



PREVALENCE OF TUBERCULOSIS : STUDY IN FORENSIC AUTOPSY

Dr Sudha A Jain*	Associate Professor, Department of Pathology, Surat Municipal Institute of Medical Education & Research (SMIMER), Surat *Corresponding Author
Dr Rina Lathia	R -3 Department of Pathology, Surat Municipal Institute of Medical Education & Research (SMIMER), Surat
Dr Gunjan Jain	R- 1 Department of Paediatrics, Govt Medical College, Surat

ABSTRACT **Background:** Tuberculosis is a major cause of morbidity and mortality in developing countries. There are many cases of tuberculosis which remain undiagnosed and are diagnosed only after death.

Aim: This study was done to determine the prevalence of tuberculosis in undiagnosed/ unexpected death. So as to ascertain the proportion of case which were not diagnosed during life or not expected.

Materials and Methods: This retrospective study was conducted on cases brought for forensic autopsy in department of Pathology, SMIMER, a tertiary care medical centre from the year August 2011 to July 2017. The brief history, post-mortem findings, histopathological findings & identification of mycobacterium bacilli after special stain were done. All histopathologically confirmed cases of sudden death due to tuberculosis were included in the study.

Results: Out of the total 2971 autopsies, 117 cases had findings of tuberculosis. Males outnumbered females, and the highest number of tuberculosis cases were observed in males in the age-groups of 31 to 40 years (30.77%). Tuberculosis as to be the primary cause of death was observed in 3.93% of the cases. There were 35% cases of disseminated/extra pulmonary tuberculosis & miliary tuberculosis was seen in 25.6% of the cases.

Conclusion: The chance finding of tuberculosis in forensic autopsy cases in this study highlights that there are undiagnosed cases of active tuberculosis who are not seeking proper medical attention and these cases may pose as a source of transmission to the general public, health-care providers and mortuary staff. So awareness of tuberculosis is essential for minimising missed diagnosis.

KEYWORDS : Forensic autopsy, Tuberculosis, Active, Inactive, Infection, Mortuary staff

Introduction:

Tuberculosis is endemic in many parts of the world and remains a major respiratory cause of morbidity and mortality. It has been identified as a 'global emergency' by the WHO^[1]. One third of the world's current population has been infected with *M. tuberculosis*, and new infections occur at a rate of one per second¹. Latent infection is however, most common and about 10% of it eventually progresses to active disease, which, if left untreated, kills more than half of its victim. India is the highest TB burden country in the world, accounting for one-fifth of the global incidence with an estimated 1.96million cases annually.^[1]

The prevalence of tuberculosis is high in the Indian subcontinent, and reason for this is drug resistance, HIV infection, lack of access to health care, Ineffective preventive control programme, so many cases may not be diagnosed until after an autopsy is performed^[2]. Most cases of TB are pulmonary and acquired by person to person transmission of airborne droplets of organism^[3]. The hallmark of *Mycobacterium tuberculosis* infected tissue is necrotizing granulomatous inflammation, composed of epithelioid histiocytes surrounding a central necrotic zone, and can be accompanied by a variable number of multinucleated giant cells and lymphocytes. Nonnecrotizing granulomas can be present as well.^[4] The most common form is pulmonary tuberculosis, characterized pathologically by necrotizing granulomas, associated pneumonia, and a great propensity for fibrosis and dystrophic calcification^[5]

Sudden death due to tuberculosis is uncommon; however since it is a common disease in India, its causal relationship with sudden death should be kept in mind. Present study was done to understand the problem status of sudden death from tuberculosis. In forensic practice, most of the cases brought for post-mortem examination are of unknown background with unknown history and as such the risks of infection from these bodies do exist. It is a known fact that autopsy is an exceptionally efficient method of transmitting TB from the dead body to those present in the autopsy room.^[5]

MATERIAL & METHOD:

This retrospective study was conducted in department of Pathology, SMIMER, Surat a tertiary care medical centre in South Gujarat, from year August 2011 to July 2017 on all the cases which were brought from forensic autopsy for histopathology. Basic demographic data such as

the age, sex & available medical history were recorded. Specimens were received in 10% formalin. Gross examination was performed and representative sections from both lung & other organs were submitted. Haematoxylin & Eosin stain was used during histopathological examination. Identification of *Mycobacterium tuberculosis* was done by special stain (Ziehl – Nelson stain). The histomorphological pattern noted, the distribution of the lesions and the morphological features of the tissue reaction. Other nonneoplastic findings in adjacent lung parenchyma were noted as well. The hallmark of the disease was granulomatous inflammation having caseous necrosis. On tissue section, non caseating granulomas were also present with fibrosis and calcification. Other causes of granulomatous inflammation were excluded by careful microscopic examination and application of special stains wherever required.

Data analysis:

Data entry has been done in Microsoft Excel in SPSS Version 18 software.

RESULTS:

Out of a total of 2971 autopsy cases received for histo-pathological examination from August 2011 to July 2017, we found that confirmed cases of sudden deaths due to tuberculosis based on gross & histopathological examination were 117 cases (3.93%), Mean age of this group was 40 years. Highest no of TB cases were observed in males in the age group of 31-40 years followed by 41 -50 years as shown in table no. 1. Male (78.63%) outnumbers the females. The lungs were the most frequently affected organ (table no 2).

Grossly lungs were involved in 90 cases. Of these, 30 lungs showed multiple grey-white nodules, 40 lungs showed caseating areas, 10 lungs showed cavitory lesion, 6 lungs showed pneumonia & 4 lungs showed fibrosis on gross examination.

Histopathological findings were restricted to lungs in 94% of cases, extra pulmonary spread was observed in 35% of cases & miliary spread seen in 25.6% of cases. Most common target organs were liver, spleen & kidney. Epithelioid cell granulomas were found in all patients, however only 54 cases were positive for Acid – fast bacilli on ZN stain.

It is observed that high prevalence of tuberculosis cases was seen in

2011 & lowest in 2012. There was no definite rise in frequency of tuberculosis.

Table 1: Organ involment by tuberculosis

Organ	No. of case	Percentage
Brain	01	1%
Heart	05	5%
Lung	110	94%
Liver	18	17%
Spleen	15	14.2%
Kidney	08	8%

Table 2: Age & sex wise distribution of the Tuberculosis positive cases

Age	Male	Female	Total
0-10	-	-	-
11-20	03	07	10(8.55%)
21-30	15	04	19(16.24%)
31-40	29	07	36(30.77%)
41-50	26	02	28(23.93%)
51-60	11	01	12(10.26%)
61-70	06	02	08(6.84%)
71-80	02	02	04(3.41%)
Total	92	25	117(100%)

Table 3: Frequency and profile of tuberculosis cases by year

Year wise distribution of cases	2011	2012	2013	2014	2015	2016	2017
Total no. of cases	180	352	486	540	533	547	333
TB cases(no & present)	14(7.7%)	06(1.7%)	23(4.73%)	25(4.63%)	24(4.5%)	16(2.9%)	09(2.7%)



Fig.1 Multiple Tubercles in lung on Gross Examination

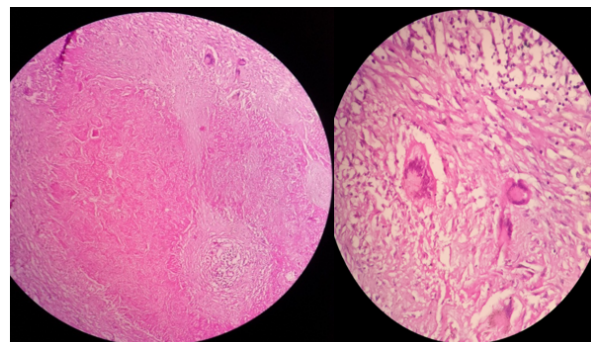


Fig 2.caseous necrosis in the centre of tubercle surrounded by epithelioid histiocytes, lymphocytes & langhan's giant cells.

DISCUSSION:

TB is an infectious disease caused by the bacillus mycobacterium tuberculosis. It typically affects the lungs (pulmonary) but can affect other sites as well (extra pulmonary). Several studies have shown that many cases of TB were diagnosed at autopsy. The morbidity and mortality of tuberculosis has decreased tremendously in developed countries but is found to exist still in higher rates in developing countries and especially among population of low socioeconomic status.

In a study by Pavic *et al.*,^[6] clinically unrecognized active TB occurred more often in men than women, especially in younger age-groups Aziz et al.^[7] in a study on 46 cases of tuberculosis of lung observed a bimodal distribution with a younger age group of less than 30 years and an older age group of more than 50 years. In our study most of the patients were in forth decade of life with male predominance. Ganapathy et al^[8]. observed a male predilection. The reasons for this are unclear. It could be due to epidemiological differences, exposure to risk of infection, and progression from infection to disease.

TB can affect any organ, 70-80% cases suffer from pulmonary TB. Study done by M Garg et al^[9] shows that 90% of patients had pulmonary tuberculosis, 30% of patients had extra pulmonary tuberculosis & 10 % had a miliary tuberculosis, which was comparable to our study. In the present study, 94% of the cases had lung involvement while disseminated/extra pulmonary TB was seen in 35% cases.

Hassan and Hanna have reported approximately 2% of all sudden deaths due to tuberculosis in Baghdad.^[10] In their study tuberculous cavitation was the principle finding in 75% of the cases followed by miliary tuberculosis in 10.1% cases. Bobrowitz conducted a study on 21 deaths due to tuberculosis (undiagnosed till autopsy) of which 11 were due to pulmonary tuberculosis and 10 due to miliary tuberculosis.^[11] Flavin et al reported 0.3% cases of TB from 4930 autopsies over a period of 14 years out of which 67 % remain undiagnosed till autopsy^[12]. In our study, 3.84 % of the cases had TB and these cases were diagnosed only during autopsy..

Acid fast bacilli positivity was seen in 46.15 % in the present study. Similarly, Park et al.^[13] observed microbiologically confirmed pulmonary tuberculosis in 50% of patients. The bacilli are normally scanty in tuberculous tissue and their identification with ZN stain requires careful examination. Failure to demonstrate them does not exclude a diagnosis of tuberculosis.

Ante mortem diagnosis of tuberculosis is not always possible. Several similar studies have shown that many cases of tuberculosis were diagnosed only at autopsy, when awareness of possibility of the disease is low. There are several reasons to know why the diagnosis is missed or delayed. Reasons range from symptomatic patients not seeking medical attention, to doctor not investigating the possibility of tuberculosis despite suspicious symptomatology. Occasionally the diagnosis is delayed or missed because the doctor did not enquire about exposure to tuberculosis and patient did not volunteer that information. Occasionally doctor does not consider the diagnosis because of concurrent illness that can produce symptoms that are indistinguishable from tuberculosis.^[15]

Active tuberculosis has implications for the health of autopsy room staff, autopsy room design and ventilation, choice of protective equipment and for the public health service. Protective strategies should include assessment of the risk of a case being infected, early recognition of gross lesions, use of methods for reducing the production of infected aerosols and protection against any aerosols created including anti-air droplet infection at autopsy.

The importance of diagnosis is that disease is curable, if diagnosed, but fatal if undiagnosed^[14-16].

Conclusion:

Tuberculosis causes unnecessary death, because of failure to diagnose and treat, what is today a curable disease. There is a need for more awareness of the disease, especially in the light of recent reports showing a growing incidence of extra-pulmonary tuberculosis. The risk of unrecognized tuberculosis not only extends to public but also to the health professional. Measures to minimise the risk to mortuary staff include the use of proper respiratory masks and performing the autopsy in the infection suit, which isolates the body and minimises exposure to staff. Autopsies are still indispensable for providing quality control and disease statistics.

Undiagnosed tuberculosis may be a health hazard to the public and healthcare providers. These cases form a substantial number in autopsy studies, probably representing the tip of the iceberg and indicating seriousness of the problem of tuberculosis.

Protective strategies like risk assessment, early diagnosis, recognition

of lesions, use of methods to reduce infection transmission, and effective regular treatment are advocated to curtail the spread of tuberculosis^[14-16]

REFERENCE

1. V. M. Vashishtha, "Current status of tuberculosis and acute respiratory infections in India: much more needs to be done!," *Indian Pediatrics*, vol. 47, no. 1, pp. 88–89, 2010.
2. Ozsoy S, Demirel B, Albay A, Kisa O, Dinc AH, Safali M. Tuberculosis prevalence in forensic autopsies. *Am J Forensic Med Pathol*. 2010; 31(1):55-7.
3. Mamta Gupta et al, A Histomorphological Pattern Analysis of Pulmonary Tuberculosis in Lung Autopsy and Surgically Resected Specimens, *Pathology Research International* Volume 2016, pp.1-7
4. Saunders B. M., Cooper A. M. Restraining mycobacteria: role of granulomas in mycobacterial infections. *Immunology and Cell Biology*. 2000;78(4):334–341. doi: 10.1046/j.1440-1711.2000.00933.x. [PubMed] [Cross Ref]
5. Sharma BR, Reader MD. Autopsy room: A potential source of infection at work place in developing countries. *Am J Infect Dis* 2005;1:25-33.
6. Pavić I, Radulović P, Bujas T, Perić Balja M, Ostojić J, Baličević D. Frequency of tuberculosis at autopsies in a large hospital in Zagreb, Croatia: A 10-year retrospective study. *Croat Med J* 2012;53:48-52.
7. Aziz R., Khan A. R., Qayum I., ul Mannan M., Khan M. T., Khan N. Presentation of pulmonary tuberculosis at Ayub Teaching Hospital Abbottabad. *Journal of Ayub Medical College, Abbottabad*. 2002;14(1):6–9. [PubMed]
8. Ganapathy S., Thomas B. E., Jawahar M. S., Selvi K. J. A., Sivasubramaniam, Weiss M. Perceptions of gender and tuberculosis in a south Indian urban community. *The Indian Journal of Tuberculosis*. 2008;55(1):9–14. [PubMed]
9. Garg M, Aggarwal AD, Singh S, Kataria SP. Tuberculous lesions at autopsy. *J Indian Acad Forensic Med* 2011;33:116-9.
10. Hassan DN, Hanna AJY. Tuberculosis and sudden death in Baghdad. *Am J Forensic Med Pathol*. 1984; 5:169-174.
11. Bobrowitz ID. Active tuberculosis undiagnosed until autopsy. *Am J Med*. 1982; 72: 650-658.
12. Flavin RJ, Gibbons N, O'Briain DS. Mycobacterium tuberculosis at autopsy – exposure and protection: an old adversary revisited. *J Clin Pathol*. 2007; 60:487-491.
13. J. S. Park, Y. A. Kang, S. Y. Kwon et al., "Nested PCR in lung tissue for diagnosis of pulmonary tuberculosis," *European Respiratory Journal*, vol. 35, no. 4, pp. 851–857, 2010.
14. P. Rastogi, T. Kanchan, and R. G. Menezes, "Sudden unexpected deaths due to tuberculosis: an autopsy based study," *Journal of Forensic Medicine and Toxicology*, vol. 28, no. 2, pp. 77–81, 2011.
15. Anand T., Arun Kumar D., Sharma N., et al. Perception of stigma towards TB among patients on DOTS & patients attending general opd in Delhi. *Indian Journal of Tuberculosis*. 2014;61(1):35–42. [PubMed]
16. Collins CH, Grange JM. Tuberculosis acquired in laboratories and necropsy rooms. *Commun Dis Public Health* 1999;2:161-7.