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Original Research Article

# SITE PREDILECTION AND SOCIODEMOGRAPHIC PROFILE OF EXTRAPULMONARY TUBERCULOSIS IN A TERTIARY CARE CENTRE: A HOSPITAL BASED OBSERVATIONAL STUDY

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## ABSTRACT

**Background:** Extra pulmonary tuberculosis (EPTB) remains a significant public health concern, particularly in high-burden countries like India. EPTB affects organs other than the lungs, including lymph nodes, pleura, spine, and central nervous system. The epidemiological distribution of EPTB varies based on demographic, clinical, and socioeconomic factors. Understanding the site predilection and sociodemographic profile of EPTB patients can help develop targeted intervention strategies. **Aim:** To assess the site predilection and sociodemographic profile of extrapulmonary tuberculosis patients attending the outpatient department of a tertiary care centre in North Kerala. **Materials and Methods:** A hospital-based observational study was conducted at the DOTS Centre, Department of Respiratory Medicine, Government Medical College, Kannur, over 12 months (September 1, 2023 – August 30, 2024). A total of 70 EPTB patients registered under the DOTS program were included. Data on demographics, comorbidities, addictions, site of infection, and diagnostic methods were collected using a structured proforma. Statistical analysis was performed using frequency, percentage, mean, standard deviation, and the chi-square test, with significance set at $p < 0.05$. **Results:** The study included 70 patients, with 55.7% males and 44.3% females. The most affected age group was 41-50 years (20%), with a mean age of 43.41 years. Lymphnode TB (31.4%) was the most common site, followed by pleural TB (30%). Swelling (32.9%) and respiratory symptoms (31.4%) were the most common complaints. Comorbidities included diabetes mellitus (10%), hypertension (11.4%), coronary artery disease (2.9%), and chronic kidney disease (5.7%). Smoking and alcohol consumption were reported in 34.3% and 28.6% of patients, respectively. Only 17.1%of cases were CBNAAT positive. **Conclusion:** Lymph node and pleural tuberculosis were the most common forms of EPTB. Middle-aged individuals, particularly those with comorbidities such as diabetes, were at higher risk. Early diagnosis and management of EPTB, with a focus on high-risk groups, can improve patient outcomes.

## INTRODUCTION

Prior to theCOVID-19 pandemic, tuberculosis (TB) was the leading infectious cause of mortality worldwide. According to The Global TB Report 2022(1), 10.6 million people contracted TB in 2021, with 1.4 million TB-negative individuals and 187,000 TB-positive individuals succumbing to the disease. Thirty high-burden nations accounted for 87% of global cases, with India alone contributing 28%.[1]

TB, caused by Mycobacterium tuberculosis (Order Actinomycetales, Genus Mycobacterium, Family Mycobacteriaceae), progresses through distinct stages: Primary TB (initial infection, often asymptomatic), Latent TB (dormant bacteria in granulomas), and Reactivation TB (active disease in

immunocompromised individuals). While active TB primarily affects the lungs and is contagious, Extra pulmonary TB (EPTB) occurs when TB spreads to other organs, including the lymph nodes, CNS, bones, joints, abdomen, pericardium etc.

Environmental factors such as smoking, malnutrition, and comorbidities like diabetes contribute to EPTB, alongside sociodemographic factors like age and sex. Given the global variation in EPTB prevalence, understanding its distribution across social, economic, and clinical indicators is essential for developing targeted health strategies.

**Aims and Objectives**

In this study we aim to describe the site predilection and demographic profile of extra pulmonary Tuberculosis patients attending the OPD in a tertiary care centre in North Kerala.

## MATERIALS AND METHODS

The study was conducted after obtaining consent from Institutional Research Committee, Institutional Ethics Committee and Nodal officers of NTEP Unit. Informed consent was taken from patients before including them in the study.

A hospital-based observational study was conducted at the DOTS Centre, Department of Respiratory Medicine, Government Medical College, Kannur, over 12 months (September 1, 2023 – August 30, 2024). Patients diagnosed with coexisting pulmonary tuberculosis were excluded. Sampling technique was Consecutive sampling.

**Sample Size** was calculated using the formula n=Z2pq/d2where Z=1.96 corresponding to 5% level of significance p=59.9%,[3] q=100-59.5=40.1%d=20%relative precision=11.98%

On substitution=64~70.A total of 70 EPTB patients registered under the DOTS program were included.

A structured proforma was used to collect information on age, gender, education, occupation, BMI, comorbidities, addictions, previous history of tuberculosis, site of TB infection, nature of specimen and method of diagnosis. Data will then be entered to Microsoft Excel.

Data on demographics, comorbidities, addictions, site of infection, and diagnostic methods were collected using a structured proforma.

**Study design:** Hospital based observational study

**Study Setting:** DOTS Center, Department of Respiratory Medicine, Government Medical College Kannur.

**Study Population:** Patients with EPTB registered for treatment under DOTS in Government Medical College Kannur.

**Exclusion Criteria:** a. Patients diagnosed with co existing pulmonary tuberculosis.

**Study duration:**12 months from getting date of clearance from ethical committee, 1st September 2023 to 30th August 2024.

**Sampling Technique:** Consecutive sampling of patients diagnosed as Extra pulmonary TB and registered at DOTS, Government Medical College Kannur

**Sample Size:** n=Z2pq/d2where Z=1.96 corresponding to 5% level of significancep=59.9%,[3] q=100-59.5=40.1%d=20%relativeprecision=11.98% On substitution=64~70

**Method of testing and data collection variables Studied:** Age, gender, education, occupation, BMI, comorbidities, addictions, previous history of tuberculosis, site of TB infection, nature of specimen and method of diagnosis.

**Statistical Analysis**

Frequency, percentage, mean and standard deviation will be used for analysis of descriptive data. Inferential statistical methods like chisquare test will be used. P value of $< 0.05$ will be taken as significant.

**Ethical considerations**

Study will be conducted only after getting approval from institutional ethics committee, Government Medical College Kannur. Data collection will be done only from participants who give written informed consent. Patients will have no extra financial burdens due to the study. All the data shall be kept confidential.

## RESULTS

A total of 70 patients were included in this study. The following observations were made from the study.

**Table 1: Site of EPTB**

| SITE | FREQUENCY | PERCENT |
|---|---|---|
| LYMPHNODE | 22 | 31.4 |
| SPINE | 9 | 12.9 |
| PLEURA | 21 | 30.0 |
| GIT | 5 | 7.1 |
| SKIN | 1 | 1.4 |
| MUSCULOSKELETAL OTHER THAN SPINE | 7 | 10.0 |
| CNS | 5 | 7.1 |

Among the 70 EPTB patients studied, lymph node tuberculosis (LNTB) was the most common, affecting 22 patients, followed closely by pleural tuberculosis in 21 patients. The least common occurrence was with skin tuberculosis, which affected only one patient Amongthetotal70EPTBpatientsstudied,39(56%) were males and31(44%) females.


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Among the study population, majority belonged to the age group of 41-50 (20%), and the least were from above 70 years of age (5.7%). The maximum age recorded was 86 years and the minimum age 10 years with a mean of 43.41 and standard deviation of 17.95.
Of the total70 patients studied,4(6%) were illiterate,57(81%) did schooling upto 12thclass and 9 (13%) were graduates and above.
Among the70 patients studied,48(68%) were non-professionals,16(23%) were unemployedand6(9%) were professionals.
The most common chief complaint among the study population was swelling, reported by 23 patients, closely followed by respiratory symptoms, reported in 22 patients. Two out of the 70 patients had no symptoms.
Of the70 EPTB patients studied,63(90%) were non diabetic and7(10%) were diabetic
Among the70 EPTB patients studied,8were hypertensive.
Among the70 EPTB patients studied,2(2.9%) had CAD.
Of the70 EPTB patients studied,4 had CKD
Among the study population, only 2 had previous history of pulmonary tuberculosis.
Among the70 patients studied,24(34.3%)were smokers
Of the70EPTB patients studied,20(28.6%) were alcoholics.
Of the 70 EPTB patients studied,20(28.6%) were alcoholics.
Among the 70 EPTB patients studied, only 12(17%) were CBNAAT positive.
Of the 70 EPTB patients studied, 27 case s(39%).
Of the 70 EPTB patients studied, 27 cases (39%) were histopathologically diagnosed.
Of the 70 EPTB patients in the study,12were radiologically diagnosed.
The maximum height recorded among the study population was185 cm and the minimum height recorded was 120 cm with a mean height of 158.97cm and standard deviation of 9.704
The maximum weight recorded among the study population was84 kg and the minimum weight recorded was 18 kg with a mean weight of 53.89 kg and standard deviation of 12.77.
The maximum BMI recorded among the study population was 34.43 kg/m2 and the minimum BMI recorded was 11.41 kg/m2 with a mean BMI of 21.18kg/m2 and standard deviation of 4.40. In our study, among the total 70 EPTB patients studied,DM was more prevalent in patients belonging to the age group 61-70 years.
Of the total 7 EPTB patients who were diabetic,5 were males and 2 females.
In our study population, diabetes was most prevalent among spinal TB and Pleural TB followed closely by LNTB.
Among the 22 LNTB cases, 15 were females and 7 males. Incidence of Spine TB was also highest among females (6 out of the 9 spine TB cases). GI TB and cutaneous TB also exhibited a similar trend with maximum cases among females. In contrast, pleural TB, extraspinal musculoskeletal TB and CNS TB had maximum incidence among males.

**Table 2**

| **GENDER** | **FREQUENCY** | **PERCENT** |
|---|---|---|
| MALE | 39 | 55.7 |
| FEMALE | 31 | 44.31 |
| Total | 70 | 100 |
| AGEGROUP | FREQUENCY | PERCENT |
| 10-20 | 7 | 10 |
| 21-30 | 12 | 17.1 |
| 31-40 | 13 | 18.6 |
| 41-50 | 14 | 20 |
| 51-60 | 10 | 14.3 |
| 61-70 | 10 | 14.3 |
| >70 | 4 | 5.7 |
| Total | 70 | 100.0 |
| EDUCATION | FREQUENCY | PERCENT |
| ILLITERATE | 4 | 5.7 |
| UPTO HIGHER SECONDARY | 57 | 81.4 |
| GRADUATE AND ABOVE | 9 | 12.9 |
| Total | 70 | 100 |
| OCCUPATION | Frequency | Percent |
| PROFESSIONAL | 6 | 8.6 |
| NON-PROFESSIONAL | 48 | 68.6 |
| UNEMPLOYED | 16 | 22.9 |
| Total | 70 | 100 |
| CHIEF COMPLAINTS | Frequency | Percent |
| NO SYMPTOMS | 2 | 2.9 |
| RESPIRATORY SYMPTOMS | 22 | 31.4 |
| MUSCULOSKELETAL SYMPTOMS | 12 | 17.1 |
| CNS SYMPTOMS | 5 | 7.1 |
| GI SYMPTOMS | 4 | 5.7 |
| SWELLING | 23 | 32.9 |
| SKIN LESION | 2 | 2.9 |


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| | | |
|---|---|---|
| Total | 70 | 100.0 |
| **PASTH/OPTB** | **FREQUENCY** | **PERCENT** |
| NO | 68 | 97.1 |
| YES | 2 | 2.9 |
| Total | 70 | 100.0 |

**Comorbidities & Addiction**

| **DM** | **Frequency** | **Valid Percent** |
|---|---|---|
| NO | 63 | 90.0 |
| YES | 7 | 10.0 |
| Total | 70 | 100.0 |
| HTN | Frequency | Percent |
| NO | 62 | 88.6 |
| YES | 8 | 11.4 |
| Total | 70 | 100.0 |
| CAD | FREQUENCY | PERCENT |
| NO | 68 | 97.1 |
| YES | 2 | 2.9 |
| Total | 70 | 100.0 |
| CKD | FREQUENCY | PERCENT |
| NO | 66 | 94.3 |
| YES | 4 | 5.7 |
| Total | 70 | 100.0 |
| SMOKING | FREQUENCY | PERCENT |
| NO | 46 | 65.7 |
| YES | 24 | 34.3 |
| Total | 70 | 100.0 |
| ALCOHOL | FREQUENCY | PERCENT |
| NO | 50 | 71.4 |
| YES | 20 | 28.6 |
| TOTAL | 70 | 100.0 |

| **ATUREOF DIAGNOSIS** | **LN** | **SPINE** | **PLEURA** | **GIT** | **SKIN** | **EXTRAS PINAL MUSCULOSKELETAL** | **CNS** | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| CLINICALONLY | 0 | 0 | 20 | 0 | 0 | 0 | 3 | 23 |
| CLINICAL&RADIOLOGICAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| RADIOLOGICALONLY | 0 | 8 | 0 | 1 | 0 | 1 | 1 | 11 |
| PATHOLOGICALONLY | 15 | 0 | 0 | 2 | 1 | 5 | 0 | 23 |
| PATHOLOGICALAND MICROBIOLOGICAL | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 4 |
| MICROBIOLOGICAL ONLY | 6 | 1 | 1 | 0 | 0 | 0 | 0 | 8 |
| Total | 22 | 9 | 21 | 5 | 1 | 7 | 5 | 70 |

| **CBNAAT** | **FREQUENCY** | **PERCENT** |
|---|---|---|
| NEGATIVE | 58 | 82.9 |
| POSITIVE | 12 | 17.1 |
| Total | 70 | 100.0 |

| **HISTOPATHOLOGY** | **FREQUENCY** | **PERCENT** | |
|---|---|---|---|
| **NOTDONE/NOTS/O TB** | **RADIOLOGY** | **Frequency** | **Percent** |
| S/0TB | NOTDONE/NOTS/OTB | 58 | 82.86 |
| Total | S//OTB | 12 | 17.14 |
| | Total | 70 | 100.0 |

| **AGE GROUP*DM Cross tabulation** | | | |
|---|---|---|---|
| **Age Group** | **DM** | | **Total** |
| | **Yes** | **No** | |
| 10-20 | 7 | 0 | 7 |
| 21-30 | 12 | 0 | 12 |
| 31-40 | 12 | 1 | 13 |
| 41-50 | 14 | 0 | 14 |
| 51-60 | 9 | 1 | 10 |
| >70 | 3 | 1 | 4 |
| | 63 | 7 | 70 |


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**Gender DM cross tabulation**

| GENDER | DM | | Total |
|---|---|---|---|
| | NO | YES | |
| MALE | 34 | 5 | 39 |
| FEMALE | 29 | 2 | 31 |
| Total | 63 | 7 | 70 |

**Site of TB-Gender**

| SITEOFTB*GENDER Cross tabulation | | | |
|---|---|---|---|
| SITEOFTB | SEX | | Total |
| | MALE | FEMALE | |
| LYMPHNODE | 7 | 15 | 22 |
| SPINE | 3 | 6 | 9 |
| PLEURA | 19 | 2 | 21 |
| GIT | 1 | 4 | 5 |
| SKIN | 0 | 1 | 1 |
| MUSCULOSKELETAL OTHER THAN SPINE | 5 | 2 | 7 |
| CNS | 4 | 1 | 5 |
| Total | 39 | 31 | 70 |

**Site of TB*DM cross tabulation**

| SITEOFTB | DM | | Total |
|---|---|---|---|
| | NO | YES | |
| LYMPH NODE | 21 | 1 | 22 |
| SPINE | 6 | 3 | 9 |
| PLEURA | 18 | 3 | 21 |
| GIT | 5 | 0 | 5 |
| SKIN | 1 | 0 | 1 |
| MUSCULOSKELETAL OTHER THAN SPINE | 7 | 0 | 7 |
| CNS | 5 | 0 | 5 |
| Total | 63 | 7 | 70 |

**Site of TB-Smoking**

| SITE OF TB*SMOKING CROSS TABULATION | | | |
|---|---|---|---|
| SITEOFTB | SMOKING | | Total |
| | NO | YES | |
| LYMPH NODE | 18 | 4 | 22 |
| SPINE | 6 | 3 | 9 |
| PLEURA | 11 | 10 | 21 |
| GIT | 4 | 1 | 5 |
| SKIN | 1 | 0 | 1 |
| MUSCULOSKELETAL OTHER THAN SPINE | 3 | 4 | 7 |
| CNS | 3 | 2 | 5 |
| Total | 46 | 24 | 70 |

**DM-Smoking**

| DM*SMOKING Cross tabulation | | | |
|---|---|---|---|
| DM | SMOKING | | Total |
| | NO | YES | |
| NO | 42 | 21 | 63 |
| YES | 4 | 3 | 7 |
| Total | 46 | 24 | 70 |

**Site of TB-CKD**

| SITEOFTB*CKD Cross tabulation | | | |
|---|---|---|---|
| SITEOFTB | CKD | | Total |
| | NO | YES | |
| LYMPH NODE | 22 | 0 | 22 |
| SPINE | 8 | 1 | 9 |
| PLEURA | 19 | 2 | 21 |
| GIT | 5 | 0 | 5 |
| SKIN | 1 | 0 | 1 |
| MUSCULOSKELETAL OTHER THAN SPINE | 6 | 1 | 7 |
| CNS | 5 | 0 | 5 |
| Total | 66 | 4 | 70 |


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## DISCUSSION

Our study provides a detailed analysis of extrapulmonary tuberculosis (EPTB) in a tertiary care setting in Kerala, India, shedding light on site predilection, demographic characteristics, comorbidities, and lifestyle factors. When compared with the findings from previous studies by Özvaran et al,[2] Prakasha et al,[3] Giovanni Sotgiu et al,[4] Ilgazlieta,[5] Mavilaetal,[6] Lakshmanan et al,[7] Mohandasetal.[8] and Nishalet al,[9] Several key similarities and differences emerge, emphasizing regional variations, evolving epidemiological trends, and associated risk factors.

**Site Predilection and Distribution of EPTB**

Across multiple studies, lymphnode tuberculosis(LNTB)and pleural tuberculosis have consistently emerged as the most common forms of EPTB. In our study, LNTB (31.4%) was the most prevalent, followed closely by pleural TB (30%). Gonzalez et al. in a study of eptb patients in a large metropolitan area with a low incidence of tuberculosis reported 538 EPTB cases (28.6%) in a total of 1,878 enrollees. The most common sites of infection were lymph nodes (43%) and pleura (23%).[10] This is consistent with our study. In the study by Özvaran et al., wh pleural TB was the most common site, followed by lymph node involvement.[2] Similarly, studies by Prakasha et al., Giovanni Sotgiu etal.,Ilgazlietal., and Lakshmananetal. Reported LNTB and pleural TB as the predominant forms.[3,4,5,7]

However, in the study by Mavila et al. at Pariyaram Medical College, gastrointestinal TB was the second most common type, differing from the broader trend observed in other studies.[6] This variation may be attributed to differences in diagnostic patterns, regional risk factors, and comorbid conditions such as diabetes mellitus(DM),which is strongly associated with gastrointestinal TB.

**Demographic Characteristics Gender and Age Trends**

Our study reported a slightly higher male predilection for EPTB (55.7% males, 44.3% females), where as previous studies have shown variations. The study by Özvaranet al. highlighted a significant female predilection for EPTB (26.8% vs. 13.1%).[2] Similarly, the study by Giovanni Sotgiu et al. about TB in Europe found a higher incidence of EPTB among females, particularly in younger age groups (<15 years).[4] The differences in gender susceptibility could be influenced by genetic predisposition, lifestyle factors, and healthcare-seeking behaviour, which vary across regions.

Regarding age distribution, our study found that most cases were in the 41-50 age group, whereas the study by Ilgazli et al. in Kocaeli reported that 41.4% of cases were under 15 years old.[5] This suggests that in some regions, EPTB disproportionately affects children and young adults, where as in Kerala, a higher burden is seen in middle-aged individuals.

**Comorbidities and Risk Factors**

Ours tudy highlights the impact of comorbidities such as DM (10%) and chronic kidney disease (CKD) (5.7%), with a strong association between DM and pleural and spinal TB. The study by Mohandas et al. in Mukkam CHC also reported a diabetes prevalence of7.61% among EPTB patients.[8] The role of diabetes in exacerbating

TB susceptibility has been well-documented, as hyperglycemia impairs immune function, making patients more prone to TB infections.

Smoking and alcohol consumption were prevalent lifestyle factors in our study, with smoking (34.3%) being more associated with musculoskeletal TB. In contrast, non-smokers showed a higher prevalence of other EPTB forms. While previous studies did not explicitly analyze smoking and alcohol consumption, our findings suggest the need for targeted lifestyle interventions to reduce EPTB risk.

**Diagnostic Influences on EPTB Detection**

Histopathological confirmation was available in 40% of cases in our study, and CBNAAT positivity in 17.1%. Radiological evidence suggestive of TB was seen in 15.7%ofcasesandtherest27.2% cases were clinically diagnosed. CBNAAT positivity and histopathological confirmation was maximum among LNTB, and radiological diagnosis maximum among spinal TB.

This highlights the challenges of microbiological diagnosis, as seen in the study by Ilgazli et al., where only 4.2% of cases were microbiologically confirmed.[5] In the study by Nishalet al, the highest proportion of EPTB diagnosed by CBNAAT was bone and joint TB (35.7%) followed by lymph node TB (34%).CBNAAT was positivein33.3%of abdominal TB cases and31.3%of TB pleural effusion (pleural tissue). No CBNAAT positive cases were found in CNS TB or urogenital TB cases. Histopathology examination (HPE) showed granulomatous inflammation in 92.9% of TB pleural effusion (pleural tissue) and 91.7% of lymph node TB. No HPE positive cases were reported among patients with CNS TB. Cases of CNS TB was diagnosed clinically, along with consistent radiological and CSF findings.[9] The form of EPTB with the highest sensitivity with CBNAAT was lymph node TB in the WHO meta-analysis.[11]

The reliance on histopathological methods underscores the difficulty of obtaining bacteriological evidence in EPTB cases, reinforcing the need for improved diagnostic tools.

**Socioeconomic Influences on EPTB Detection**

Socioeconomic disparities play a crucial role in EPTB burden. In our study, most patients were non-professionals (68.6%) or unemployed (22.9%), reflecting a socioeconomic vulnerability. In the study by Ilgazliet al., urban residents had higher TB exposure rates. Limited healthcare access and delayed diagnosis contribute to the continued high burden of EPTB in these populations.


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**Regional Variations and Global Comparisons**

Our study's findings align closely with Indian studies (Prakasha et al., Mavila et al., Lakshmanan et al., and Mohandas et al.) but differ from European data (GiovanniSotgiu et al.) and findings from a Turkish industrial city (Ilgazli et al.). While lymph node and pleural TB remain predominant across most studies, gastrointestinal and musculoskeletal TB appear more frequently in certain regions as suggested by study. by Mavila et al at Kannur,[6] and our study, likely due to geographic, lifestyle, and immunological factors.

A notable distinction is the geographic variation in paediatric cases. The study by Giovanni Sotgiu et al. identified a higher EPTB incidence in children <15 years, while our study found the majority in middle-aged adults. This suggests that in high TB-burden countries like India, adult cases dominate, where as in Europe, childhood EPTB is more prominent.

Our study provides a contemporary, region-specific perspective on EPTB, reinforcing trends observed in previous studies while also presenting unique findings related to lifestyle factors, diabetes associations, and demographic shifts. The predominance of lymph node and pleural TB remains consistent with global patterns, but regional variations in age distribution, gender susceptibility, and diagnostic challenges highlight the complexity of EPTB epidemiology.

These insights emphasize the need for targeted screening strategies, improved diagnostic accessibility, and socioeconomic interventions to mitigate the burden of EPTB, particularly among vulnerable populations. Future studies should further investigate genetic, immunological, and environmental determinants contributing to these variations.

## CONCLUSION

Extrapulmonary tuberculosis (EPTB) remains a significant public health concern, demanding a nuanced understanding of its demographic, clinical, and diagnostic patterns. This study underscores that lymph node and pleural tuberculosis are the predominant manifestations, highlighting the necessity for heightened vigilance in diagnosing these forms. The observed age distribution, with a peak incidence in the 41-50 age group, suggests that middle-aged individuals bear a substantial burden of the disease, warranting targeted awareness campaigns and early intervention strategies.

Sociodemographic insights reveal that EPTB disproportionately affects non-professionals and those with lower educational attainment, emphasizing the intricate interplay between socioeconomic status and disease vulnerability. The association of EPTB with comorbidities such as diabetes mellitus, hypertension, and chronic kidney disease under scores the need for an integrated health care approach, ensuring that high-risk individuals receive timely screening and intervention.

Lifestyle factors such as smoking and alcohol consumption further complicate the disease trajectory, reinforcing the necessity for public health initiatives that address these modifiable risk factors. The relatively low CBNAAT positivity and histopathological confirmation rates highlight the persistent diagnostic challenges associated with EPTB, underscoring the need for advanced diagnostic modalities and enhanced accessibility to definitive testing.

Anthropometric findings indicate a wide variation in BMI, with a notable proportion of underweight individuals, further emphasizing the role of nutritional status in disease susceptibility and progression. Given these findings, a multifaceted strategy incorporating early diagnosis, lifestyle modifications, and comprehensive disease management is imperative in combating EPTB effectively.

Ultimately, this study contributes valuable epidemiological insights, reinforcing the urgency of tailored public health strategies and improved diagnostic frameworks. Addressing EPTB requires a holistic approach that integrates clinical expertise, socio-economic considerations, and public health interventions to mitigate the burden of this complex disease in tertiary care settings.

**Limitations of the Study**

Despite providing valuable insights into the site predilection and sociodemographic profile of extrapulmonary tuberculosis (EPTB) patients, this study has certain limitations. Firstly, as a hospital-based observational study conducted at a single tertiary care centre, the findings may not be generalizable to the broader population, particularly those who do not seek medical care at government facilities. Secondly, the study relied on consecutive sampling, which may introduce selection bias, as only patients registered at the DOTS centre were included. Additionally, the diagnosis of EPTB was based on available clinical, radiological, and histopathological data, but microbiological confirmation was not uniformly obtained for all cases, potentially affecting diagnostic accuracy. The reliance on patient-reported data for lifestyle factors such as smoking and alcohol consumption also introduces the possibility of recall bias. Furthermore, the study did not assess treatment outcomes or long-term prognosis, limiting its ability to evaluate the impact of various sociodemographic and clinical factors on disease progression and response to therapy. Lastly, as the study duration was limited to12 months, seasonal variations and longer-term trends in EPTB incidence and distribution could not be explored.

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