“SURGICAL MANAGEMENT AND EVALUATION OF IMPACT OF DIAGNOSIS OF TUBERCULOUS LYMPHADENITIS BY GENEXPERT”

By

Dr. RAADHIKA RAJA

DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTER, KOLAR, KARNATAKA

In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

GENERAL SURGERY

Under the Guidance of

Dr. P.N SREERAMULU

PROFESSOR

DEPARTMENT OF GENERAL SURGERY,

SRI DEVARAJ URS MEDICAL COLLEGE,

TAMAKA, KOLAR-563101

APRIL/MAY 2020

SRI DEVARAJ URS MEDICAL COLLEGE,
TAMAKA, KOLAR-563101

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Signature of the candidate

Dr. RAADHIKA RAJA

SRI DEVARAJ URS MEDICAL COLLEGE,

TAMAKA, KOLAR-563101

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Date:

Place: Kolar

Signature of the Guide

Dr. P.N SREERAMULU

Professor

Department of General surgery,

Sri Devaraj Urs Medical College, &

Research Center, Tamaka, Kolar.

SRI DEVARAJ URS MEDICAL COLLEGE,

TAMAKA, KOLAR-563101

ENDORSEMENT BY THE HOD,

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This is to certify that the dissertation entitled **"SURGICAL MANAGEMENT AND EVALUATION OF IMPACT OF DIAGNOSIS OF TUBERCULOUS LYMPHADENITIS BY GENEXPERT"** is a bona fide research work carried out by **Dr. RAADHIKA RAJA** under the guidance of **Dr. P.N SREERAMULU,** Professor**,** Department of General Surgery.

Dr. MOHAN KUMAR K
Professor and Head
Department of General Surgery,
Sri Devaraj Urs Medical College
& Research Center, Tamaka, Kolar
Date:
Place: Kolar

Dr. P.N SREERAMULU
Principal and Dean
Sri Devaraj Urs Medical College
& Research Center,
Tamaka, Kolar.
Date:
Place: Kolar

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTER, TAMAKA, KOLAR, KARNATAKA

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This is to certify that the ethics committee of Sri Devaraj Urs Medical College & Research Center, Tamaka, Kolar has unanimously approved **Dr. RAADHIKA RAJA** Post-Graduate student in the subject of **GENERAL SURGERY** at Sri Devaraj Urs Medical College, Kolar to take up the dissertation work entitled **"SURGICAL MANAGEMENT AND EVALUATION OF IMPACT OF DIAGNOSIS OF TUBERCULOUS LYMPHADENITIS BY GENEXPERT "** to be submitted to **SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTER, TAMAKA, KOLAR, KARNATAKA.**

Date:

Place: Kolar

Signature of Member Secretary

Sri Devaraj Urs Medical College & Research center, Tamaka, Kolar– 563101

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Place: Kolar

Signature of the candidate

Dr. RAADHIKA RAJA

Post graduate student

Department of General Surgery

Sri Devaraj Urs Medical College

Kolar.

SDUAHER

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Department	GENERAL SURGERY
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Raadhikaraja

Signature of Student

Signature of Supervisor

Prof. of Surgery
SDUMC, Tamako, KOLAR.

Head of the Department

Prof. & HOD of Surgery
Sri Devaraj Urs Medical College.
Tamaka, KOLAR-563101

University Librarian

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Tamaka, KOLAR-563 101.

Director Of Post Graduate Studies

Director
P.G. STUDIES
Sri Devaraj Urs Medical College
Tamaka, KOLAR-563 101

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Signature of the candidate

Dr. RAADHIKA RAJA

LIST OF ABBREVATIONS

ABBREVIATION	***DEFINITION***
AFB	Acid Fast Bacilli
CNS	Central Nervous System
CRS	Composite Reference Standard
CT	Cycle Threshold
EPTB	Extrapulmonary Tuberculosis
FNAC	Fine Needle Aspiration Cytology
HIV	Human Immunodeficiency Virus
M. tuberculosis	Mycobacterium Tuberculosis
MDR-TB	Multidrug Resistant Tuberculosis
MTBC	Mycobacterium Tuberculosis Complex
NPV	Negative Predictive Value
PCR	Polymerase Chain Reaction
PPV	Positive Predictive Value
RIF	Rifampicin
SR	Sample Reagent
TB	Tuberculosis
WHO	World Health Organization
ZN	Ziehl-Neelsen

ABSTRACT

BACKGROUND

The most prevalent clinical entity of extra pulmonary tuberculosis is tuberculous lymphadenitis. However, it resembles other pathological conditions and obtaining tissue for microbiological diagnosis is also difficult and thus it is a challenging task for diagnosis and management. Fine needle aspiration cytology and biopsy are the methods generally used to obtain the lymph node samples for histopathology and microbiological diagnosis. Mycobacterium culture on Lowenstein-Jensen medium remains the gold standard for definitive diagnosis, but its major limitations are a turn-around time of 2–4 weeks.The GeneXpert MTB/RIF assay is a novel molecular diagnostic method diagnosis of tuberculosis and rapid detection of RIF resistance in clinical specimens.

AIMS AND OBJECTIVE

To evaluate the role of GeneXpert MTB/RIF in diagnosis of TB Lymphadenitis and its sensitivity, specificity, PPV and NPV and compared with histopathology

METHODS

This was a cross sectional analytical study conducted on 67 cases of suspected TB Lymphadenitis at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar. The study was carried out between December 2017 to June 2019. The samples were collected using excision biopsy and subjected to GeneXpert MTB/RIF assay and Histopathology. Further, sensitivity, specificity, PPV and NPV was measured and compared with histopathology.

RESULTS

The average age of the patients was 37.04 ±19.27 and majority was males. The lymph nodes were predominantly present in cervical region. Histopathology analysis reveals 46 positive cases of TB Lymphadenitis and GeneXpert MTB/RIF assay detects 42 cases of TB Lymphadenitis. IN the present study GeneXpert MTB/RIF assay had a sensitivity of 82.60 % and specificity of 85% when compared to histopathology. Further the PPV and NPV was found to be 92.68% and 68% respectively. GeneXpert MTB/RIF showed 2 cases of RIF resistance out of 67 cases. In this study, the GeneXpert MTB/RIF showed the results in 0.79 days.

CONCLUSION

Thus, the present study showed that Gene Xpert MTB/RIF is simple and reliable technique for diagnosing TB Lymphadenitis with high specificityand sensitivityas compared histopathology. Further, the methods elicit rapid diagnosis and also detected RIF resistance. It is thus a reliable and useful diagnostic modality in rapid detection of the causative agent and initiation of appropriate category anti-tubercular therapy when necessary.

Keywords: Tubercular lymphadenitis, Gene Xpert MTB/RIF, histopathology, RIF resistance

TABLE OF CONTENTS

LIST OF TABLES

LIST OF CHARTS

LIST OF FIGURES

INTRODUCTION

INTRODUCTION

Extrapulmonary tuberculosis (EPTB) continues to be one of the leading health problem in developing countries. Lymphadenopathy is the commonest form of EPTB.[1] In India in general outpatients 10-20% of new TB cases maybe extrapulmonary, while among those suffering from HIV it could be up to 50%.[1]

EPTB comprises of a wide gamut of diseases affecting all parts of the body excluding the lungs. Commonly affected sites include lymph nodes, pleura, urogenital tract, bones and joints, meninges, CNS, bowel and/or peritoneum, pericardium and skin. Although morbidity, mortality and disease sequelae are common, it is an entity that is underplayed as it does not contribute significantly to the transmission of TB.[2] Challenges faced by treating clinicians are its myriad clinical features and the difficulty in sample collection from deep-seated tissue. The laboratory diagnosis is an added hurdle, as a good number of specimens are paucibacillary or smear negative.[3]

The investigative parameters for the TB diagnosis in lymph nodes are neither specific nor does their absence exclude TB involvement. Conventional ZN method for AFB detection plays a key role in diagnosis and also monitoring treatment of TB but has low sensitivity ranging from 20% to 43%.[2] The gold standard method for the TB diagnosis is Mycobacterial culture, but it is time consuming and requires specialized safety precautions in laboratories.[3] Serological techniques lack sensitivity and specificity.[3] Newer molecular techniques such as PCR, although rapid, are costly to be routinely used in developing countries. In recent times, attention has been devoted to new nucleic acid amplification diagnostic technologies, owing to their rapidity, sensitivity, and specificity.

Diagnosis of extra pulmonary infection with members of the MTBC is challenging task to establish, since the extrapulmonary specimens are have lower bacterial count as compared to pulmonary specimens. Furthermore, collection of extrapulmonary specimen for analysis requires invasive procedures.

One of the latest systems, the GeneXpert MTB/RIF assay, was evaluated only recently in a large study with pulmonary specimens. [4] The GeneXpert assay uses heminested real-time PCR to amplify an M. tuberculosis-specific-sequence of the "rpoB gene". [4] To determine RIF resistance, the RIF resistance-determining area ie rpoB gene is probed with molecular beacons.[4] The technique can be conducted in a nearly fully automated manner, including bacterial lysis, nucleic acid extraction and amplification, and amplicon detection. [4] The test runs on the GeneXpert platform (Cepheid, Sunnyvale, CA) using a disposable plastic cartridge with all required reagents.[5] Reports have shown that GeneXpert MTB/RIF assay detected pulmonary TB in all TB patients, including over 90% of smear-negative patients, with a high sensitivity of over 97%.[6]

The GeneXpert MTB/RIFassay was soon endorsed by WHO in December 2010 as a replacement for sputum smear microscopy, particularly in settings with high rates of HIV-associated TB and multidrug-resistant TB.[7]

OBJECTIVES

AIMS AND OBJECTIVE

- To evaluate the role of GeneXpert in diagnosis of TB Lymphadenitis.
- To validate GeneXpert findings of TB lymphadenitis with respect to FNAC
- To validate GeneXpert findings of TB lymphadenitis with respect to histopathology

REVIEW OF LITERATURE

REVIEW OF LITERATURE

TUBERCULOSIS- A GENERAL OVERVIEW

TB is the earlier disease of mankind and has co-evolved with humans for many thousands of years or perhaps for several million years. [8] The oldest known molecular evidence of TB was found in a fossil of an extinct bison (Pleistocene bison), which was radiocarbon dated at 17,870±230 years [9], and in a nearly 10,000 year old human's remains which were detected from a neolithic settlement in the Eastern Mediterranean region.[10] During 1689, it was stated by Dr. Richard Morton that the pulmonary type was resembles with "tubercles" due to wide range of symptoms, TB was not described as a single disease till 1820s and was finally named "tuberculosis" in 1839 by J. L. Schönlein.[11] During 1882, the *M. tuberculosis*, which is main causative agent of TB was identified by Robert Koch; and he received Nobel prize in physiology or medicine in 1905.[12] TB is caused by a group of closely related bacterial species termed MTBC. Currently chief cause of human TB is M. tuberculosis. Apart from M. tuberculosis complex the other species that cause TB are M. *bovis, M. microti and M. africanum. M. microti* but are not known to cause TB in humans; infection with *M. africanum* is very rare, while *M. bovis* has a wide host range and is the main cause of TB in other animal species. Humans become infected by M. bovis, usually via milk, milk products or meat from an infected animal.[13,14] Its estimated that in pre-antibiotic era, *M. bovis* was responsible for about 6% of TB deaths in humans.[15]

MYCOBACTERIUM

The mycobacteria are rod shaped, acid fast, aerobic or micro aerophilic, non-spore forming, non motile, non-capsulated and lipid rich bacteria. Most of them grow slowly on solid Lowenstein - Jensen (LJ) medium, are resistant to drying,

disinfectants and remain viable in clinical samples for prolonged duration.[17] The genus includes pathogens which can induced alarming diseases in mammals, including TB and leprosy (*Mycobacterium leprae*).

Since *M. tuberculosis* cell wall devoid of phospholipids in their outer membrane, it is classified as a gram-positive bacterium. However, if a Gram stain is performed, *M. tuberculosis* either stains very weakly gram-positive or does not retain dye due to the high lipid and mycolic acid content of its cell wall. *M. tuberculosis* is a small rod-like bacillus that can withstand weak disinfectants and survive in a dry state for weeks. In nature, the bacterium can grow only within the cells of a host organism, but *M. tuberculosis* can be cultured in vitro.

Since *M. tuberculosis* retains certain stains after being treated with acidic reagent, it is categorized as an AFB. The widely used staining technique, the ZN stain, dyes AFB's a bright red that stands out clearly against a blue background. Other ways to visualize AFB's include an auramine-rhodamine stain and fluorescent microscopy.

The MTBC members are causative agents of human and animal TB. Species in this complex include: M. tuberculosis, *M. bovis*, *M. africanum*, *M. canetti*, *M. caprae*, *M. microti* and *M. pinnipedii*. are not widespread, but in parts of Africa, *M. africanum* is the notable cause of tuberculosis. *M. bovis* was once a common cause of TB, but the introduction of pasteurized milk has largely eliminated this as a public health issue in developed countries. *M. microti* is mostly seen in immunocompromised hosts, although there is possibility that the prevalence of this pathogen has been underrated. Other known pathogenic mycobacterium includes M. leprae, M. avium and M. kansasii. The last two organisms are known as non-tuberculous mycobacteria. Non-tuberculous mycobacteria cause neither TB nor leprosy, but they do cause pulmonary diseases resembling TB.[18]

TUBERCULOSIS- GLOBAL SCENARIO

TB remains a significant health issue globally, responsible for ill health among a large number of individuals every year. TB positions as the second driving reason for death from an irresistible malady around the world, after the HIV. Globally in 2017, there were an estimated 10.0 million incident cases of TB (range, 9.0–11.1 million), equivalent to 133 cases (range, 120–148) per 100 000 population.[19]Most of the estimated cases in 2017 occurred in WHO South-East Asia Region (44%), the WHO African Region (25%) and the WHO Western Pacific Region (18%); smaller proportions of cases occurred in the WHO Eastern Mediterranean Region (7.7%), the WHO Region of Americas (2.8%) and WHO European Region (2.7%).

The 30 high TB burden countries accounted for 87% of all estimated incident cases worldwide, and eight of these countries accounted for two thirds of the global total: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%).

Further, an estimated 9% (range, 7.9–11%) of the incident TB cases in 2017 were among people living with HIV. The proportion of TB cases co infected with HIV was highest in countries in the WHO African Region, exceeding 50% in parts of southern Africa. The probability of developing TB in the 37 million people living with HIV was 20 times higher than the rest of the world population (range, 17–23), increasing with a decreasing prevalence of HIV in the general population.[19]

TUBERCULOSIS MORTALITY

As per WHO TB global report 2017 an estimated 1.3 million (range, 1.2–1.4 million) deaths from TB among HIV-negative people (in 2017) and an additional 300,000 (range, 266,000–335,000) deaths from TB among HIV-positive people has been

reported. TB is the 10th leading cause of deaths worldwide, and since 2011 it has been the paramount cause of death from a single infectious agent, ranking above HIV/AIDS.[19]

TUBERCULOSIS BURDEN: INDIA SCENARIO

India accounts for one fourth of the global TB burden. In 2015, an estimated 28 lakh cases occurred and 4.8lakh people died due to TB. India has highest disease burden of both TB and MDR-TB according to estimates reported in Global TB Report 2016. An estimated 1.3 lakh TB patients emerge annually in India which includes 79000 MDR-TB among notified pulmonary TB cases. India bears second highest number of estimated HIV associated TB in the world. An estimated 1.1 lakh HIV associated TB cases occurred in 2015 and 37,000 patients died among them.[20]

PATHOPHYSIOLOGY OF TUBERCULOSIS

About 90% of those infected with M.tuberculosis are asymptomatic called latent TB infection with only a 10% lifetime chance that the latent infection will progress to active disease. However, if no treated in the early phase, the death rate for these active TB cases is more than 50%.[21] Lung is the main entrance gate of the tuberculous bacillus, which causes a focal infection in the site where it is deposited after inhalation. If the infection cannot be contained at the local level, bacilli dissemination is produced initially by hematogenous route, probably inside phagocytic cells, towards different organs and, eventually, to the contiguous pleura. It reaches hilar lymph nodes via the lymphatic route, and from there, a secondary systemic dissemination can occur, through the thoracic duct and superior vena cava, with the development of local foci in the lungs. Extrapulmonary foci can also be produced by

hematogenous and lymphatic dissemination. The clinical manifestations of TB depends on the local organ defenses at the site of bacilli multiplication.[21] TB arises when the bacteria reaches pulmonary alveoli and gets replicated in endosomes present in alveolar macrophages. Ghon focus is the primary site of infection in lungs which is situated in upper and lower part of lung lobes.[21] The dendritic cells destroys the bacteria by phagocytosis and blocks the replication, although these cells can transport the bacilli to local(mediastinal) lymph nodes. Further dissemination is through the bloodstream to other tissues and organs where secondary TB lesions can develop in other parts of the lung (particularly the apex of lung) peripheral lymph nodes, kidneys, brain and bone. TB can affect most parts of the body except the heart, skeletal muscles, pancreas and thyroid.

TB is categorized as a granulomatous inflammatory condition. Macrophages, T lymphocytes, B lymphocytes and fibroblasts are among the cells that participate in the formation of a granuloma, with lymphocytes surrounding the infected macrophages. The granuloma functions not only to prevent dissemination of the mycobacteria, but elicits a suitable environment for interaction of immune cells. Within the granuloma, T lymphocytes (CD4+) secrete cytokines such as interferon gamma, which activates macrophages to destroy the bacteria with which they are infected. T lymphocytes (CD8+) can also directly kill infected cells. Importantly, bacteria are not always eliminated within the granuloma, but can become dormant, resulting in a latent infection. Granulomas also cause necrosis and apoptosis in the center of tubercles. For normal eye it looks like white cheese like appearance and was termed caseous necrosis.[21]

If mycobacteria enter the bloodstream they enter the body and spreads and causes many foci of infection, and resembles small white tubercles in the tissues. This

condition is common in infants and elderly and is called miliary tuberculosis. Patients with this disseminated TB have a fatality rate of approximately 20%, even with intensive treatment.[21]

TYPES OF TUBERCULOSIS

TB may occur in any organ of the body. Based on affected site TB is mainly divided into two categories: pulmonary and extrapulmonary.

EXTRAPULMONARY TUBERCULOSIS

Although the predominant form of TB is pulmonary disease, infection with *M. tuberculosis* may be seen in any organ system. EPTB mainly results from hematogenous dissemination or lymphatic spread from a primary, usually a pulmonary focus. This hematogenous spread may occur years before the onset of progressive TB, as foci of latent infection may lie dormant before reactivation occurs.[22]The precise incidence of EPTB has not been determined, but a rise in incidence has been noted in both developing and developed countries since the mid-1980s.[23] Especially in patients infected with HIV an increased prevalence of EPTB has been reported.[24]In these patients multiple extra pulmonary sites are often involved.[25]

Other factors that have contributed to the increased prevalence of EPTB are the development of strains which are drug resistant and aging of the population.[25,26]Finally the more widespread use of cross sectional imaging modalities may also explain why EPTB is more commonly been seen. The common sites of EPTB consist of lymph nodes, genitourinary tract, bones and joint and CNS involvement followed by peritoneal and other abdominal organ involvement.

The majority of the extra pulmonary forms of TB affect organs with suboptimal conditions for bacillary growth. For this reason, the extra pulmonary disease generally has an insidious presentation, a slow evolution and paucibacillary lesions and/or fluids. In the immunocompetent patient, the tuberculin skin test (TST) response is usually positive (induration≥ 10 mm).[27]

In immunocompetent patients, the extra pulmonary forms only occasionally coexist with active pulmonary TB. Nevertheless, the chest X-ray is mandatory for the evaluation of evidence of primary infectious lesion, which provide a good verification to support the diagnosis.[28]

TUBERCULOUS LYMPHADENITIS

Peripheral lymph node involvement is the commonest form of extra pulmonary mycobacterial disease and cervical region is the most frequent site. [29,30]In the present era M. tuberculosis and non-tuberculous mycobacteria is the most common cause of lymphadenitis.

PATHOPHYSIOLOGY OF TUBERCULOUS LYMPHADENITIS

Tuberculous lymphadenitis is a local manifestation of the systemic disease.[31] The infection arises during primary stage or due to dormant foci reactivation or from contiguous focus as a direct extension. Primary infection is due to exposure of tubercle bacilli. Droplet nuclei inhalation invades ciliary defense system of bronchi and reaches terminal alveoli of the lungs. The proliferation of Bacilli in lungs is referred as Ghon focus.[21] The lymphatics drain the bacilli to the hilar lymph nodes. The Ghon focus and related hilar lymphadenopathy form the primary Ghon complex. The infection tends to spread from primary focus to regional lymph nodes followed by spread via the lymphatic system to other nodes or may pass through the nodes to

reach blood stream, from where it can virtually spread to all organs of the body. Hilar, mediastinal and paratracheal lymphnodes are the first site of spread of infection from the lung parenchyma.[32] Supraclavicular lymph node involvement may reflect the lymphatic drainage routes for the lung parenchyma.[32] Cervical tuberculous lymphadenitis is due to the spread of primary infection from tonsils, adenoids, sinonasal or osteomyelitis of the ethmoid bone[32]. In untreated primary TB of children, enlargement of hilar and paratracheal lymph nodes (or both) become apparent on chest radiographs. In initial stage of superficial lymph node involvement progressive multiplication of the M. tuberculosis occurs, the onset of delayed hypersensitivity is accompanied by marked hyperemia, swelling, necrosis and caseation of the centre of the nodes.[32] This can be followed by inflammation, progressive swelling and matting with other nodes within a group. Adhesion to the adjacent skin may result in purplish discolouration. The centre of the enlarging gland becomes soft filled with cheesy/caseous material that may rupture through skin with sinus formation. Tuberculous mediastinal lymphadenitis may enlarge and cause compression of major blood vessels, phrenic/recurrent laryngeal nerves or erosion of bronchus. Asymptomatic intestinal or hepatic TB may spread via lymphatic drainage to the mesenteric, hepatic or peripancreatic lymphnodes.[33]As immune deficiency advances HIV positive patients were found to have atypical pulmonary diseases resembling pulmonary or extra-pulmonary or disseminated TB.

CLINICAL PRESENTATION OF TUBERCULOUS LYMPHADENITIS

Tuberculous lymphadenitis most often involves the cervical lymph nodes followed in frequency by mediastinal, axillary, mesenteric, hepatic portal, perihepatic and inguinal lymph nodes.[34,35] TB should be considered as the differential diagnosis of a

cervical swelling, especially in endemic areas. The duration of symptoms prior to the diagnosis may range from few weeks to months. It may present as a unilateral or bilateral, single or multiple painless slow growing mass or masses developing over weeks to months, mostly located in the posterior cervical and less commonly in supraclavicular region.[36]

Jones and Campbell,[37] classified peripheral tuberculous lymph nodes into following five stages.

- ✓ Stage 1- Enlarged, firm, mobile, discrete nodes showing non-specific reactive hyperplasia;
- ✓ Stage 2- Large rubbery nodes fixed to surrounding tissue owing to periadenitis;
- ✓ Stage 3- Central softening due to abscess formation;
- ✓ Stage 4 - Collar-stud abscess formation
- ✓ Stage 5- Sinus tract formation.

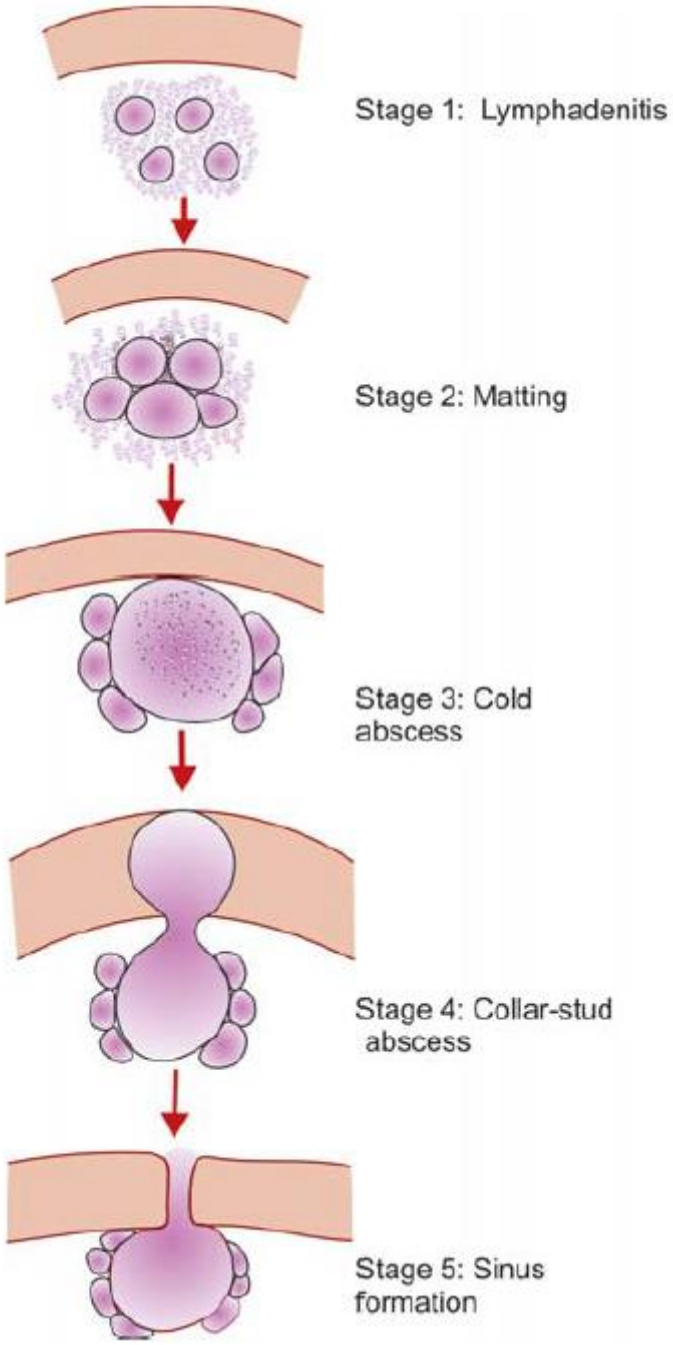


Figure 1 : Jones and Campbell Classification of Tuberculous Lymphadenitis

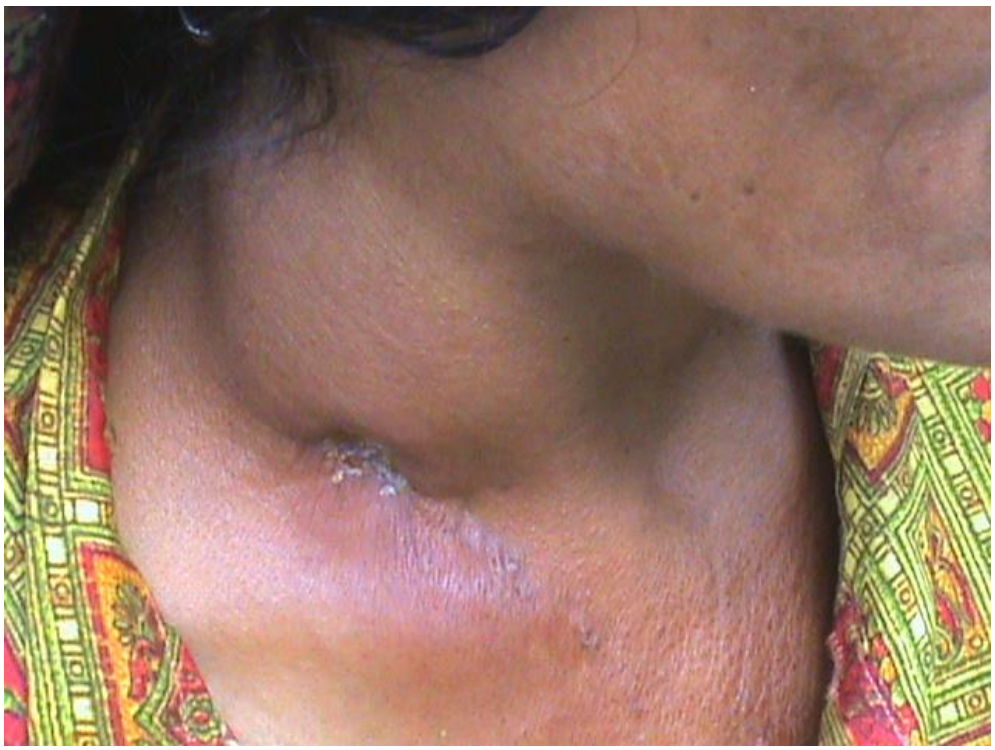


Figure 2 Right Cervical Lymphadenitis with Purulent discharge

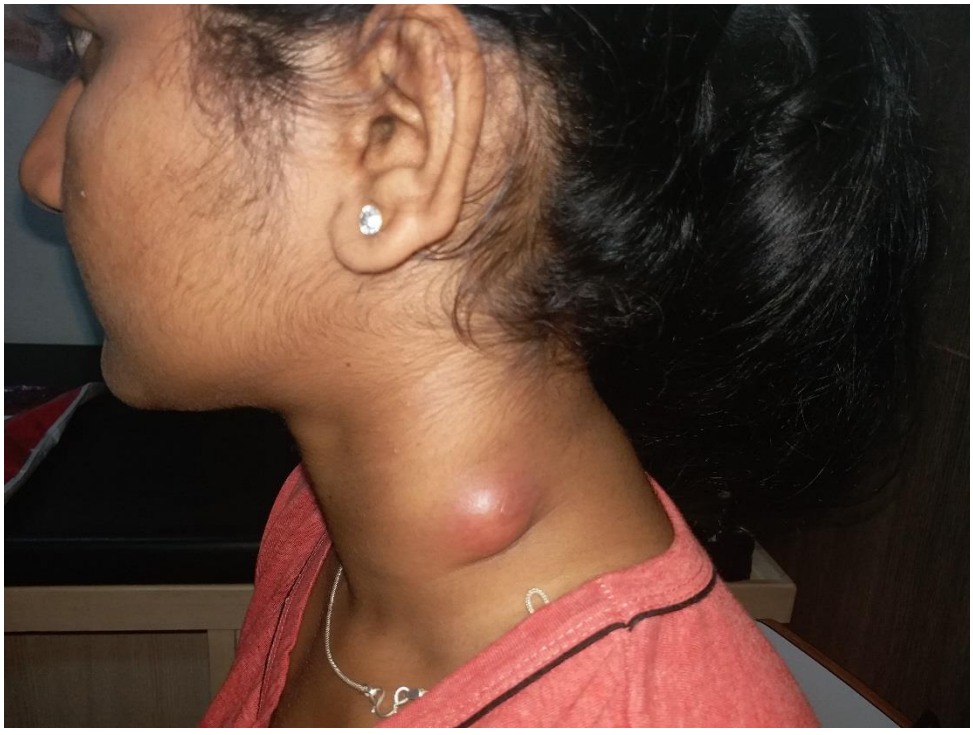


Figure 3 Left Cervical Lymphadenitis with erythema

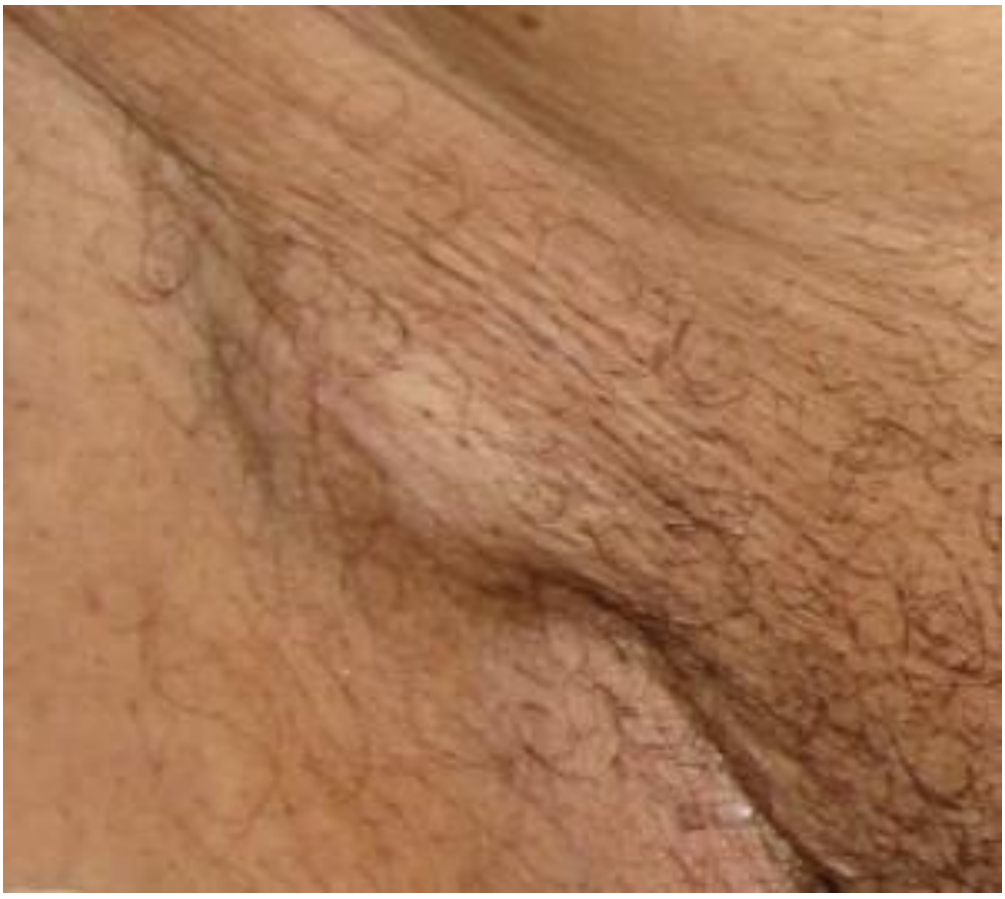


Figure 4 Right Inguinal Lymphadenitis

Figure 5 Right Cervical Lymphadenitis

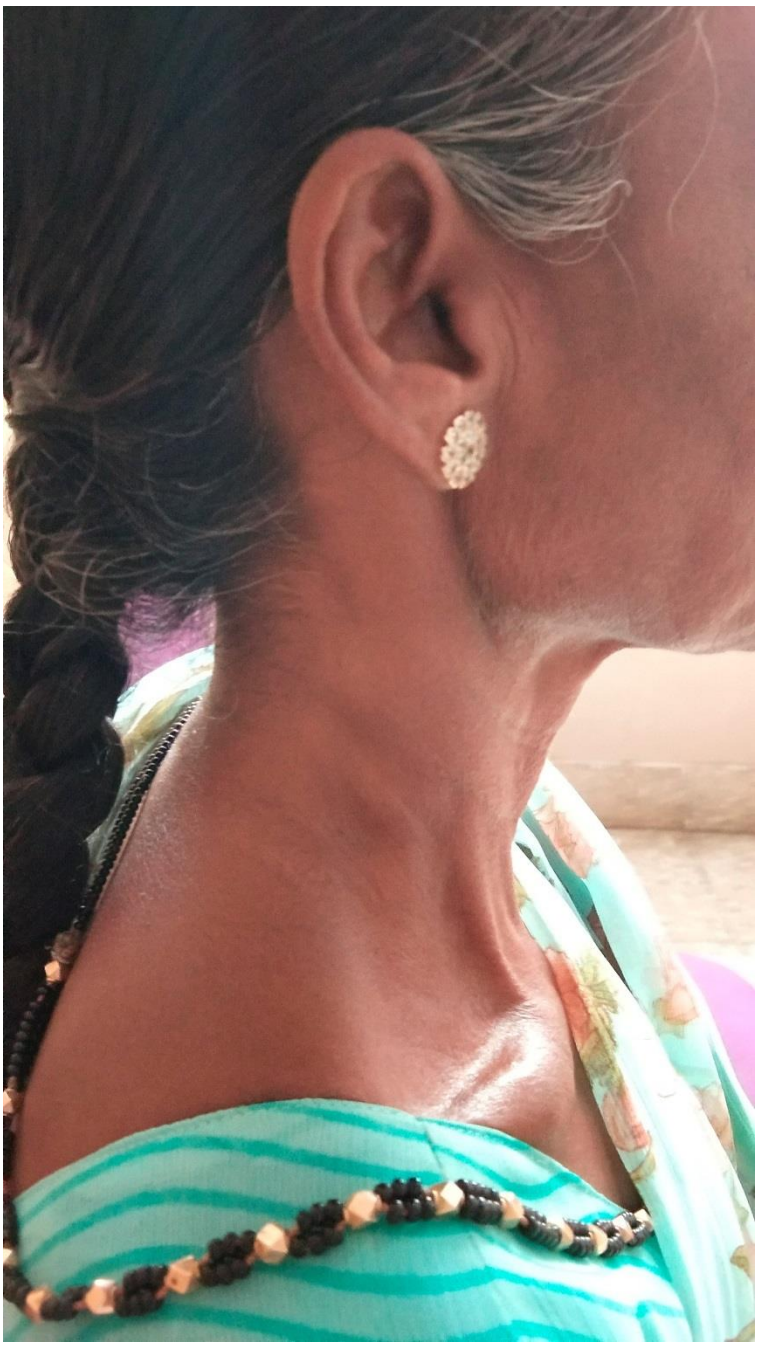


Figure 6 Right Cervical Lymphadenopathy

CAUSATIVE AGENT OF TUBERCULOUS LYMPHADENITIS

The genus Mycobacterium includes members of the MTBC, consisting of medically important species. The species found in the complex are *M. tuberculosis* (the most widely spread bacterium responsible for TB*), M. bovis*(worldwide but limited by pasteurization of milk and it has the broadest host range of species in the complex), *M. africanum*(mainly found in Africa), *M. microti*and *M. canetti*(limited to small rodents). [38]*M.tuberculosis, M. bovis*, *M. africanum*and non-tuberculous mycobacteria can cause lymphadenitis, but lymphadenitis caused by MTBC is more chronic as compared with lymphadenitis caused by other mycobacteria, which has a more rapid course.[39]

In the study conducted by Jindal [40,] on 190 children with chronic cervical lymphadenitis showed tuberculous etiology on histopathological examination in 92 (48.4%) and bacteriological evidence of mycobacterial infection (smear and/or culture) in 42 (22.1%). They reported that the positive culture for mycobacteria was obtained in 40, of which 30 (75%) were typical *M. tuberculosis* and 10 (25%) were atypical mycobacteria. In India, *M. tuberculosis* remains the most frequent cause of lymphadenitis, it was reported that 90% - 98% of mycobacterial lymphadenitis in adults is due to *M. tuberculosis* and 2.6% due to the Non- tubercular mycobacteria.

DIAGNOSIS OF PERIPHERAL LYMPHADENOPATHY

There are numerous causes of lymphadenopathy. The diagnosis of tuberculous lymphadenitis depends on the physician considering the possibility of TB in patients at risk and submitting material for mycobacterial culture and pathological examination. Multiplicity, matting and caseation are three features which aid in diagnosing tuberculous lymphadenitis. The definitive diagnosis of TB depends on the

isolation and identification of the etiological agents responsible for the infection. Identification and early initiation of treatment of affected patients is the primary strategy for the control of TB.[41] The low sensitivity of conventional tests in detecting tubercle bacilli in clinical specimens makes the diagnosis of TB in pulmonary and EPTB in particular, a major challenge in developing countries.[42] It is estimated that only 50% - 60% of all patients with TB worldwide are actually diagnosed. High index of suspicion is required for the diagnosis of tuberculous lymphadenitis.[43]

HISTOPATHOLOGY

Mounting studies have supported excisional biopsy as the definitive diagnostic procedure for diagnosis of nodal TB.[44]Identification of caseating granulomatous inflammation with Langhans and foreign body giant cells is suggestive of TB. Though histopathology is most rewarding in diagnosing cervical lymphadenitis, its feasibility is limited due to lack of facilities in peripheral health-care centers and its non-acceptability, as it is an invasive procedure. Incisional biopsy is associated with sinus tract and fistula formation and therefore is contraindicated.[45] Presently, this procedure has been widely replaced by FNAC and histopathology is only reserved for patients with negative FNA despite high clinical suspicion.

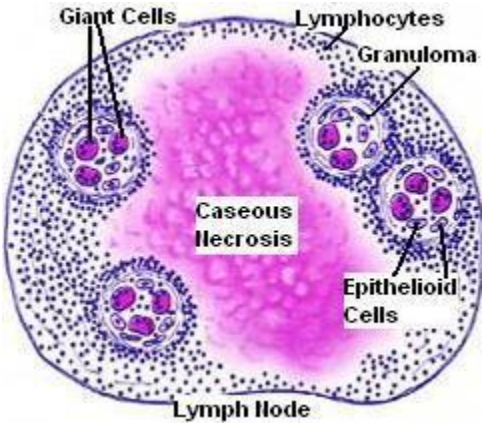


Figure 7 Schematic Representation of Tuberculous Lymphadenitis On Histopathology

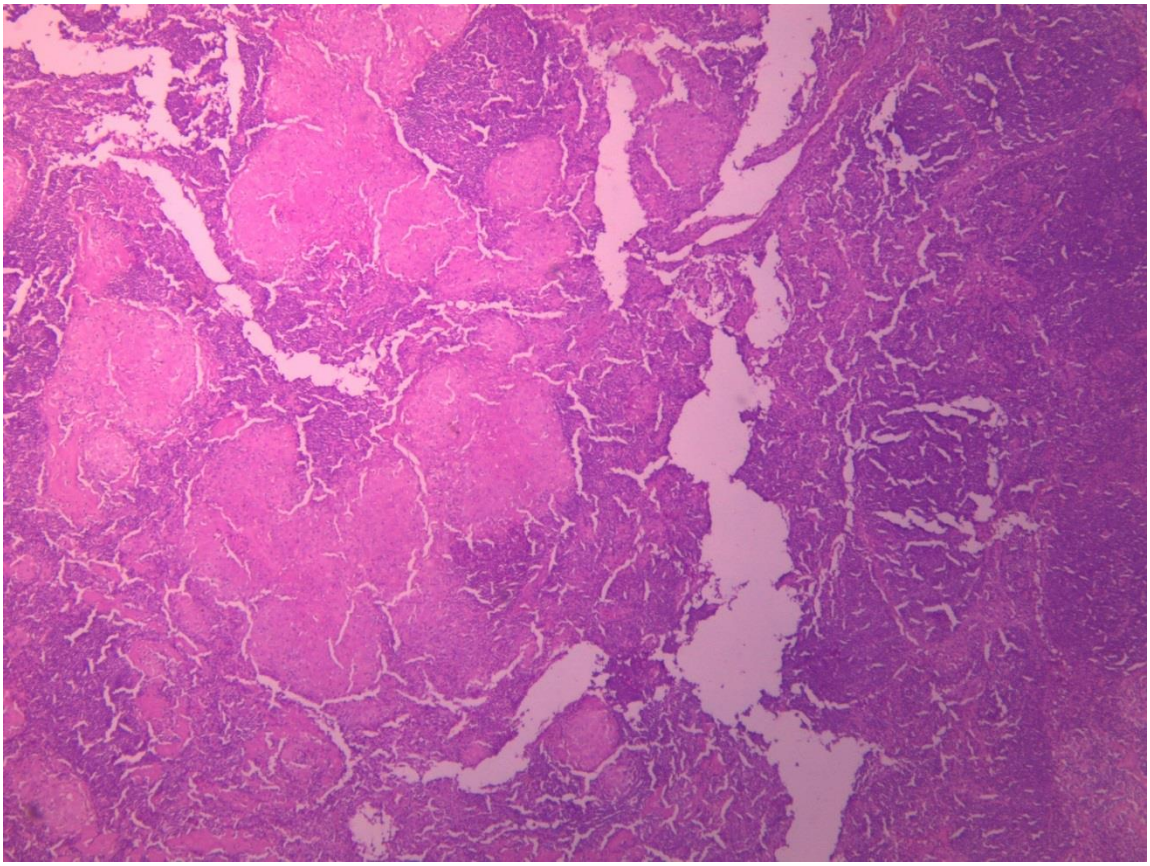


Figure 8 Caseating Granuloma on Low Power Microscopy

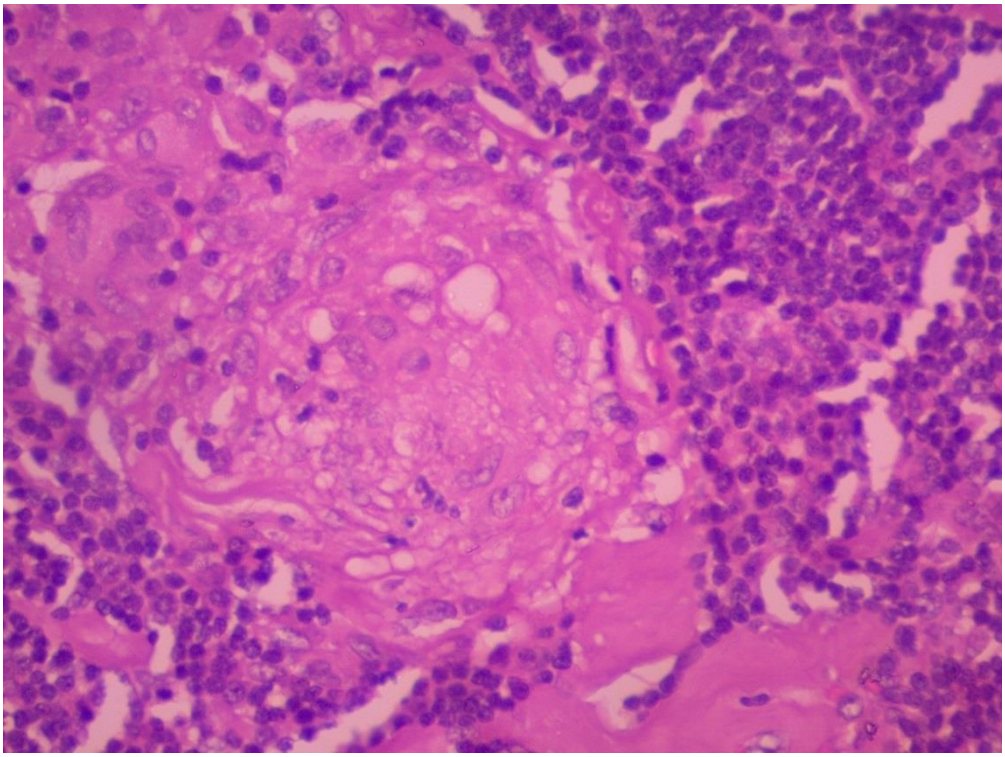


Figure 9 Tubercular Lymphadenitis under High Power

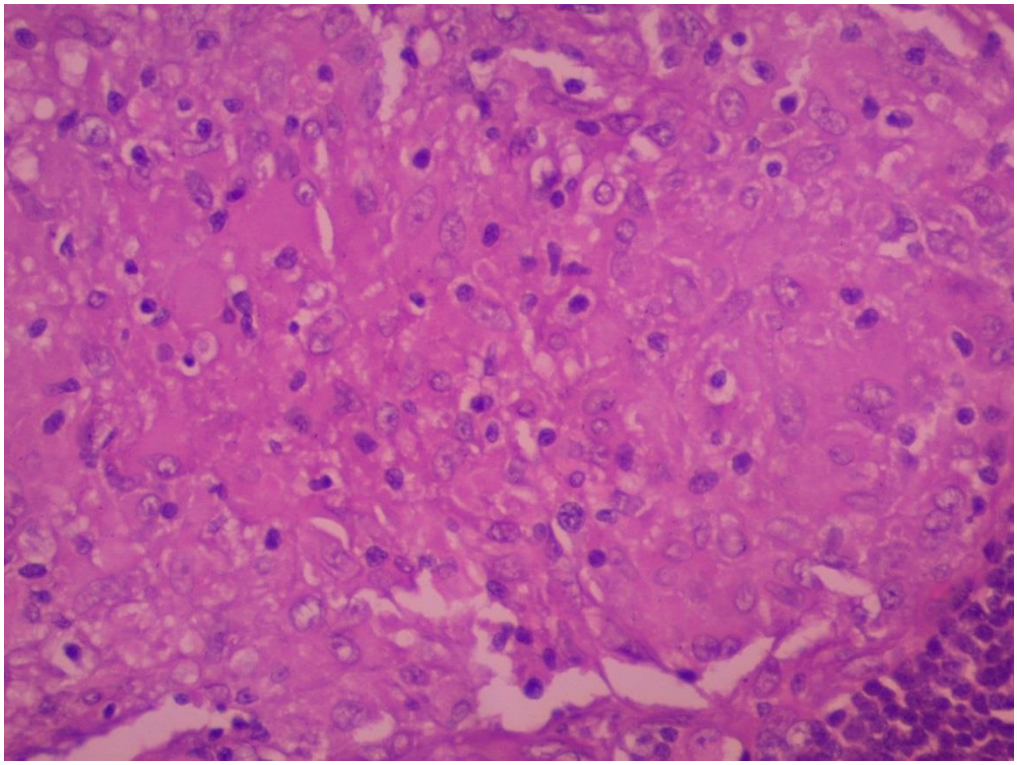


Figure 10 Tubercular Granuloma on Histopathological Examination

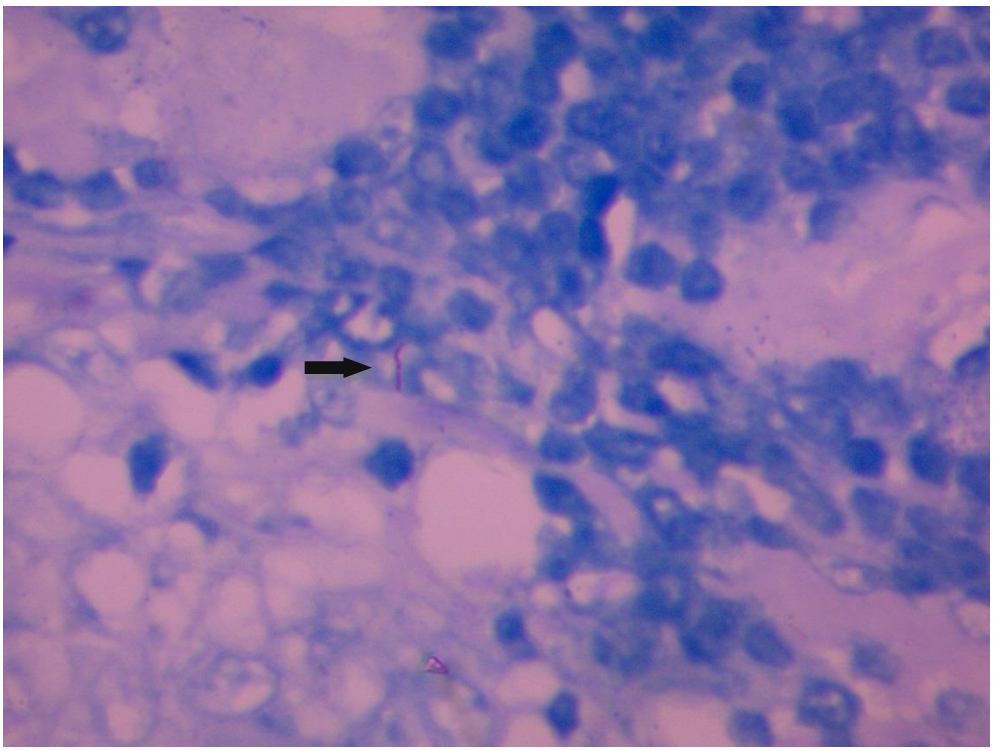


Figure 11 Acid Fast Bacilli on ZN Staining

FINE NEEDLE ASPIRATION CYTOLOGY

FNAC is a simple, less expensive out-patient diagnostic procedure used for the diagnosis of tuberculous lymphadenitis.[46] In this a procedure a thin needle is inserted into the affected lymph node and the aspirated contents are subjected to microscopy. FNAC has high sensitivity and specificity for the diagnosis of TB lymphadenitis and is recommended to be used as the screening diagnostic test in suspected cases.

The following cytomorphological patterns can be seen in FNA smears from a suspected case of nodal TB.[47]

- ✓ Predominantly reactive picture with occasional or a few clusters of epithelioid cells.
- ✓ Presence of numerous clusters of epithelioid cells with presence of multinucleate giant cells. In this pattern the diagnosis can be made with relative ease.

- ✓ Mostly necrotic material, with a few epithelioid cells found on diligent search.
- ✓ Mostly necrotic material with a few lymphocytes and histiocytes but no epithelioid cells.
- ✓ Necrotic material only.

Mittal [48]analyzed the cytomorphological features of TB in fine needle aspirates of lymph nodes. Out of 36 cases which had cytological features of tuberculous lymphadenitis, a combination of well formed epithelioid cell granulomas, giant cells and caseous necrosis was seen in 17 cases (34%), epithelioid cell granulomas but no caseous necrosis was seen in 6 cases (12%), and only caseous necrosis unassociated with granulomas was seen in 13 cases (26%).A confident diagnosis of TB can be rendered on cytology when a combination of epithelioid cell granulomas and caseous necrosis with or without multinucleated giant cells is seen. However, typical granulomas and caseation are unlikely to be found in tuberculous lymphadenitis in advanced HIV disease because T-cell functions are necessary for epithelioid granuloma formation. Instead, necrotizing atypical granuloma formation is a pattern consistent with advanced HIV disease.[49] The presence of micro abscesses, ill-defined granulomas, non-caseating granulomas with few giant cells are more prominent in NTM lymphadenitis when compared with tuberculous lymphadenitis.[50]

Aspirated material is always subjected to ZN staining for AFB, mycobacterial culture, and sensitivity testing. Microscopy using ZN staining procedure is rapid, cheap and easy. The sensitivity varies depending on the source of the sample. Sensitivity ranges from 46-78% and the specificity is virtually 100%.[51] In one study, the sensitivity and specificity of AFB on aspirate smear from lymph nodes was found to be 76.47% and 100% respectively [48] Centrifugation and fluorochrome staining with ultraviolet

microscopy markedly increases the sensitivity of microscopy.[52] AFB yield is highest in the smears in which purulent material is aspirated.

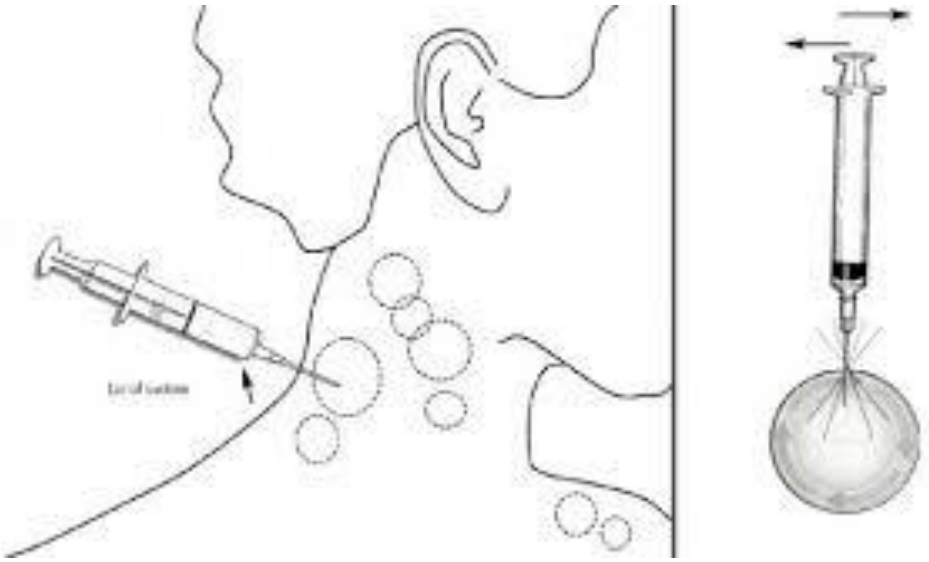


Figure 12 Procedure - FNAC of Lymph Node

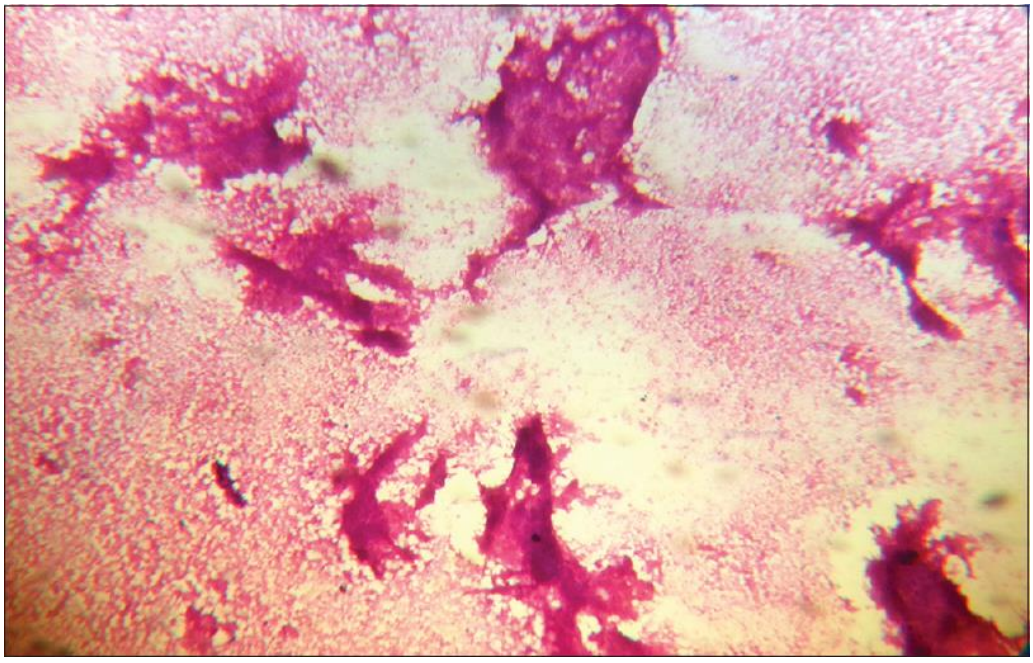


Figure 13 Tuberculous Lymphadenitis showing Caseous Necrosis On FNAC

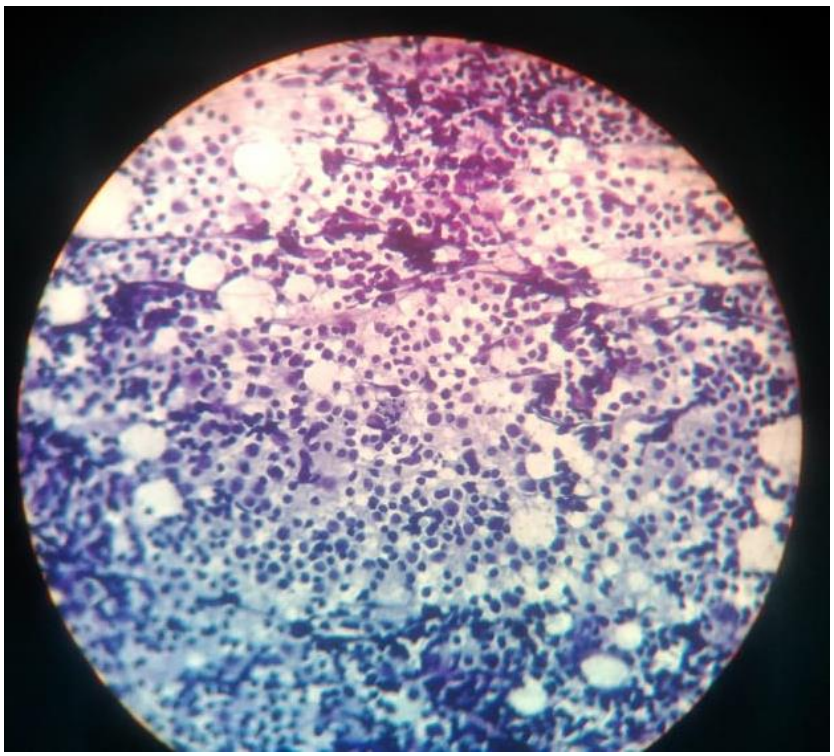


Figure 14 Cytomorphology of Granulomatous Lymphadenitis

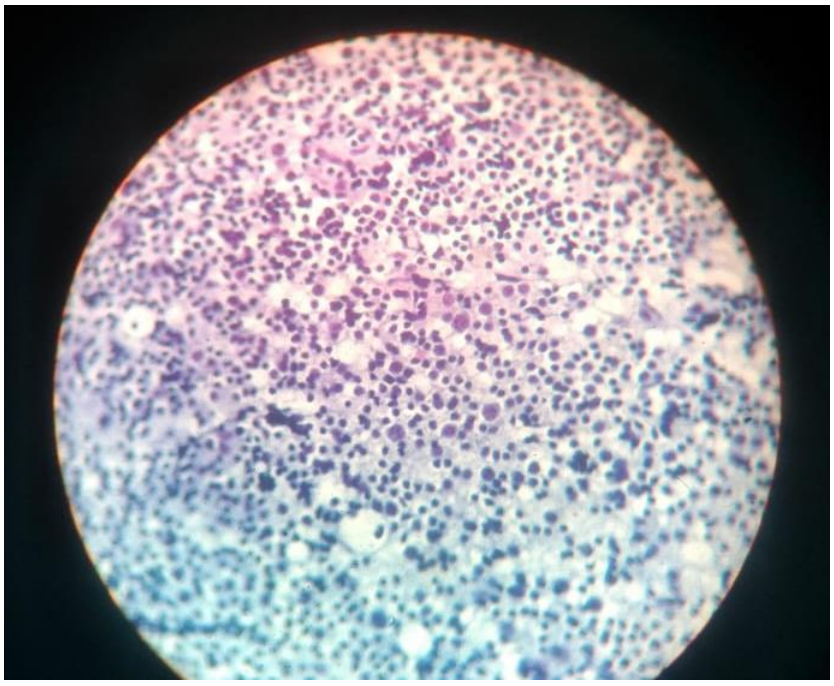


Figure 15 Cytology of Granulomatous Lymphadenitis showing Epithelioid cells

CULTURE

Isolation of mycobacteria by culture still represents the cornerstone on which the definitive diagnosis is based. Major constraint of culturing mycobacteria in conventional media is its slow growth, which necessitates a mean incubation period of at least four weeks. Although a combination of solid and liquid media is currently the gold standard for primary isolation of mycobacteria, a few modern rapid methods are also available. These include micro colony detection on solid media, septicheck AFB method, microscopic observation of broth culture, the BACTEC 460 , BACTEC MGIT 960 system, MB/ BacT system and ESP II culture system.[53]

IMAGING MODALITIES

Chest radiograph, ultrasound, computerized tomography and magnetic resonance imaging of neck can be performed in tuberculous lymphadenitis. Associated chest lesions can be identified by these methods. The status of the retroperitoneal, porta hepatic or mesenteric lymph nodes also can be assessed

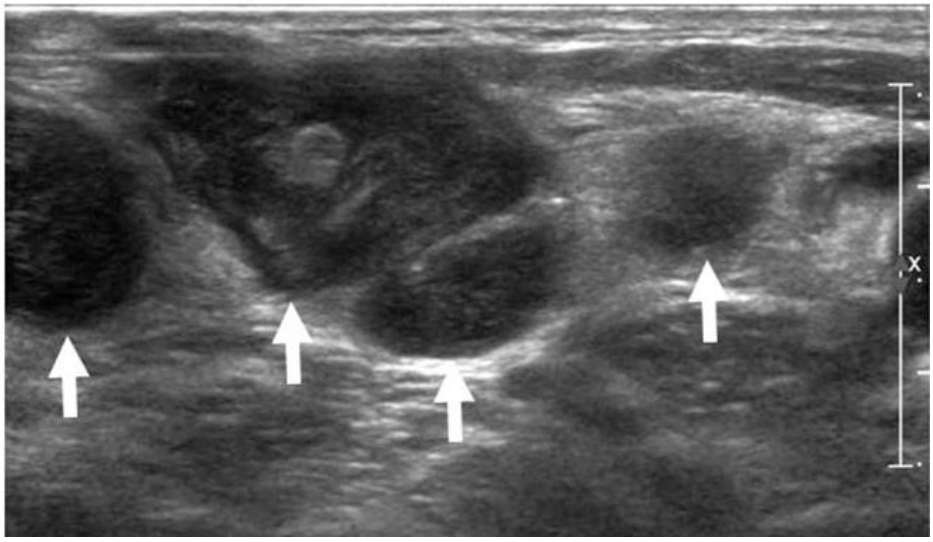


Figure 16 Tuberculous lymph nodes (LNs) in the right neck (Transverse gray-scale US image shows multiple enlarged nodes (arrows) with heterogeneous echogenicity, intranodal necrosis, nodal matting, and indistinct nodal border)

MOLECULAR TESTS

The diagnostic modalities of TB have improved in recent years with introduction of several molecular techniques in diagnostics.[54] They have much higher sensitivity than conventional methods and results are available within 24 to 48 hours. An early diagnosis allows prompt and specific initiation of anti mycobacterial treatment. An additional advantage of molecular methods is the direct identification of the species and detection of drug resistance. Polymerase chain reaction (PCR) is a fast and useful investigation for the demonstration of mycobacterial DNA fragments in patients suspected to have TB lymphadenitis clinically. The target commonly used in PCR is IS6110. Species specific and genus specific PCR methods are being used with various targets and modifications of PCR such as ligase chain reaction, transcription mediated amplification, strand displacement amplification (SDA), and nucleic acid sequence based amplification (NASBA), branched DNA (b-DNA) and line probe assay (LPA) .[53]

CHALLENGES IN CONVENTIONAL DIAGNOSTIC MODALITIES FOR THE IDENTIFICATION OF TUBERCULOUS LYMPHADENITIS

Smear microscopy is the examination of smears for AFB under a microscope. Around 5000 to 10,000 organisms per mL must be present in the specimen for TB bacteria to be visible by microscopy. [55]For EPTB, microscopy can be performed in fluid or tissue specimens from sites of disease involvement, for example, in CSF in presumptive TB meningitis or in lymph node tissue in presumptive TB lymph node. For most extra pulmonary sites, because there are usually few organisms, the sensitivity of smear microscopy is generally low.

Mycobacterial culture is a method used to grow bacteria on nutrient-rich media. In comparison with microscopy, a positive culture requires only around 100 organisms per mL and therefore can detect lower numbers of TB bacteria.[55]However, culture takes several weeks and requires a highly equipped laboratory and has reduced sensitivity.

Diagnosis of EPTB by histological examination is based on finding acid-fast bacilli and granulomatous inflammation, frequently with caseous necrosis. The sensitivity of histology is highly variable for different forms of EPTB (reference standards have included smear microscopy, culture, NAA tests, clinical criteria, and imaging studies, done alone or in various combinations): 59% to 88% for lymph node TB .[56]

NAA test is a molecular technique that can detect small quantities of genetic material (DNA or RNA) from micro-organisms, such as M. tuberculosis. The key advantage of NAA tests is that they are rapid diagnostic tests, potentially providing results in a few hours. Systematic reviews (140 studies) of commercial and in-house NAA tests for different forms of EPTB found relatively low sensitivity and underscored concerns about the cost and feasibility of this technology in resource-limited areas.[57]

LF-LAM (Alere Determine™ TB LAM Ag, Alere Inc, Waltham, USA) is a commercially available point-of-care test for active TB (pulmonary and EPTB). The test detects lipoarabinomannan (LAM), a component of the bacterial cell wall, which is detectable in patients with active TB infection. LF-LAM is done by placing urine on one end of a test strip, with results appearing as a line (i.e. a band) on the strip if TB is present. The test is simple, requires no special equipment, and shows results in 25 minutes.[58] However, the WHO does not recommend LF-LAM for screening or diagnosis of TB .[59]

The development of the GeneXpert MTB/RIF assay on the GeneXpert platform was completed in 2009. It is considered an important breakthrough in the fight against TB. For the first time, a molecular test is simple and robust enough to be introduced and used outside conventional laboratory settings. GeneXpert MTB/RIF detects M. tuberculosis. It also detects a mutation that confers RIF resistance, using three specific primers and five unique molecular probes to ensure a high degree of specificity. The assay provides results directly from sample in less than 2 hours. The GeneXpert MTB/RIF system remains the only self-contained cartridge based fully automated DNA testing platform that can accurately detect both TB and resistance to RIF in less than 2 hours, and it is the only reliable technology among a new generation of automated molecular diagnostic platforms.[60]

In 2010, WHO[61] recommended the use of the GeneXpert MTB/RIF assay. In 2013, WHO issued an updated Policy Guidance, providing revised recommendations on using of GeneXpert MTB/RIF to diagnose pulmonary TB, pediatric TB, EPTB and RIF resistance.[62]

MOLECULAR BEACON TECHNOLOGY

The GeneXpert MTB/RIF utilizes molecular beacon technology to detect DNA sequences amplified in a hemi-nested RT-PCR assay.[63] Five different nucleic acid hybridization probes are used in the same multiplex reaction. Each probe is complementary to a different target sequence within the "rpoB gene" of RIF-susceptible M. tuberculosis and is labeled with a differently colored fluorophore. Together, these overlapping probes span the entire 81 bp core region of the rpoB gene .[64]

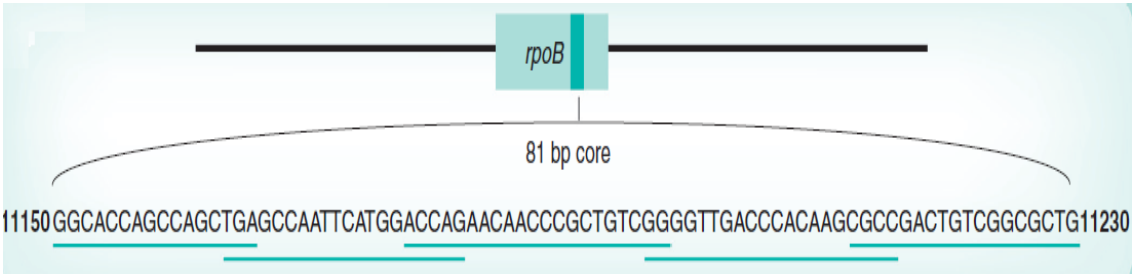


Figure 17 The rpoB gene core region target sequence and molecular beacon technology. The rpoB gene, the nucleotides sequence of the core region and the localization of the complementary overlapping molecular beacon probes that span the complete core region.

The molecular beacons are oligonucleotide sequences that contain a probe sequence inserted between two 'arm' sequences. The two 'arm' sequences are designed to be complementary to each other such that, under assay conditions, they hybridize to form a stem-and-loop secondary structure; the probe is located within the loop structure.[63] A fluorophore is linked covalently to the end of one arm and a nonfluorescent quencher to the other. With the probe in its free,non-hybridized state, the close proximity of the quencher and fluorophore molecules suppresses fluorescence. However, when the probe sequence binds to its complementary DNA target, the molecular beacon undergoes conformational change. This causes separation of the two arms and the fluorophore and quencher molecules, resulting in bright fluorescence.[63] The molecular beacons were designed to only hybridize correctly with amplified wild-type(RIF sensitive) rpoB sequences.[64]A mutation within these sequences interferes with hybridization such that the conformational integrity of the probe may be retained in the nonfluorescing state. Thus, a mutation anywhere in the core region of the rpoB gene results in either delayed onset (partial inhibition) or complete suppression of fluorescence of the corresponding molecular beacon.[64]

Using genomic DNA or culture lysates of a large number of clinical strains of M. tuberculosis, this assay was found to have high specificity and sensitivityin detection of RIF resistance.[65] An important step ahead was the development of a version of the assay that could successfully be performed in a single well.[65]

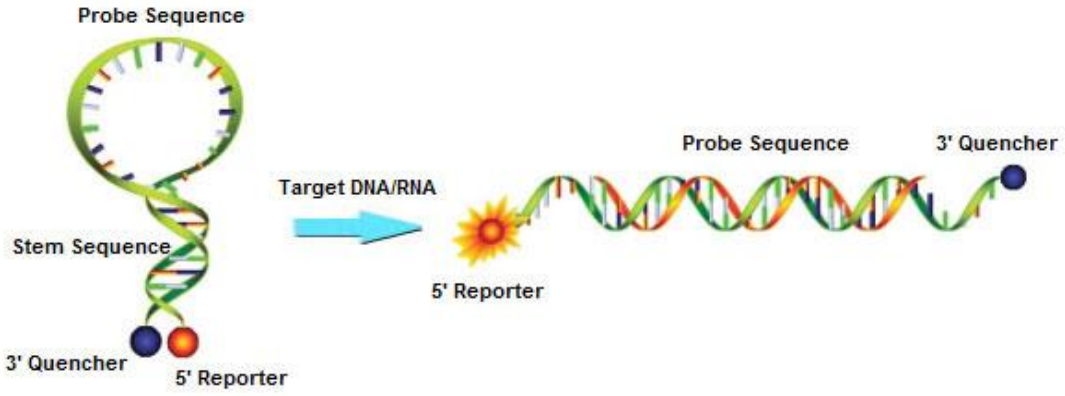


Figure 18 The stem-and-loop structure of a molecular beacon

THE GENEXPERT® DIAGNOSTIC PLATFORM

The GeneXpert diagnostic system was originally developed by Cepheid Inc.[66] for the detection of anthrax and was deployed for this purpose by the United States Postal Service in mail sortingfacilities.[66] This assay required the development of a self-contained, fully integrated and automated platform that could be operated with minimal technical expertise. The GeneXpert system has been successful in combining on-board sample preparation with fully-automated rt-PCR amplification and detection functions. The cartridge-based system incorporates microfluidics technology and fully automated nucleic acid analysis to purify, concentrate, detect and identify targeted nucleic acid sequences from unprocessed clinical samples. An expanding range of different organisms may be detected using pathogen-specific cartridges within the same GeneXpert test platform. The test platform is modular, with each module independently processing one cartridge at a time. Machines with 1, 4, 16 and 48

modules are available, permitting multiple assays to be run concurrently and independently (Cepheid Systems).

THE GENEXPERT MTB/RIF ASSAY

The assay utilizes single-use plastic cartridges with multiple chambers that are preloaded with liquid buffers and lyophilized reagent beads necessary for sample processing, DNA extraction and heminested rt-PCR.[60,67] Clinical samples are treated with a sodium hydroxide and isopropanol-containing SR and incubated at room temperature for 15 min. This step is designed to reduce the viability of M. tuberculosis in sputum at least 106-fold to reduce biohazard risk.[68] The treated sample is then manually transferred to the cartridge which is loaded into the GeneXpert instrument. Subsequent processing is fully automated.

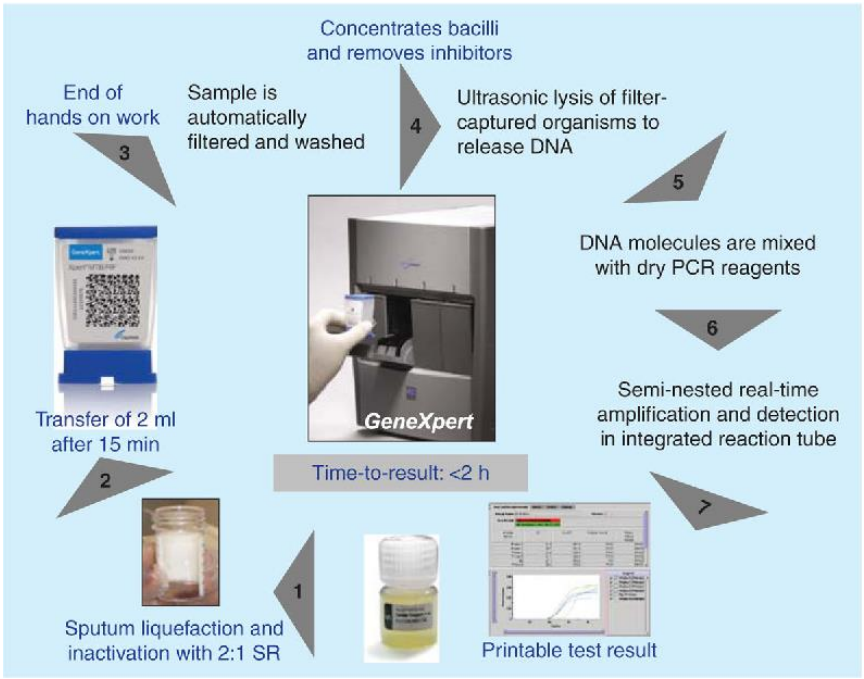


Figure 19 Process Involved In GeneXpert MTB/RIF Assay

The cartridge incorporates a syringe drive, a rotary drive and a filter upon which M. tuberculosis bacilli are deposited after being liberated from the clinical material. The

test platform employs a sonic horn that inserts into the cartridge base to cause ultrasonic breakdown of the bacilli and release of the genetic material. The assay then amplifies a 192bp segment of the rpoB gene using a hemi-nested RT-PCR reaction.[60,67] It also contains lyophilized Bacillus globigii spores which serve as an internal PCR control. The B. globigii PCR assay is multiplexed with the M. tuberculosis assay.

M.tuberculosis is detected by the five overlapping molecular probes (probes A–E) that collectively are complementary to the entire 81 bp rpoB core region.[60,67]M. tuberculosis is identified when at least two of the five probes give positive signals with a CT of ≤38 cycles and that differ by no more than a prespecified number of cycles. The B. globigii internal control is positive when the single B.globigii-specific probe produces a CT of ≤38 cycles.[60,67] The standard user interface detects the presence or absence of M. tuberculosis and RIF resistance, and a semi-quantitative estimate of the concentration of bacilli as defined by the CT range (high, <16; medium, 16–22; low,22–28; very low, >28). Assays that are negative for M. tuberculosis and for the B. globigii internal control are reported as invalid assays. When performed on unprocessed samples, the assay can generate results within 2 hours with less than 15 min of hands-on time[67].

The detection of RIF resistance is based on the difference between the first CT and the last CT (ΔCT) for M. tuberculosis-specific beacon. The system was originally configured such that resistance was reported when ΔCT was >3.5 cycles and sensitive if ≤3.5 cycles. Since the assay terminates after 38 cycles, the assay was deemed indeterminate for RIF resistance if the first probe CT is >34.5 cycles and the last probe has a CT of >38 cycles.[60,67]

DIAGNOSTIC ACCURACY OF GENEXPERT MTB/RIF ASSAY IN EXTRAPULMONARY TUBERCULOSIS

Various clinical studies have highlighted the importance of GeneXpert MTB/RIF assay method in the diagnosis of EPTB.

Bhankar[69]conducted a study to determine specificity and sensitivity of GeneXpert MTB/RIF assay for diagnosis of EPTB and RIF resistance in comparison to culture on Lowenstein–Jensen medium and proportion method. In this study,738 specimens from clinically suspected cases of EPTB were subjected to ZN staining, GeneXpert MTB/RIF assay and culture on LJ medium. Proportion methods was done on the isolates. The result inferred that the specificity , sensitivity of GeneXpert MTB/RIF assay for diagnosis of EPTB were 84.91% (95% confidence interval [CI] 72.41%–93.25%) and 86.72% (95% CI 83.94%–89.17%) and for RIF resistance detection were 60.00% (95% CI 32.29%–83.66%) and 94.74% (95% CI 73.97%–99.87%). Among culture-positive cases, the sensitivity of GeneXpert MTB/RIF assay was 94.12% in smear positive and 80.56% in smear-negative cases. GeneXpert MTB/RIF showed maximum sensitivity of MTB detection from lymph node specimens (100% [95% CI 54.07%–100.00%]) and other body fluids (100% [95% CI 15.81%–100.00%]). Thus the study establishes, GeneXpert MTB/RIF assay as a promising tool in swift detection and diagnosis of EPTB and RIF resistance.

Tadesse[70]conducted a study to assess the performance of GeneXpert for the diagnosis of tuberculous lymphadenitis on concentrated FNAC samples. In this study, out of 143 enrolled suspects, 64.3% (92/143) were confirmed tuberculous lymphadenitis cases by the CRS using culture and/or smear microscopy. GeneXpert detected MTBC in 60.1% (86/143) of the presumptive tuberculous lymphadenitis cases. The

sensitivity of GeneXpert with respect to CRS was 87.8% [95% CI: 81.0–94.5] and specificity 91.1% [95% CI: 82.8–99.4]. The sensitivity was 27.8% for smear microscopy and 80% for cytology compared to CRS. Cytology showed least specificity (57.8%). GeneXpert detected M.tuberculosis in 4 out of 45 culture- and smear-negative cases. Among 47 cytomorphologically negative cases, 15 were positive on GeneXpert. Approximately >50% of GeneXpert-positive cases were in the range of very low cut-off threshold values (28<CT<38). Resistance to RIF was identified in 4.7% (4/86) of GeneXpert-positive cases. Thus, the results revealed that GeneXpert test showed a high specificity and sensitivity for the diagnosis of tuberculous lymphadenitis on concentrated FNAC samples. Further, GeneXpert facilitated rapid detection of RIF resistance in the strains isolated from lymph node aspirates.

A study done by Ligthelm[71] showed that the GeneXpert MTB/RIF correctly identified 29 out of 30 TB cases (sensitivity, 96.7%; 95% CI, 86.6 to 100). The possible false-negative result had a prolonged transit interval of 9 days before GeneXpert MTB/RIF testing, which may have affected the result. GeneXpert MTB/RIF was positive in two cases with negative cytomorphology and culture (specificity, 88.9%; 95% CI, 69.6 to 100). The GeneXpert MTB/RIF test was positive in all 6 smear-negative culture-positive cases and correctly detected 1 of the 2 RIF-resistant cases. The average time to results for microbiological culture was 18.5 days (range, 9 to 55 days), while the GeneXpert MTB/RIF test revealed results within 2 hours of commencing the test. This represents a considerable reduction in diagnostic delay, thereby permitting real-time decision making, planning of treatment and early initiation of the appropriate treatment.

Further, Ghariani[72]in their study revealed that, GeneXpert detected the DNA of MTBC in 134 samples (77%). Standard bacteriological assays, including AFB microscopy and culture, were positive, respectively, in 41 (23.6%) and 79 (45.4%) specimens. M. bovis was isolated in 76% of positive cultures. GeneXpert sensitivity and specificity results were assessed according to clinical findings, smear, culture and histological findings. The sensitivity and specificity of the GeneXpert assay were 87.5% (126/144) and 73.3%.

Biadglegne[73]processed 231 FNA specimens for smear, culture, and GeneXpert test. When compared to culture, the GeneXpert test correctly identified 29 out of 32 culture positive cases, 5 out of 11 contaminated cases, and 56 out of 188 culture negative cases. The net sensitivity of the test was 93.5% [95% CI, 78.3-98.9%] and specificity 69.2% [95% CI, 66.4-70.0%]. The GeneXpert test identified the rpoB mutation associated with RIF resistance concordant with GenoType MTBDR plus and phenotypic drug susceptibility testing. Thus, GeneXpert assay was found to perform well in detecting MTBC and RIF resistance in TB lymphadenitis patients.

A meta- analysis was carried out to determine the diagnostic accuracy of GeneXpert for the detection of EPTB. In this analysis, 36 studies were identified, with a pooled sensitivity 77% (95% CI 66-85)and specificity of 97% (95% CI 94-98). Substantial variations existed between study estimates of sensitivity (I(2) = 99%) and specificity (I(2) = 96%). Among site-specific estimates for lymph, pleural fluid, cerebrospinal fluid, gastro-intestinal and urinary samples, the pooled sensitivity was lower in pleural fluid (37%, 95%CI 26-50, meta-regression P < 0.001) and higher among lymph node samples (87%, 95%CI 75-95, meta-regression P = 0.03).[74]

METHODOLOGY

MATERIALS AND METHODS

Study Population: Patients with clinically suspected Tubercular Lymphadenitis

Study Design: Cross Sectional Analytical Study

Place of study: R.L Jalappa Hospital and Research Centre, Tamaka, Kolar.

Study Period and Duration: December 2017 to June (18 Months .)

Sample size estimation:

Calculated using the formula$N = \frac{Za^2PQ}{d^2}$:

d^2 – Absolute error of 10%

Za – Standard deviation at 95% confidence interval

P – 35.6%

Q – 100-1a

Sample size: 67 cases of clinically suspected tubercular lymphadenitis

Inclusion Criteria

Clinically Suspected cases of tuberculous lymphadenitis

Patients with age >5years

Exclusion Criteria

Patients with lymphadenopathy who are established case of malignancy with primary or secondary deposits in the lymph nodes.

PATIENT DATA COLLECTION AND EVALUATION:

The selected patients after taking their consent were subjected to a detailed history taking followed by thorough evaluation of clinical features. Further, the patients were subjected to preliminary investigations (CBC, ESR, HIV, HbsAg, RFTand Chest X-Ray) followed by specific Investigation (FNAC, USG of involved area). Each patient underwent FNAC for the involved lymph node. If the involved node is inaccessible for FNAC or the patient/attendants wanted excision and not willing for FNAC, excision of the affected lymph node was done. One part was sent in special GeneXpert containers fixed in saline and subjected to GeneXpert assay and the other part was fixed in formalin and sent for histopathological examination.

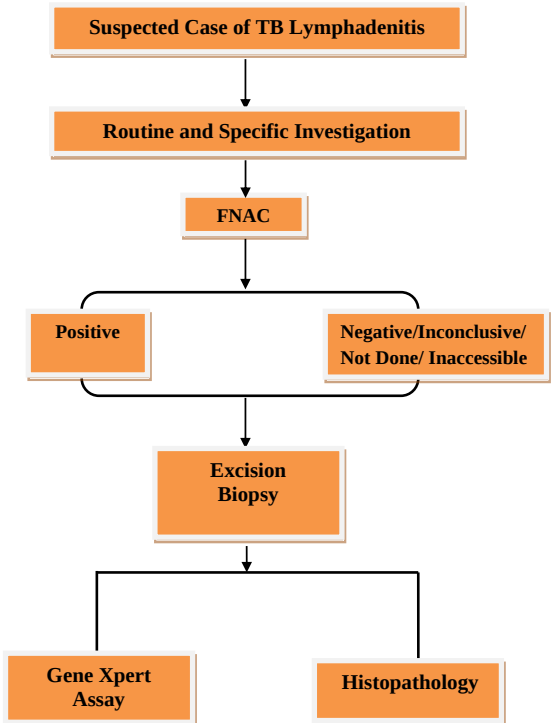


Fig.20 STUDY DESIGN FLOW CHART

GENE XPERT MTB/RIF (Cepheid, Sunnyvale, CA, USA) [67]

Requirements:

- ✓ Biosafety cabin
- ✓ GeneXpert system
- ✓ GeneXpert MTB/RIF cartridge
- ✓ Sample reagent
- ✓ Sterile disposable transfer pipette
- ✓ Sterile screw capped container
- ✓ Discard containers
- ✓ Permanent marker pen

Figure 21 GeneXpert System Equipment At SNR Hospital, Kolar

GENEXPERT PROCEDURE

Materials and Reagents provided:

Bead 1: Primer, probes, KCL, MgCl2, HEPES (4-(2- hydroxyethyl)- 1- piperazine ethane sulfonic acid), Bovine serum albumin (BSA), pH: 8.

Bead 2: primer, probe, KCL, MgCl2, dNTP (deoxyriboucleotide triphosphate), HEPES, BSA, pH 7.2.

Bead 3: approximately 6000 non-infectious sample preparation control spores.

Reagent 1: Tris buffer, EDTA an surfactants

Reagent 2: Tris buffer, EDTA an surfactants

Sample reagent: Sodium hydroxide and Isopropanol.

Procedure:

To the specimen in a centrifuge tube, double volume buffer solution is added, vortexed and left at room temperature for 15 minutes. Then 3ml of the vortexed mixture was added to the sample loading area of the cartridge without air bubbles. The lid of the cartridge was closed. Then the barcode on the cartridge was scanned, patient ID entered and the instrument module opened and the cartridge was loaded. The instrument module door is closed. Once the test gets over, the door lock will be released.

Interpretation Of GeneXpert Results

The results from GeneXpert assay indicates if M. tuberculosis is detected in the sample or not. When the result comes as invalid, the test should be repeated. The result also says whether RIF resistance was detected or not detected.

MTB detected: Target DNA is detected and depending on cycle threshold value, the result will be displayed as high, medium, low or very low detection.

MTB detected, RIF resistance detected: MTB target was present within the sample and mutation in rpo B gene detected.

MTB detected, RIF resistance not detected: MTB target was present within the sample and no mutation in rpo B gene detected.

MTB detected, RIF resistance indeterminate: MTB target was present within the sample and RIF resistance is not be determined due to insufficient signal detection.

MTB not detected: MTB target was not detected within the sample.

Invalid: MTB DNA cannot be determined. Repeat the test in this case.

Error: MTB cannot be determined. Sample processing control shows no result and probe check results failed. The test should be repeated.

No result: MTB cannot be determined. The test was repeated.

DATA ANALYSIS

Descriptive statistics were used to depict the frequency using SPSS statistical software. Chi-Square test of independence was used to determine if there was a significant relationship between two nominal (categorical) variables.

The efficacy of GeneXpert was done by calculating the sensitivity, specificity, positive and negative predictive value.

$$\text{Sensitivity} = \frac{\text{True positive}}{\text{True Positve} + \text{False Negative}} \text{X100}$$

$$\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Positive}} \text{X100}$$

$$\text{Positive Predictive Value(PPV)} = \frac{\text{True Positive}}{\text{True Positve} + \text{False Positive}} \text{X100}$$

$$\text{Negative Predictive Value(NPV)} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Negative}}$$

RESULTS

RESULTS

This study was conducted on 67 patients who were clinically suspected with tuberculous lymphadenitis at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar between December 2017 to June 2019.

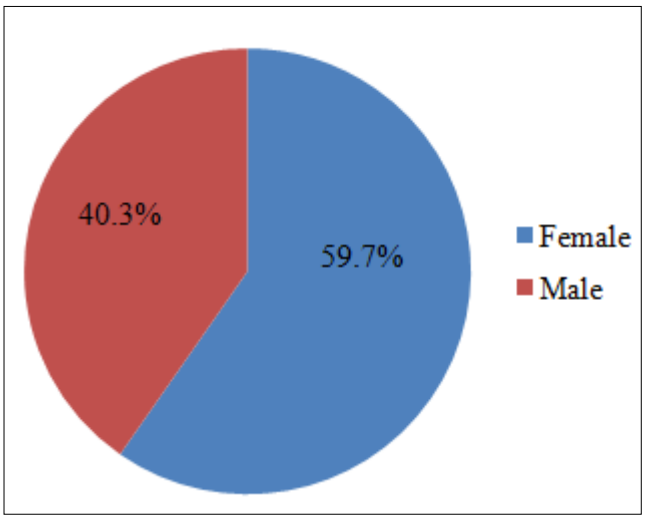
Demographic parameters

In this study out of 67 cases, 40 were females and 27 were males. The average age of the study subjects was 37.04 ±19.27 years. The average height of the study population was found to be 155±45.20 Cms. The mean weight of the study subjects was found to be 57.13±8.50 Kgs. The average BMI of the participants was found to be 23.47 ± 4.20 kg/m^2. The results were displayed in Table 1 and Chart 1-5.

Table 1: Demographic details of the present study

Demographic parameters	**Values ± SD**	
Gender	**Male**	27 (40.3%)
	Females	40 (59.7%)
Age	37.04 ±19.27 Years	
Height	155±45.20 Cms	
Weight	57.13±8.50 Kgs	
BMI	23.47 ± 4.20 kg/m^2	

Chart 1: Gender Distribution



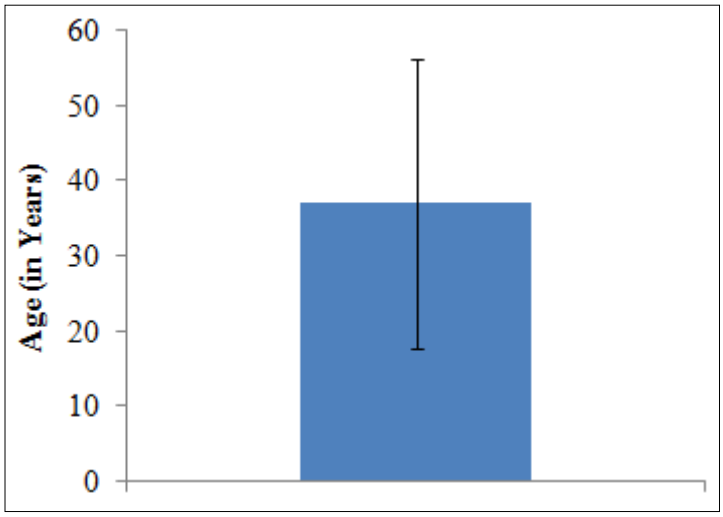


Chart 2: Age Distribution

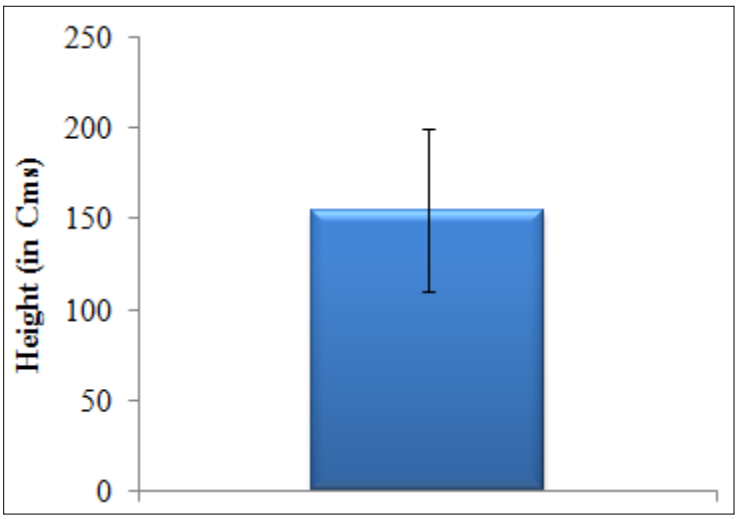


Chart 3: Mean Height of patients in the study

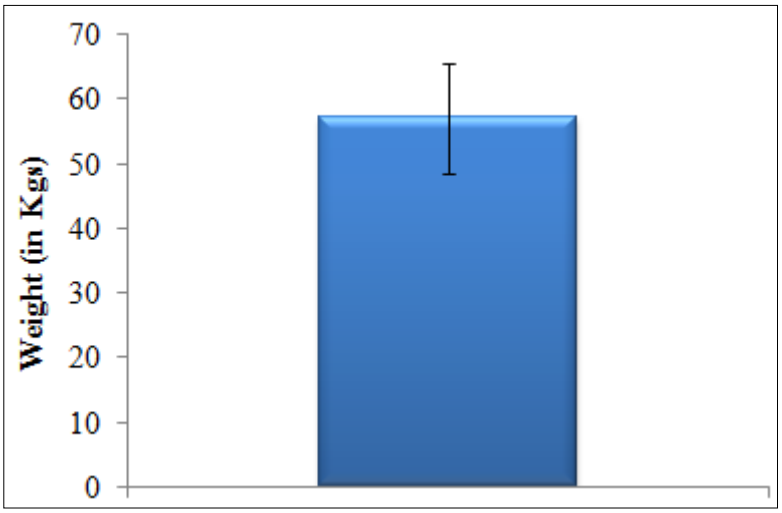


Chart 4: Mean Weight of patients in the study

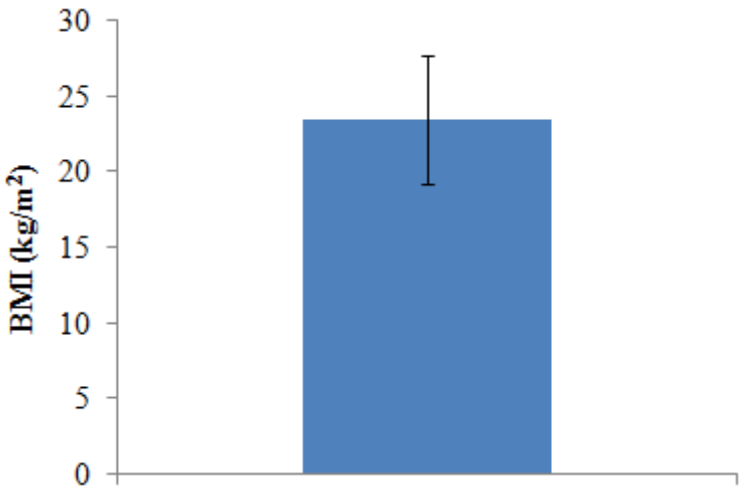


Chart 5: Average BMI of subjects in the present study

Chief Complaints and Symptoms

In the present study majority of the patients presented with the chief complaint of swelling in the right side of neck in 25 patients (37.31%), swelling in left side of neck in 19 patients (28.3%). The results were shown in Table 2 and Chart 6.

Table 2: Major Complaints of the study participants

CHIEF COMPLAINT	NO OF PATIENTS	PERCENTAGE (%)
Swelling in Right Neck	25	37.31
Swelling in Left Neck	19	28.36
Swelling in chin	7	10.45
Swelling in B/L neck	4	6
Pain abdomen	4	6
Swelling behind right ear	2	3
Swelling in left groin	3	4.5
Swelling in right groin	1	1.5
Swelling back of neck	1	1.53
Swelling in axilla	1	1.5
Total	67	100

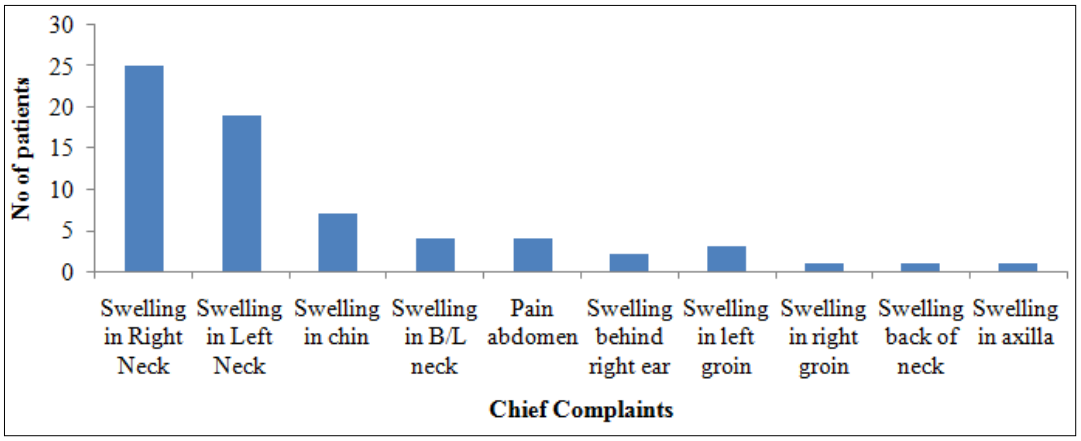


Chart 6: Major Complaints of the study participants

Constitutional Symptoms

In this study, of 67 patients, 36 cases (53.73%) showed absence of constitutional symptoms. 27 patients (40.3%) had fever , 3 patients had weight loss (4.5%) and 1 patient (1.5%) had cough. The results were shown in Table 3 and Chart 7.

Constitutional Symptoms	No of patients	Percentage (%)
No Symptoms	36	53.73
Fever	27	40.3
Weight Loss	3	4.5
Cough	1	1.5
Total	67	100

Table 3: Constitutional Symptoms among the study subjects

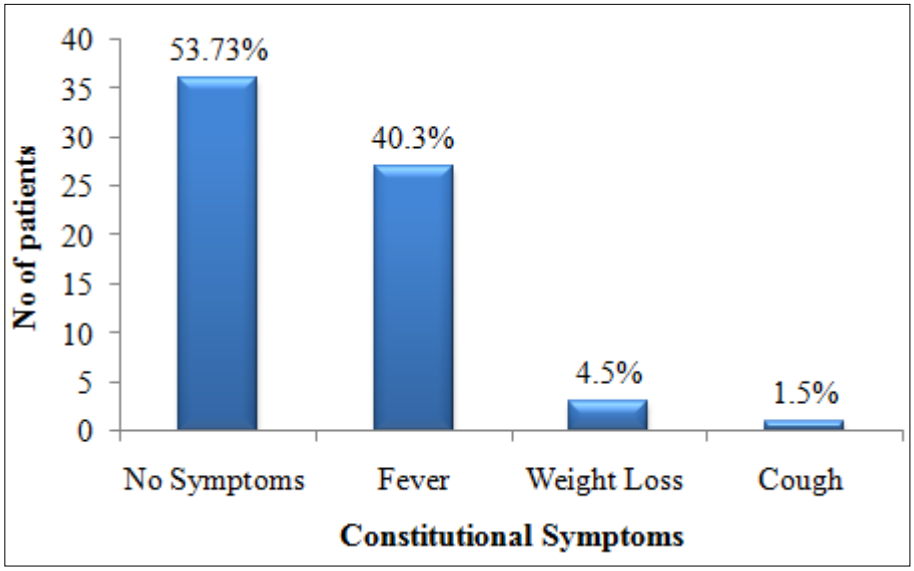


Chart 7: Constitutional Symptoms among the study subjects

Nourishment

In this study, out of 67 patients, 49 cases (73.1%) were moderately nourished, 14 cases (20.9%) were well nourished and 4 cases (6.03%) were poorly nourished. The data was depicted in Table 4 and Chart 8.

Table 4: Nutritional status of the patients

Nourishment	No of Patients	Percentage (%)
Moderate	49	73.1
Well	14	20.9
Poor	4	6.0

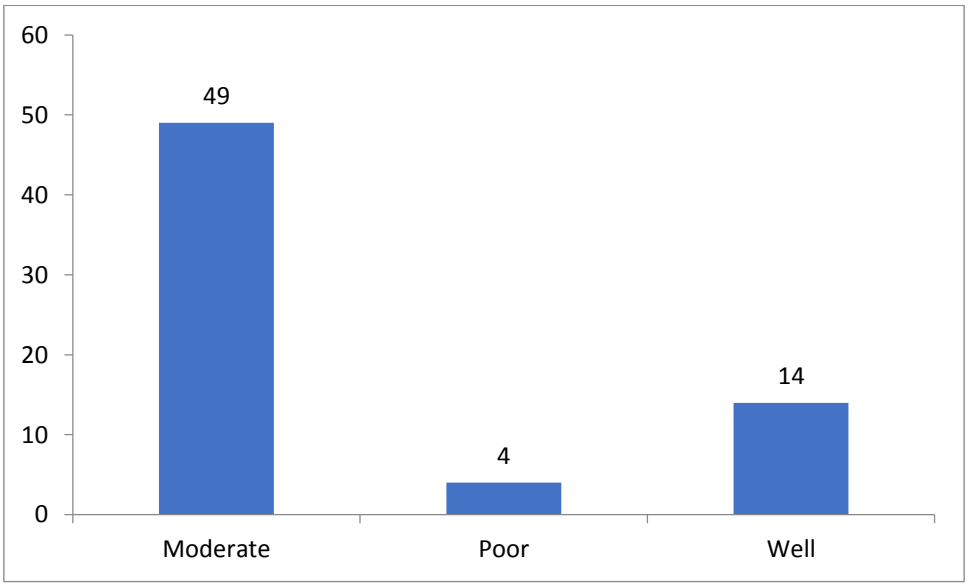


Chart 8: Nutritional status

Pallor

In this study, pallor was observed only in 15 patients (22.4%). The data were given in Table 5 and Chart 9.

Table 5: Pallor among the study participants

Pallor	No of Patients	Percentage (%)
Present	15	22.4
Absent	52	77.6

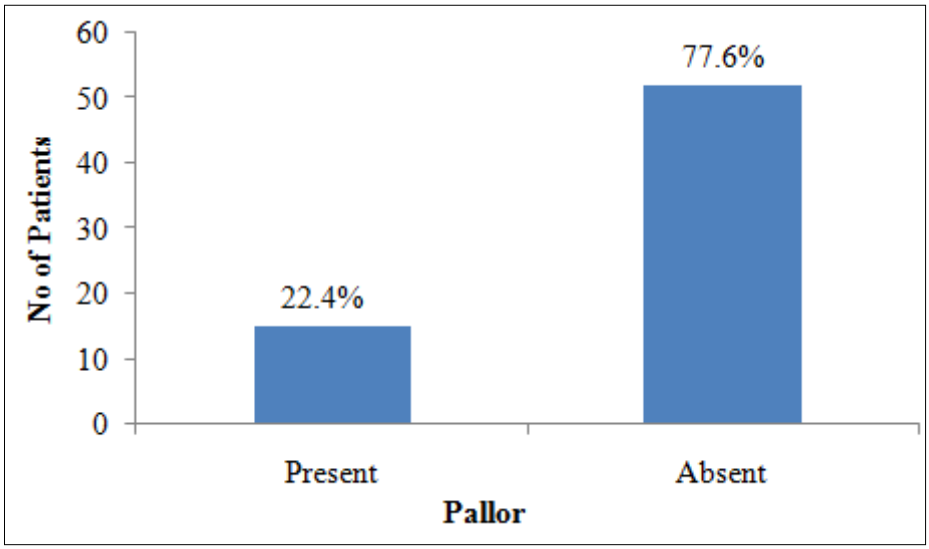


Chart 9: Pallor in the present study

Icterus

In this study, icterus was present only in one patient (1.5%) out of the 67 cases. The data were given in Table 6 and Chart 10.

Table 6: Icterus among the study participants

Icterus	No of Patients	Percentage (%)
Present	1	1.5
Absent	66	98.5

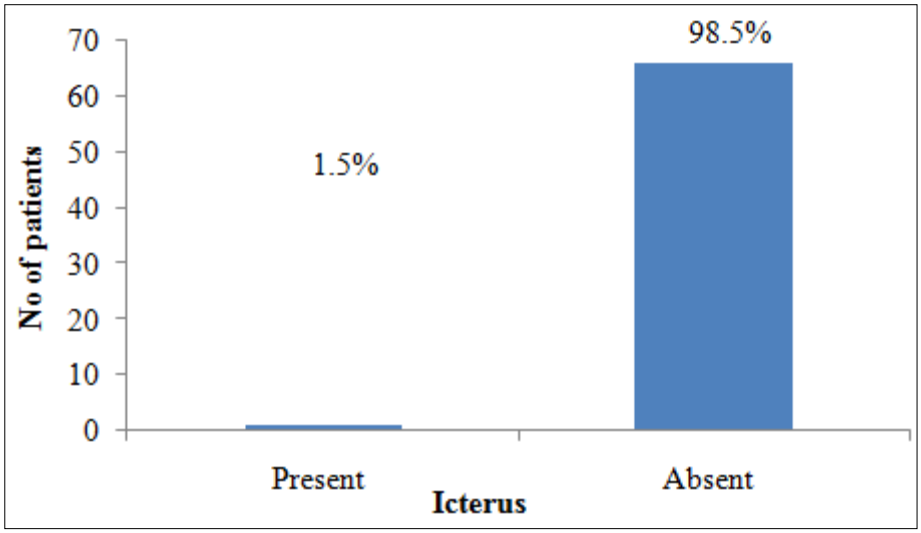


Chart 10: Icterus in the present study

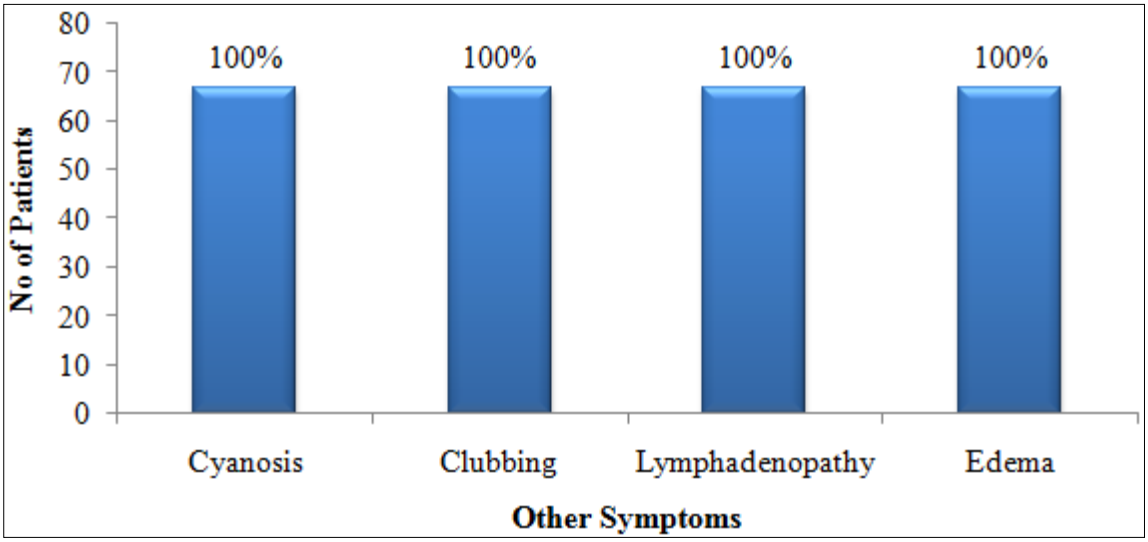
Other Symptoms

In this study, the other clinical symptoms like cyanosis, clubbing, lymphadenopathy and pedal edema was absent in all the patients recruited in this study. The data were given in Table 7 and Chart 11.

Table 7: Various symptoms in the present study

Other Symptoms	Cyanosis	Clubbing	Lymphadenopathy	Pedal Edema	Percentage (%)
Present	0	0	0	0	0
Absent	67	67	67	67	100

Chart 11: Various symptoms in the present study



Temperature

In this study, out of 67 patients 54 cases (80.67%) were afebrile and 13 cases (19.4) were febrile (19.4%). The results were given in Table 8 and Chart 12

Table 8: Temperature of study participants

	Frequency	Percent
Afebrile	54	80.6
Febrile	13	19.4
Total	67	100

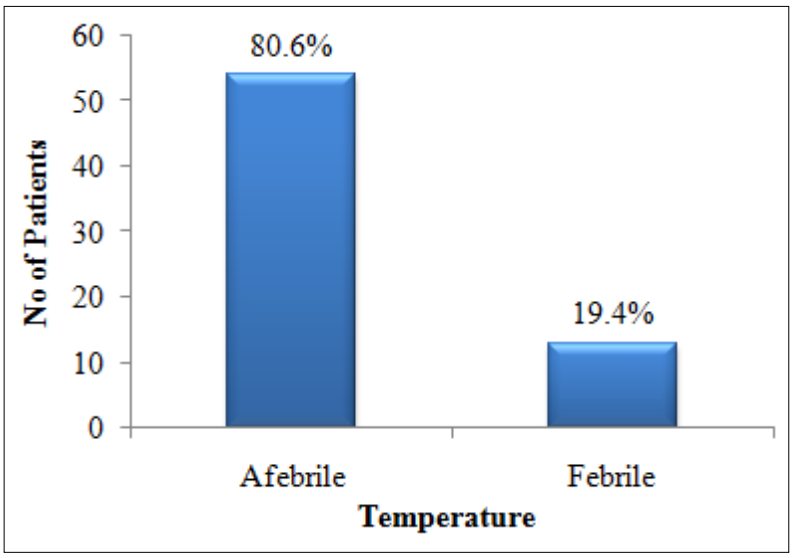


Chart 12: Temperature of study participants

INSPECTORY FINDINGS

Site

In this study, out of 67 patients the location of involved lymph node was predominantly in Right side of neck in 24 patients (35.6%), followed by left side of neck in 19 patients (28.4%). Meanwhile bilateral neck nodes were involved in 4 cases. The results were given in Table 9 and Chart 13.

Table 9: Lymph node site among the patients

Site	Frequency	Percentage (%)
B/L Neck	4	6.0
Left Axilla	2	3.0
Left Inguinal	3	4.5
Left Neck	19	28.4
Left Submandibular	3	4.5
Occipital	1	1.5
Right Inguinal	2	3.0
Right Neck	24	35.6
Right Postauricular	3	4.5
Right Submandibular	3	4.5
Sub mental	3	4.5
Total	67	100.0

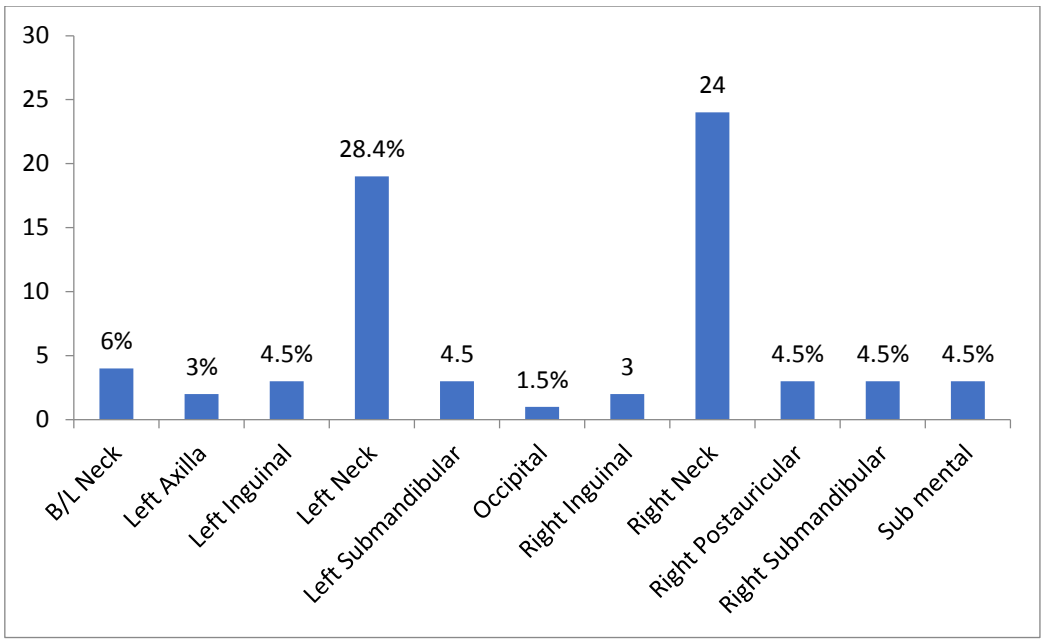


Chart 13: Lymph node site among the patients

Shape

In this study the lymph nodes were spherical in entire cases. The results were given in Table 10 and Chart 14.

Table 10: Lymph nodes Shapes among the patients

Shape	No of patients	Percentage (%)
Spherical	67	100

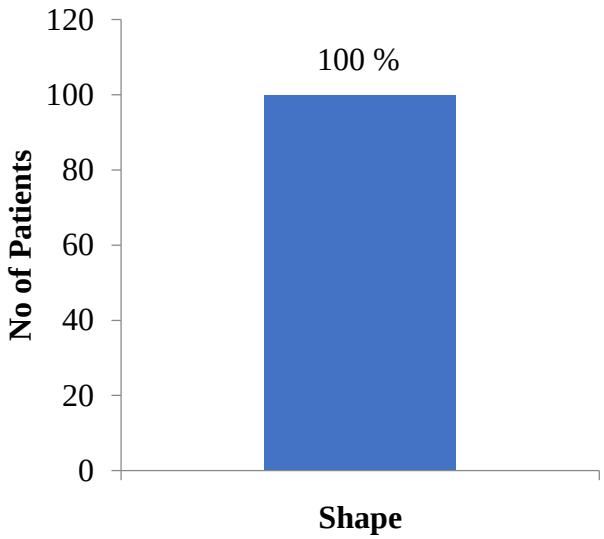


Chart 14 : Lymph nodes Shapes among the patients

Borders

In the present study, most of the patients 59 (89%) displayed well defined borders of involved lymph nodes whereas 6 cases had ill defined borders. The results were given in Table 11 and Chart 15.

Table 11: Nature of lymph node bordersin the present study

Borders	No of patients	Percentage (%)
Ill Defined	6	11.00
Well Defined	59	89.00

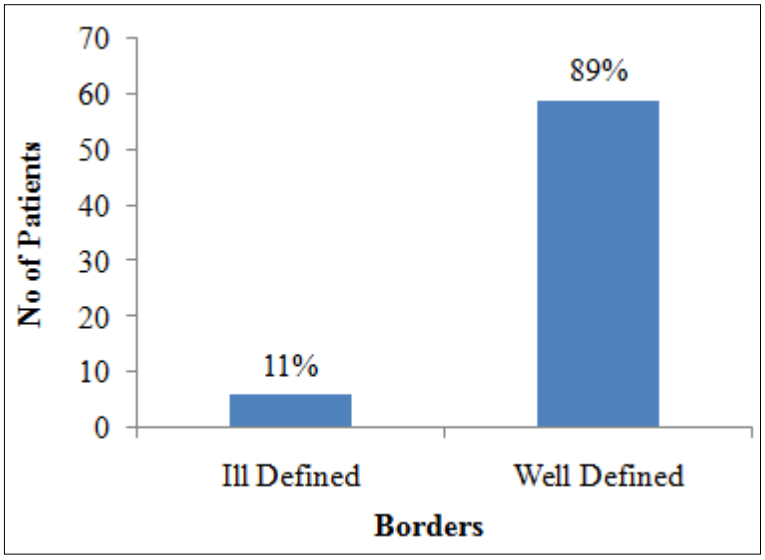


Chart 15: Nature of lymph node borders among the patients

Surface

In the this study, surface of lymph node was found to be smooth in majority of the cases i.e.,58 (86.55%) and irregular in 9 cases (13.45 %). The results were displayed in Table 12 and Chart 16.

Table 12: Surface of lymph nodes

Surface	No of Patients	Percentage (%)
Irregular	9	13.45
Smooth	58	86.55

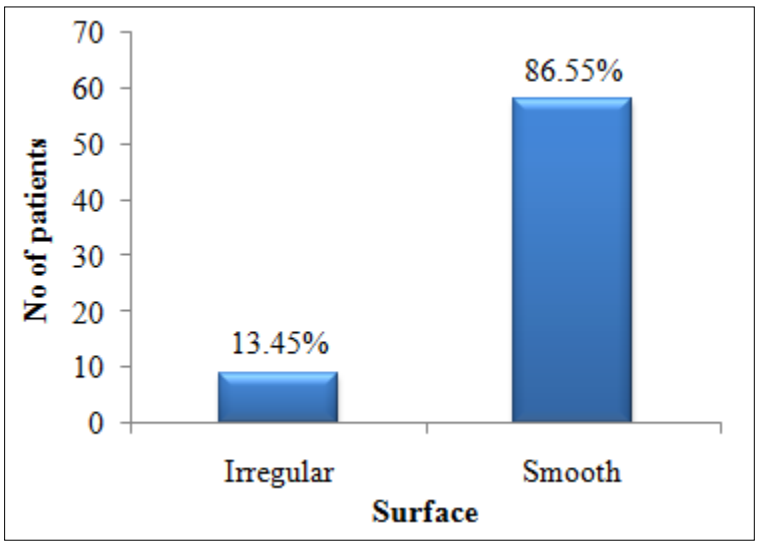


Chart 16: Surface of lymph nodes

Skin over Swelling

In this study, skin appearance on the surface of lymph node was found to be normal in 42 patients (62.68) and erythema was visualized in 25 patients (37.32%). The results were displayed in Table 13 and Chart 17

Table 13: Skin appearance over lymph node

Skin appearance	No of patients	Percentage (%)
Erythema	25	37.32
Normal	42	62.68
Total	67	100.0

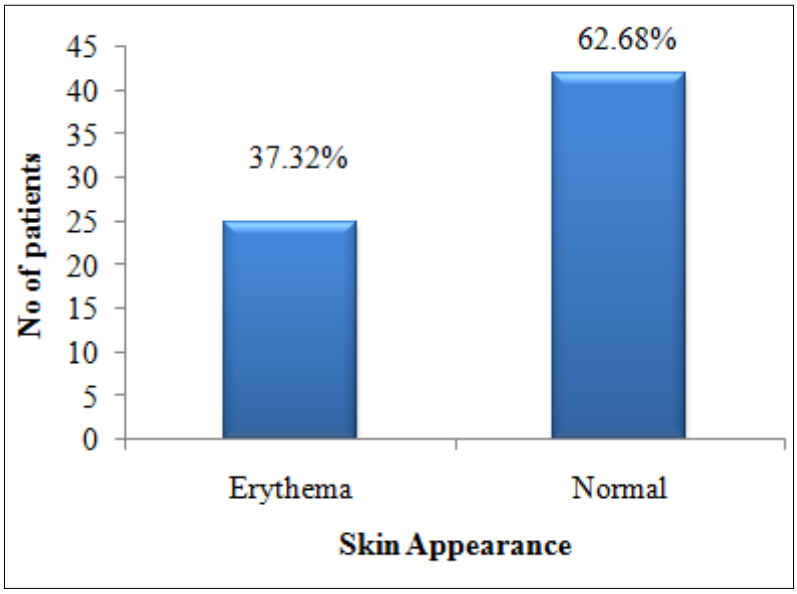


Chart 17: Skin over lymph node

PALPATORY FINDINGS

Site

In the present study, out of 67 patients on palpation it was noted that the affected site was predominantly in Right side of neck in 24 patients (35.6%), followed by left side of neck in 19 patients (28.4%) and bilateral neck was seen in 4(6.0%) cases. The results were shown in Table 14 and Chart 18.

Table 14: Palpatory site among the patients

Site	Frequency	Percent
B/L Neck	4	6
Left Axilla	2	3
Left Inguinal	3	4.5
Left Neck	19	28.4
Left Submandibular	3	4.5
Occipital	1	1.5
Right Inguinal	2	3
Right Neck	24	35.6
Right Postauricular	3	4.5
Right Submandibular	4	4.5
Sub mental	2	4.5
Total	67	100

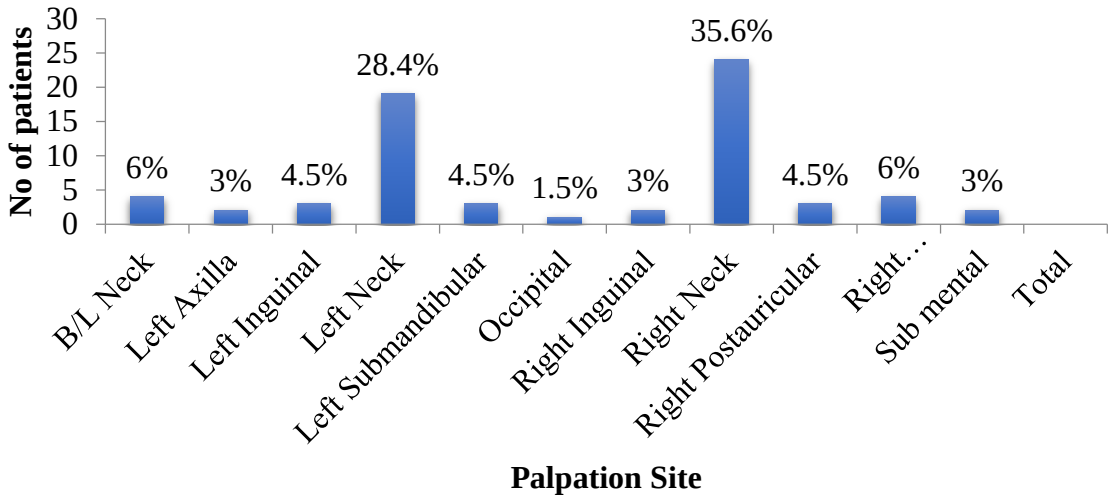


Chart 18: Palpatory site among the patients

Shape

In this study the shape on palpation was found to be globular in all cases. The results were shown in Table 15 and Chart 19.

Table 15: Palpatory shape among the patients

Shape	No of patients	Percentage (%)
Globular	100	100
Total	67	100

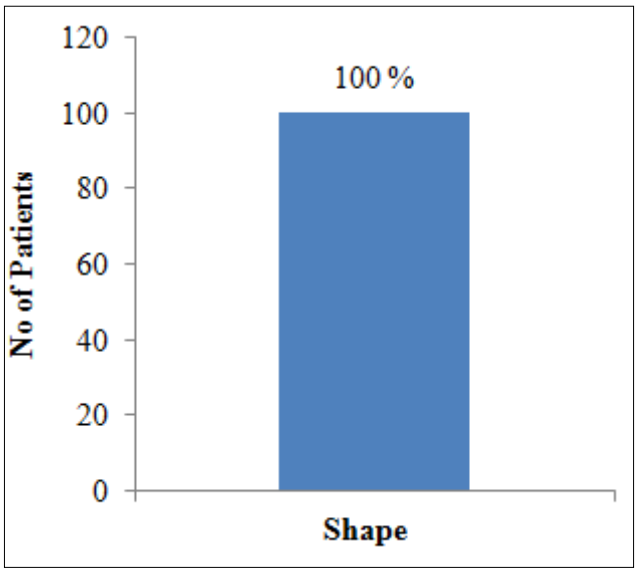


Chart 19: Palpation shape in the present study

Borders

In this study, most of the patients 60 (89.55%) displayed well defined borders on palpation and 7 cases (10.45%) had ill defined borders. The results were given in Table 16 and Chart 20.

Table 16: Palpation borders among the patients

Palpation Borders	No of patients	Percentage (%)
Ill Defined	7	10.45
Well Defined	60	89.55
Total	67	100.0

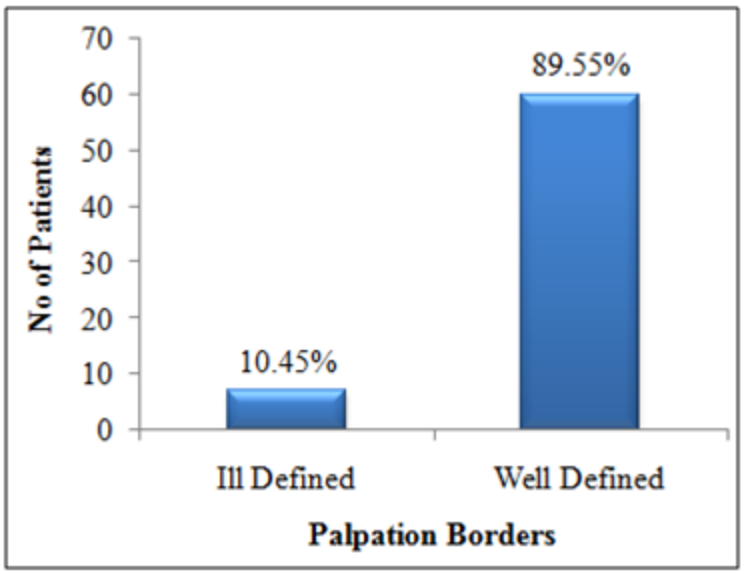


Chart 20: Palpation borders among the patients

Surface

In this study, surface of lymph node on palpation was found to be smooth in most of the cases 57 (85.08%) and irregular in 10 cases (14.92 %). The results were displayed in Table 17 and Chart 21.

Table 17: Palpatory surface among the patients

Palpation Surface	Frequency	Percentage (%)
Irregular	10	14.92
Smooth	57	85.08

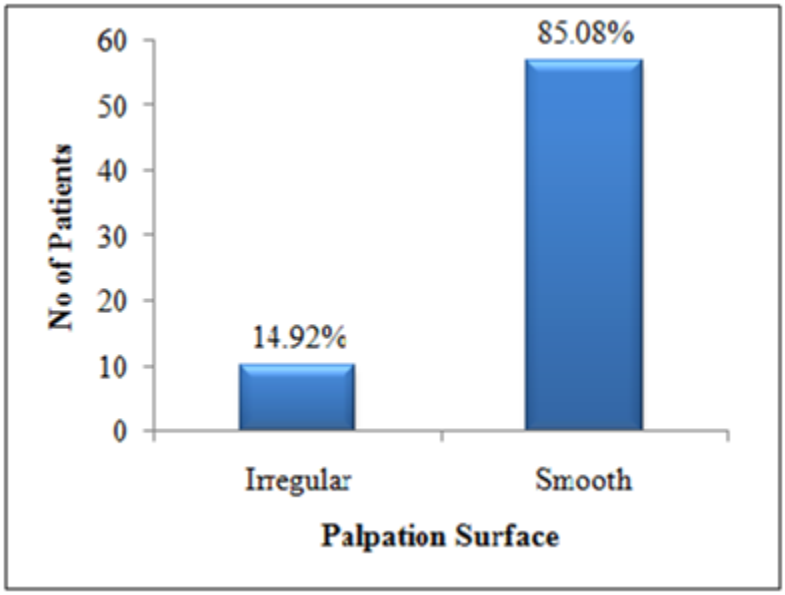


Chart 21: Palpatory surface among the patients

Temperature

In this study, the local rise of temperature was found in 37 cases (55.23%) and absent in 30 cases (44.77%). The results were given in Table 18 and Chart 22.

Table 18: Palpation temperature among the patients

Palpation Temperature	No of patients	Percent
Increased	37	55.23
Normal	30	44.77

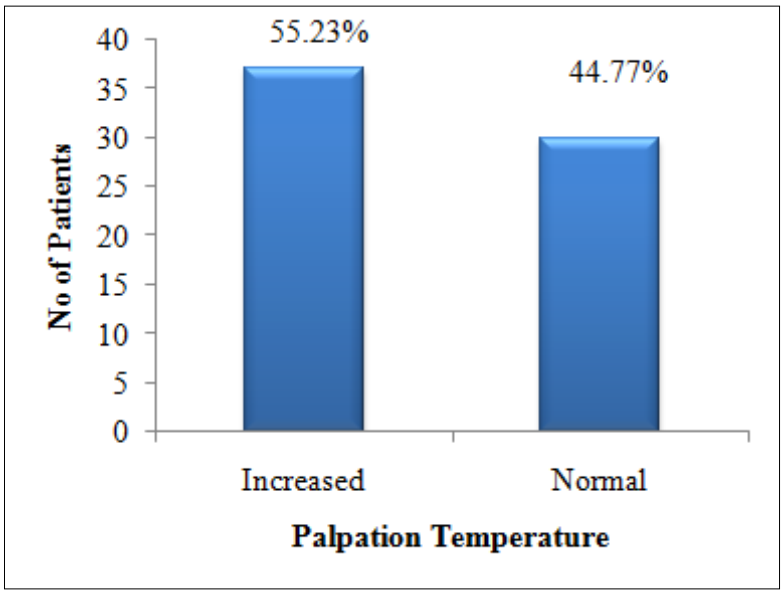


Chart 22: Palpation temperature among the patients

Tenderness

In this study, on palpation tenderness was observed in 54 cases (80.60%) and absent in 13 cases (19.40%). The results were given in Table 19 and Chart 23.

Table 19: Palpation Tenderness among the patients

Palpation Tenderness	No of Patients	Percentage (%)
Absent	13	19.40
Present	54	80.60

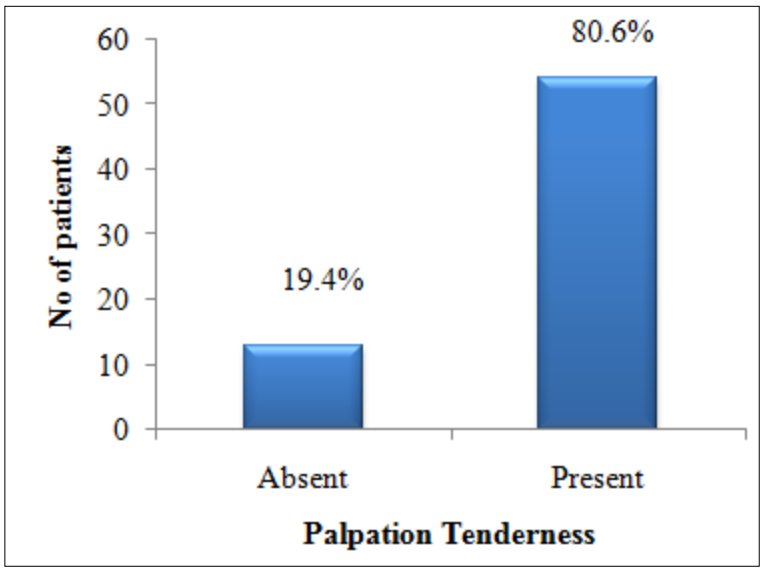


Chart 23: Palpation Tenderness among the patients

Final Diagnosis

In this study, final diagnosis shows the occurrence of Right Cervical Lymphadenitis in majority of the patients ie. 22 cases (32.8%) followed by Left Cervical Lymphadenitis in 18 cases (26.9%). The data were given in Table 20 and Chart 24.

Table 20: Final Diagnosis of the study participants

Final Diagnosis	No of Patients	Percentage (%)
Abdominal Tuberculosis	4	6
B/L Cervical Lymphadenitis	4	6
Hodgkins Lymphoma	1	1.5
Inguinal Lymphadenitis	4	6
Left Cervical Lymphadenitis	18	26.9
Left Submandibular Lymphadenitis	3	4.5
Left Axillary	1	1.5
Occipital	1	1.5
Right Cervical Lymphadenitis	22	32.8
Right Postauricular Lymphadenitis	2	3.0
Right Submandibular Lymphadenitis	5	7.5
Submental Lymphadenitis	2	3
Total	67	100

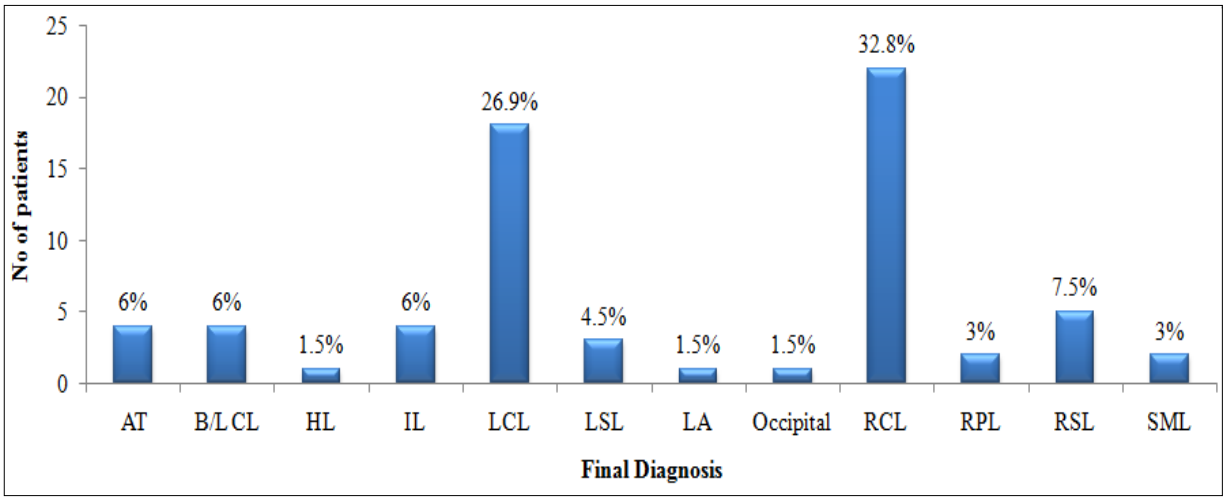


Chart 24: Final Diagnosis of the study participants

AT- Abdominal Tuberculosis; B/L CL - B/L Cervical Lymphadenitis; HL- Hodgkins Lymphoma; IL-Inguinal Lymphadenitis; LCL- Left Cervical Lymphadenitis; LSL- Left Submandibular Lymphadenitis; LA- Left Axillary; RCL- Right Cervical Lymphadenitis; RPL- Right Postauricular Lymphadenitis; RSL- Right Submandibular Lymphadenitis; SML- Submental Lymphadenitis

Fine needle aspiration cytology (FNAC) impression

FNAC analysis elicits the occurance of reactive Lymphadenitis in 34 patients (50.7%), Granulomatous Lymphadenitis in 19 patients (28.4%) and 2 patients (3%) with Tubercular Lymphadenitis. The data were givenin Table 21 and Chart 25.

Table 21: FNAC impression among the patients

FNAC Impression	No of patients	Percentage (%)
A/C Inflammatory lesion	3	4.5
A/c Supp lesion	3	4.5
Benign spindle tumor	1	1.5
Chronic lymphadenitis	1	1.5
Granulomatous lymphadenitis	19	28.4
Inaccessible to FNAC	4	6.0
Reactive lymphadenitis	34	50.7
Tubercular lymphadenitis	2	3.0
Total	67	100.0

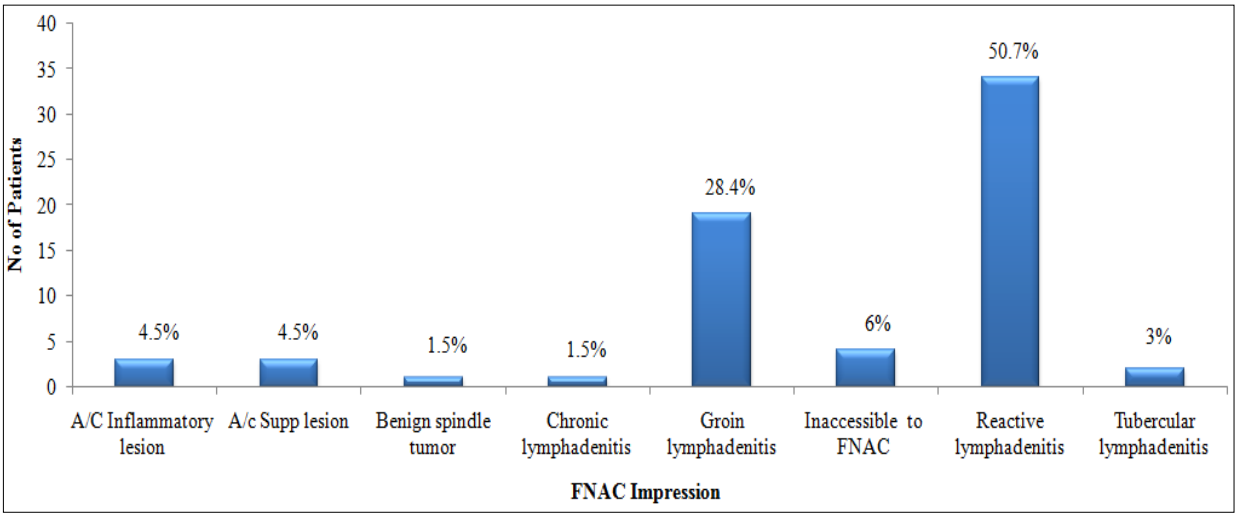


Chart 25: FNAC impression among the patients

Histopathology impression

Based on histopathology analysis, it shows the occurance of Tubercular Lymphadenitis in 26 patients (38.8%), Granulomatous Lymphadenitis in 20 patients (29.9%) and 15 patients (22.4%) with Reactive Lymphadenitis. The data were given in Table 22 and Chart 26.

Table 22: Histopathology Impression in the present study

	Frequency	Percent
CHR-Abscess	2	3.0
Granulomatous Lymphadenitis	20	29.9
Malignancy	2	3.0
Necrotizing Lymphadenitis	2	3.0
Reactive Lymphadenitis	15	22.4
Tubercular Lymphadenitis	26	38.8
Total	67	100.0

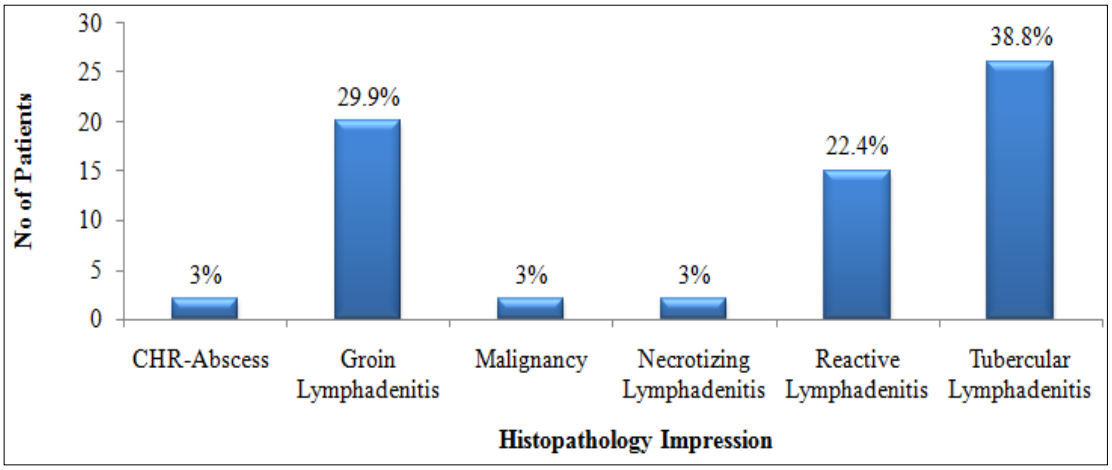


Chart 26: Histopathology Impression among the patients

Analysis of MTB detection by GeneXpert MTB/RIF assay

All the specimens were tested by GeneXpert MTB/RIF assay. Among 67 cases, 42 (62.7 %) were found to be positive for MTBC and remaining 25 (37.3%) were negative. GeneXpert assay can also tell us about the RIF susceptibility status (Resistant or Sensitive). Among the 28 positive cases, only two cases were resistant to RIF (3 %) and remaining 26 were susceptible. The results were given on Table 23 and 24 and Chart 27 and 28.

Table 23: Outcome of GeneXpert analysis

	No of patients	Percentage (%)
Negative	25	37.3
Positive	42	62.7

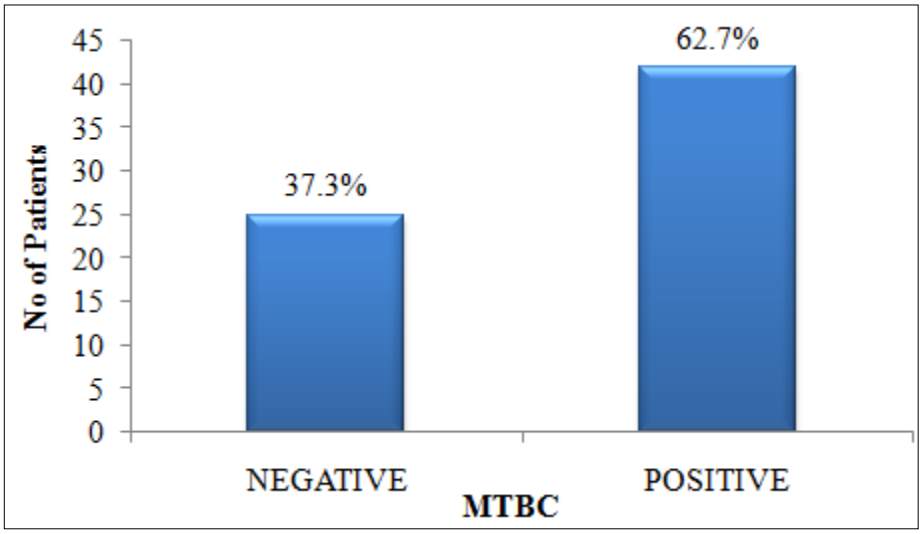


Chart 27: Outcome of GeneXpert analysis

Table 24: Outcome of RIF Sensitivity among the patients

RIF Resistance	No of patients	Percent
Negative	65	97.0
Positive	2	3.0
Total	67	100.0

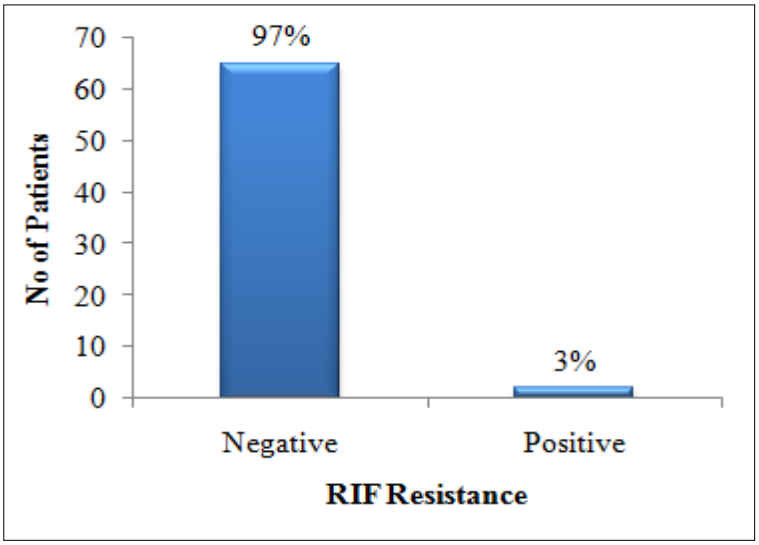


Chart 28: Outcome of RIF Sensitivity among the patients

Diagnostic accuracy of GeneXpert MTB/RIF as compared to the Histopathology

In this study the GeneXpert showed sensitivity of 82.60 % and specificity of 85% as compared to histopathology. Further it showed positive predictive value of 92.68% and negative predictive value of 68%. The results were given in Table 25

Table 25: Diagnostic accuracy of GeneXpert MTB/RIF vs Histopathology

Techniques	Histopathology Positive	Histopathology Negative
MTB Positive on Genexpert	38	3
MTB Negative on Genexpert	8	17

Diagnostic accuracy of GeneXpert MTB/RIF as compared to the FNAC

In this study, GeneXpert showed sensitivity of 86.36 % and specificity of 48.78 % when compared to FNAC. Further it showed positive predictive value of 47.50 % and negative predictive value of 86.96 %. The results were shown in Table 26.

Table 26: Diagnostic accuracy of GeneXpert MTB/RIF as that of FNAC

Techniques	FNAC Positive	FNAC Negative
MTB Positive on Genexpert	**19**	**21**
MTB Negative on Genexpert	**3**	**20**

Time Needed For The Diagnostic Outcome Of GeneXpert, FNAC And Histopathology

In the present study, GeneXpert had displayed the results fastest in 0.79 days as compared to the FNAC 1 day and histopathology 4.46 days. Thus, GeneXpert was found to be a reliable and rapid method for tubercular lymphadenitis detection. The results were shown in Table 27 and Chart 29.

Table 27: Time needed for the diagnostic outcome of GeneXpert, FNAC and Histopathology

Diagnostic Techniques	Time Required for Analysis (in Days)
GeneXpert	0.79
FNAC	1
Histopathology	4.46

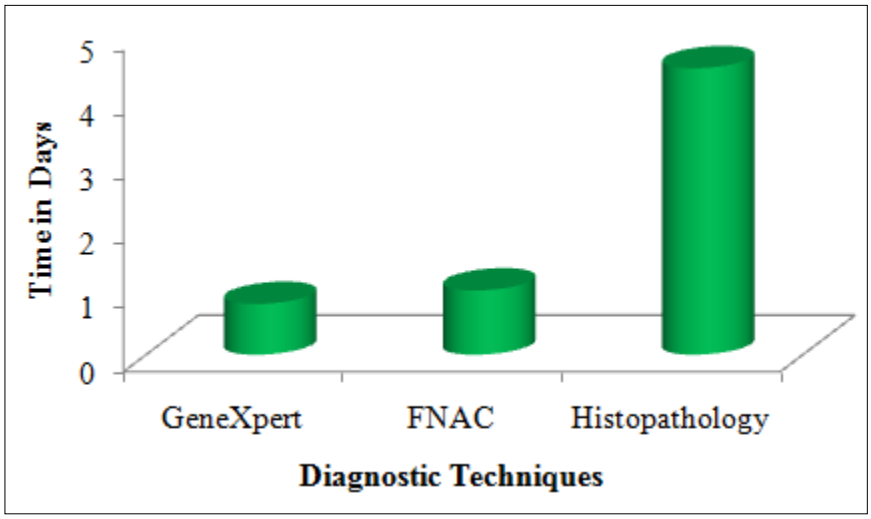


Chart 29: Time needed for the diagnostic outcome of GeneXpert, FNAC and Histopathology

DISCUSSION

DISCUSSION

TB is one of the primeval chronic and complex infectious diseases which is caused by a group of bacteria belonging to the MTBC. The complex includes the human adapted species of *M. tuberculosis and M. africanum*, and zoonotic pathogens- *M. bovis, M. caprae, M. microti* and *M. pinnipedii* which affect cattle, goats/sheep, voles and seals/lions, respectively.[75,76]

Globally, pulmonary TB accounted for 85% whereas EPTB accounted for the remaining 15%.[77]The most common types of EPTB include TB of the lymphatics (TBLN), pleura, bone, meninges, genitourinary tract and peritoneal TB.[78,79] However, the incidence of EPTB and its predominant forms differs country to country.[80,81]

Global TB control efforts have largely ignored EPTB. This is because EPTB is generally considered non-infectious and as such inconsequential to the global epidemic. [82] However, recent evidence from northwest England has showed the prevalence of active TB disease among household contacts of EPTB was high (440 per 100 000 contacts screened), indicating that EPTB cases might have substantial impact on TB transmission.[83]Moreover, it is conceivable that the slower annual decline rate of EPTB compared to PTB could retard the progress towards the END-TB targets set by WHO.[84]

Diagnosis of Tubercular lymphadenitis

Fine-needle aspiration biopsy (FNAB) offers a feasible and safe option for specimen collection.[85] The use of cytology together with the confirmation of acid fastness by ZN staining and Papanicolaou stain-induced fluorescent microscopy and identification of the organism by culture offers excellent yields[86] but remains limited by the absence

of species confirmation, slow turnaround times, and/or lack of drug resistance guidance. Conventional microbiological culture and drug sensitivity testing are not always available and may take 6 weeks or longer.[87]

GeneXpert MTB/RIF (Cepheid, Sunnyvale, USA) is an automated, cartridge-based and isothermal nucleic acid amplification test (NAAT) for the detection of *M. tuberculosis* complex and RIF drug-resistance from sputum and other specimens, with a turnaround time of less than two hours.[88,89] A WHO policy statement from 2013 formulated recommendations to guide the use of the test for pulmonary and EPTB in adults and children. Based so far only on very low evidence, GeneXpert has been conditionally recommended as a replacement test for usual practice (including conventional microscopy, culture or histopathology) for testing specific non-respiratory specimens, including lymph nodes.[90] This study was carried out to evaluate the role of GeneXpert assay in diagnosis of TB lymphadenitis and validate with FNAC and histopathology findings.

Demographic parameters

In this study a total of 67 patients with suspected tuberculous lymphadenitis were subjected to FNAC, histopathology analysis and GeneXpert. Similar closely related sample size of 48 cases was reported in the previous study done by Ligthelm[71]

In our study the female predominance was noted, 40 females and 27 males. In a study conducted by Ligthelm[71] there was a female preponderance with 28 females and 20 males. In our study, the mean age of the study population was found to be 37.04 ±19.27 years. In a study done by Zeka[91] the mean age of the study population was found to be 47.5 ± 22.2 years. A female preponderance of tuberculous lymphadenitis has previously been reported in many Indian studies.[92,93] The biological, hormonal,

social, environmental, and behavioral differences between men and women may be the probable reason.[94,95] Biologically, there is a constituent difference in the immune system of men and women, and a hormonal influence on immunity can be indicated as the underlying cause for the different patterns of disease in women.[96] Socially, in developing countries, women often have a low socioeconomic and nutritional status, which can affect the immune response to the disease making them more susceptible to TB.[95]

In our study the average BMI of the study population was found to be 23.47 ± 4.20 Kg/m^2. However in a study conducted by Sarfaraz et al. the average BMI was 19.5 Kg/m^2.[97]

Chief Complaints and Symptoms

In the present study the major symptoms of tubercular lymphadenitis was swelling in the neck. Similarly in a study conducted by Patel, majority of patients (90%) had a symptom of neck swelling. [98]Further, in this study 40.3% had fever and 34.5% displayed weight loss as the constitutional symptoms. In a study by Patel, 22% and 24% had a symptom fever and weight loss respectively[98]. In a study done by Kant[99] et al. 73.3% of patients had fever and 66.7% reported weight loss as the symptom. [99] The systemic manifestations like fever, night sweat, and weight loss are variably reported in different studies in different countries with weight loss seen in 16%- 60% of patients and fever reported in19%- 40% of patients. These constitutional symptoms significantly increased in HIV positive patients.[100]

Nourishment status

In this study, 73.1% patients were moderately nourished and malnutrition is very limited in this study. The association between TB and malnutrition is bi-directional. TB predisposes the patient to malnutrition and malnutrition escalates the risk of developing active TB by 6 to 10 folds.[101,102]

Pallor

In our study, pallor was present in 22.4% of patients. It has been shown that TB presents with a wide variety of hematological manifestations. The most common is normocytic normochromic anemia of chronic disease. Anemia in TB is most often due to nutritional deficiency, malabsorption syndromes, failure of iron utilization, and bone marrow suppression. Further, Borie et al. reported a case series of 5 patients with TB and thrombocytopenia who were treated with anti tubercular drugs and other drugs like danazol, vincristine, IV immunoglobulin, and steroids.[103]

Icterus

In this study icterus or jaundice was present in only 1.5% of the cases. Biliary obstruction due to enlarged lymph nodes can result in obstructive jaundice.[104]

Temperature

In this study, 80.67% of patients were afebrile (no elevated body temperature) and 19.4% were febrile. In a study done by Gautam et al. 75% of tubercular lymphadenitis cases displayed fever as major symptom.[105]

Site or Location of Lymph Node

In this study the neck is the predominant site of involvement with 64%. In a study done by Gautam[105] 87.14% of lymph node was present in the neck region.Jasim [106]conducted a review of 188 cases of tuberculous lymphadenitis and reported that cervical involvement representing the most common site of involvement [65.43%].[106] Further, Gupta and Bhake also reported that the cervical was the major site of lymph location constituting about 69.2%.[107]

Lymph node Borders

In the current study, 89% of cases displayed well defined borders. Similarly, in a study conducted by Singh and Tiwari, 84% of lymph nodes had well defined borders.[108]

Lymph node surface

According to this study, surface of the lymph node was found to be smooth in 86.55% cases. Correspondingly, in a study conducted by Singh and Tiwari, 10.3 % of lymph nodes displayed smooth surface.[108]

Skin over lymph nodes

In this study, in most of the cases the skin overlying the lymph node was normal (62.68%). in a study conducted by Singh and Tiwari, 92.6% of cases displayed normal skin appearance over the lymph nodes.[108]

Palpatory Findings

In this study 100% palpable mass was observed. Similarly in Singh and Tiwari, study 100% palpable mass was the most prevalent presenting feature.[108] Further, in our

study tenderness was noted in 80.6 % cases. In Singh and Tiwari, study tenderness was observed in 30.4% of patients.

Final Diagnosis

In this current study, cervical lymphadenitis was found to be highly prevalent encompassing 59.7%. Cervical lymphadenitis is the consequence of lympho-hematogenous spread of pulmonary TB.[109] Further it might be also due to hyper reactivity of lymph nodes against previous pulmonary TB.[110] The major pathway of dissemination of the tubercle bacilli to the cervical lymph nodes is from lung parenchyma as the lymphatics of the right lung and the lower lobe of the left lung drain into the right supraclavicular lymph nodes and then upwards to the right lower cervical chain.[111] However, the etiology of cervical lymphadenitis without pulmonary TB cannot be explained by this theory, and also alternate routes of spread to lymph nodes, such as the tonsils and adenoids, have been proposed.[112] Lymph node TB could be also occurring by direct exposure to infection.[113]

FNAC analysis

In this study, FNAC reveals the presence of granulomatous lymphadenitis in 28.4%, reactive lymphadenitis in 50.45% and tubercular lymphadenitis in 3%. In a study done by Singh et al. FNAC diagnosis of palpable lymph mass revealed 33.38% as reactive lymphadenitis, 39.77% of tubercular lymphadenitis and 7.1% of Granulomatous lymphadenitis.[114]In a study done by Rammeh[115]FNAC analysis reveals 55.9% as tubercular lymphadenitis and 24.3% as reactive lymphadenitis.[115]In another study done by Kumar et al. FNAC analysis reveals 47.67% of tubercular lymphadenitis and 44.39% of reactive lymphadenitis.[116] Thus in our study based on the FNAC

impression, the final inference shows 35.82% of cases as positive and 64.18% of cases as negative for tubercular lymphadenitis.

Histopathology analysis

In this study, histopathology reveals the presence of granulomatous lymphadenitis(29.9%), reactive lymphadenitis(22.4%) and tubercular lymphadenitis(38.8 %). Thus in this study based on the histopathology impression, the inference is that 68.70 % of cases are positive and 31.3 % are negative for tubercular lymphadenitis

Diagnostic accuracy of GeneXpert MTB/RIF assay in the detection of tubercular lymphadenitis

The GeneXpert MTB/RIF assay shows 62.7% positive cases in the present study. In a study conducted by Bankar et al. GeneXpert MTB/RIF assay displayed 18.42% of positive cases in the detection EPTB as compared to the culture and ZN smear microscopy.[69] In a study performed by Ghariani[72] 77% of cases were positively detected for TB among the lymph node samples.[72] In Nidhi Gupta et al. study out of 143 FNAC samples, GeneXpert MTB/RIF assay revealed 60.1 % as positive for tuberculous lymphadenitis.[117]

In the present study, the sensitivity and specificity of GeneXpert MTB/RIF assay was established as 82.60 % and 85% as compared to histopathological examination. Further, PPV and NPV was found to be 92.68% and 68% respectively. On comparing with FNAC, sensitivity and specificity of GeneXpert MTB/RIF assay was found 86.36 % and 48.78 % respectively. Further, the positive and negative predictive value

was found to be 47.50 % and 86.96 % respectively. The sensitivity and specificity of GeneXpert MTB/RIF in previous studies were shown in Table 28.

Table 28: Sensitivity and Specificity of GeneXpert MTB/RIF for extra-pulmonary samples in various studies.

Study	Year	Sensitivity	Specificity
Lawn SD[118]	2011	73.3%	99.2%
Causse[119]	2011	95%	100%
Hilleman[120]	2011	77.3%	98.2%
Ligthelm[121]	2011	96.7%	90%
Armand [122]	2011	50%	100%
Vadwai[123]	2011	50%	100%
Nichol MP [124]	2012	77.3%	98.2%
Tortoli[125]	2012	81%	99.8%
Lawn SD [126]	2012	79%	97.3%
Siddiqui M [127]	2013	70%	100%
Held M [128]	2014	95.65%	96.2%
Denkinger[129]	2014	83.1%	98.7%
Sharma [130]	2014	71%	95%
Scott[131]	2014	47%	93%
Marouane [132]	2015	84.3%	94.3%
Rufai [133]	2015	55%	100%
Suzana[134]	2016	62%	100%

RIF Sensitivity

Multidrug resistant TB is resistant to isoniazid and RIF. As per WHO, globally 490,000 people are estimated to have become MDR-TB and 110,000 of RIF resistance in 2016. This multidrug resistance accounts for about 4.1% of new TB cases. Around 240,000 deaths were reported in 2016 due to multidrug resistant TB/ RIF resistant TB.[135] In this study only 2 cases (2.9%) out of 67 cases analyzed were found to be RIF resistant on GeneXpert MTB/RIF. In a study by Avashia[136] 5.4% of RIF resistance by GeneXpert MTB/RIF were reported. [136] Similar study was also done by Gupta et al in which RIF resistance was detected in 5.8% of EPTB samples.[137]

Time required for the diagnosis of tubercular lymphadenitis

Our study revealed that GeneXpert required least time (0.79 day) as compared to the FNAC (1 day) and Histopathology (4.46 days) for definitive diagnosis of TB. Thus, introducing the GeneXpert assay early in the diagnostic workflow can potentially improve detection and shorten turn-around time in the laboratory. Recent reports suggest that GeneXpert increases the rate of identification of RIF resistance, decreases unnecessary empiric treatment among smear-negative EPTB and facilitates the early initiation of second-line drugs treatment.[138]

SUMMARY

SUMMARY

This study was conducted to evaluate the role of GeneXpert in diagnosis of tuberculous lymphadenitis in patient treated at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar.

In this study 67 patients were recruited and 40 were females and 27 were males. The mean age of the study population was found to be 37.04 ±19.27 years.

The chief complaint in the study was swelling in right neck 35.8%.

The constitutional symptoms according to this present study were fever, weight loss and cough.

Pallor and Icterus were absent in most of the cases.

In this study, the majority of lymph nodes involved were cervical (64%) encompassing both right, left, bilateral.

Regarding lymph node appearance 86.55% cases displayed smooth surface, 89% of cases showed well defined borders and 62.68% showed normal skin appearance over the lymph node.

As per our findings, FNAC showed granulomatous lymphadenitis in 28.4%, reactive lymphadenitis in 50.45% and tubercular lymphadenitis in 3% of the cases.

In this study, histopathological examination revealed granulomatous lymphadenitis in 29.9%, reactive lymphadenitis in 22.4% and tubercular lymphadenitis in 38.8 %.

In the present study, GeneXpert MTB/RIF assay shows 62.7% positive cases, with sensitivity and specificity of 82.60 % and 85%. Further, the PPV and NPV was found to be 92.68% and 68% respectively.

When compared to FNAC, sensitivity and specificity of GeneXpert assay was 86.36 % and 48.78 %. Meanwhile, PPV AND NPV respectively was found to be 47.50 % and 86.96 %.

In this present study, 67 patients were analysed for RIF susceptibility and only 2 cases (2.9%) were resistant on GeneXpert assay.

We also noted that GeneXpert required lesser time (0.79 day) as compared to the FNAC (1 day) and Histopathology (4.46 days).

CONCLUSION

CONCLUSION

The GeneXpert MTB/RIF assay is a new test that is revolutionizing TB control by augmenting the detection of TB and drug resistance. Major advantages of the GeneXpert MTB/RIF assay are that results are available quickly, and minimal technical training is required to run the test. Additionally, the GeneXpert can quickly identify possible multidrug-resistant TB. From our study we conclude that GeneXpert MTB/RIF is simple and reliable technique for diagnosing EPTB with high sensitivity and specificity as compared to the FNAC and Histopathology. Thus playing an essential role in early and accurate diagnosis of TB and prompt initiation of the appropriate treatment. It is of utmost diagnostic importance in view of the high disease burden but low socio-economic status of the population commonly affected by the disease.

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ANNEXURES

ANNEXURES

PATIENT INFORMATION SHEET

- I am Dr.Raadhika Raja, Post-Graduate in Department of General Surgery in Sri Devaraj Urs Medical College. We are doing research on tubercular lymphadenitis, which is very common in our country. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with, about the research.

- Tuberculosis is one of the common diseases in our country. As more people are getting infected with tuberculosis and multi-drug resistant tuberculosis, a rapid and sensitive diagnostic tool is needed to identify and treat these cases as early as possible.

- We are inviting everyone above 5years of age with clinical suspicion of tuberculous lymphadenitis who visit Department of General Surgery at R.L Jalappa Hospital and Research Centre, Tamaka, Kolar to participate in the research on diagnostic accuracy of Gene-Xpert Assay.

- Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive at this clinic will continue and nothing will change. If you choose not to participate in this research project, you will be offered the treatment that is routinely offered at R.L Jalappa Hospital for tubercular lymphadenitis. You may change your mind later and stop participating even if you agreed earlier.

- During the study you will be subjected to routine blood investigations and some specific investigations like chest x-ray, FNAC and ultrasound. After this you will undergo excision of the lymph node under appropriate anesthesia and the sample will be tested for tuberculosis by GeneXpert and Biopsy.

- Gene Xpert is an automated test which will test if the excised lymph node is positive for mycobacterium tuberculosis and RIF resistance or not.

- The procedure is relatively safe and shall be carried out under strict aseptic precautions. Yet it may have some side effects and also has the risk of anesthesia.
- Side-Effects of excision include hemorrhage, infection, lymphedema, recurrence of lymphadenitis, neurovascular injury.
- If you participate in this research, you will have the following benefits: You will be relieved of the swelling and symptoms caused by it and you will receive appropriate treatment at the earliest once the diagnosis is confirmed and causative organism is identified. There may not be any benefit to the society at this stage of the research, but future generations are likely to benefit.
- We will not be sharing the identity of those participating in the research. The information that we collect from this research project will be kept confidential.
- If you have any questions you may ask them now or later, even after the study has started. If you wish to ask questions later, you may contact me.

Dr.Raadhika Raja
Post-Graduate
General Surgery

Sri Devaraj Urs Medical College
Ph.: 9036947250, E-mail-drraadhikaraja@hotmail.com

CERTIFICATE OF CONSENT

I have been invited to participate in research about EVALUATION OF IMPACT OF GENEXPERT ON DIAGNOSIS AND SURGICAL MANAGEMENT OF TUBERCULAR LYMPHADENITIS.

I have read the foregoing information/ it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of Participant -

Left Thumb Impression (If Illiterate)

Signature of Participant -

Date-

STATEMENT BY THE RESEARCHER/PERSON TAKING CONSENT

I have accurately read out the information sheet to the participant, and to the best of my ability made sure that the participant understands that the following will be done:

1.FNAC of the enlarged lymphnode

2.Excision biopsy of the enlarged lymph node

3.Genexpert analysis of excised lymph node

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Name of Researcher/person taking the consent-

Signature of Researcher /person taking the consent-

Date –

ರೋಗಿಯ ಮಾಹಿತಿ ಟಿಪ್ಪಣಿ

ಅಧ್ಯಯನ ಶೀರ್ಷಿಕೆ : *ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ ಕ್ಷಯ ರೋಗದ 'ರೋಗ-ನಿರ್ಣಯ' ಮತ್ತು 'ಶಸ್ತ್ರಚಿಕಿತ್ಸೆ-ನಿರ್ವಹಣೆಯಲ್ಲಿ' 'ಜೀನ್ ಎಕ್ಸ್ಪರ್ಟ್' ನ ಪರಿಣಾಮದ ಬಗ್ಗೆ ಮೌಲ್ಯ ನಿರ್ಣಯ)* ವಿಧಾನದ ರೋಗ ನಿರ್ಣಯದ ನಿಖರತೆ

ಅಧ್ಯಯನ ಸ್ಥಳ: RL ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆ, ತಮಕ, ಕೋಲಾರ

ವಿವರಣೆ : ಡಾ||ರಾಧಿಕಾ ರಾಜ ಆದ ನಾನು, ಸ್ನಾತಕೋತ್ತರ ಪದವಿ, ಶಸ್ತ್ರ ಚಿಕಿತ್ಸೆ ವಿಭಾಗ, ಶ್ರೀ ದೇವರಾಜ ಅರಸು ಕಾಲೇಜು, ಕೋಲಾರ. ಭಾರತದಲ್ಲಿ ಅತಿ ಸಾಮಾನ್ಯವಾಗಿ ಕಂಡುಬರುವ ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ ಕ್ಷಯ ರೋಗದ ಬಗ್ಗೆ ಸಂಶೋಧನೆ ನಡೆಸುತ್ತಿರುವುದರಿಂದ, ನಿಮ್ಮನ್ನು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಆಮಂತ್ರಿಸುತ್ತೆನೆ.

ಕ್ಷಯ ರೋಗ ಭಾರತದಲ್ಲಿ ಅತಿ ಸಾಮಾನ್ಯವಾಗಿ ಕಂಡುಬರುವ ರೋಗಿಗಳಲ್ಲಿ ಒಂದು. ಬಹಳಷ್ಟು ಜನರಿಗೆ ಈ ಸೋಂಕು ಹೊರಡುವುದರಿಂದ ಮತ್ತು ಬಹು ಔಷಧ ಪ್ರತಿರೋಧಕ ಬ್ಯಾಕ್ಟೀರಿಯಾ ಹೆಚ್ಚುತ್ತಿರುವುದರಿಂದ ತ್ವರಿತವಾಗಿ ಚಿಕಿತ್ಸೆ ನೀಡಲು ಅತಿ ಸೂಕ್ಷ್ಮವಾದ ಮತ್ತು ವೇಗವಾಗಿ ಪತ್ತೆ ಮಾಡುವ ಪರೀಕ್ಷೆ ಸಾಧನ ಬೇಕಾಗಿದೆ

ಈ ಅಧ್ಯಯನದಲ್ಲಿ RL ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆಗೆ, `ದೊಡ್ಡದಾಗಿರುವ ದುಗ್ಧರಸ ಗ್ರಂಥಿ` (lymphnode) ಯ ಕಾರಣದಿಂದ ಬರುವ

5 ವರ್ಷದ ಮೇಲ್ಪಟ್ಟ ಹೊರ ರೋಗಿಗಳನ್ನು ಸೇರಿಸಿಕೊಳ್ಳಲಾಗುತ್ತದೆ. ಒಪ್ಪಿಗೆ ನೀಡಿದ ರೋಗಿಗಳಿಗೆ ದುಗ್ಧರಸ ಗ್ರಂಥಿಯ 'ಛೇಧನ ಜೀವ ಕಣ ಪರೀಕ್ಷೆ'(Excision Biopsy) ಮಾಡಲಾಗುವುದು ಹಾಗೂ ಫಲಿತಾಂಶವನ್ನು ಸಂಶೋಧನೆಗೆ ಬಳಸಲಾಗುತ್ತದೆ.

ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮಗೆ ಕೆಲವು ಸಾಮಾನ್ಯವಾಗಿ ಮಾಡುವ ರಕ್ತ ಪರೀಕ್ಷೆಗಳು ಮತ್ತು ಸ್ಕ್ಯಾನಿಂಗ್, ಕ್ಷ ಕಿರಣ ದಂತಹ ನಿರ್ದಿಷ್ಟವಾದ ಪರೀಕ್ಷೆಗಳನ್ನು ನಡೆಸಲಾಗುವುದು. ನಂತರ ಸೋಂಕು ರಹಿತ ವಾತಾವರಣದಲ್ಲಿ ಸೂಕ್ತ ಅರಿವಳಿಕೆ ಮದ್ದು ನೀಡಿ ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ ಛೇಧನ(lymphnode Excision) ಮಾಡಲಾಗುವುದು ಹಾಗು ***ಜೀನ್ ಎಕ್ಸ್ಪರ್ಟ್ ಆರ್ಐಎಫ್(Gene Xpert MTB RIF)*** ಗೆ ಕಳಿಸಲಾಗುತ್ತದೆ.

ಜೀನ್ ಎಕ್ಸ್ಪರ್ಟ್ ಆರ್ಐಎಫ್(Gene Xpert MTB RIF) ಒಂದು ಸ್ವಯಂ ಚಾಲಿತ ಪರೀಕ್ಷೆ, ದುಗ್ಧರಸ ಗ್ರಂಥಿ ಗಳಲ್ಲಿ ಮೈಕೊಬ್ಯಾಕ್ಟೀರಿಯದ ಇರುವಿಕೆ ಮತ್ತು ರಿಫಾಂಪಿಸಿನ್ ಔಷಧದ ಪ್ರತಿರೋಧಕತೆಯನ್ನು ಪರೀಕ್ಷಿಸಲಾಗುತ್ತದೆ.

ಈ ಪ್ರಕ್ರಿಯೆ ತುಲನಾತ್ಮಕವಾಗಿ ಸುರಕ್ಷಿತವಾಗಿದ್ದು, ರೋಗ ನಿಯಂತ್ರಿತ ವಾತಾವರಣದಲ್ಲಿ ಮಾಡಲಾಗುವುದಾದರೂ ಕೆಲವು ಪ್ರತಿಕೂಲ ಪರಿಣಾಮಗಳ ಮತ್ತು ಅರಿವಳಿಕೆ ಮದ್ದಿನ ಅಪಾಯದ ಸಾಧ್ಯತೆಗಳಿವೆ.

ಪ್ರತಿಕೂಲ ಪರಿಣಾಮಳಲ್ಲಿ ರಕ್ತ ಸ್ರಾವ, ಸೋಂಕು, ಲಿಂಫೆಡಿಮ, ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ ಊತದ ಪುನರಾವೃತ್ತಿ,ನರ ರಕ್ತ ನಾಳಗಳಿಗೆ ಹಾನಿ ಸಂಭವಿಸಬಹುದು.

ಈ ಮುಂಚಿತವಾಗಿ ಕ್ಷಯ ರೋಗದ ಚಿಕಿತ್ಸೆ ಪಡೆಯುತ್ತಿರುವವರನ್ನು ಹಾಗು ಕ್ಯಾನ್ಸರ್ ಗಡ್ಡೆ ಎಂದು ಗುರುತಿಸಲಾದವರನ್ನು ಅಧ್ಯಯನದಲ್ಲಿ ಸೇರಿಸಲಾಗುವುದಿಲ್ಲ.

ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗಿಯಾಗುವ ಬಗ್ಗೆ ತಮಗೆ ಮತ್ತು ತಮ್ಮ ಕುಟುಂಬದವರಲ್ಲಿ ಚರ್ಚೆ ಮಾಡಲು ಮುಕ್ತ ಅವಕಾಶ ನೀಡಲಾಗಿದೆ. ನಿಮಗೆ ಯಾವುದೇ ಪ್ರಶ್ನೆಗಳಿದ್ದರೆ ಮುಕ್ತವಾಗಿ ಕೇಳಬಹುದು. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಬೇಕು ಎಂದು ಯಾವ ರೀತಿಯ ಕಡ್ಡಾಯವಿಲ್ಲ ಅಥವಾ ನಿಮ್ಮ ಚಿಕಿತ್ಸೆಯಲ್ಲಿ ಯಾವುದೇ ಬದಲಾವಣೆ ಇರುವುದಿಲ್ಲ.

ಒಂದು ವೇಳೆ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ತಮಗೆ ಇಚ್ಛೆ ಇದ್ದರೆ ತಾವು ಸಹಿ/ ಹೆಬ್ಬೆರಳು ಗುರುತು ನೀಡಿ ಒಪ್ಪಿಗೆ ಕೊಡಬೇಕು, ತಮ್ಮ ತೊಂದರೆಯ ಬಗ್ಗೆ ಮತ್ತು ಆರೋಗ್ಯದ ಬಗ್ಗೆ ವೈದ್ಯಕೀಯ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ. ನಿಮ್ಮಿಂದ ಪಡೆದ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದಲ್ಲಿ ಪ್ರಕಟಿಸಲಾಗುವುದು. ಆದರೆ ನಿಮ್ಮ ಗುರುತನ್ನು ಎಲ್ಲಿಯೂ ತೋರಿಸುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗುವುದು ಹಾಗು ಎಲ್ಲಿಯೂ ಬಹಿರಂಗಪಡಿಸುವುದಿಲ್ಲ.

ಈ ಅಧ್ಯಯನಕ್ಕೆ ನೈತಿಕ ಸಮಿತಿಯ ಸಮ್ಮತಿ ಇರುತ್ತದೆ ಹಾಗು ವಿವಿಧ ವಿವರಗಳಿಗೆ ನೈತಿಕ ಸಮಿತಿಯನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗೆ ಸಂಪರ್ಕಿಸಿ :

ಡಾ||ರಾಧಿಕಾ ರಾಜ

(ಸ್ನಾತಕೋತ್ತರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿ)

ಶಸ್ತ್ರ ಚಿಕಿತ್ಸೆ ವಿಭಾಗ

ಶ್ರೀ ದೇವರಾಜ ಅರಸು ಕಾಲೇಜು, ಕೋಲಾರ

ಒಪ್ಪಿಗೆ ಪ್ರಮಾಣ ಪತ್ರ

ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ ಕ್ಷಯ ರೋಗದ 'ರೋಗ-ನಿರ್ಣಯ' ಮತ್ತು 'ಶಸ್ತ್ರಚಿಕಿತ್ಸೆ- ನಿರ್ವಹಣೆಯಲ್ಲಿ' 'ಜೀನ್ ಎಕ್ಸ್ಪರ್ಟ್' ನ ಪರಿಣಾಮದ ಬಗ್ಗೆ ಮೌಲ್ಯ ನಿರ್ಣಯ ಎಂಬ ಸಂಶೋಧನೆಗಾಗಿ ನನ್ನನ್ನು ಆಮಂತ್ರಿಸಲಾಗಿದೆ

ನಾನು ಈ ಮುಂದುವರಿದ ವಿವರಣೆಯನ್ನು ಓದಿದ್ದೇನೆ /ತಿಳಿಸಿಕೊಟ್ಟಿದ್ದಾರೆ. ನನಗೆ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ಅವಕಾಶ ಕೊಟ್ಟಿರುತ್ತಾರೆ ಹಾಗು ಕೇಳಿದೆ ಪ್ರಶ್ನೆಗಳಿಗೆ ತೃಪ್ತಿದಾಯಕ ಉತ್ತರ ನೀಡಿರುತ್ತಾರೆ.

ನನ್ನ ಸ್ವಇಚ್ಛೆಯಿಂದ ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸುತ್ತಿದ್ದೇನೆ

ಭಾಗವಹಿಸುತ್ತಿರುವವರ ಹೆಸರು :

ಭಾಗವಹಿಸುತ್ತಿರುವವರ ಸಹಿ :

ದಿನಾಂಕ :

ಸಂಶೋಧಕರ/ಒಪ್ಪಿಗೆ ತೆಗೆದುಕೊಳ್ಳುತ್ತಿರುವವರ ಹೇಳಿಕೆ :

ನಾನು ಭಾಗವಹಿಸುತ್ತಿರುವವರಿಗೆ ಈ ಕೆಳಗಿನ ಎಲ್ಲಾ ವಿಷಯಗಳನ್ನು ನಿಖರವಾಗಿ ಓದಿ ಹೇಳಿದ್ದೇನೆ ಹಾಗು ನನ್ನ ಸಾಮರ್ಥ್ಯಕ್ಕೆ ತಕ್ಕಂತೆ ತಿಳಿಸಿರುತ್ತೇನೆ.

1. ದೊಡ್ಡದಾಗಿರುವ ದುಗ್ಧರಸ ಗ್ರಂಥಿ(Lynphnode) ಗಳ FNAC ಮಾಡಲಾಗುವುದು
2. ದೊಡ್ಡದಾಗಿರುವ *ದುಗ್ಧರಸ ಗ್ರಂಥಿಗಳ* ಛೇದನ ಜೀವ ಕಣ ಪರೀಕ್ಷೆ (Excision Biopsy) ಮಾಡಲಾಗುವುದು
3. ಛೇಧಿಸಿದ ದುಗ್ಧರಸ ಗ್ರಂಥಿಯ Gene Xpert RIF ಮಾಡಲಾಗುವುದು.

ಸಂಶೋಧನಾ ವಿಷಯದ ಕುರಿತು ಭಾಗವಹಿಸುತ್ತಿರುವವರಿಗೆ ಪ್ರಶ್ನೆ /ವಿವರಣೆ ಕೇಳಲು ಅವಕಾಶ ಕೊಡಲಾಗಿದೆ ಎಂದು ಹಾಗು ಕೇಳಿದ ಪ್ರಶ್ನೆ/ವಿವರಣೆ ಗಳಿಗೆ ನನ್ನ ಸಾಮರ್ಥ್ಯಕ್ಕೆ ಅನುಗುಣವಾಗಿ ಉತ್ತರಿಸಿರುತ್ತೇನೆ ಎಂದು ದೃಢೀಕರಿಸುತ್ತೇನೆ

ಭಾಗವಹಿಸುತ್ತಿರುವವರಿಗೆ ಒಪ್ಪಿಗೆ ನೀಡಲು ಯಾವುದೇ ಒತ್ತಡ ನೀಡಿರುವುದಿಲ್ಲ ಹಾಗು ತಮ್ಮ ಸ್ವಇಚ್ಛೆಯಿಂದ ಮತ್ತು ಸ್ವತಂತ್ರವಾಗಿ ಒಪ್ಪಿಗೆ ನೀಡಿರುತ್ತಾರೆ ಎಂದು ದೃಢೀಕರಿಸುತ್ತೇನೆ

ಸಂಶೋಧಕರ ಹೆಸರು /ಒಪ್ಪಿಗೆ ತೆಗೆದುಕೊಳ್ಳುತ್ತಿರುವವರ ಹೆಸರು :

ಸಂಶೋಧಕರ ಸಹಿ / ಒಪ್ಪಿಗೆ ತೆಗೆದುಕೊಳ್ಳುತ್ತಿರುವವರ ಸಹಿ :

ದಿನಾಂಕ :

PROFORMA

TITLE: SURGICAL MANAGEMENT AND EVALUATION OF IMPACT OF DIAGNOSIS OF TUBERCULOUS LYMPHADENITIS BY GENEXPERT

Sl.No.:	OP/IP No.:
Name:	Ward:
Age:	Unit:
Sex:	Admission date:
Address:	Discharge date:
Weight	Height

- CHIEF COMPLAINTS:
- HISTORY OF PRESENT ILLNESS:
- PAST HISTORY:
- FAMILY HISTORY:
- TREATMENT HISTORY:
- PERSONAL HISTORY:
- OBSTETRIC AND MENSTRUAL HISTORY:
- HISTORY OF IMMUNISATION:

GENERAL PHYSICAL EXAMINATION:

- Built and nourishment
- Pallor/Cyanosis/Icterus/Clubing/Oedema/Generalised lymphadenopathy

VITAL DATA:

- Pulse:
- Temperature:
- BP:
- Respiration rate:

LOCAL EXAMINATION(If Applicable):

INSPECTION:

- Number
- Site
- Size
- Shape
- Extent
- Borders
- Surface
- Skin over the swelling
- Visible veins/pulsations

PALPATION:

- Number
- Temperature
- Tenderness
- Extent
- Borders
- Consistency: soft/cyctic/firm/hard
- Site
- Size
- Shape
- Surface
- Fluctuation
- Matting

- Mobility
- Fixity to underlying skin or surrounding structure

SYSTEMIC EXAMINATION:

- Cardiovascular system
- Respiratory system
- Abdominal examination:
- Nervous system
- Musculoskeletal system
- Eye/ENT/Skin

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

Routine:

- Haemoglobin
- TC
- DC
- ESR
- Blood group
- BT
- CT
- HIV
- HBsAg
- RBS
- Blood urea
- Serum creatinine
- Chest X-ray

Specific:

- FNAC of lymph node
- Ultrasound of Neck
- Xray Neck-AP and Lateral view
- Gene Xpert MTB/RIF
- Histopathology report

KEY TO MASTER CHART

ABBREVIATION	DESCRIPTION
A/C INFL LESN	Acute Inflammatory Lesion
B/L	Bilateral
CHR ABSCESS	Chronic Abscess
G-LN	Granulomatous Lymphadenitis
HTn	Hypertension
LNE	Lymphadenopathy
Lt	Left
N	No
NAD	No Abnormality Detected
NEC-LN	Necrotising Lymphadenitis
NFND	No Focal Neurological Deficits
R-LN	Reactive Lymphadenitis
Rt	Right
Sl. No.	Serial Number
T2DM	Type II Diabetes Mellitus
TB-LN	Tubercular Lymphadenitis
UHID	Unique Hospital Identification
Y	Yes

SL. No	UHID	Age	Gender	Height	Weight	Chief Complaint	Constitutional Symptoms			Past History		Built/ Nourishment	Pallor	Icterus	Cyanosis	Clubbing	Lymphadenopathy	Edema	Temperature	BP (Vitals)	Pulse (Vitals)
1	445050	28	Female	154	68	Swelling in axilla	No			No		Moderate	N	N	N	N	N	N	Afebrile	120/70	74
2	445884	35	Female	154	60	Swelling in chin	No			No		Moderate	N	N	N	N	N	N	Afebrile	134/80	82
3	450890	39	Male	170	72	Swelling in Rt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	120/74	78
4	460399	30	Male	164	82	Swelling in chin	No			No		Moderate	N	N	N	N	N	N	Afebrile	140/80	88
5	467464	37	Female	152	68	Swelling in Rt neck	No			No		Moderate	Y	N	N	N	N	N	Afebrile	120/74	78
6	479257	19	Female	148	38	Swelling in Rt neck	No			No		Moderate	Y	Y	N	N	N	N	Afebrile	106/80	98
7	480335	80	Male	164	59	Swelling in Rt groin	Fever			No		Moderate	Y	N	N	N	N	N	Febrile	110/80	88
8	487839	47	Male	168	70	Pain abdomen	Fever			Similar in Past		Moderate	N	N	N	N	N	N	Afebrile	120/80	84
9	507611	27	Female	152	44	Swelling in Rt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	110/69	78
10	513632	65	Female	160	64	Swelling in Lt neck	Fever			T2DM	HYSTERECTOMY	Moderate	Y	N	N	N	N	N	Febrile	124/76	84
11	522832	78	Male	164	72	Pain abdomen	Fever	Vomitting		No		Moderate	N	N	N	N	N	N	Afebrile	134/80	86
12	530277	15	Male	157	47	Swelling B/L neck	Fever	Cough		No		Moderate	N	N	N	N	N	N	Febrile	108/70	86
13	515966	20	Female	152	47	Swelling in Rt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	110/70	78
14	347761	17	Male	158	52	Pain abdomen	Fever			No		Well	N	N	N	N	N	N	Febrile	106/70	88
15	545202	55	Male	172	68	Swelling in Rt neck	Fever	Weight Loss		Similar in Past		Moderate	N	N	N	N	N	N	Afebrile	116/80	74
16	543704	17	Male	174	72	Swelling in Lt groin	Fever			No		Moderate	Y	N	N	N	N	N	Febrile	110/80	88
17	542412	11	Male	138	44	Swelling in Lt neck	Fever			No		Well	N	N	N	N	N	N	Febrile		80
18	548238	68	Female	158	38	Swelling in Rt neck	Cough			HTn	T2DM	Poor	Y	N	N	N	N	N	Afebrile	94/60	72
19	550339	23	Female	148	51	Swelling in Lt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	120/80	74
20	547702	28	Male	170	60	Swelling in Rt neck	No			Similar in Past		Poor	N	N	N	N	N	N	Afebrile	120/70	80
21	558035	31	Male	162	64	Swelling in chin	No			No		Moderate	N	N	N	N	N	N	Afebrile	124/80	82
22	555885	26	Female	158	52	Swelling in Rt neck	No			No		Well	N	N	N	N	N	N	Afebrile	144/90	86
23	469944	35	Female	148	49	Pain abdomen	Weight Loss			No		Moderate	N	N	N	N	N	N	Afebrile	110/70	84
24	559810	70	Female	152	54	Swelling in Rt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	110/74	78
25	566571	33	Male	168	64	Swelling B/L neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	134/80	88
26	565446	25	Female	158	63	Swelling B/L neck	No			No		Moderate	Y	N	N	N	N	N	Afebrile	110/70	78
27	567419	22	Female	152	70	Swelling behind Rt ear	Fever			No		Well	N	N	N	N	N	N	Afebrile	124/90	82
28	569173	66	Male	174	60	Swelling in Rt neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	140/80	80
29	570122	48	Female	160	57	Swelling in Lt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	120/80	76
30	247394	27	Female	154	42	Swelling in Lt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	110/70	78
31	570612	25	Female	150	62	Swelling in Lt neck	Fever	Cough	Weight Loss	No		Well	N	N	N	N	N	N	Febrile	116/80	80
32	571009	20	Female	152	52	Swelling in Rt neck	Fever			No		Moderate	Y	N	N	N	N	N	Afebrile	100/70	74
33	568432	50	Male	171	78	Swelling in Rt neck	No			T2DM		Well	N	N	N	N	N	N	Afebrile	144/90	86
34	571494	26	Female	146	62	Swelling in Lt neck	Fever			No		Well	N	N	N	N	N	N	Febrile	124/78	86
35	572504	60	Male	174	82	Swelling in Lt neck	No			HTn		Well	N	N	N	N	N	N	Febrile	150/100	80
36	578116	10	Male	140	32	Swelling in chin	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	100/60	90
37	577553	29	Female	158	70	Swelling in Rt neck	Fever			No		Well	N	N	N	N	N	N	Afebrile	120/80	76
38	583774	20	Male	160	62	Swelling B/L neck	Fever	Weight Loss	Cough	No		Moderate	N	N	N	N	N	N	Febrile	130/74	82
39	590516	43	Female	160	64	Swelling in Lt neck	No			HTn		Moderate	N	N	N	N	N	N	Afebrile	134/90	82
40	590206	45	Female	140	48	Swelling in chin	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	106/64	78
41	586617	60	Male	164	76	Swelling in Lt groin	Fever			No		Moderate	N	N	N	N	N	N	Febrile	144/90	78
42	595010	6	Female	106	12	Swelling in chin	No			No		Moderate	N	N	N	N	N	N	Afebrile		102
43	591448	27	Female	154	58	Swelling in Lt neck	No			No		Moderate	Y	N	N	N	N	N	Afebrile	130/80	86
44	594780	21	Male	140	34	Swelling in chin	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	100/60	90
45	599201	15	Female	162	56	Swelling in Rt neck	No			No		Well	N	N	N	N	N	N	Afebrile	144/90	86
46	515877	46	Male	171	78	Swelling in Rt neck	No			T2DM		Well	N	N	N	N	N	N	Afebrile	144/90	86
47	539522	80	Female	136	42	Swelling in chin	Weight Loss			No		Poor	N	N	N	N	N	N	Afebrile	100/60	64
48	606102	63	Male	165	70	Swelling in Lt neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	140/84	80
49	607104	6	Male	118	34	Swelling in Lt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile		98
50	612906	27	Male	160	59	Swelling in Rt neck	Fever			Similar in Past		Moderate	N	N	N	N	N	N	Afebrile	124/80	78
51	596063	20	Female	148	38	Swelling Back of neck	No			No		Moderate	Y	N	N	N	N	N	Febrile	100/64	72
52	499795	55	Female	152	60	Swelling behind Rt ear	No			No		Well	N	N	N	N	N	N	Afebrile	140/84	82
53	613175	30	Male	164	82	Swelling in Rt neck	No			HTn	T2DM	Moderate	N	N	N	N	N	N	Afebrile	134/90	84
54	613302	38	Female	154	41	Swelling in Rt neck	No			No		Moderate	Y	N	N	N	N	N	Afebrile	100/70	72
55	624668	16	Female	152	54	Swelling in Lt neck	No			TB		Moderate	N	N	N	N	N	N	Afebrile	100/70	82
56	625613	57	Female	148	62	Swelling in Rt neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	112/70	82
57	633491	33	Male	162	56	Swelling in Lt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	130/80	82
58	638169	43	Female	162	64	Swelling in Lt neck	Fever			T2DM		Moderate	Y	N	N	N	N	N	Febrile	124/76	84
59	643597	40	Female	156	62	Swelling in Rt neck	No			No		Well	Y	N	N	N	N	N	Afebrile	100/60	72
60	642716	32	Female	149	48	Swelling in Rt neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	130/74	80
61	647057	27	Female	144	48	Swelling in Rt neck	Fever			No		Moderate	N	N	N	N	N	N	Afebrile	130/70	76
62	646362	75	Female	132	38	Swelling in Lt groin	No			HYSTERECTOMY		Moderate	Y	N	N	N	N	N	Afebrile	150/100	72
63	646176	70	Female	158	44	Swelling in Lt neck	Weight Loss			HTn		Poor	Y	N	N	N	N	N	Afebrile	94/60	70
64	646652	40	Female	146	64	Swelling in Rt neck	No			T2DM		Moderate	N	N	N	N	N	N	Afebrile	134/90	84
65	646681	50	Female	146	71	Swelling in Lt neck	No			No		Well	N	N	N	N	N	N	Afebrile	124/90	86
66	686802	25	Male	168	66	Swelling in Lt neck	No			TB		Moderate	N	N	N	N	N	N	Afebrile	130/80	86
67	699265	30	Female	156	48	Swelling in Rt neck	No			No		Moderate	N	N	N	N	N	N	Afebrile	100/60	76

SL. No	SWELLING – Inspection: No.	Site	Size	Shape	Borders	Surface	Skin over Swelling	Palpation: No.	Site	Size	Shape	Borders	Surface	Temperture	Tenderness	Consistency	Fluctuation	Matting	Mobility	CVS	RS	CNS	P/Abdomen		Tenderness	Free Fluid	Bowel Sounds
1	1	Lt Axilla	3X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Axilla	4X3	Globular	Well Defined	Smooth	Increased	Present	Soft	Present	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
2	1	Rt Submandibul	3X3	Spherical	Well Defined	Smooth	Normal	1	Rt Submandibul	3X3	Globular	Well Defined	Smooth	Increased	Absent	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
3	Multiple	Rt Neck	2X2	Spherical	Well Defined	Irregular	Normal	Multiple	Rt Neck	2X2	Globular	Well Defined	Irregular	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
4	1	Submental	3X3	Spherical	Well Defined	Smooth	Normal	1	Submental	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
5	Multiple	Rt Neck	1X2	Spherical	Well Defined	Smooth	Normal	Multiple	Rt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Soft	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
6	1	Rt Neck	3X2	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X2	Globular	Well Defined	Smooth	Normal	Absent	Soft	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
7	1	Lt Inguinal	3X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Inguinal	3X3	Globular	Well Defined	Smooth	Increased	Present	Firm	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
8	NA																			S1S2+	B/L NVBS +	NFND	Non Distended	Soft	Present		Heard
9	1	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
10	1	Lt Neck	3X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Neck	3X3	Globular	Well Defined	Smooth	Increased	Present	Cystic	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
11	NA																			S1S2+	B/L NVBS +	NFND	Non Distended	Soft	Present	Absent	Heard
12	1	B/L Neck	3X3	Spherical	Well Defined	Smooth	Normal	2	B/L Neck	4X3	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
13	1	Rt Neck	3X2	Spherical	Well Defined	Smooth	Normal	2	Rt Neck	2X1	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
14	NA																			S1S2+	B/L NVBS +	NFND	Non Distended	Soft	Present	Absent	Heard
15	Multiple	Rt Neck	2X1	Spherical	Well Defined	Smooth	Erythema	Multiple	Rt Neck	2X1	Globular	Ill Defined	Irregular	Increased	Present	Firm	Absent	Present	Absent	S1S2+	B/L NVBS +	NFND	NAD				
16	1	Lt Inguinal	4X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Inguinal	4X4	Globular	Well Defined	Smooth	Increased	Present	Soft	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
17	1	Lt Neck	3X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Neck	3X3	Globular	Well Defined	Smooth	Increased	Present	Cystic	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
18	1	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	2X2	Globular	Well Defined	Smooth	Increased	Present	Soft	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
19	2	Lt Neck	3X3	Spherical	Well Defined	Smooth	Normal	2	Lt Neck	2X2	Globular	Well Defined	Smooth	Normal	Absent	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
20	2	Rt Neck	2X2	Spherical	Well Defined	Smooth	Erythema	2	Rt Neck	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
21	1	Lt Submandibul	2X2	Spherical	Well Defined	Smooth	Normal	1	Lt Submandibul	2X2	Globular	Well Defined	Smooth	Normal	Absent	Soft	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
22	1	Rt Neck	3X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
23	NA																			S1S2+	B/L NVBS +	NFND	Non Distended	Soft			
24	Multiple	Rt Neck	2x1	Spherical	Well Defined	Smooth	Erythema	Multiple	Rt Neck	2x1	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
25	2	B/L Neck	2X3	Spherical	Well Defined	Smooth	Normal	2	B/L Neck	2X3	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
26	Multiple	B/L Neck	1.5X1	Spherical	Well Defined	Smooth	Normal	Multiple	B/L Neck	1.5X1	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
27	2	Rt Postauricular	3X3	Spherical	Well Defined	Smooth	Erythema	2	Rt Postauricular	2X3	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
28	Multiple	Lt Neck	1X2	Spherical	Ill Defined	Smooth	Normal	Multiple	Lt Neck	1X1	Globular	Ill Defined	Smooth	Normal	Absent	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
29	2	Lt Neck	.5X1	Spherical	Well Defined	Smooth	Normal	2	Lt Neck	1X1	Globular	Well Defined	Irregular	Increased	Present	Cystic	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
30	Multiple	Lt Neck	2X1	Spherical	Ill Defined	Irregular	Erythema	Multiple	Lt Neck	2X2	Globular	Ill Defined	Irregular	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
31	1	Lt Neck	2X2	Spherical	Well Defined	Smooth	Erythema	1	Lt Neck	2x2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
32	2	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	2	Rt Neck	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
33	1	Rt Neck	3X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
34	2	Lt Neck	2X1	Spherical	Well Defined	Irregular	Erythema	2	Lt Neck	2X1	Globular	Well Defined	Irregular	Increased	Absent	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
35	2	Lt Neck	2X1	Spherical	Well Defined	Smooth	Normal	2	Lt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Firm	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
36	1	Rt Submandibul	2X2	Spherical	Well Defined	Smooth	Erythema	1	Rt Submandibul	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
37	Multiple	Rt Neck	5X3	Spherical	Ill Defined	Irregular	Normal	3	Rt Neck	5X3	Globular	Well Defined	Irregular	Increased	Present	Firm	Absent	Present	Absent	S1S2+	B/L NVBS +	NFND	NAD				
38	Multiple	B/L Neck	6X5	Spherical	Ill Defined	Irregular	Erythema	Multiple	B/L Neck	6X5	Globular	Ill Defined	Irregular	Increased	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
39	1	Lt Neck	2X1.5	Spherical	Well Defined	Smooth	Erythema	1	Lt Neck	2X1.5	Globular	Well Defined	Smooth	Increased	Present	Firm	Present	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
40	1	Lt Submandibul	2X3	Spherical	Well Defined	Smooth	Normal	1	Lt Submandibul	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
41	1	R-Inguinal	4X3	Spherical	Well Defined	Smooth	Erythema	1	R-Inguinal	4X4	Globular	Well Defined	Smooth	Increased	Present	Cystic	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
42	1	Lt Submandibul	1X1	Spherical	Well Defined	Smooth	Erythema	1	Lt Submandibul	2X1	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
43	3	Lt Neck	2X2	Spherical	Well Defined	Smooth	Normal	3	Lt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
44	1	Rt Submandibul	2X2	Spherical	Well Defined	Smooth	Erythema	1	Rt Submandibul	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
45	1	Rt Neck	3X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
46	1	Rt Neck	3X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
47	1	Submental	3X3	Spherical	Well Defined	Smooth	Normal	1	Submental	3X3	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
48	Multiple	Lt Neck	1X1	Spherical	Ill Defined	Smooth	Normal	Multiple	Lt Neck	1X1	Globular	Ill Defined	Smooth	Normal	Absent	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
49	2	Lt Neck	1X1	Spherical	Well Defined	Smooth	Erythema	2	Lt Neck	1X1	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Present	Absent	S1S2+	B/L NVBS +	NFND	NAD				
50	Multiple	Rt Neck	1X2	Spherical	Well Defined	Smooth	Normal	3	Rt Neck	1X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
51	1	OCCIPITAL	3X2	Spherical	Well Defined	Smooth	Erythema	1	OCCIPITAL	3X2	Globular	Well Defined	Smooth	Increased	Present	Cystic	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
52	2	Rt Postauricular	1X1	Spherical	Well Defined	Smooth	Normal	2	Rt Postauricular	2X1	Globular	Well Defined	Smooth	Normal	Absent	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
53	1	Rt Neck	4X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Soft	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
54	2	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	2	Rt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
55	Multiple	Lt Neck	2X1	Spherical	Well Defined	Smooth	Erythema	Multiple	Lt Neck	2X1	Globular	Well Defined	Smooth	Normal	Present	Cystic	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
56	2	Rt Neck	1X1.5	Spherical	Well Defined	Irregular	Normal	2	Rt Neck	1X1.5	Globular	Well Defined	Irregular	Increased	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
57	2	Lt Neck	2X1	Spherical	Well Defined	Smooth	Normal	2	Lt Neck	2X1	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
58	1	Lt Neck	2X3	Spherical	Well Defined	Smooth	Erythema	1	Lt Neck	2X3	Globular	Well Defined	Smooth	Increased	Present	Cystic	Present	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
59	1	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	2X2	Globular	Well Defined	Smooth	Normal	Absent	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
60	2	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	2	Rt Neck	2X2	Globular	Well Defined	Smooth	Increased	Present	Soft	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
61	2	Rt Neck	2X2	Spherical	Well Defined	Smooth	Normal	2	Rt Neck	4X2	Globular	Well Defined	Smooth	Increased	Present	Soft	Present	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
62	1	Lt Inguinal	3X2	Spherical	Well Defined	Smooth	Erythema	1	Lt Inguinal	3X1.5	Globular	Well Defined	Smooth	Increased	Absent	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
63	Multiple	Lt Neck	2X1	Spherical	Ill Defined	Irregular	Normal	Multiple	Lt Neck	2X2	Globular	Well Defined	Smooth	Normal	Absent	Hard	Absent	Absent	Absent	S1S2+	Crepts	NFND	NAD				
64	1	Rt Neck	2X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Soft	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				
65	1	Lt Neck	4X3	Spherical	Well Defined	Smooth	Normal	1	Lt Neck	3X3	Globular	Well Defined	Smooth	Normal	Present	Soft	Absent	Absent	Absent	S1S2+	B/L NVBS +	NFND	NAD				
66	3	Lt Neck	2X2	Spherical	Well Defined	Smooth	Normal	3	Lt Neck	2X2	Globular	Well Defined	Smooth	Normal	Present	Firm	Absent	Present	Present	S1S2+	B/L NVBS +	NFND	NAD				
67	1	Rt Neck	2X3	Spherical	Well Defined	Smooth	Normal	1	Rt Neck	2X2	Globular	Well Defined	Smooth	Increased	Present	Firm	Absent	Absent	Present	S1S2+	B/L NVBS +	NFND	NAD				

SL. No	DIAGNOSIS	REPORTS – FNAC: IMP	INFERENCE	DOS	DOR	HPR: IMP	INFERENCE	DOS	DOR	No.Of Days	GENEXPERT: MTB	RIF	DOS	DOR	No.Of Days
1	LEFT AXILLARY LNE	G-LN	POSITIVE	13-Jun-17	13-Jun-17	G-LN	POSITIVE	15-Jun-17	17-Jun-17	2	POSITIVE	NEGATIVE	16-Jun-17	16-Jun-17	0
2	RT SUBMANDIBULAR LN	R-LN	NEGATIVE	19-Jun-17	19-Jun-17	R-LN	NEGATIVE	19-Jun-17	24-Jun-17	5	NEGATIVE	NEGATIVE	19-Jun-17	21-Jun-17	2
3	RT CERVICAL LNE	R-LN	NEGATIVE	26-Jun-17	26-Jun-17	R-LN	NEGATIVE	28-Jun-17	4-Jul-17	6	NEGATIVE	NEGATIVE	28-Jun-17	29-Jun-17	1
4	SUBMENTAL LNE	G-LN	POSITIVE	28-Jul-17	28-Jul-17	G-LN	POSITIVE	31-Jul-17	3-Aug-17	3	NEGATIVE	NEGATIVE	31-Jul-17	2-Aug-17	2
5	RT CERVICAL LNE	R-LN	NEGATIVE	28-Jul-17	28-Jul-17	G-LN	POSITIVE	2-Aug-17	7-Aug-17	5	NEGATIVE	NEGATIVE	2-Aug-17	4-Aug-17	2
6	RT CERVICAL LNE	G-LN	POSITIVE	28-Aug-17	28-Aug-17	TB-LN	POSITIVE	30-Aug-17	5-Sep-17	6	POSITIVE	NEGATIVE	30-Aug-17	31-Aug-17	1
7	INGUINAL LNE	R-LN	NEGATIVE	27-Aug-17	27-Aug-17	G-LN	POSITIVE	9-Sep-17	14-Sep-17	5	NEGATIVE	NEGATIVE	11-Sep-17	12-Sep-17	1
8	ABDOMINAL TB	N/A				G-LN	POSITIVE	23-Sep-17	29-Sep-17	6	NEGATIVE	NEGATIVE	25-Sep-17	25-Sep-17	0
9	RT CERVICAL LNE	G-LN	POSITIVE	30-Oct-17	30-Oct-17	TB-LN	POSITIVE	1-Nov-17	8-Nov-17	7	POSITIVE	NEGATIVE	2-Nov-17	2-Nov-17	0
10	LT CERVICAL LNE	R-LN	NEGATIVE	14-Dec-17	14-Dec-17	R-LN	NEGATIVE	19-Dec-17	23-Dec-17	4	NEGATIVE	NEGATIVE	19-Dec-17	21-Dec-17	2
11	ABDOMINAL TB	N/A				MALIGNANCY	NEGATIVE	23-Dec-17	28-Dec-17	5	NEGATIVE	NEGATIVE	26-Dec-17	26-Dec-17	0
12	B/L CERVICAL LNE	G-LN	POSITIVE	1-Jan-18	1-Jan-18	TB-LN	POSITIVE	4-Jan-18	12-Jan-18	8	POSITIVE	NEGATIVE	5-Jan-18	5-Jan-18	0
13	RT CERVICAL LNE	R-LN	NEGATIVE	25-Jan-18	25-Jan-18	R-LN	NEGATIVE	29-Jan-18	5-Feb-18	7	POSITIVE	NEGATIVE	29-Jan-18	29-Jan-18	0
14	ABDOMINAL TB	N/A				G-LN	POSITIVE	8-Feb-18	10-Feb-18	2	POSITIVE	NEGATIVE	8-Feb-18	9-Feb-18	1
15	RT CERVICAL LNE	R-LN	NEGATIVE	10-Feb-18	10-Feb-18	TB-LN	POSITIVE	13-Feb-18	19-Feb-18	6	POSITIVE	NEGATIVE	13-Feb-18	14-Feb-18	1
16	INGUINAL LNE	A/C INFL LESN	NEGATIVE	12-Feb-18	12-Feb-18	TB-LN	POSITIVE	16-Feb-18	19-Feb-18	3	POSITIVE	NEGATIVE	16-Feb-18	17-Feb-18	1
17	LT CERVICAL LNE	R-LN	NEGATIVE	12-Feb-18	12-Feb-18	R-LN	NEGATIVE	20-Feb-18	25-Feb-18	5	NEGATIVE	NEGATIVE	21-Feb-18	21-Feb-18	0
18	RT SUBMANDIBULAR LN	G-LN	POSITIVE	19-Feb-18	19-Feb-18	TB-LN	POSITIVE	22-Feb-18	28-Feb-18	6	POSITIVE	NEGATIVE	22-Feb-18	23-Feb-18	1
19	LT CERVICAL LNE	G-LN	POSITIVE	23-Feb-18	23-Feb-18	TB-LN	POSITIVE	26-Feb-18	28-Feb-18	2	POSITIVE	NEGATIVE	27-Feb-18	27-Feb-18	0
20	HODGKINS LYMPHOMA	CHRONIC LYMPHADENITIS	NEGATIVE	19-Feb-18	19-Feb-18	MALIGNANCY	NEGATIVE	12-Mar-18	14-Mar-18	2	NEGATIVE	NEGATIVE	12-Mar-18	14-Mar-18	2
21	LT SUBMANDIBULAR LN	G-LN	POSITIVE	15-Mar-18	15-Mar-18	TB-LN	POSITIVE	18-Mar-18	28-Mar-18	10	POSITIVE	NEGATIVE	19-Mar-18	20-Mar-18	1
22	RT CERVICAL LNE	R-LN	NEGATIVE	14-Mar-18	14-Mar-18	R-LN	POSITIVE	20-Mar-18	23-Mar-18	3	NEGATIVE	NEGATIVE	21-Mar-18	21-Mar-18	0
23	ABDOMINAL TB	N/A				G-LN	POSITIVE	22-Mar-18	26-Mar-18	4	POSITIVE	NEGATIVE	23-Mar-18	24-Mar-18	1
24	RT CERVICAL LNE	R-LN	NEGATIVE	24-Mar-18	24-Mar-18	R-LN	NEGATIVE	26-Mar-18	30-Mar-18	4	POSITIVE	NEGATIVE	26-Mar-18	27-Mar-18	1
25	B/L CERVICAL LNE	R-LN	NEGATIVE	7-Apr-18	7-Apr-18	NEC-LN	NEGATIVE	9-Apr-18	18-Apr-18	9	NEGATIVE	NEGATIVE	10-Apr-18	11-Apr-18	1
26	B/L CERVICAL LNE	G-LN	POSITIVE	4-Apr-18	4-Apr-18	G-LN	POSITIVE	10-Apr-18	14-Apr-18	4	POSITIVE	NEGATIVE	10-Apr-18	11-Apr-18	1
27	RT POSTAURICULAR LNE	G-LN	POSITIVE	10-Apr-18	10-Apr-18	TB-LN	POSITIVE	12-Apr-18	18-Apr-18	6	POSITIVE	NEGATIVE	12-Apr-18	13-Apr-18	1
28	LT CERVICAL LNE	A/C SUPP LESN	NEGATIVE	13-Apr-18	13-Apr-18	G-LN	POSITIVE	17-Apr-18	20-Apr-18	3	NEGATIVE	NEGATIVE	17-Apr-18	17-Apr-18	0
29	LT CERVICAL LNE	G-LN	POSITIVE	16-Apr-18	16-Apr-18	TB-LN	POSITIVE	18-Apr-18	21-Apr-18	3	POSITIVE	NEGATIVE	19-Apr-18	19-Apr-18	0
30	LT CERVICAL LNE	R-LN	NEGATIVE	9-Apr-18	9-Apr-18	TB-LN	POSITIVE	18-Apr-18	21-Apr-18	3	POSITIVE	NEGATIVE	18-Apr-18	18-Apr-18	0
31	LT CERVICAL LNE	R-LN	NEGATIVE	17-Apr-18	18-Apr-18	TB-LN	POSITIVE	20-Apr-18	22-Apr-18	2	POSITIVE	NEGATIVE	20-Apr-18	20-Apr-18	0
32	RT CERVICAL LNE	R-LN	NEGATIVE	18-Apr-18	18-Apr-18	TB-LN	POSITIVE	20-Apr-18	22-Apr-18	2	POSITIVE	NEGATIVE	20-Apr-18	21-Apr-18	1
33	RT CERVICAL LNE	G-LN	POSITIVE	15-Apr-18	15-Apr-18	G-LN	POSITIVE	20-Apr-18	24-Apr-18	4	NEGATIVE	NEGATIVE	20-Apr-18	23-Apr-18	3
34	LT CERVICAL LNE	R-LN	NEGATIVE	20-Apr-18	20-Apr-18	G-LN	POSITIVE	26-Jun-18	30-Jun-18	4	POSITIVE	POSITIVE	26-Apr-18	28-Apr-18	2
35	RT SUBMANDIBULAR LN	A/C SUPP LESN	NEGATIVE	23-Apr-18	23-Apr-18	CHR. ABSCESS	NEGATIVE	2-May-18	7-May-18	5	NEGATIVE	NEGATIVE	2-May-18	2-May-18	0
36	RT SUBMANDIBULAR LN	TB-LN	POSITIVE	9-May-18	9-May-18	TB-LN	POSITIVE	11-May-18	18-May-18	7	POSITIVE	NEGATIVE	12-May-18	12-May-18	0
37	RT CERVICAL LNE	TB-LN	POSITIVE	14-May-18	15-May-18	TB-LN	POSITIVE	17-May-18	25-May-18	8	POSITIVE	NEGATIVE	17-May-18	18-May-18	1
38	B/L CERVICAL LNE	G-LN	POSITIVE	24-May-18	25-May-18	TB-LN	POSITIVE	26-May-18	30-May-18	4	POSITIVE	NEGATIVE	28-May-18	28-May-18	0
39	LT CERVICAL LNE	R-LN	NEGATIVE	8-Jun-18	8-Jun-18	TB-LN	POSITIVE	10-Jun-18	13-Jun-18	3	POSITIVE	NEGATIVE	11-Jun-18	12-Jun-18	1
40	LT SUBMANDIBULAR LN	R-LN	NEGATIVE	11-Jun-18	11-Jun-18	R-LN	NEGATIVE	13-Jun-18	17-Jun-18	4	NEGATIVE	NEGATIVE	13-Jun-18	14-Jun-18	1
41	INGUINAL LNE	R-LN	NEGATIVE	18-Jun-18	18-Jun-18	R-LN	NEGATIVE	22-Jun-18	27-Jun-18	5	NEGATIVE	NEGATIVE	22-Jun-18	23-Jun-18	1
42	LT SUBMANDIBULAR LN	R-LN	NEGATIVE	20-Jun-18	20-Jun-18	TB-LN	POSITIVE	22-Jun-18	26-Jun-18	4	POSITIVE	NEGATIVE	22-Jun-18	25-Jun-18	3
43	LT CERVICAL LNE	R-LN	NEGATIVE	20-Jun-18	20-Jun-18	G-LN	POSITIVE	26-Jun-18	30-Jun-18	4	POSITIVE	NEGATIVE	26-Jun-18	27-Jun-18	1
44	RT SUBMANDIBULAR LN	R-LN	NEGATIVE	26-Jun-18	26-Jun-18	R-LN	NEGATIVE	30-Jun-18	4-Jul-18	4	NEGATIVE	NEGATIVE	2-Jul-18	2-Jul-18	0
45	RT CERVICAL LNE	G-LN	POSITIVE	29-Jun-18	29-Jun-18	TB-LN	POSITIVE	1-Jul-18	4-Jul-18	3	POSITIVE	NEGATIVE	2-Jul-18	3-Jul-18	1
46	RT CERVICAL LNE	R-LN	NEGATIVE	2-Jul-18	2-Jul-18	G-LN	POSITIVE	4-Jul-18	10-Jul-18	6	POSITIVE	NEGATIVE	4-Jul-18	5-Jul-18	1
47	SUBMENTAL LNE	R-LN	NEGATIVE	7-Feb-18	7-Feb-18	NEC-LN	NEGATIVE	21-Jul-18	23-Jul-18	2	NEGATIVE	NEGATIVE	23-Jul-18	23-Jul-18	0
48	LT CERVICAL LNE	A/C SUPP LESN	NEGATIVE	19-Jul-18	19-Jul-18						POSITIVE	NEGATIVE	16-Jul-18	16-Jul-18	0
49	LT CERVICAL LNE	R-LN	NEGATIVE	26-Jul-18	26-Jul-18	TB-LN	POSITIVE	29-Jul-18	5-Aug-18	7	POSITIVE	NEGATIVE	30-Jul-18	31-Jul-18	1
50	RT CERVICAL LNE	G-LN	POSITIVE	6-Aug-18	6-Aug-18	TB-LN	POSITIVE	8-Aug-18	8-Aug-18	0	POSITIVE	NEGATIVE	8-Aug-18	9-Aug-18	1
51	OCCIPITAL	A/C INFL LESN	NEGATIVE	8-Aug-18	8-Aug-18	G-LN	POSITIVE	10-Aug-18	12-Aug-18	2	POSITIVE	POSITIVE	10-Aug-18	11-Aug-18	1
52	RT POSTAURICULAR LNE	G-LN	POSITIVE	13-Aug-18	13-Aug-18	TB-LN	POSITIVE	15-Aug-18	18-Aug-18	3	POSITIVE	NEGATIVE	14-Aug-18	16-Aug-18	2
53	RT CERVICAL LNE	G-LN	POSITIVE	6-Aug-18	6-Aug-18	G-LN	POSITIVE	17-Aug-18	20-Aug-18	3	POSITIVE	NEGATIVE	17-Aug-18	17-Aug-18	0
54	RT CERVICAL LNE	R-LN	NEGATIVE	7-Aug-18	7-Aug-18	R-LN	NEGATIVE	24-Aug-18	30-Aug-18	6	NEGATIVE	NEGATIVE	24-Aug-18	25-Aug-18	1
55	LT CERVICAL LNE	R-LN	NEGATIVE	6-Sep-18	6-Sep-18	G-LN	POSITIVE	8-Sep-18	12-Sep-18	4	POSITIVE	NEGATIVE	7-Sep-18	7-Sep-18	0
56	RT CERVICAL LNE	G-LN	POSITIVE	9-Sep-18	9-Sep-18	G-LN	NEGATIVE	12-Sep-18	17-Sep-18	5	NEGATIVE	NEGATIVE	12-Sep-18	14-Sep-18	2
57	LT CERVICAL LNE	G-LN	POSITIVE	4-Oct-18	4-Oct-18	G-LN	POSITIVE	4-Oct-18	6-Oct-18	2	POSITIVE	NEGATIVE	5-Oct-18	5-Oct-18	0
58	LT CERVICAL LNE	A/C INFL LESN	NEGATIVE	11-Oct-18	11-Oct-18	G-LN	POSITIVE	15-Oct-18	20-Oct-18	5	NEGATIVE	NEGATIVE	11-Oct-18	11-Oct-18	0
59	RT CERVICAL LNE	R-LN	NEGATIVE	25-Oct-18	25-Oct-18	TB-LN	POSITIVE	28-Oct-18	6-Nov-18	9	POSITIVE	NEGATIVE	29-Oct-18	29-Oct-18	0
60	RT CERVICAL LNE	R-LN	NEGATIVE	23-Oct-18	23-Oct-18	G-LN	POSITIVE	29-Oct-18	5-Nov-18	7	POSITIVE	NEGATIVE	30-Oct-18	30-Oct-18	0
61	RT CERVICAL LNE	R-LN	POSITIVE	3-Nov-18	3-Nov-18	TB-LN	POSITIVE	5-Nov-18	9-Nov-18	4	POSITIVE	NEGATIVE	5-Nov-18	6-Nov-18	1
62	INGUINAL LNE	R-LN	NEGATIVE	5-Nov-18	5-Nov-18	R-LN	NEGATIVE	7-Nov-18	10-Nov-18	3	NEGATIVE	NEGATIVE	8-Nov-18	8-Nov-18	0
63	LT CERVICAL LNE	R-LN	NEGATIVE	2-Nov-18	2-Nov-18	R-LN	NEGATIVE	8-Nov-18	12-Nov-18	4	POSITIVE	NEGATIVE	9-Nov-18	9-Nov-18	0
64	RT CERVICAL LNE	R-LN	NEGATIVE	7-Nov-18	7-Nov-18	TB-LN	POSITIVE	9-Nov-18	12-Nov-18	3	POSITIVE	NEGATIVE	9-Nov-18	9-Nov-18	0
65	LT CERVICAL LNE	BENIGN SPINDLE TUMOR	NEGATIVE	9-Nov-18	9-Nov-18	R-LN	NEGATIVE	23-Nov-18	28-Nov-18	5	NEGATIVE	NEGATIVE	23-Nov-18	24-Nov-18	1
66	LT CERVICAL LNE	R-LN	NEGATIVE	19-Feb-19	19-Feb-19	TB-LN	POSITIVE	21-Feb-19	27-Feb-19	6	POSITIVE	NEGATIVE	20-Feb-19	21-Feb-19	1
67	RT CERVICAL LNE	R-LN	NEGATIVE	9-Apr-19	9-Apr-19	R-LN	NEGATIVE	13-Apr-19	15-Apr-19	2	NEGATIVE	NEGATIVE	13-Apr-19	15-Apr-19	2