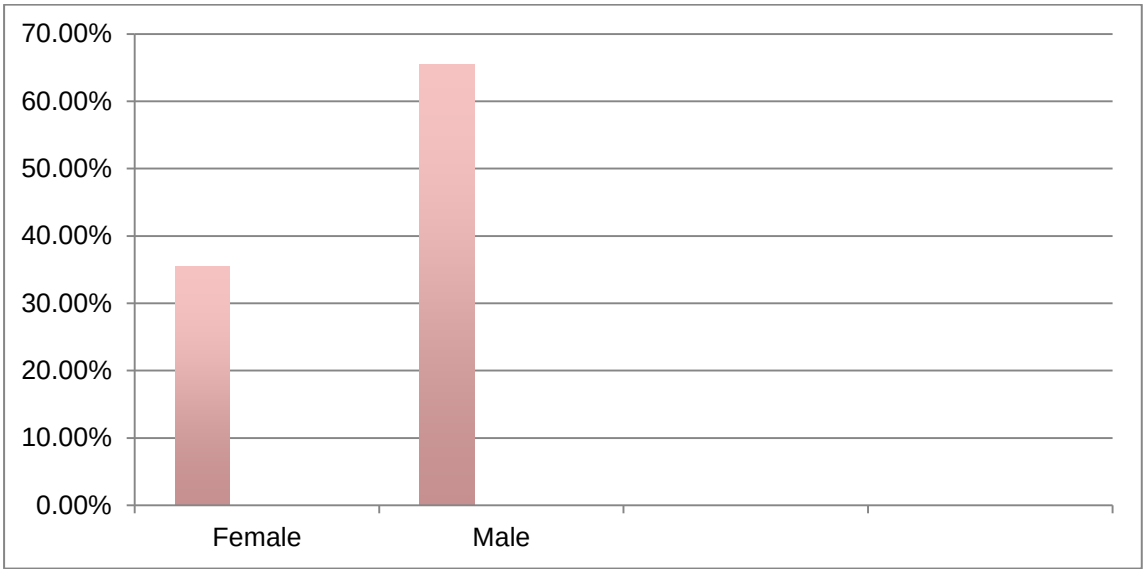

Figure 2 : Gender distribution among sample population

Majority of the patients were males (65.42%) followed by females (35.47%) (Table 6 and Figure 2).

SOCIOECONOMIC STATUS

Table 7: Distribution of subjects based on socio economic status (n=188)

(Modified Kuppuswamy's Socioeconomic scale)

Socioeconomic status	Number	Percentage
Lower middle	65	34.57%
Upper lower	56	29.78%
Lower	28	14.89%
Upper middle	32	17.02%
Upper	7	3.72%
Total	188	100%

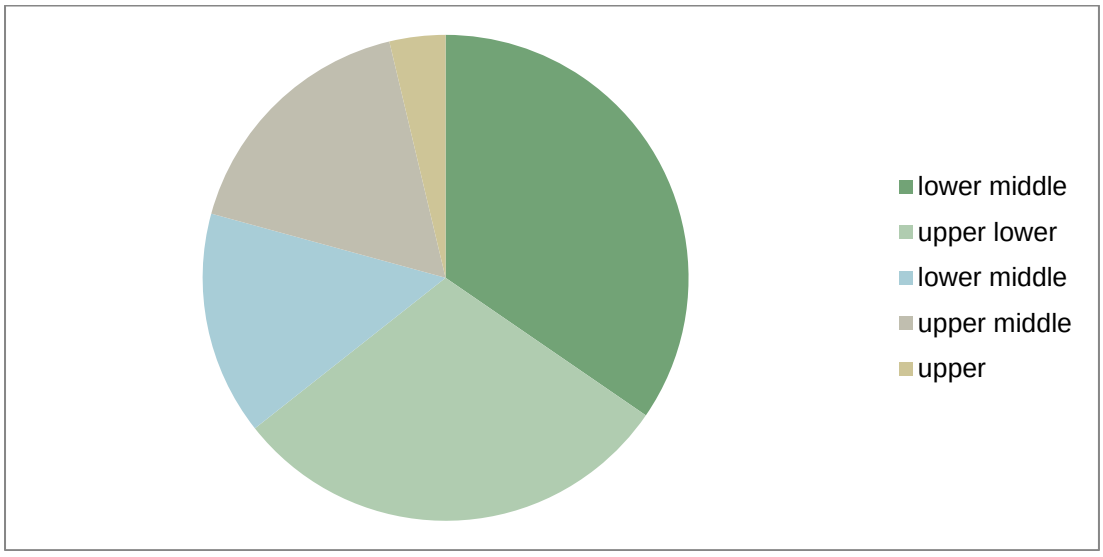

Figure 3: Socioeconomic status

Most of the patients belonged to the lower middle class (34.57%) followed by upper lower class (29.78%), upper middle class (17.02%), lower class (14.09%) and upper class(3.72%).(Table 7 and Figure 3).

LOCALITY

Table 8 :Distribution of study subjects according to locality (n=188)

Locality	Frequency	Percentage
Rural	184	97.87%
Urban	4	2.12%
Total	188	100%

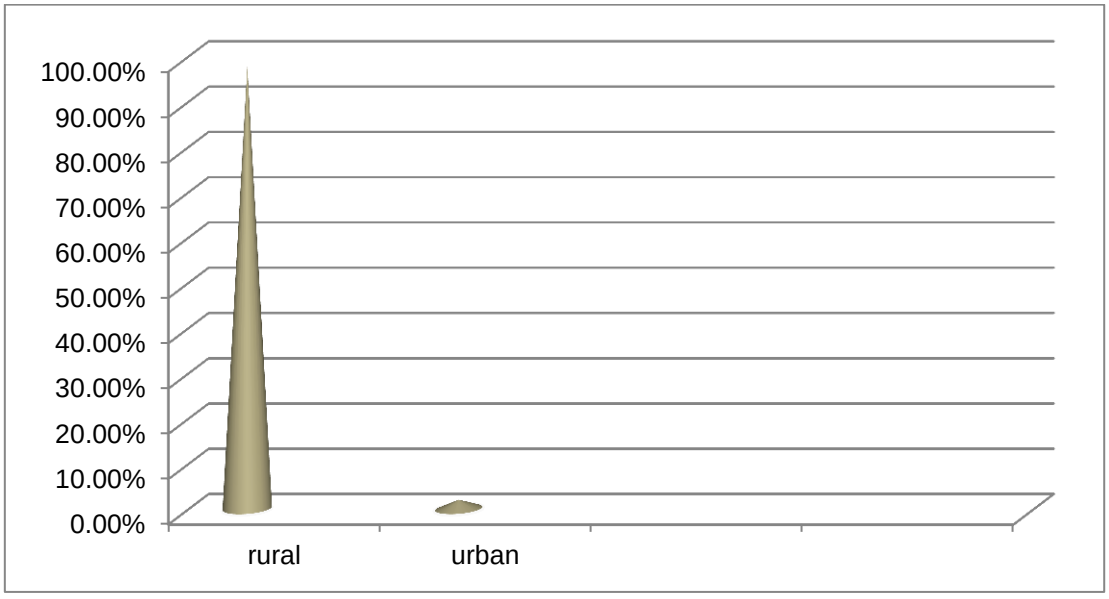

Figure 4: Distribution of study subjects according to locality

As our study was conducted in a rural province of Karnataka, majority of the patients belonged to a rural area (97.87%) and few belonged to the urban population (2.12%), (Table 7 and Figure 4).

SEASON

Table 9: Distribution of subjects according to season (n=188)

Season	Number		Total	Percentage	
	Infestations	Infections		Infestations	Infections
Summer	34	42	76	44.73%	55.26%
Winter	34	25	59	57.62%	42.37%
Monsoon	30	23	53	56.60%	43.39%

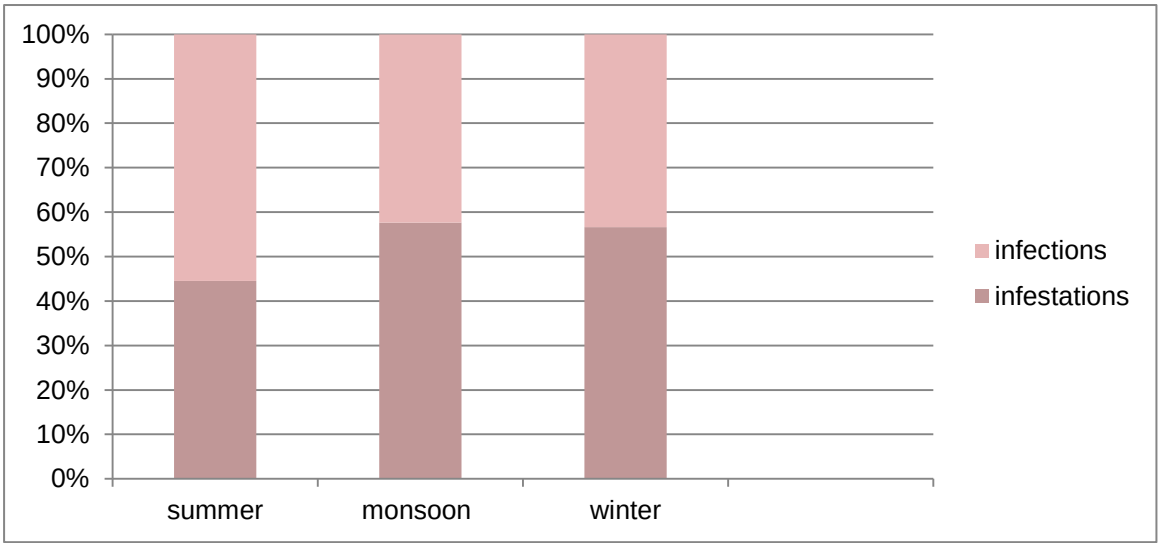

Figure 5: Seasonal distribution

Most patients were involved in summer, in which infections (55.26%) were prevalent more than infestations(44.73%). Infestations (57.62%) were predominant in winter, (Table 9 and Figure 5).

ETIOLOGICAL DISTRIBUTION

Table 10: Etiological distribution (n=188)

Causative agent	Number	Percentage
Bacterial	41	21.80%
Viral	37	19.68%
Fungal	38	20.21%
Parasitic	72	38.29%
Total	188	100%

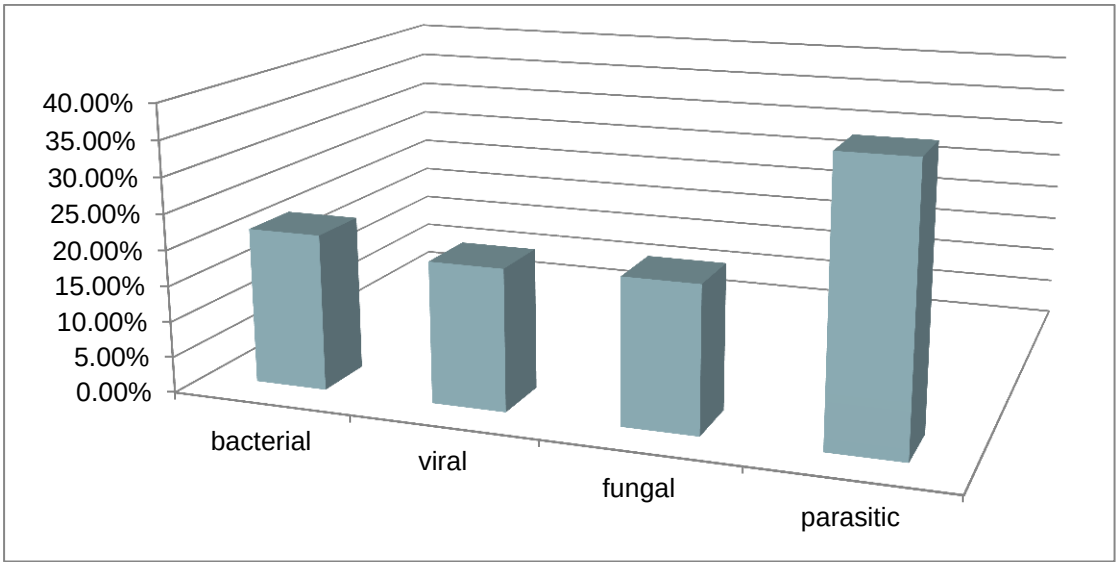

Figure 6: Etiological distribution

Most of the patients had parasitic infestations (38.29%),followed by bacterial (21.80%), fungal (20.21%) and viral (19.68%) infections, (Table 10 and Figure 6).

AGE WITH INFECTIONS/INFESTATIONS

Table 11: Association between age and infections/infestations (n=188)

Age group	Bacterial	Viral	Fungal	Parasitic	Total
5-9	20 (48.78%)	11 (29.72%)	7 (18.42%)	25 (34.72%)	63 (33.51%)
10-14	14 (34.14%)	17 (45.94%)	16 (42.10%)	25 (34.72%)	72 (38.29%)
15-18	7 (17.07%)	9 (24.32%)	15 (39.47%)	22 (30.55%)	53 (28.19%)
Total	41 (100%)	37 (100%)	38 (100%)	72 (100%)	188 (100%)

Chi square value -10.61df–6 p value- 0.101

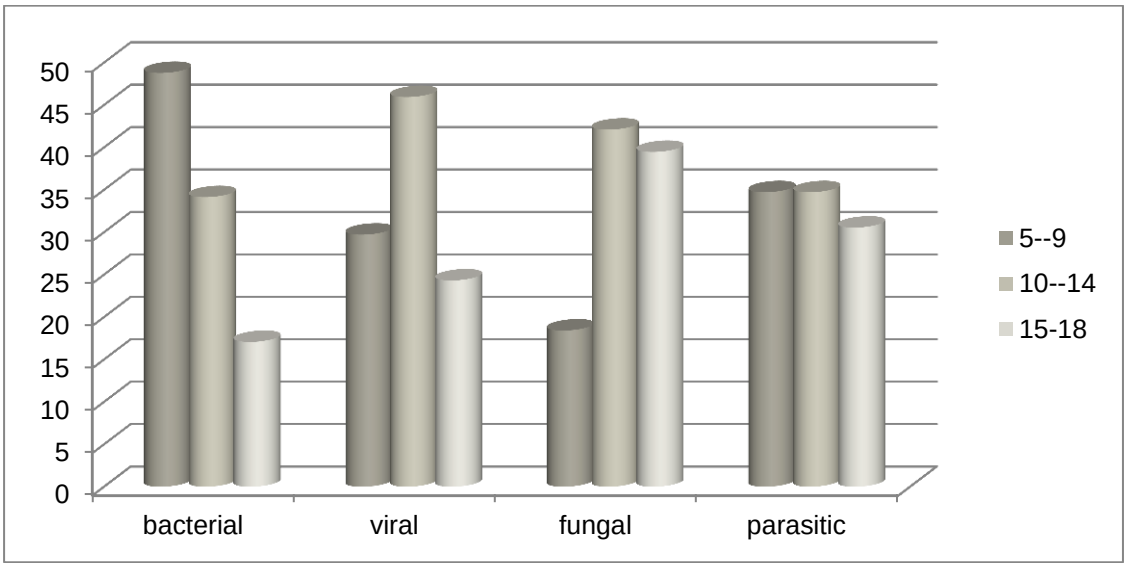

Figure 7 : Association between age and infections/infestations

From the above table, the commonest age group involved for fungal, viral and parasitic infestations was 10-14 years that is 42.10%, 45.94%, 34.72% respectively, whereas age group 5-9 years had the highest incidence of bacterial (48.78%) infections. (Table 11 and Figure 7).

The statistical analysis showed a p value of 0.101 which was not statistically significant.

GENDER WITH INFECTIONS/INFESTATIONS

Table 12 : Association between gender and infections/infestations (n=188)

Sex	Bacterial	Viral	Fungal	Parasitic	Total
Male	29 (70.73%)	26 (70.27%)	25 (65.78%)	44 (61.11%)	123 (65.42%)
Female	12 (29.26%)	11 (29.72%)	13 (34.21%)	28 (38.88%)	65 (34.57%)
Total	41 (100%)	37 (100%)	38 (100%)	72 (100%)	188 (100%)

Chi square value – 1.476 df-3 p value-0.688

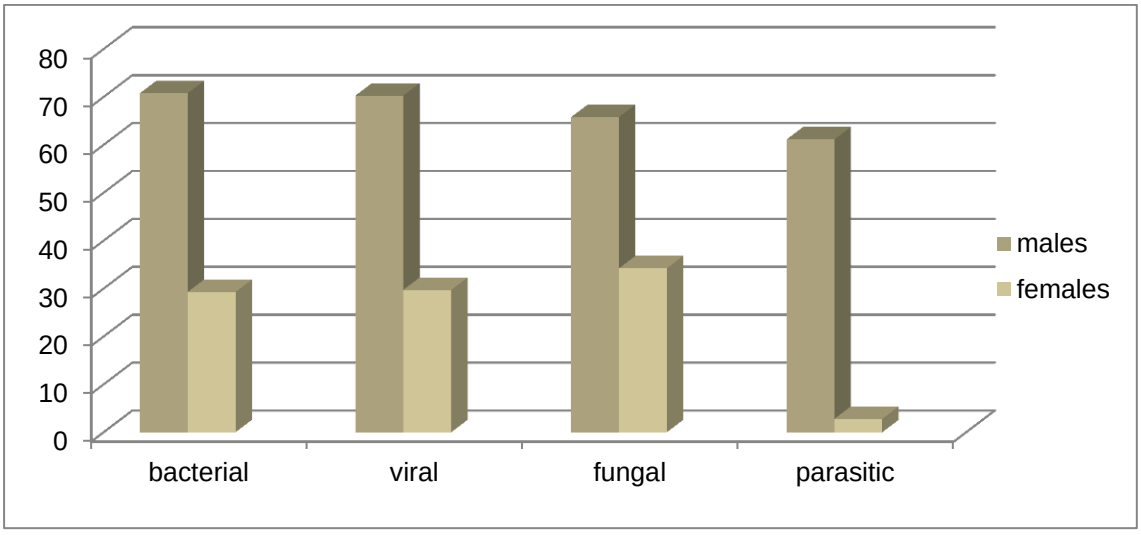

Figure 8 : Association between gender and infections/infestations

All types of infections/infestations were predominantly involving male children compared to females, among which bacterial (70.73%) was the predominant infection in males, and parasitic infestations (34.57%) the predominant disease in females. (Table 12 and Figure 8).

SOCIOECONOMIC STATUS WITH INFECTIONS/INFESTATIONS

Table 13 : Association between socioeconomic status and infections/infestations (n=188)

Socioeconomic status	Bacterial	Viral	Fungal	Parasitic	Total
Upper	3 (42.85%)	1 (14.28%)	1 (14.28%)	2 (28.57%)	7 (100%)
Upper middle	8 (25%)	6 (18.75%)	4 (12.5%)	14 (43.75%)	32 (100%)
Lower middle	16 (24.61%)	11 (16.92%)	10 (15.38%)	28 (43.07%)	65 (100%)
Upper lower	9 (16.07%)	17 (30.35%)	15 (26.78%)	15 (26.78%)	56 (100%)
Lower	5 (17.85%)	3 (10.71%)	7 (25%)	13 (46.42%)	28 (100%)

Chi square value –14.07 df- 12 p value-0.296

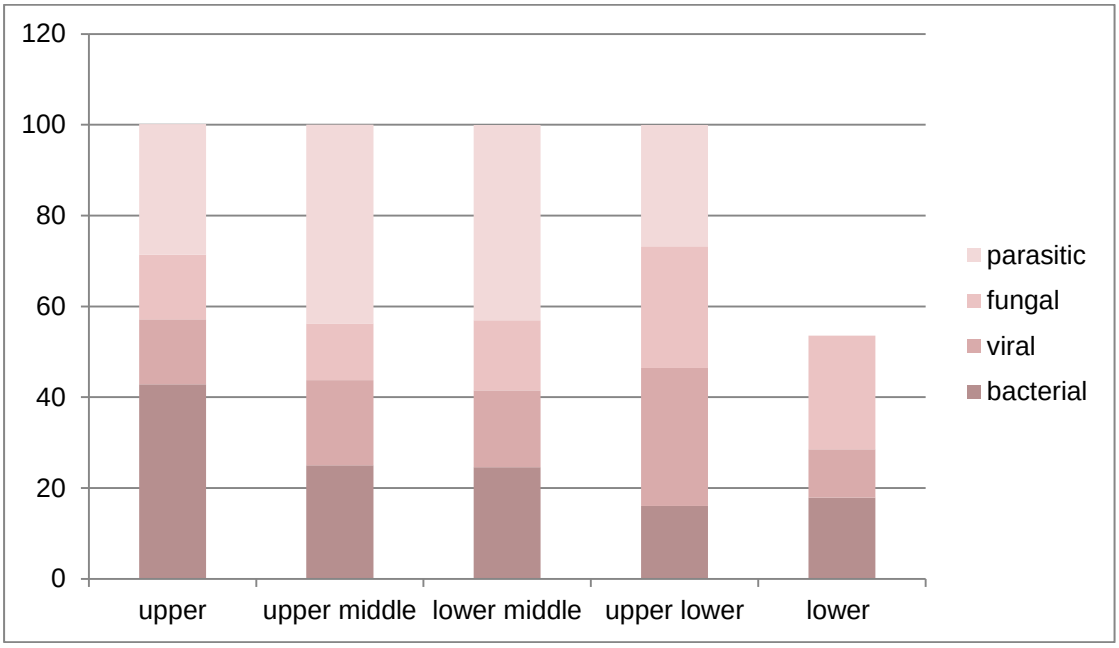

Figure 9 : Association between socioeconomic class and infections/infestations

According to the above data, the most predominant involvement of infections/ infestations were found in the lower middle class family. Viral and fungal infections were more common in upper lower class with 30.35% and 43.75% involvement respectively. (Table 13 and Figure 9).

SEASON WITH INFECTIONS/INFESTATIONS

Table 14 : Association between season and infections/infestations (n=188)

Season	Bacterial	Fungal	Viral	Parasitic
Summer	19 (46.34%)	12 (31.57%)	11 (29.72%)	34 (47.22%)
Winter	13 (31.70%)	12 (31.57%)	14 (37.83%)	20 (27.77%)
Monsoon	09 (21.95%)	14 (36.84%)	12 (32.43%)	18 (25%)
	41 (100%)	38(100%)	37(100%)	72(100%)

Chi square value – 5.823 df-6 p value-0.44

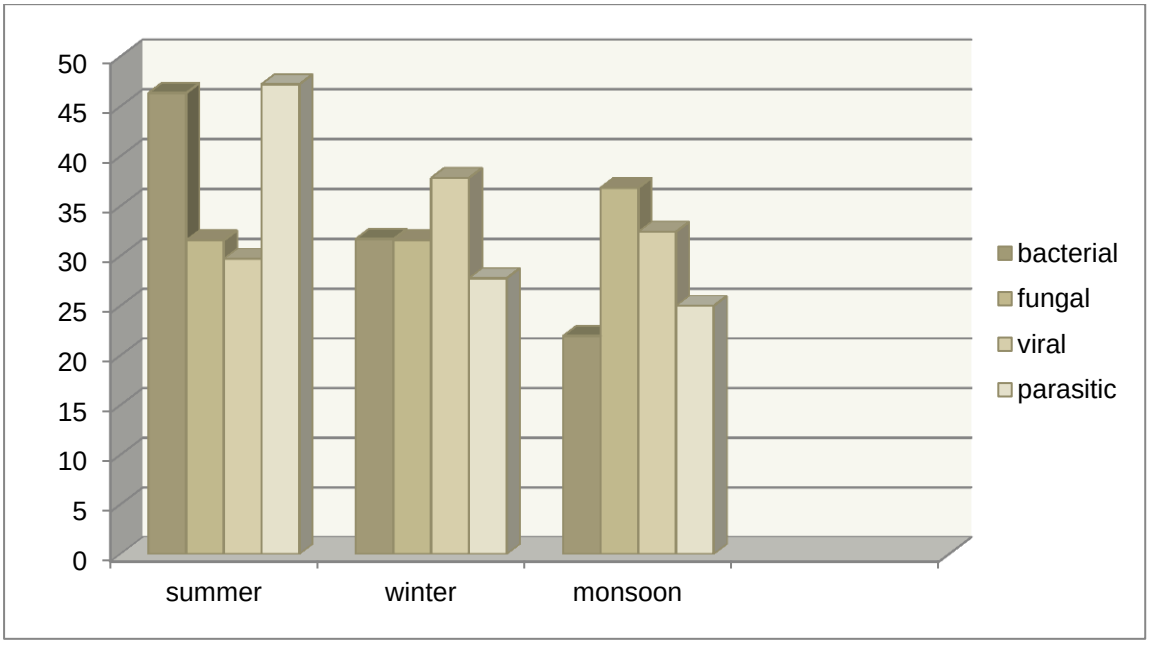

Figure 10 : Association between season and infections/infestations

According to above data, the bacterial infections(46.34%) were predominant in summer, fungal(36.84%) in monsoon, viral(37.83%) in winter, and parasitic infestations (47.22%) in summer. (Table 14 and Figure 10).

B. PREDISPOSING FACTORS

OVERCROWDING

Table 15 : Association of overcrowding with infections/ infestations (n=188)

Overcrowding	Infections/infestations			
	Bacterial	Viral	Fungal	Parasitic
Family size </=4	16 (39.02%)	17 (45.94%)	13 (34.21%)	19 (26.38%)
>4	25 (60.97%)	20 (54.05%)	25 (65.78%)	53 (73.61%)
No of rooms 1	27 (65.85%)	30 (81.08%)	29 (76.31%)	62 (86.11%)
2 -3	14 (34.14%)	7 (18.91%)	9 (23.68%)	10 (13.88%)

Based on family size, Chi square value – 4.609 df-3 p value-0.203

Based on number of rooms , Chi square value – 6.65 df-3 p value-0.08

Overcrowding was assessed by family size and number of rooms. According to the above information tabulated, it was observed that 60.97% bacterial infections. 54.07% of viral infections, 65.78% of fungal infections and the most predominant, 73.61% of parasitic infections belonged to a family size of more than four.

86.11% of patients who had parasitic infestations had an increased number of members in the family compared with the number of rooms which has probably led to the spread of the disease. The disease prevalence was more in the houses with single rooms which has predisposed to overcrowding and contagiousness of the disease.

However, the association was observed to be statistically insignificant.

HYGIENE

Table 16: Hygiene status and infections/infestations (n=188)

Hygiene status	Bacterial	Viral	Fungal	Parasitic
Good	13 (31.70%)	5 (13.51%)	14 (36.84%)	26 (36.11%)
Poor	28 (68.29%)	32 (86.48%)	24 (63.15%)	46 (63.88%)
Total	41 (100%)	37 (100%)	38 (100%)	72 (100%)

Chi square value – 6.801 df-3 p value-0.07

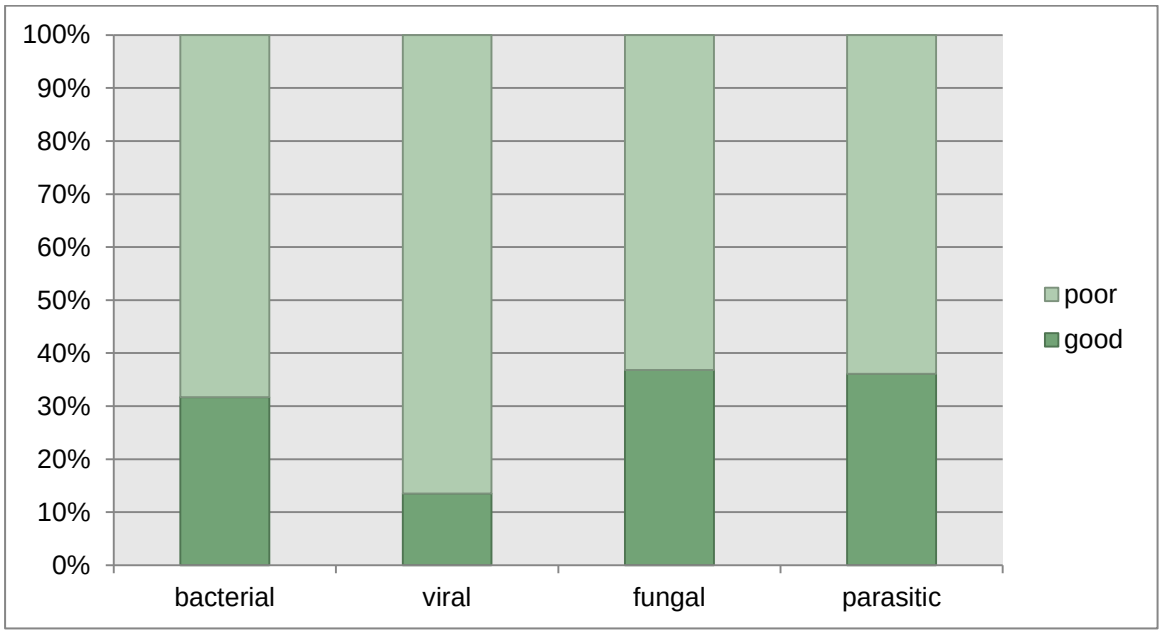

Figure 11 : Relation between hygiene and infections/infestations

The occurrence of infections /infestations in the sample size was increased among the children who had poor hygiene, with 68.29% of bacterial infections, 86.48% of viral infections, 63.15% of fungal infections, and 63.88% of parasitic infestations. (Table 16 and Figure 11).

However, the association was found to be statistically insignificant.

IMMUNISATION

Table 17 : Immunisation assessment with infections/infestations (n=188)

Immunisation status	Bacterial	Viral	Fungal	Parasitic
Poor	27 (65.85%)	30 (81.08%)	16 (42.10%)	33 (45.83%)
Adequate	14 (34.14%)	7 (18.91%)	22 (57.89%)	39 (54.16%)
Total	41 (100%)	37 (100%)	38 (100%)	72 (100%)

Chi square value – 17.08 df-3 **p value-0.001**

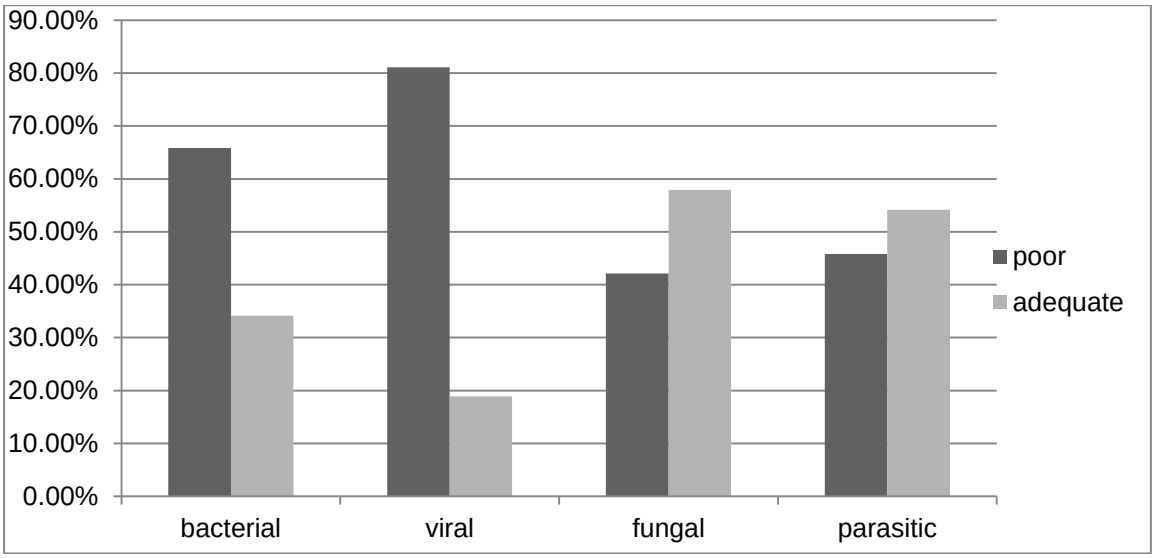

Figure 12 : Association between immunisation and infections/infestations

There was a predominant involvement of children who were not adequately immunized, with 65.85%, 81.08% , 42.10%, and 45.83% of bacterial, viral, fungal and parasitic infections respectively.

There was a **statistically significant** correlation between the individual's immune status and the incidence of infections / infestations,(Table 17 and Figure 12).

MORPHOLOGY OF LESIONS

Table 18: Distribution of morphology of lesions (n=188)

Morphology of lesion	Number	Percentage
Papule	101	53.72%
Pustule	16	8.51%
Macule	5	2.65%
Vesicle	10	5.31%
Plaque	55	29.25%
Bulla	3	1.59%
Abscess	2	1.063%
Nodule	4	2.12%

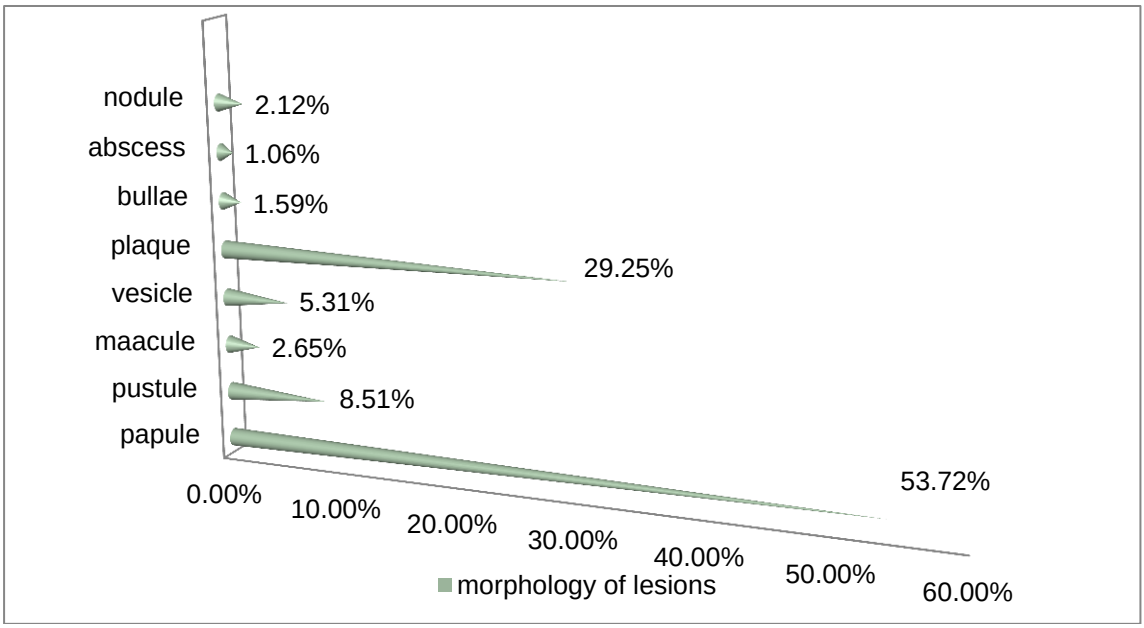

Figure 13: Distribution of lesions morphologically

The most common skin lesions were papules (53.72%) followed by plaque(29.25%), pustule (8.51%) and others (Table 18 and Figure 13).

SITE OF LESIONS

Table 19: Distribution of site of lesions affected (n=188)

Site of lesion	Number	Percentage
Head and neck	38	15.44%
Upper limbs	33	13.41%
Trunk	82	33.33%
Lower limbs	65	26.42%
Buttocks	28	11.38%

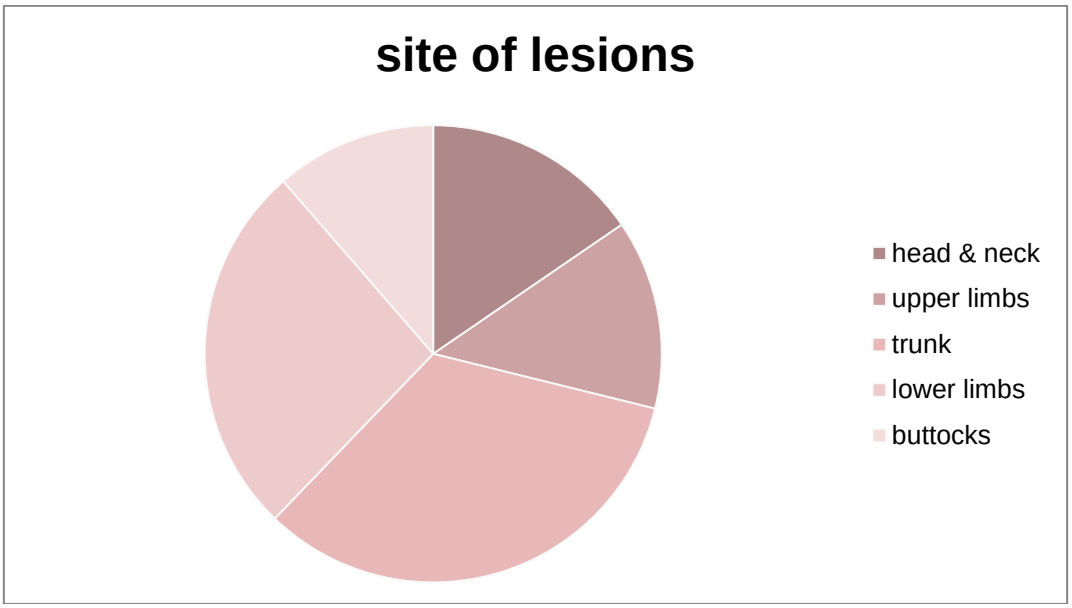

Figure 14: Distribution according to site of lesions

Most common site of involvement among the study subjects were trunk (33.33%), followed by lower extremities (26.42%), head and neck (15.44%) and upper extremities (13.41%) (Table 19 and Figure 14).

SIMILAR ILLNESS IN FAMILY

Table 20: Association with infection/infestations and similar illness in family (n=188)

Similar complaints	Number	Percentage
Present	109	57.97%
Absent	79	42.02%
Total	188	100%

Figure 15: Distribution of cases with similar family history

57.97% of the study subjects had a similar history among the family members, whereas 42.02% of the patients did not have the same (Table 20 and Figure 15).

C. PATTERNS OF CUTANEOUS INFECTIONS/INFESTATIONS

BACTERIAL INFECTIONS

Table 21: Distribution of patients based on the clinical type of bacterial infection (n=41)

Bacterial infection	Frequency	Percentage
Folliculitis	09	21.95%
Ecthyma	01	2.43%
Impetigo contagiosa	14	34.14%
Bullous impetigo	05	12.19%
Furunculosis	04	9.75%
TT-Hansens disease	01	2.43%
BT-Hansens disease	01	2.43%
Infective eczema	03	7.31%
Abscess	02	4.87%
Pitryosporum folliculitis	01	2.43%
Total	41	100%

Among bacterial infections, commonest was impetigo (34.14%) followed by folliculitis (9.75%), bullous impetigo (12.19%), furunculosis (9.75%) and others. (Table 21 and Figure 16).

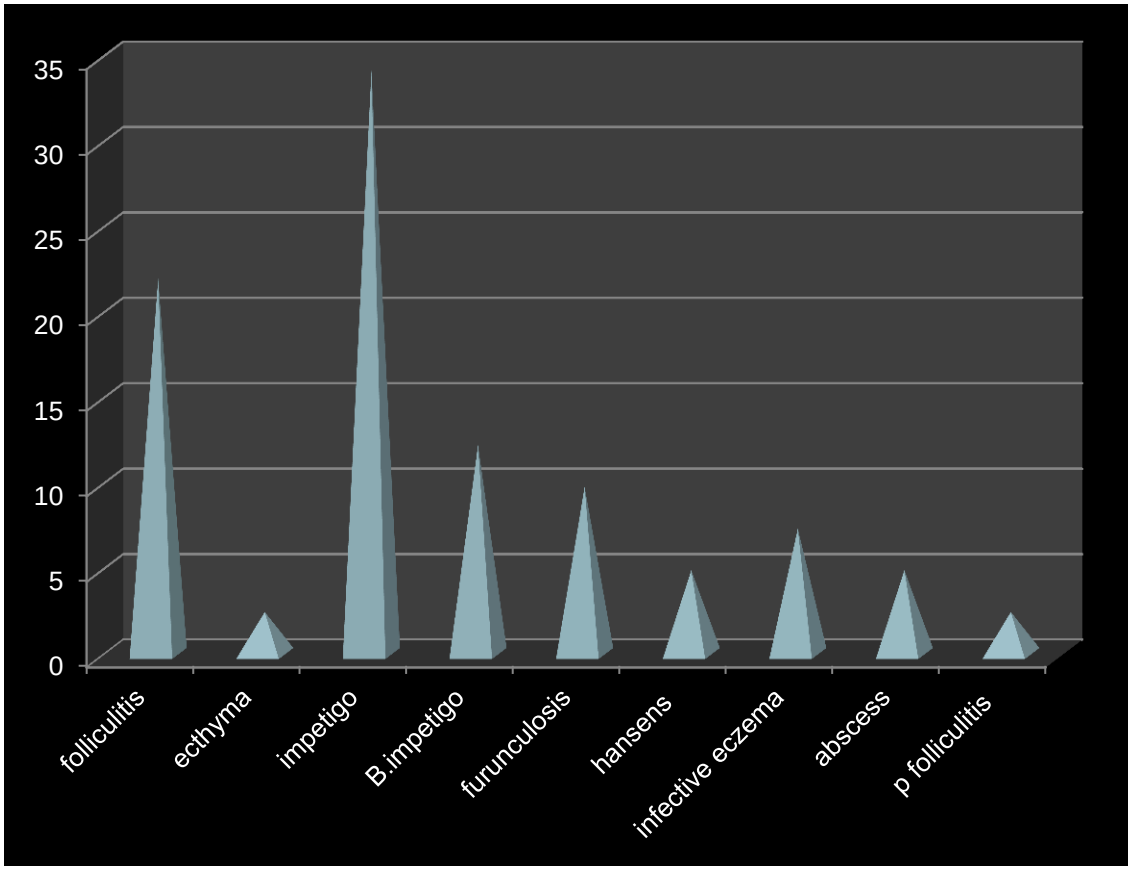

Figure 16: Distribution of bacterial infections

VIRAL INFECTIONS

Table 22: Disease distribution of viral infections (n=37)

Viral infection	Number	percentage
Varicella zoster	3	8.10%
Herpes labialis	2	5.40%
Hand foot mouth disease	2	5.40%
Molluscumcontagiosum	4	10.81%
Herpes zoster	3	8.10%
Common warts	15	40.54%
Palmoplantar	4	10.81%
Filliform	3	8.10%
Plane	1	2.70%
Total	37	100%

Among viral infections, commonest was verruca (62.16%) followed by molluscum contagiosum (10.81%), varicella and herpes zoster (8.10%), and others (Table 22 and Figure 17).

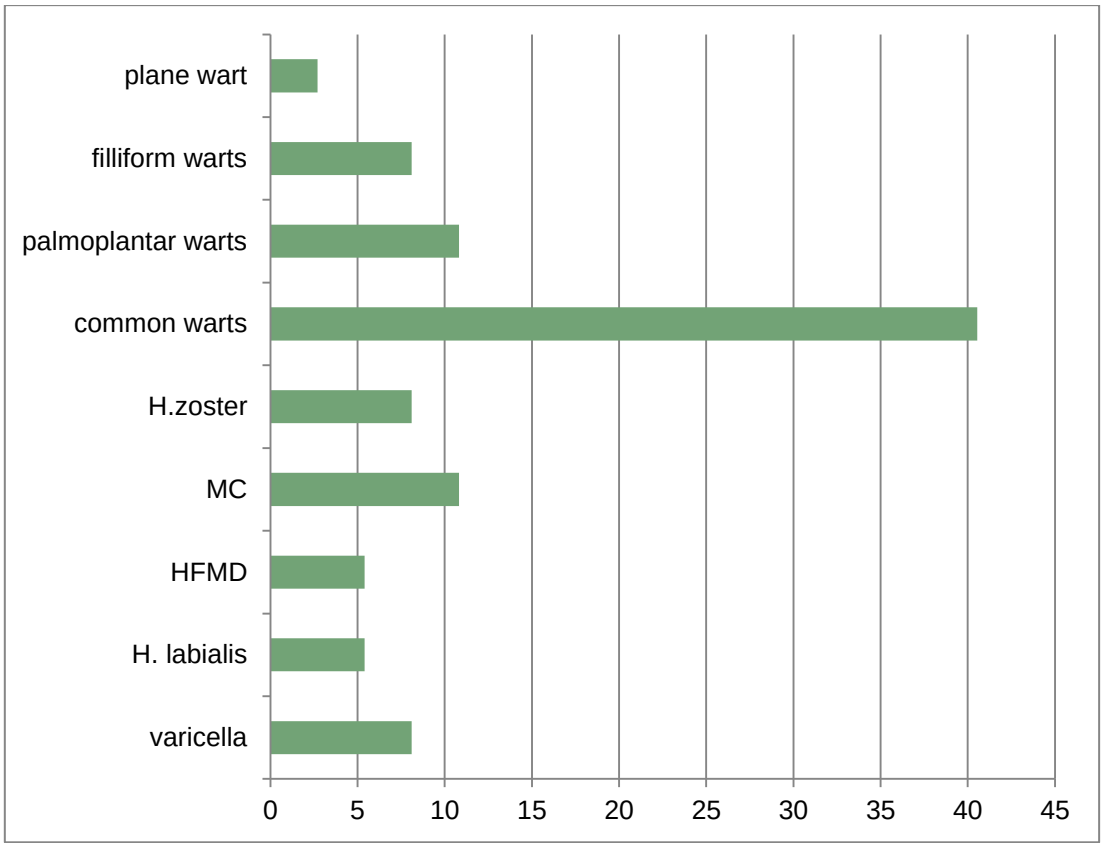

Figure 17: Distribution of viral infections

FUNGAL INFECTIONS

Table 23: Distribution of study subjects who had fungal infections (n=38)

Fungal infections	Number	Percentage
Tineacoporis	19	50%
Tineacruris	9	23.68%
Tineacapitis	3	7.89%
Tineapedis	1	2.63%
Tineafacei	3	7.89%
Pityriasisversicolor	3	7.89%
Total	38	100%

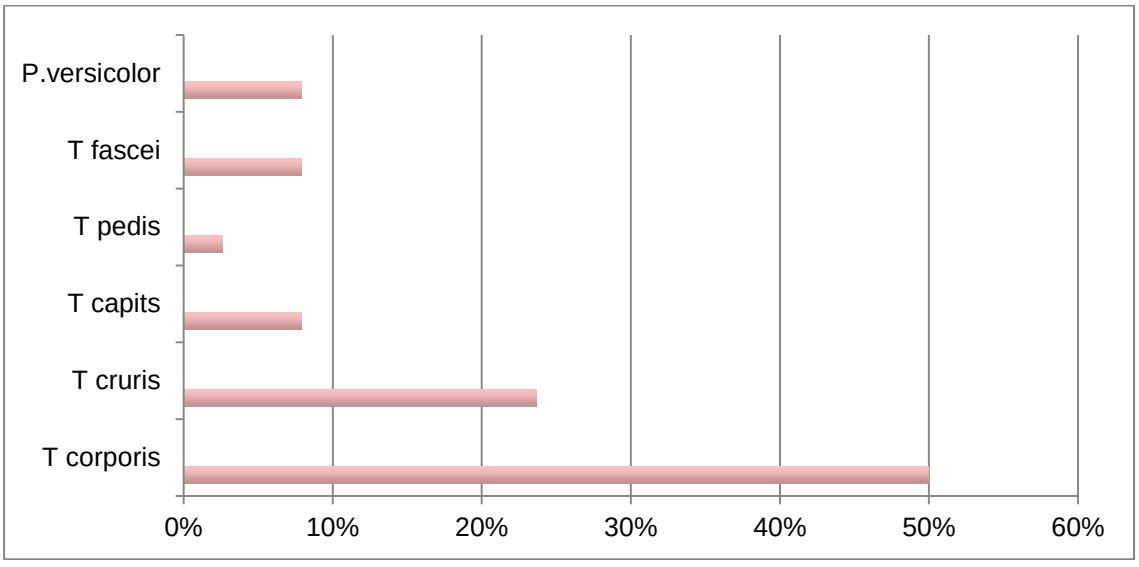

Fig 18: Distribution of fungal infections

The major component among fungal infections were dermatophytosis, in which tinea corporis had major contribution (50%) followed by T. cruris (23.68%), T. capitis/facei (7.89%) and pityriasis versicolor (7.89%), (Table 23 and Figure 18).

PARASITIC INFESTATIONS

Table 24:Distribution of study subjects with parasitic infestation

Parasitic infestation	Number	Percentage
Scabies	68	94.44%
Pediculosiscapitis	4	5.55%
Total	72	100%

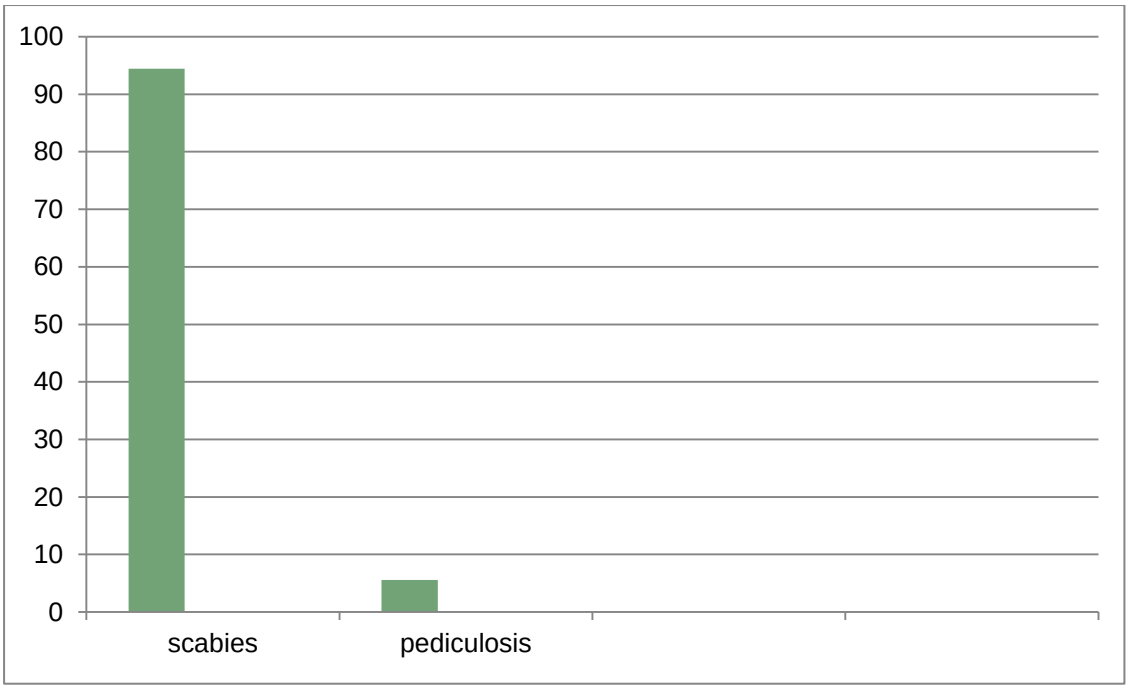

Figure 19: Distribution of parasitic infestations

The most common parasitic infestations were scabies (94.44%), followed by pediculosis (5.55%) (Table 24 and Figure 19).

INVESTIGATIONS FOR BACTERIAL INFECTIONS :

Table 25: Investigations for bacterial infections

Investigations	Number	Percentage
Grams stain		
Positive	19	76%
Negative	7	28%
Bacterial culture		
Positive	11	64.70%
Negative	6	35.29%
Organism isolated		
Staphylococcus aureus	11	64.70%
Streptococci	4	23.52%
Staphylococcus epidermidis	2	11.76%

Gram stain was positive in 76% of the cases. Among the culture positive cases (64.70%), the most common organism isolated was Staphylococcus aureus (64.70%) followed by streptococci (23.52%).

INVESTIGATIONS FOR FUNGAL INFECTIONS:

Table 26: Investigations for fungal infections

Investigations	Number	Percentage
KOH mount		
Positive	15	65.21%
Negative	8	34.78%
Fungal culture		
Positive	9	75%
Negative	3	25%
Organism isolated		
Trichophyton rubrum	3	33.33%
Trichophyton mentagrophytes	6	66.66%

KOH mount was done in 23 patients, in which 65.21% came positive. Among the fungal culture positive cases, the most common organism isolated were Trichophyton mentagrophytes (66.66%), followed by Trichophyton rubrum (33.33%).

PHOTOGRAPHS

PHOTOGRAPHS

BACTERIAL INFECTIONS

Figure 20: Impetigo contagiosa with honey colored crusts on chin

Figure 21: Ruptured bullous impetigo

Figure 22: Ecthyma gangrenosum

Figure 23: Multiple folliculitis

Figure24: Scalp folliculitis

Figure 25: Multiple symmetric hypopigmented macules in Borderline lepromatous leprosy

Figure 26: Infective eczema

VIRAL INFECTIONS

Figure 27:Herpes labialis

Figure 28: Herpes zoster

Figure 29: Palmar warts

Figure 30: Plantar warts

Figure 31: Periungual warts

Figure 32: Varicella zoster

Figure 33: Verruca on upper lip

FUNGAL INFECTIONS

Figure 34: Annular lesion in tinea corporis

Figure 35: Pityriasis versicolor

Figure 36: Tinea capitis

PARASITIC INFESTATIONS

Figure 37: Nodules in genital scabies

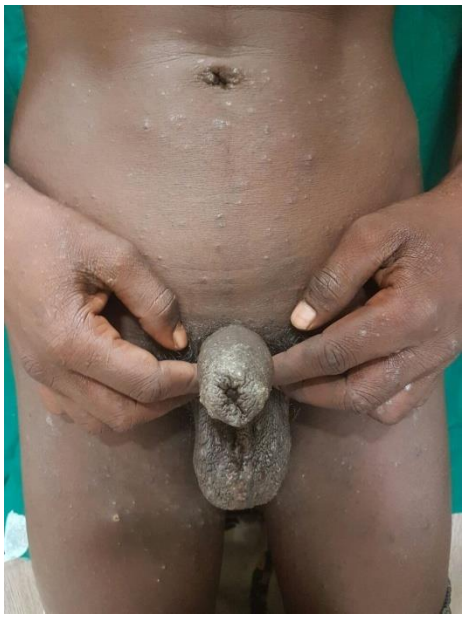

Figure 38: Severe involvement in scabies

Figure 39: Severely excoriated papules in scabies

Figure 40: Characteristic involvement of web spaces by papules in scabies

DISCUSSION

DISCUSSION

Climatic factors, external environmental factors, dietary habits and nutrition and socioeconomic status influence the pattern or trend among skin diseases in children.Studies on the incidence of cutaneous infections/infestations in the pediatric age group from this area of the country are scanty. This present study was hence undertaken with an objective to know the clinical profile and trend of cutaneous infections/infestations in pediatric age group.

AGE

In ourstudy the most common age group involved was 10- 14 years (38.29%).

In a study carried out by Gunathilakaet al[71] in Sri Lanka, 83.3% cases belonged to the age group of 5 to 7 years, followed by 66.2% of 11 to 13 years.

Another study by Upendra et al[32] in Chattisgarh, the most predominant age group involved was 6- 10 years with 54.3% followed by 10-16 years with 45.7%.

Our present study showed a lower occurrence among of 5 to 9 years age group, 33.51%.

Older children above 14 years are capable of performing their daily self-care and hygienic activities independently which could have been the reason for the lower prevalence in that age group. Younger age group children below 10 years depend on their parents for their hygiene and grooming activities.

Hygienic practices by the child may be insufficient and lead to increase in skin disorders.

GENDER

Table 27: Comparison of different studies based on gender

	Our study	Gunathilaka et al[71]	Upendra et al[32]
Male	123 (65.42%)	21 (26.6%)	(51.6%)
Female	65 (34.57%)	110 (87.3%)	(48.4%)
Total	188 (100%)	(100%)	(100%)

Our study had a predominance of males with 65.42% which was similar to study conducted by Upendra et al . But this was found contrary to the results obtained in a study by Gunathilaka et al where females were predominantly involved with a percentage of 87.3%.

SOCIOECONOMIC STATUS

In the present study, according to the Modified Kuppuswamy socioeconomic scale, most of patients were from the lower middle class (34.57%) followed by upper lower class (29.78%), upper middle class (17.02%), lower class (14.89%) and upper class (3.72%).

In similar studies conducted in Salem by Jose et al[3] and a different study by Sharma et al[1] showed the most number of study subjects belonged to the middle class followed by upper lower.

Lower classes of socioeconomic status are more predisposed to poor hygiene, overcrowding and low sanitation facilities which make them prone for increased infections and infestations.

SEASON

In this study, the rate of infections were increased in summer (55.26%), and the infestations (57.62%) were predominant in the season of winter. In monsoon, the number of cases with infestations(56.60%) were more predominant than infections (43.39%).

ETIOLOGICAL DISTRIBUTION

In our study infections (61.70%) were prevalent more than infestations (38.29%).

According to the causative agent, parasitic infestations(38.29%) were found predominant over bacterial infections(21.80%), fungal infections(20.21%) and viral infections (19.68%).

The Sri Lankan study[71] showed predominance of pediculosis (42%) followed by fungal infections(6.8%) and the least common were bacterial infections (1.5%) , which was contrasting to our study.

In a different study which was done in Libya[2], viral infections(12.6%) were more common , followed by bacterial(11.6%) and parasitic infestations (8.5%).

In their study by GM Sanghameshwara et al[72], in northern province of Karnataka, observed a predominance of fungal followed by viral and bacterial infections.

The above mentioned data take us to the conclusion that the prevalence of the infections and infestations vary with the geographical area and environmental factors to which they are exposed.

ASSOCIATION BETWEEN AGE GROUP AND BACTERIAL INFECTIONS

Table 28: Comparison of bacterial infections with age

Age group	Bacterial infections (n=41)	
5-9 years	20 (45.78%)	
10-14 years	14(34.14%)	
15-19 years	7 (17.07%)	
Age group	Present study (n=41)	Upendra et al[32] (n=161)
Primary school age group (5-10 years)	20 (45.78%)	80 (49.68%)
High school age group (10-18 years)	31 (75.60%)	81 (50.31%)
Total	41 (100%)	161(100%)

Throughout our sample, bacterial infections were more common in the 10 to 18 year age group with 75.6% participation. A similar study by Upendra et al[32] showed no significant difference in the prevalence of bacterial infections in both primary and secondary school age groups.

The higher incidence of infections, especially bacterial, in this age group in our study indicates indirectly the importance of knowledge of self care among the high school children.

COMPARISON OF FUNGAL INFECTIONS WITH AGE

Table 29: comparison of fungal infections with age

Age group	Present study (n=38)	Mishra et al[73] (n=235)
5-9 years	7 (18.42%)	74 (31.5%)
10-14 years	16 (42.10%)	38 (16.2%)
15-18 years	15 (39.47%)	14 (6%)

Throughout our research, fungal infections were more frequent at the age of 10-14. The predominant age group involved in a study carried out by Mishra et al[73] on fungal skin infections was 5 to 9 years.

In the study conducted by Gandhi S etal[74] in Gulbarga, Karnataka on fungal infections alone, the most prevalent age group was 10-14 years, which was in accordance with our study.

COMPARISON OF VIRAL INFECTIONS WITH AGE

Age group	Present study (n=37)
5-9 years	11 (29.72%)
10-14 years	17 (45.94%)
15-18 years	9 (24.32%)
Total	37 (100%)

For comparison, modifying the division into primary school age and high school age,

Table 30: Comparison of viral infections with age

Age group	Present study (n=37)	Upendra et al[32] (n=49)
Primary school age (5-10 years)	11 (29.72%)	25 (51.02%)
High school age (10-18 years)	26 (70.27%)	24 (48.97%)
Total	37 (100%)	49(100%)

In our study, the older age groups presented with higher prevalence of viral infections. In the study by Upendra et al[32], there was no significant difference in the prevalence of viral infections in both the age groups.

COMPARISON OF PARASITIC INFESTATIONS

Age group	Present study (n=72)
5-9 years	25 (34.72%)
10-14 years	25 (34.72%)
15-18 years	22 (30.55%)
Total	72 (100%)

According to the division as primary school age and high school age,

Age group	Present study (n=72)	Upendra et al[32] (n=441)
Primary school age	25 (34.72%)	158 (35.82%)
High school age	47(65.27%)	283 (64.17%)
Total	72 (100%)	441(100%)

Table 31: Comparison of parasitic infestations with age

According to the above data, the high school age were mostly involved with a 65.27% involvement in this study. The study by Upendra et al[32] showed the prevalence of infestations was on the higher side in the high school age group with a 64.17% involvement which was in similarity with our study. Increased outdoor exposure in the school may enhance chances of acquiring infestations.

COMPARISON OF INFECTIONS/ INFESTATIONS BASED ON GENDER

Table 32: Comparison of infection/infestation with gender

Disease	Present study Males (n=123) Females(n=65)	Upendra et al[32] Males (n=413) Females(n=320)
Bacterial	29 (70.73%) 12(29.26%)	109(67.70%) 52 (32.29%)
Viral	26(70.27%) 11(29.72%)	21(42.85%) 28(57.14%)
Fungal	25(65.78%) 13(34.21%)	65(79.26%) 17(20.73%)
Parasitic	44(61.11%) 28(38.88%)	218(49.43%) 223(50.56%)

Male predominance was observed in all infections and infestations in the present study. In the study by Upendra et al, male predominance was seen mainly among the bacterial(67.70%) and fungal(79.26%) infections. There was a slight predominance of females involved among the parasitic infestations(50.56%) and viral infections (57.14%), which was not seen in our study.

ASSOCIATION BETWEEN LOCALITY AND INFECTIONS/INFESTATIONS

The proportion of rural versus urban population in our study for infections/ infestations were 97.87% and 2.12% respectively. Thus we observed a higher incidence of all types of infections/ infestations among rural population as the area of the study is rural geographically.

The higher prevalence in rural area is contributed by factors like low literacy rate, poor hygiene /sanitary conditions, lack of awareness and health services for the skin diseases.

Our hospital in Kolar district of Karnataka caters health services mainly to rural population who belong to lower socioeconomic strata.

SOCIOECONOMIC STATUS WITH INFECTIONS/INFESTATIONS

In our study, the most predominant involvement of infections/infestations were in lower middle class (34.75%), followed by upper lower (29.78%), upper middle (17.02%), lower(14.89%) and upper class(3.72%).

In similar studies conducted in Salem[3] and Uttar Pradesh[75], the most affected were seen in the middle class with 49.9% and 40% involvement respectively.

Lower SES may contribute to poor nutrition leading to lower immunity status and thereby precipitate skin infections.

OVERCROWDING WITH INFECTIONS/INFESTATIONS

In our study, it was observed that 60.97% bacterial infections. 54.07% of viral infections, 65.78% of fungal infections and the most predominant, 73.61% of parasitic infections belonged to a family size of more than four.

In the study carried out in Sri Lanka[71], the prevalence of infections were found more infamily size of 4 to 6 members with 82% involvement. This was suggestive that overcrowding is inturn, a significant risk factor for the increased prevalence of

infections and infestations which eventually leads to the spread of the disease and increase in the disease burden.

COMPARISON OF BACTERIAL INFECTIONS

In our study, among bacterial infections, commonest was impetigo (46.34%) followed by folliculitis (9.75%), furunculosis (9.75%) and others.

In the study carried out in Sri lanka[71], the occurrence of impetigo was negligible with only 1.5% involvement.

In a similar study conducted in Libya[2], the predominant bacterial infection was impetigo, which was in line with our study. In comparison, another study conducted in northern part of Kerala[5], furunculosis (38%) was commoner than impetigo.

Malnutrition, overcrowding, low hygiene, poverty and weather have an important role to play in deciding the occurrence of bacterial infections in children.

Two cases of Hansens disease were present in our study, one borderline tuberculoid and one tuberculoid leprosy. A recent study[76] on childhood leprosy states that borderline tuberculoid is the most predominant spectrum among children, followed by pure neuritic, lepromatous and borderline lepromatous leprosy in that order.

COMPARISON OF VIRAL INFECTIONS

In this report, verruca (62.16 percent) was the most prevalent viral infection followed by molluscum contagiosum (10.81%), varicella and herpes zoster (8.10%) and others.

In two studies conducted in northern province of Karnataka[74] and Libya[5], verruca were the mostly present viral infections which was in similarity with our study.

In their study, Sharma et al[1], found the predominant among viral infections were varicella(5.9%), followed by molluscum contagaiosum(5%) and verrucae(4.1%).

Infection spreads by blood, sputum, and nasal discharge by droplet infection.

Therefore, viral skin infections varied in different ratios in different studies which indicate the disparity in geographical location and socioeconomic strata. Children may be favored by barefoot walking for maceration and trauma as it may predispose to development of warts.

COMPARISON OF FUNGAL INFECTIONS

In our research, tinea corporis (50%) infections were the most frequent manifestations of dermatophytosis followed by T. cruris (23.68%), T.capitis and T.facei (7.89%) and pityriasis versicolor (7.89%).

In a different study conducted by Gandhi S et al[74], exclusively in dermatophytosis of paediatric age, tinea corporis was the most predominant(45%), followed by T. cruris (28%), T.capitis (11%) and T. facei(8%). This was in similarity with our study.

Another study on fungal infections conducted at Chattisgarh[32] revealed a predominance of tinea corporis (43%) in their study.

When fungal culture was done for relevant patients, trichophyton mentagrophytes were the predominant species which was isolated. This was in accordance with the study by Mishra N et al[73] which also showed predominance of trichophyton mentagrophytes followed by trichophyton rubrum and trichophyton violaceum.

Pityriasis versicolor's lower occurrence may be due to sebaceous gland inactivity in the pediatric age group.

Poor hygiene, frequent injury, lack of fungistatic sebum, humidity, moisture and overcrowding make children more vulnerable to all types of fungal infection.

COMPARISON OF PARASITIC INFESTATIONS

Table 33: Comparison of parasitic infestations

Infestations	Present study (n=72)	Upendra et al	Gunathilaka et al
Scabies	94.4%	13.6%	1.5%
Pediculosis	5.55%	9.2%	42%

In our study the predominant involvement was by scabies (94.44%) followed by pediculosis (5.55%).

In a similar study by Upendra Y et al[32], scabies (13.6%) was prevalent more than pediculosis (9.2%), which was in line with our results.

In contrast, the study carried out by Gunathilaka et al[71], pediculosis (42%) was commoner than scabies(1.5%).

CONCLUSION

CONCLUSION

- Overcrowding, lower socioeconomic status, unhygienic environment, malnutrition, poor immunisation status, geographical area , season, and other environmental factors are the predisposing factors for pediatric cutaneous infection/infestations.
- A good primary health care setup helps in alleviating the morbidity associated with cutaneous infection/infestations. The family members of the child has to be properly counselled, and awareness has to be created among the same regarding the hygiene maintenance, proper nutrition, immunisation to reduce the incidence of infections/infestations .

SUMMARY

SUMMARY

- Out of the total 188 cases, parasitic infestations (38.29%) were the most predominant among all infestations and infections followed by bacterial (21.80%), fungal(20.21%), and viral(19.68%) infections.
- All types of infections were commoner in the age group of 10-14 years (38.29%) followed by 5-9 years (33.51%) and 15-18 years(28.19%).
- All cutaneous infections/infestations were commoner in male children.
- All cutaneous infestations/infestations were commoner in patients from rural area.
- Majority of patients belonged to lower middle class (34.57%), followed by upper lower, upper middle, lower and upper classes according to Modified Kuppuswamy socioeconomic scale.
- The bacterial infections (46.34%) were predominant in summer, fungal (36.84%) in monsoon, viral (37.83%) in winter, and parasitic infestations (47.22%) in summer.
- All types of cutaneous infections /infestations were substantially higher in children living in overcrowded houses.
- The occurrence of infections /infestations in the sample size was increased among the children who had practices of poor hygiene.
- There was a predominant involvement of children who were not adequately immunized. Statistically significant correlation was found between the individual's immune status and the incidence of infections / infestations.
- There was increased prevalence of infections/infestations among families which had similar complaints within it.

- Impetigo contagiosa (34.14%) was the commonest type of bacterial infection followed by folliculitis (21.95%), bullous impetigo (12.19%), furunculosis (9.75%) and others.
- We had 2 Hansens disease patients, one borderline lepromatous and the other borderline tuberculoid.
- Among viral infections, commonest was verruca (62.16%) followed by molluscum contagiosum (10.81%) and varicella & herpes zoster (8.10%).
- The major component among fungal infections were dermatophytoses, in which tinea corporis had major contribution (50%) followed by cruris (23.68%), capitis/facei (7.89%) and pityriasis versicolor (7.89%).
- The more common parasitic infestations was found to be scabies (94.44%), followed by pediculosis (5.55%)
- Staphylococcus aureus (64.70%) was the commonest bacteria isolated among culture positive cases.
- Trichophyton mentagrophytes (66.66%) was the commonest dermatophyte isolated among culture positive patients.

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ANNEXURES

PROFORMA

Patient particulars **Case number**

NAME:	**OP/IP NUMBER**
AGE& GENDER:	**DATE:**
ADDRESS:	**Occupation:**

CHIEF COMPLAINTS:

Skin lesions- flat/ elevated

Discomfort/ burning sensation/pain/ swelling/ discoloration

HISTORY OF PRESENT ILLNESS:

Onset

Duration

First site of involvement , whether progressed further or not

Sites involved at present : head and neck/upper and lower extremities/trunk /buttocks/genitals

Progression: slow/ rapid

H/o fever prior to the onset

Occupation of parents

Education of head of family

Monthly income of family

Socioeconomic status

No of members in family

No of rooms in house

H/o similar illness in any family member/collegue

Season: Summer/winter/monsoon

Any other associated symptoms (eg itching)

Location (address)

H/o vaccination in recent past

Immunisation status

H/o insect bites

H/o drug intake

PAST HISTORY:

- Similar history in the past
- Treatment history
- On any regular medications or not

PERSONAL HISTORY:

Food habits: Non vegetarian / vegetarian/ spicy diet

Bowel/ Bladder habits: regular/ altered.

Appetite : normal/decreased

Hygiene habits

FAMILY HISTORY:

Similar complaints:

Other skin problems:

ON EXAMINATION:

General physical examination:

Built and Nourishment: Weight of the child : (adequate or underweight)

Pallor/ Icterus/ Clubbing/ Cyanosis/ Significant lymph node enlargement/ Edema

Vitals: Temperature

Pulse

Blood pressure

Respiratory rate

Cutaneous examination:

Morphology of lesion

Distribution of lesions

Surrounding skin changes

Hair and nail examination:

Mucosal examination:

Systemic examination:

- **CVS**
- **RS**
- **PER ABDOMEN**
- **CNS**

INVESTIGATIONS:

1. Complete haemogram

2. Gram stain

3. Culture: Bacterial/Fungal

4. KOH mount

5. Biopsy: histopathology findings

6. Tzanck smear

7. Other investigations based on need

FINAL DIAGNOSIS:

TREATMENT

REMARKS OF THE GUIDE

CONSENT FORM

Study title:A STUDY ON CLINICAL PATTERNS OF CUTANEOUS INFECTIONS AND INFESTATIONS IN SCHOOL GOING CHILDREN
Chief researcher/ PG guide's name: DR. ASHNA ASHRAF

Under the guidance of: DR. RAJASHEKAR T.S

Name of the subject:

Age :

Address :

a. I have been informed in my own vernacular language the purpose of the study, the necessity of relevant investigations to be carried out and photographs to be taken.
b. I understand that the medical information produced by this study will become part of institutional record and will be kept confidential by the said institute.
c. I understand that my participation is voluntary and may refuse to participate or may withdraw my consent and discontinue participation at any time without prejudice to my present or future care at this institution.
d. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).
e. I confirm that _____ (chief researcher/ name of PG guide) has explained to me the purpose of research and the study procedure that I will undergo and the possible risks and discomforts that I may experience, in my own language. I hereby agree to give valid consent to participate as a subject in this research project.

Participant's signature

Signature of the witness: Date:

I have explained to _____ (subject) the purpose of the research, the possible risk and benefits to the best of my ability.

Chief Researcher/ Guide signature Date:

PATIENT INFORMATION SHEET

Study title: A STUDY ON CLINICAL PATTERNS OF CUTANEOUS INFECTIONS AND INFESTATIONS IN SCHOOL GOING CHILDREN

Study site: R.L Jalappa Hospital, Tamaka, Kolar.

Aim: To document the various clinical patterns of cutaneous infections and infestations among the children of school going age and to stress upon prevention of recurrences.

All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. The expenses required for the above investigations will be funded by the study investigator. This study has been reviewed by the Institutional Ethics Committee and you are free to contact the member of the Institutional Ethics Committee. There is no compulsion to agree to this study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.

For any further clarification you can contact the study investigator:

Dr. ASHNA ASHRAF

Mobile no: 8217879240

E-mail id: ashu3889@gmail.com

KEY TO MASTERCHART

- AGE

5-9 years - 1

10-14 years – 2

15-18 years – 3

- ADDRESS

Urban –2

Rural – 1

- SEASON

Summer – 1

Monsoon – 2

Winter – 3

- SOCIOECONOMIC STATUS

  Upper – 1

  Upper middle – 2

  Lower middle – 3

  Upper lower – 4

  Lower – 5

- NUTRITION

  Adequate – 1

  Poor – 2

- HYGIENE

  Good – 1

  Poor – 2

- SIMILAR COMPLAINTS IN FAMILY

  Y- yes

  N- no

- IMMUNISATION STATUS

  Adequate – 1

  Poor – 2

- PRESENTING COMPLAINTS

  Erythema – 1

  Itching – 2

  Pain – 3

  Burning – 4

  Asymptomatic- 5

- SYSTEMIC SYMPTOMS

  Fever- 1 Nil – 0

- SITE OF LESIONS

  Head and neck – 1

  Upper extremities- 2

  Trunk – 3

  Lower extremities-4

  Buttocks – 5

- MORPHOLOGY OF LESIONS

  Papule – 1 plaque - 5

  Pustule- 2 bulla - 6

  Macule- 3 abscess- 7

  Vesicle- 4 nodules- 8

- INVESTIGATIONS

KOH mount- 1 Gram stain–2

Skin biopsy – 3 Tzanck smear- 4

Culture (bacterial/fungal) -5a/5b Wet mount- 6

- ORGANISMS ISOLATED

Gram positive cocci- 1 Trichophytonrubrum- 5

Gramnegativecocci-2 Trichophyton mentagrophytes- 6

Gram positive bacilli- 3 Staph aureus- 7

Gram negative bacilli- 4 Staph epidermidis- 8

Streptococci- 9

PROVISIONAL DIAGNOSIS

BACTERIAL INFECTIONS	
Folliculitis	A1
Ecthyma	A2
Impetigo • Bullous • Non bullous	A4 A4a A4b
Furunculosis	A5
Hansens disease • TT • BT	A6 A6a A6b
Infective eczema	A7
Abscess	A8
VIRAL INFECTIONS	
Varicella	C1
Herpes labialis	C2
Hand foot mouth disease	C3
Molluscumcontagiosum	C4

Herpes zoster	C5
Verrucae • Common • Filliform • Palmoplantar • Plane	C6 C6a C6b C6c C6d
<u>FUNGAL INFECTIONS</u>	
Dermatophytoses Tineacorporis Tineacruris Tineacapitis Tineafacei Tineapedis	B1 B1a B1b B1c B1d B1e
Pityriasisversicolor	B2
<u>INFESTATIONS</u>	
Scabies	D1
Pediculosis	D2

SL NO	OP NO	AGE	SEX	ADDRESS	OCCUPATION	SEASON (MONTH)	NO OF MEMERS IN FAMILY	NO OF ROOMS	SOCIOECONOMIC STATUS	NUTRITIONAL STATUS	HYGIENE	SIMILAR COMPLAINTS IN FAMILY	IMMUNISATION STATUS	PRESENTING COMPLAINTS	SITE OF LESION	MORPHOLOGY OFLESION	ASSOCIATED SYSTEMIC SYMPTOMS	INVESTIGATIONS	ORGANISM ISOLATED	PROVISIONAL DIAGNOSIS
1	492516	2	M	1	1	1	4	2	3	1	2	N	2	1,3	5	2	1	2,5a	7	A1
2	479358	1	F	1	1	2	5	2	3	1	2	Y	1	2	4,5	1	0			D1
3	543508	1	F	1	1	1	4	1	4	1	1	Y	2	2	5	5	0	1		B1b
4	470807	2	M	1	1	2	6	2	4	2	1	Y	2	1,3	3,4	5	0	2		A4b
5	497985	2	F	1	1	2	6	2	3	1	1	Y	1	2	1,3	5	0	1,5b		B1a,B1d
6	513586	2	M	1	1	3	4	2	3	1	2	N	2	3	1	4	0			C2
7	481392	1	M	1	1	2	6	2	4	2	2	Y	2	2	3	1	0			D1
8	578619	1	F	1	1	1	5	1	4	1	1	N	1	3	1	8	1	2,5a	7	A5
9	485129	1	F	1	1	1	8	2	5	2	2	N	2	3	4	2	0	2,5a	9	A1
10	488167	1	F	1	1	1	4	2	2	1	2	Y	2	5	1	1	0			C4
11	408481	2	M	1	1	2	4	2	2	1	2	Y	1	2	3	1	0			D1
12	550764	1	F	1	1	2	6	1	5	2	1	Y	1	3	1,4	5,6	0			A4a
13	610549	3	M	1	1	1	5	2	3	1	2	N	1	4	3	4	1			C5
14	553028	2	M	1	1	1	3	1	2	1	2	Y	2	2	3	5	0	1		B1a
15	679836	3	M	1	1	3	9	2	5	2	2	Y	1	2	3,5	1	0			D1
16	492199	2	M	2	1	2	10	3	5	2	1	Y	2	2	3	1	0			D1
17	488357	3	M	1	1	1	3	2	2	1	2	N	1	1	3	1	0	2,5a	7	A8
18	529157	2	M	1	1	3	5	2	3	1	2	N	1	3	4	5	0	2,5a	7	A7
19	575320	1	M	1	1	1	6	2	4	2	2	Y	1	2	3	1	0			D1
20	495575	1	F	1	1	2	3	1	4	1	1	Y	2	3	2,4	5,2	1			A4b
21	517438	2	M	1	1	1	8	2	5	1	2	N	2	1,3	5	2	1	2		A1
22	410453	3	M	1	1	3	4	2	3	1	2	N	1	3	3	1	0			D1
23	473087	1	M	1	1	1	4	2	3	1	2	Y	2	1	1	5	0	2,5a		A4b
24	494814	1	M	1	1	2	4	1	4	1	1	Y	1	2	3	5	0	1		B1a
25	576845	3	M	1	1	2	10	2	5	2	1	Y	1	2	3,4,2	1	0			D1
26	464556	2	M	1	1	2	3	1	2	1	2	N	2	1,3	4	2	0	2,5a	7	A1
27	523620	3	M	1	1	1	4	2	3	1	2	Y	1	2	3	4	1			C1
28	554272	1	M	1	1	3	5	2	3	1	2	N	2	2	4,3	1	0			D1
29	529998	2	F	1	1	2	4	1	3	1	2	Y	2	5	2	1	0			C6c
30	236852	3	M	1	1	3	6	2	5	1	1	Y	1	2	3	5	0	1		B1a
31	576945	3	M	1	1	1	5	2	3	1	2	Y	2	2	3	1	0			D1
32	520798	1	F	1	1	3	6	2	3	1	1	Y	2	5	1	1	0			C4
33	556887	3	M	1	1	2	5	2	2	1	2	Y	1	2	3	1	0			D1
34	480321	2	F	1	1	1	5	1	4	1	2	Y	2	2	4,5	5	0	1		B1b
35	474343	3	F	1	1	1	8	2	4	1	2	N	1	1,3	1	2	0	2,5a		A1
36	579115	3	M	1	1	3	7	3	4	1	2	Y	1	5	1	1	0			C6b
37	576988	2	M	1	1	3	4	2	2	1	2	Y	2	2	4	1	0			D1
38	660093	2	M	1	1	3	5	2	4	1	2	N	1	5	4	1	0			C6a
39	488352	2	F	1	1	2	5	2	2	1	2	Y	1	2	1	5	0	2		A4a

SL NO	OP NO	AGE	SEX	ADDRESS	OCCUPATION	SEASON (MONTH)	NO OF MEMERS IN FAMILY	NO OF ROOMS	SOCIOECONOMIC STATUS	NUTRITIONAL STATUS	HYGIENE	SIMILAR COMPLAINTS IN FAMILY	IMMUNISATION STATUS	PRESENTING COMPLAINTS	SITE OF LESION	MORPHOLOGY OFLESION	ASSOCIATED SYSTEMIC SYMPTOMS	INVESTIGATIONS	ORGANISM ISOLATED	PROVISIONAL DIAGNOSIS
40	581101	3	M	1	1	3	6	2	4	1	2	Y	2	2	3,4	1	0			D1
41	496579	3	F	1	1	1	3	1	4	1	2	N	2	4	1	4	1			C2
42	519062	2	F	1	1	1	8	2	5	2	2	Y	1	2	3,4	1	0			D1
43	509487	3	M	1	1	1	5	2	3	2	2	N	1	3,1	4	5	1	2,5a		A2
44	493832	2	M	1	1	1	4	1	4	2	2	Y	2	2	1	2,5	0	1,5b	5	B1c
45	677578	2	F	1	1	2	6	2	3	1	2	Y	1	2	3	1	0			D1
46	508640	1	M	1	1	1	4	2	2	1	2	N	2	1,3	1	7	1	2,5a	9	A9
47	636307	1	M	1	1	1	5	2	3	1	1	Y	2	2	3,2	1	0			D1
48	583611	2	M	1	1	3	6	2	4	1	1	Y	1	5	2	1	0			C6a
49	536625	1	F	1	1	3	5	2	2	1	2	N	2	2	3	1	0			D1
50	580732	3	F	1	1	3	6	2	3	1	1	Y	1	2	5	2	0	1		B1b
51	597711	2	M	1	1	2	4	1	4	1	2	N	2	5	1	1	0			C6b
52	509829	3	M	1	1	1	3	2	2	1	2	N	2	2	3	5	0	5b		B1a
53	631720	3	M	1	1	2	9	2	5	2	1	Y	1	2	3,4	1	0			D1
54	613296	2	F	1	1	1	3	1	3	2	2	Y	1	2	3,4	4	1			C1
55	493285	2	M	1	1	2	3	2	1	1	2	Y	2	2	3	1	0			D1
56	576076	3	M	1	1	2	4	2	1	1	2	N	2	1	3	3	0			B2
57	555882	1	M	1	1	1	3	2	2	1	2	Y	2	2	3,4	4	1			C1
58	610135	1	F	1	1	3	4	1	3	1	2	Y	1	5	1	1	0			C4
59	637150	1	F	1	1	2	4	1	3	1	2	N	2	2	3	1	0			D1
60	536324	3	M	1	1	1	5	2	4	1	2	Y	1	2	3	5	0	1,5b	6	B1a
61	498074	1	M	1	1	1	4	2	3	1	2	N	1	2	4	1	0			D1
62	487715	1	F	1	1	3	6	2	4	1	2	Y	2	5	2	1	0			C6a
63	645923	2	F	1	1	1	6	2	3	1	2	N	1	3	4	2,8	1	2,5a	7	A5
64	638173	1	M	1	1	3	8	2	5	2	1	Y	1	1	1	5	1	2		A4b
65	640331	2	F	1	1	3	6	2	3	1	2	N	1	2	2,4,5	1,2	1			D1
66	525207	2	M	1	1	2	9	2	5	2	2	Y	1	2	4	5	0	5b	5	B1e
67	598868	2	F	1	1	3	5	2	3	1	2	Y	2	5	2	1	0			C6a
68	499157	2	M	2	1	1	5	1	4	1	1	Y	1	2	4	1	0			D1
69	530882	1	F	1	2	2	4	2	3	1	1	N	2	1,3	2			2		A1
70	600577	1	F	1	1	3	5	2	3	1	2	Y	2	2	4,5	1	0			D1
71	636253	3	M	1	1	1	6	2	4	1	2	Y	2	5	2	1	0			C6a
72	545571	2	M	1	1	1	4	2	3	1	1	Y	1	2	5	5	0			B1b
73	635427	2	M	1	1	2	6	2	3	1	2	Y	1	2	4,5	1	0			D1
74	502992	2	M	1	1	3	5	2	3	1	2	N	2	5	4	1	0			C6a
75	503049	1	M	1	1	2	3	1	3	1	2	Y	1	2	4,3	1	0			D1
76	642262	1	M	1	1	2	3	1	2	1	2	N	2	1	4	5	0			A4b
77	620608	3	M	1	1	3	5	2	1	1	2	N	2	1	4	1	0	2		A1
78	550171	1	M	1	1	3	5	2	4	1	2	Y	1	2	4	5	0	1		B1a

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79	491838	3	M	1	1	1	4	2	4	1	2	N	2	5	2	1	0			C6a
80	596473	1	M	1	1	2	5	2	2	1	2	Y	2	2	3,4	1	0			D1
81	580068	3	M	1	1	1	5	2	3	1	1	Y	2	2	5	5	0	5b	6	B1b
82	507434	3	M	1	1	3	5	2	3	1	2	Y	1	2	2,4	1,2	1			D1
83	539630	3	F	1	1	1	5	2	4	1	2	N	2	5	2	1	0			C6a
84	632182	1	M	1	1	3	5	2	3	1	2	Y	2	5	1	1	0			C4
85	641541	3	M	1	1	1	5	2	3	1	1	Y	1	2	3,4	1	0			D1
86	492105	1	M	1	1	1	8	2	5	2	1	Y	2	3	2,4	2,4	0			C3
87	536843	3	M	1	1	2	4	2	2	1	2	Y	2	2	4	1	0			D1
88	92311	2	M	1	1	3	5	1	4	1	1	N	1	3	4	6	0			A4a
89	611842	2	F	1	1	1	3	1	3	1	2	Y	2	2	3	5	0			B1a
90	466509	3	M	1	1	1	4	1	3	1	1	N	1	3	5	8	0	2,5a	7	A5
91	471675	2	M	1	1	1	7	2	4	2	1	Y	1	2	3	1	0			D1
92	597495	2	M	1	1	2	6	2	3	1	2	N	1	3	2	2	0	2		A1
93	680561	1	M	1	1	1	5	2	4	1	2	N	2	5	2	1	0			C6c
94	665991	3	F	1	1	3	5	2	4	1	2	Y	2	2	3,5	5	0	1		B1a
95	664062	2	M	1	1	3	5	2	3	1	2	Y	1	2	3	1	0			D1
96	522906	2	M	1	1	1	4	2	2	1	2	N	1	5	2	1	0			C6a
97	527445	3	M	1	1	1	3	1	2	1	2	N	2	2	3	1	0			D1
98	464522	1	M	1	1	2	5	2	3	1	2	N	2	3	4	5	0	2,5a	9	A7
99	626449	3	M	1	1	3	5	2	4	1	2	Y	1	2	5	5	0			B1b
100	649896	1	F	1	1	2	5	2	2	1	2	N	2	2	4,5	1	0			D1
101	485538	1	F	1	1	3	3	2	2	1	2	N	2	3	1	5	0			A4b
102	575319	1	F	1	1	2	5	2	3	1	1	Y	1	2	4,3	1	0			D1
103	670931	3	M	1	1	1	5	1	4	1	2	N	2	1	3	3	0			B2
104	655653	2	M	1	1	1	9	2	5	2	1	Y	1	2	3,5,4	1	0			D1
105	606159	3	M	1	1	3	10	3	5	1	1	Y	1	2	2,4,3	5	0	1,5b	5	B1a
106	603657	3	M	1	1	2	5	1	3	1	2	N	2	3	4	2	0	2,5a	8	A1
107	578666	1	F	1	1	1	12	3	5	2	1	Y	1	2	3,4	1	0			D1
108	578633	3	M	1	1	1	5	2	4	1	2	Y	1	5	2,4	1	0			C6c
109	597526	3	F	1	1	3	5	2	3	1	2	N	1	2	3,2	1	0			D1
110	667625	2	M	1	1	3	7	1	4	2	2	N	1	1	3	5	0			A4b
111	627892	2	M	1	1	2	6	2	3	1	1	N	2	3	1	2,5	1	1,5b	6	B1c
112	538840	2	F	1	1	1	6	3	2	1	2	Y	1	2	4	1	0			D1
113	499550	2	M	1	1	2	4	2	3	1	2	N	2	3,4	3	4	1			C5
114	507063	1	F	1	1	3	8	3	2	1	2	N	2	1,3	1	5	0			A4b
115	495108	1	F	1	1	2	4	1	4	2	2	Y	2	3	2,4	4	0			C3
116	527276	1	M	1	1	1	5	2	4	1	2	N	1	2	3	1	0			D1
117	586827	3	M	1	1	2	7	2	4	1	2	Y	2	5	2	1	0			C6a

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118	639072	3	F	1	1	3	6	2	3	1	2	Y	2	2	3,2	5	0	1		B1a
119	598500	1	M	2	1	2	4	1	3	1	2	N	2	2	3	1	0			D1
120	538823	2	M	1	1	1	4	2	2	1	2	Y	1	2	3,4	1	0			D1
121	521551	2	M	1	1	1	8	3	5	1	1	N	1	5	1	1	0			C6d
122	601076	3	F	1	1	2	3	1	3	1	2	Y	2	2	5	5	0			B1b
123	676635	2	F	1	1	2	4	2	3	1	2	N	2	2	3	1	0			D1
124	673397	1	F	1	1	3	4	2	2	1	2	N	1	3	1	5	0			A4b
125	464522	1	M	1	1	2	5	1	4	1	1	Y	2	2	3	1	0			D1
126	598595	3	M	1	1	2	6	2	4	1	2	N	1	5	3	3	0			A6
127	645048	3	M	1	1	3	5	1	5	2	1	Y	1	2	3	5	0	1		B1a
128	599274	1	M	1	1	1	5	2	4	1	1	Y	2	2	3	1	0			D1
129	598372	2	F	1	1	1	6	2	3	1	1	N	1	3	5	8	0	2,5a		A5
130	487649	3	F	1	1	3	7	2	3	1	2	N	1	2	3,4	1	0			D1
131	594639	2	M	1	1	3	9	3	5	1	2	N	2	5	2	1	0			C6a
132	621733	1	M	1	1	1	4	1	3	1	2	N	2	3	4	5	0			A4b
133	605794	2	F	1	1	1	6	2	4	1	2	N	2	2	1	1	0			D2
134	643080	2	M	1	1	2	4	1	4	2	2	Y	1	2	1	5	0	1		B1d
135	603714	2	M	1	1	3	9	3	5	1	1	Y	2	2	3,5	1	0			D1
136	493697	1	F	1	1	1	4	1	4	1	1	Y	2	2	4	1	0			D1
137	576049	1	M	1	1	1	3	2	1	1	2	N	1	5	1	1	0			C6a
138	548920	1	M	1	1	1	6	2	4	1	2	N	2	3	1	5	0	2		A4b
139	666887	2	M	1	1	3	5	2	4	1	2	Y	1	2	3	5	0	1,5b	6	B1a
140	635197	2	M	1	1	2	5	2	4	1	1	N	1	2	3,5	1	0			D1
141	619117	2	M	2	1	1	5	2	3	1	1	N	1	3	1	7	0	2,5a		A9
142	497449	3	M	1	1	1	12	3	5	1	1	Y	1	2	3,4	1	0			D1
143	500838	2	M	1	1	1	6	2	3	1	1	N	1	5	3,4	3	0			A6
144	649935	1	F	1	1	1	5	2	4	1	2	Y	1	2	2	5	0	1		B1a
145	657097	2	M	1	1	1	6	2	4	1	1	Y	1	2	3	1	0			D1
146	501049	2	M	1	1	2	4	2	2	1	2	N	2	2	3	1	0			D1
147	615848	3	F	1	1	1	5	2	4	1	2	Y	2	2	1	1	0			D2
148	477959	2	M	1	1	1	8	1	5	2	1	Y	1	2	3,4,5	1	0			D1
149	612335	1	F	1	1	2	7	2	5	1	1	Y	2	2	1	1	0			D2
150	608421	2	M	1	1	3	5	2	4	1	2	Y	2	2	3	5	0	5b		B1a
151	667067	1	F	1	1	1	5	2	3	1	1	N	1	2	3,2	1	0			D1
152	603708	2	F	1	1	2	6	2	4	1	1	N	2	2	1	1	0			D2
153	505486	3	M	1	1	1	5	2	2	1	2	Y	2	2	3	1	0			D1
154	660134	2	M	1	1	3	6	2	4	1	2	N	2	2	2,4	5	0			B1a
155	576456	1	M	1	1	1	8	2	5	2	1	Y	1	3	1	6	0			A4a
156	638497	1	M	1	1	2	5	2	3	1	2	N	2	1	3	3	0			B2

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157	543274	3	F	1	1	2	6	2	2	1	2	N	2	2	3,4	1	0			D1
158	600554	1	F	1	1	2	4	2	2	1	2	Y	2	2	1	5	0	1		B1d
159	667693	1	M	1	1	3	5	2	3	1	1	Y	2	2	4	1	0			D1
160	424611	2	M	1	1	1	6	2	4	1	1	N	2	2,3	4	5	0	2,5a		A7
161	523227	1	F	1	1	1	3	1	3	1	1	Y	1	2	3	1	0			D1
162	642011	3	M	1	1	2	7	2	5	2	1	Y	1	3	1	2,,5	0	1,5b	6	B1c
163	557774	2	M	1	1	2	4	2	1	1	2	N	2	3	1	5	0			A4b
164	627795	2	M	1	1	2	5	2	4	1	2	N	2	4	3	4	0			C5
165	692311	2	M	1	1	1	4	2	3	1	1	Y	2	2	5	5	0	1		B1b
166	667926	2	F	1	1	3	4	2	2	1	2	Y	2	2	2,3	1	0			D1
167	500074	2	F	1	1	3	4	2	2	1	2	N	2	5	1	1	0			C6b
168	527696	2	F	1	1	2	6	2	3	1	2	Y	2	2	3	1	0			D1
169	517438	1	M	1	1	3	3	1	2	2	2	N	2	3	1	5	1			A4a
170	597396	2	F	1	1	2	8	2	5	1	2	Y	2	2	3	5	0			B1a
171	610549	3	F	1	1	1	7	2	5	1	1	Y	2	2	3,4	1	0			D1
172	678820	3	M	1	1	3	8	2	5	2	1	Y	1	2	3,4,5	1	0			D1
173	527113	2	M	1	1	2	6	2	4	1	2	Y	1	5	4	1	0			C6a
174	640554	1	F	1	1	3	4	2	2	1	2	Y	2	2	5	5	0	1		B1a
175	536155	3	F	1	1	1	4	2	1	1	2	N	2	2	3	1	0			D1
176	490202	1	M	1	1	1	5	1	3	2	2	Y	2	1	2	5	0			A4b
177	484265	1	M	1	1	2	5	2	4	1	2	N	1	5	2	1	0			C6a
178	681014	3	M	1	1	3	5	1	5	1	1	Y	2	2	3,4	5	0			B1a
179	532182	1	M	1	1	2	5	2	3	1	2	N	2	2	3,5	1	0			D1
180	465629	1	F	1	1	1	4	1	3	1	1	Y	2	3	1	5	0	2		A4
181	536273	3	M	1	1	3	8	2	4	1	1	Y	1	2	3	1	0			D1
182	488426	2	M	1	1	3	4	2	2	1	2	N	2	5	2,4	1	0			C6c
183	681014	2	M	1	1	1	8	2	4	1	1	Y	2	2	5	5	0	1,5b	6	B1b
184	674854	1	F	1	1	3	7	3	3	1	2	Y	2	2	4,5	1	0			D1
185	576105	3	M	1	1	2	4	1	3	1	2	N	2	2	2,4	1	0			D1
186	490207	1	F	1	1	2	3	1	1	1	2	N	2	1	1	5	0			A4b
187	543265	2	F	1	1	1	5	2	3	1	2	N	2	2	3,4	1	0			D1
188	467386	2	M	1	1	1	3	1	4	1	2	Y	2	5	2	1	0			C6a