

A Study to Find the Prevalence of Pulmonary Tuberculosis among the Diabetes Individuals using Ziehl Neelsen StainingSwetha Sutrave¹, Pedapati Kasturi², T Jaya Chandra³¹Assistant Professor, Department of Biochemistry, ASRAM Medical College, Eluru.²Associate Professor, Department of Microbiology, ACSR Government Medical College, Nellore.³Professor, Department of Microbiology, GSL Medical College, Rajahmundry.

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Conflict of interest: Nil

Abstract:

Introduction: Tuberculosis (TB) is a world pandemic, bacterial disease caused by *Mycobacterium tuberculosis* (MTB) complex. Diabetes mellitus (DM) is a metabolic disorder, very common in low and middle income countries (LMICs) such as India. A study was undertaken to find the prevalence of pulmonary tuberculosis (PT) among the diabetes individuals using Ziehl Neelsen (ZN) staining.

Methods: It was a prospective research conducted in the department of Microbiology, GSL Medical College. Study protocol was approved by the Institutional Ethics Committee. Study was conducted between June to September 2023. Informed written consent was taken from the study participants. Individuals aged ≥ 18 years, with cough for ≥ 2 weeks were included in this research. Detailed clinical history was collected and study was explained. Sputum specimen collection was demonstrated practically. New, sterile sample containers were provided and asked for specimen collection. Smears were predated and stained by ZN technique as per the guidelines. Simultaneously fasting blood sample was collected by venue puncture by following the universal safety precautions, serum glucose was estimated by automated analyser as per the manufacturer instructions. Chisquare test was used for statistical analysis and $P < 0.05$ were considered to be statistically significant.

Results: Total 232 members were included. 41.4 years was mean age. In this 58 (25%) were diabetes. Total 48 (20.7%) PT cases were identified; in this 7.3% (17) were diagnosed in DM and 13.4% (31) were identified in non DM individuals; statistically there was no significant difference.

Conclusion: There was high prevalence of PT among the DM individuals. Studies for long duration with high sample size is recommended.

Keywords: Study, Prevalence, Stain, diabetes, pulmonary tuberculosis.

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Introduction

Tuberculosis (TB) is a world pandemic, bacterial disease caused by *Mycobacterium tuberculosis* (MTB) complex; airborne mode is the main transmission route. [1] Various techniques were introduced to diagnose this white plague, sputum microscopy by Ziehl Neelsen (ZN) stain was considered to be the more advantageous. [2] Cell mediated immunity (CMI) is the most important defensive mechanism against MTB. [1]

Diabetes mellitus (DM) is a metabolic disorder, very common in low and middle income countries (LMICs) such as India. [3] According to the WHO report, DM is the ninth leading cause of global deaths. [4] Defect in CMI, deficiency of nutrients, renal failure are the few important changes among the DM individuals. As per the reports, in the infected individuals there is 3 times risk of developing active TB. [1]

A study was undertaken to find the prevalence of pulmonary tuberculosis (PT) among the diabetes individuals using ZN staining.

Methods

It was a prospective research conducted in the department of Microbiology, GSL Medical College. Study protocol was approved by the Institutional Ethics Committee. Study was conducted between June to September 2023. Informed written consent was taken from the study participants. Individuals aged ≥ 18 years, with cough for ≥ 2 weeks were included in this research. Non cooperative members were not considered in the research.

After recruiting the participant in the study, detailed clinical history was collected. All the findings were recorded in the study proforma. The study was clearly explained in the local language. The participants were allowed to ask doubts. After

clarifying all the doubts beyond the knowledge sputum collection was explained and demonstrated. New, sterile sample containers were provided and asked to collect good quality sputum as per the guidelines. Immediately smears were predated and stained by ZN technique. Specimen collection, smear preparation staining and smear grading were carried as per the guidelines. [2, 5]

Simultaneously fasting blood sample was collected by venue puncture by following the universal safety precautions in heparin anticoagulant tube. It was centrifuged at 3000rpm for 10 mnts. The serum was used for glucose estimation. Blood parameters were estimated by automated analyser as per the manufacturer instructions as well as by using standard guidelines. [6, 7]

Statistical Analysis: The data were analysed using SPSS version 21. It was presented in mean and percentage. Chisquare test was used for statistical analysis and $P < 0.05$ were considered to be statistically significant.

Results

Total 232 members were included in this study. The mean age of the study members was 48.4 years. In this 58 (25%) were diabetes. DM and non DM ratio was 3. Total 48 (20.7%) PT cases were identified; in this 7.3% (17) were diagnosed in DM and 13.4% (31) were identified in non DM individuals; statistically there was no significant difference between PT and diabetes (Table 1).

Table 1: Correlation between diabetes and PT among the study members; n (%)

| Clinical condition | DM | Non DM | Total |
|----------------------|---|-----------|------------|
| PT | 17 (7.3) | 31 (13.4) | 48 (20.7) |
| Non PT | 41 (17.7) | 143 (62) | 184 (79.3) |
| Total | 58 (25) | 174 (75) | 232 (100) |
| Statistical analysis | Ψ^2 value = 3.5024; P value = 0.062179 | | |
| | No statistical significance | | |

Discussion:

India one of the LMICs with high population where there is increased incidence of DM. Diabetes has surged to epidemic levels in numerous emerging economies, notably in countries like China and India. [8] There was increase in the burden of DM in LMICs and high income group had low burden. [9] Urbanization, increased population, unhealthy food habits are some of the causes for increase in DM in India.

As per the International Diabetes Federation (IDF), diabetes affects 8.8% of the adult population with a higher rate among the men. [10] In the current research also rate of DM was high among the adults, 41.4 years was the mean age. In the current research, out of 232 (100%) members, DM was detected in 25% (58) individuals. Very few studies were reported from this subcontinent regarding the prevalence of DM. In a recent report from Kerala, there was alarming growth of DM; 60% of participants with base line glucose were turned to be DM. [11]

The current research was conducted with an aim to find the incidence of PT among the diabetes individuals. With this, 48 (20.7%) PT cases were identified using ZN staining; in this 7.3% (17) were diagnosed in DM and 13.4% (31) were identified in non DM individuals; statistically there was no significant difference between PT and diabetes (Table 1). DM and PT are prevalent in India. [12] Approximately 15% of adult with PT are thought to be linked with DM, this is closely mirrors the association between HIV and TB. [13] Variations in literature is available in

the prevalence of PT among the DM individuals; In a report from Pune, out of the 630 adult study participants, just 18% were only the PT individuals but 70.5% were diagnosed to be DM. [14] In another research, just 1465 per 1 lakh DM members were reported to be PT. [15] It was also reported that in PT cases there is high incidence of DM. [16]

Though statistically there is no significant difference in DM and PT relationship in this study we should screen all the PT cases for DM and vice versa. Because it was clear in the literature that each individual with undiagnosed PT can spread infection for a minimum of 10 – 12 per annum. [5] So the pathogen may spread exponentially in high populated country like India. Individuals with signs and symptoms of PT were only considered, limitation of this research. Studies for long duration with high sample size in general public is recommended.

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