

A Retrospective Study of Pulmonary Tuberculosis (PTB) Prevalence among Patients in Eastern Nigeria Medical Centre Enugu, Nigeria

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Abstract

A retrospective study aimed at ascertaining the prevalence of Pulmonary TB amongst patients visiting Eastern Nigeria Medical Centre, Enugu State was conducted between September, 2015 and November, 2015. Sputum samples were obtained from one hundred and twenty patients. Samples were smeared on glass slides, stained using Ziehl Neelsen Stain and observed under light (oil immersion) microscopy. Data obtained were analysed using SPSS Statistic Base 17.0, where descriptive analyses such as sum, percent distribution, and mean, were computed. While Chi-Squared Goodness of Fit, degree of differences, p-value in order to statistically determine if any significance between variables such as age groups, sex of subjects, AFB positivity and prevalence existed. The results showed positive results for tuberculosis with prevalence of 42 (35%) out of 120 subjects. The age group 21-30 years had the highest prevalence of 18 (43%) out of 42 of PTB positive subjects. There was no significant difference between sex of subjects with PTB positivity (X^2 : 1.33 at $P= 0.12$). There was significant difference between age groups of subjects with PTB positivity (X^2 : 33.18 at $P= 0.01$). It is observed that PTB is still a serious health burden in this part of the world, thus, there is need for improved TB awareness, treatment and control programme.

Keywords: Tuberculosis (TB), Pulmonary, Ziehl Neelsen.

Introduction

Tuberculosis (TB) remains one of the leading global infectious killer diseases around the world. (CDC, 2015)

TB has become second ranked in global disease burden, which means that millions of people have been infected by TB bacteria (WTD, 2008). Any person with compromised immune system like people who are infected with HIV, people who use tobacco, malnourished persons or diabetics have a much higher risk of falling ill (CDC, 2014). TB is still a major public health burden in Nigeria, with the country ranking 5th among the 22 high burden countries which collectively bear 80% of global burden of TB. (WHO, 2012).

Tuberculosis is an infectious disease that occur in pulmonary and extra pulmonary sites caused by various strains of mycobacterium normally *Mycobacterium tuberculosis* (USAID).

M. tuberculosis is also carried in airborne particles known as droplet nuclei, of 1–5 microns diameter (Khan, 2006). TB is spread from person to person through the air. Germs are expelled into the air when people with pulmonary TB cough, spit or sneeze. It requires just inhaling a few germs to become infected. Only people with active TB can spread the disease to others. (Taura *et al.*, 2008)

Factors that determine them, tuberculosis transmission includes

Susceptibility -Susceptibility (immune status) of the exposed individual. (Shetty *et al.*, 2006)

Infectiousness- Infectiousness of the person with TB disease is directly related to the number of tubercle bacilli that he or she expels into the air. (De jong *et al.*, 2010)

Environment- Environmental factors that affect the concentration of *M. tuberculosis* organisms are space, ventilation, air circulation and specimen handling (Gupta, *et al.*, 2011).

The people that at risk of TB are

HIV infected patient, younger children under 5 years of age, persons who were infected with *M. tuberculosis* within the past 2 years, persons that have history of untreated or inadequately treated TB disease and individuals that receive immunosuppressive therapy like immunosuppressive drug therapy following organ transplantation (WHO, 2008). Others are persons that suffer diabetes mellitus, silicosis, leukaemia, or cancer of the head, neck, lung and chronic renal failure, persons who had past history of gastrectomy or jejunioileal bypass, persons who weigh less than 95% of their ideal body weight, cigarette smokers and persons who abuse drugs or alcohol (WHO, 2011). Also populations defined locally as having an increased incidence of disease due to *M. tuberculosis*, including medically deprived and low-income populations. (Alan, 2002)

Early symptoms of active TB can include fever, weight loss, night sweats, and loss of appetite. Symptoms may become chronic and more debilitating with cough, bloody sputum (saliva) and chest pain. Symptoms of extra pulmonary TB, depends upon the organ or area affected (Corbett *et al.*, 2006)

Adequate ventilation and limited contact with patients can prevent TB. Latent TB is a phenomenon when people who are infected with *Mycobacterium tuberculosis* but do not get sick nor spread the bacteria to others (Vestal, 1997).

TB vaccine called BCG (Bacille Calmette-Guérin) has been recommended by World Health Organization for infants (Jan *et al.*, 1992). BCG is fairly effective in protecting small children from severe TB complications but in adult, it does not protect well against lung TB. (Rusch-Gerdes *et al.*, 2006)

Objective of this study are

1. To determine the number of patients infected with pulmonary tuberculosis by sputum examination in Enugu metropolis.
2. To ascertain gender and age predilection.
3. To compare results obtained with that of other researchers.

Materials and methods

The study was done in Eastern Nigeria Medical Centre Enugu, Nigeria.

Targeted groups, sample size and sample collection

Six age groups were selected for this study, which were 11-20, 21-30, 31-40, 41-50, 51-60 and 61- above years of age respectively.

A total of one hundred and twenty (120) patients cutting across age groups and of both sex were surveyed. Three sputum samples of early morning spot were collected from each patient. Patients were told to cough deeply into a sterile container at a well ventilated environment and away from people. The obtained sputum samples after firmly closing the lid were registered immediately after collection; the side and cap of the container were labelled accordingly, and stored in a cool, dry and dark place (WHO, 2010). The sample collection was done between September 2015 to November, 2015. The smear was prepared using Ziehl Neelsen Staining method according to WHO guideline. (WHO, 2000)

Microscopy identification of acid fast bacilli (AFB)

The smear was stained, dried and viewed under oil immersion using electric light microscope. AFB is seen as a fine red rod against blue background. Interpretation of results was done using guideline given by WHO. (WHO, 2006)(Sharma *et al.*, 2011)

Statistical Analysis: Data obtained were analysed using SPSS Statistic Base 17.0, where descriptive analyses such as sum, percent distribution, and mean e.t.c. were computed. While Chi- Squared Goodness of Fit, degree of differences, p- value in order to statistically

determine if any significance between variables such as age groups, sex of subjects, AFB positivity and prevalence existed.

Results

The retrospective study of total number of 120 Patients who have TB and who did not have TB was obtained in Infections disease clinic of Eastern Nigeria Medical Centre, Enugu. 76 of them i.e. 63 % were male and 44(37%) were female.

The study also shown PTB prevalence of 42(35%) out of 120 subjects (table 1), with highest prevalence of 28 (23%) among male subjects in table 2 below. It was observed in (table 2 and figure 4) that patients in age group at 21-30 years were the most affected 48 (40%). This was followed by patients in 31-40 age groups of 24 (20%). Patients in age group of 10-20 years and patients in age group of 61 and above did not show positive results. It was also observed that out of 120 samples, 78 (65%) showed negative AFB test.

The mean age of the distribution was 36, the median age was 32, the modal age distribution was 21-30 and the age range was 54.

There was no significant difference between sex of subjects with PTB positivity (X^2 : 1.33 at $P= 0.12$). There was significant difference between age groups of subjects with PTB positivity (X^2 : 33.18 at $P= 0.01$).

Table 1: Sex Distribution of Occurrence of *M. Tuberculosis*

Sex	Absolute Frequency	Relative Frequency (%)
Male	28	24%
Female	14	11%
Total	42	35%

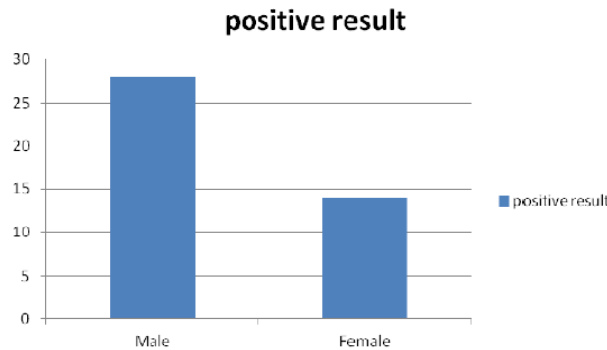


Figure 1: Bar chart showing the positive result among sex

Table 2: Age Distribution of Occurrence of *M. tuberculosis*

Age Group (Year)	Absolute Frequency	Relative Frequency (%)
11-20	12	10%
21-30	48	40%
31-40	24	20%
41-50	12	10%
51-60	18	15%
61-above	6	5%

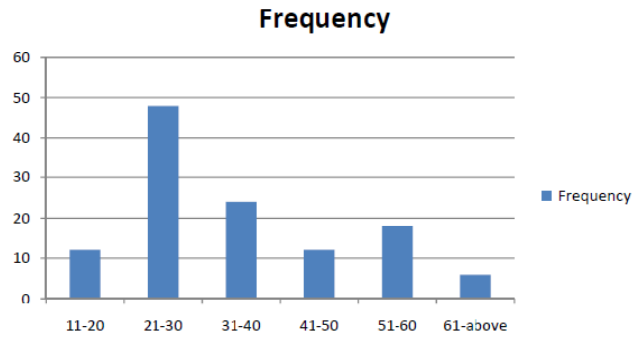


Figure 2: Bar chart showing positive result among age group.

Table 3: Frequency distribution of Positive and Negative result

Result	Absolute Frequency	Relative Frequency (%)
Positive	42	35%
Negative	78	65%

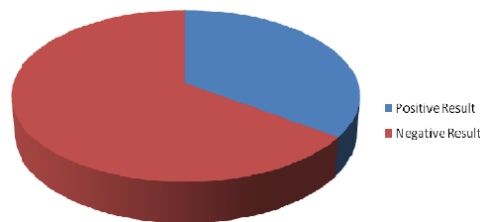


Figure 3: Pie chart showing positive and negative result.

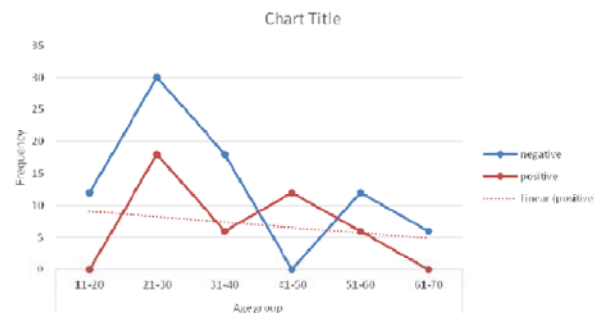


Figure 4: Scatter diagram of specimen result by age.

Discussion

The study analysis showed 21-30 age group having the highest percent distribution of 48 (40%) out of 120, followed by 31-40 age group with percent distribution of 24(20%) and male subjects had the higher distribution among the sexes 28 (24%) out of 120 subjects. The result of the current study showed PTB prevalence of 42(35%) out of 120 subjects within the period of the study. Highest prevalence of 18 (43%) out of 42 AFB positive subjects was obtained from 21-30 age group. This corroborates WHO (2000) study which asserts that it is safe to estimate that 50 percent of the population above the age of 20 years is infected and remain at risk of the disease throughout their lifetime. It might be reasonable to say that at this age, most individuals experience increased interaction and environment physical stress and exposure which may increase the susceptibility of their contracting infections. It was also observed that prevalence of PTB is higher in male among sexes 28(24%) out of 42. This has vividly shown that male subjects are more infected than the rest of the population. These figures were similar to findings by NTI (1974) which documented the prevalence of PTB that

among adults in India was 35% and 25% in males and females respectively. It also corroborates the work of Taura *et al.*, 2008 where male subjects had prevalence of 61.5% as against 38.5% in the females. This could be due to the fact that male subjects are more exposed to risk factors of TB such as smoking which can make them more prone to the infection. The prevalence of TB within the study area was high. The result showed that 35% of the total sample population had a positive result. A picture of the larger population can be seen from this analysis and it can be deduced that tuberculosis disease is still a health menace in Nigeria.

Social factors prove tuberculosis as a social disease with medical aspects welfare. The social factors may be associated with non – medical factors like low quality of life, poor housing and overcrowding, over population, malnutrition, lack of education, large families, and lack of awareness of cause of illness; of which many communities in Nigeria are experiencing. All these factors are interrelated and contributed to the occurrence and spread of tuberculosis. Equally, there has been a decline in public health measures in many parts of developing countries, such as lack of access to childhood vaccination programmes, inadequate ante-natal care in pregnancy, and inadequate fund releasing for research into diseases like TB. (WHO, 2008)

Conclusion

This research is concerned with the retrospective study with the prevalence of tuberculosis among patients in Eastern Nigeria Medical Centre, Enugu State. It was observed that high rate of ingestion of *Mycobacterium tuberculosis* was prevalent in males than in female generally; the frequency was relatively high with regards to the entire population. This can be explained by the apparent low standard of living and inadequate social and welfare services in Enugu State.

The individuals most susceptible to TB infection were those within the age bracket of 21 and 30 years. This class of people are those involved in active social activities and invariably, exposed to more TB attack. This implies that the fight against TB cannot be said to be complete without incorporating sexual education / re-orientation, strict adherence to Directly Observed Treatment Short course (DOTS)(Vijay *et al.*, 2004), Health education, personal hygiene, improved social and public health services, in order to curb / control the disease.

Recommendation

Sexual education / re-orientation: Due to the close relationship between HIV/AIDS and pulmonary tuberculosis, it is important that proper sexual education is done especially among teenagers in secondary school. This will go a long way in improving the immune status of the populace at large.

Strict adherence to Directly Observed Treatment Short course (DOTS): This is the current regimen which is involves initial intensive therapy of 2 months duration followed by maintenance therapy. The direct observation will ensure proper compliance to prevent drug failure.

Health education: This should be incorporated in the school curriculum such that at the formative stages, pupils/students are able to identify the symptoms and management of pulmonary tuberculosis.

Personal hygiene: Improved personal hygiene with proper ventilation will prevent spread of PTB which is airborne.

Improved social and public health services, in order to curb / control the disease: Availability of health care services especially at primary level in the rural areas will go a long way in controlling PTB.

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References

- [1.] Alan, R.L., Dzung, T., Ann, O.F., Wendy, A.M., and Kaying, H. (2002). Prevalence of Tuberculosis, Hepatitis B virus and Intestinal Parasitic infections among refugees to Minnesota, Public Health reports, 117:69-77.
- [2.] Centers for Disease Control and Prevention (2015). TB Basic facts. CDC/TB/Basic TB Facts. Available on line at <http://www.cdc.gov/tb/topic/basics/default.htm>
- [3.] Centers for Disease Control and Prevention (2014). TB Basic facts. CDC/TB/Basic TB Facts/Risk Factors. Available on line at <http://www.cdc.gov/tb/topic/basics/risk.htm>
- [4.] Corbett, E.L, Marston, B., Churchyard, G.J and De Cock, K.M. (2006), Tuberculosis in sub-Saharan Africa: opportunities, challenges, and change in the era of antiretroviral treatment. *Lancet* 2006; **367**:926.
- [5.] deJong, B.C, Antonio, M. and Gagneux, S. (2010). Mycobacterium africa num: review of an important cause of human tuberculosis in West Africa. *PLoS Negl Trop Dis* 2010; **4**:e744.
- [6.] D'souza, D.T., Mistry, N.F., Vira, T.S., Dholakia, Y., Hoffner, S., Pasvol, G., Nicol. M. and Wilkinson, R.J (2009): High levels of multidrug resistant tuberculosis in new and treatment-failure patients from the Revised National Tuberculosis Control Programme in an urban metropolis (Mumbai) in Western India. *BMC Publ Health.*, 9: 211-10.1186/1471-2458-9-211.
- [7.] Gupta, S., Shenoy, V.P., Mukhopadhyay, C., Bairy, I. and Muralidharan, S. (2011): Role of risk factors and socio-economic status in pulmonary tuberculosis: a search for the root cause in patients in a tertiary care hospital, *South India. Trop MedInt Health.*, 16 (1): 74-78. 10.1111/j.1365-3156.2010.02676.
- [8.] Jain, N.K., Chopra, K.K., Prasad, G., (1992): Initial and acquired isoniazid and rifampicin resistance to *Mycobacterium tuberculosis* and its implication for treatment. *Indian J Tuberc.* 39: 12-14.
- [9.] Khan, Q.H. (2006): Epidemiology of pulmonary tuberculosis in rural Aligarh. *Indian J Community Med. (1)*: 39-40. 10.4103/0970-0218.54938.
- [10.] Rüsich-Gerdes, S., Pfyffer, G.E., Casal, M., Chadwick, M. and Siddiqi, S. (2006): Multicenter Laboratory validation of the BACTEC MGIT 960 technique for testing susceptibilities of *mycobacterium tuberculosis* to classical second-line drugs and newer antimicrobials. *J Clin Microbiol.* 44 (3): 688-692. 10.1128/JCM.44.3.688-692.2006.
- [11.] Sharma, S.K., Kaushik, G., Jha, B., George, N., Arora, S.K., Gupta, D., Singh, U., Hanif, M. and Vashisht, R.P. (2011): Prevalence of multidrug-resistant tuberculosis among newly diagnosed cases of sputum-positive pulmonary tuberculosis. *Indian J Med Res, 133*: 308-311.
- [12.] Sharma, S.K., Kaushik, G., Jha, B., George, N., Arora, S.K., Gupta, D., Singh, U., Hanif, M. and Vashisht, R.P. (2011):Prevalence of multidrug-resistant tuberculosis among Category II pulmonary tuberculosis patients. *Indian J Med Res, 133*: 312-315.
- [13.] Shetty, N., Shemko, M., Vaz, M. and D'souza G (2006): An epidemiological evaluation of risk factors for tuberculosis in south India: a matched case control study. *Int J Tuberc Lung Dis.*, 10 (1): 80-86.
- [14.] Taura, D.W., Sale, I.T and Mohammed, Y. (2008). The prevalence of Tuberculosis In patients attending the Infectious Disease Hospital, Kano, Nigeria. *Int. Jor. P. App. Scs.*, 2(3): 63-69.
- [15.] USAID Health: Infectious Diseases, Tuberculosis, Countries, Sudan. Available on line at: http://www.usaid.gov/our_work/global_health/id/tuberculosis/countries/africa/ssudan_profile.html
- [16.] Vestal, A.L. (1997): Procedures for isolation and identification of Mycobacteria, CDC Atlanta, Georgia: U.S. Department of Health, Education and Welfare, Publication No CDC-77-8230, 15-19.
- [17.] Vijay, S., Bala Sangameshwara, V.J., Jagannatha, P.S. and Kumar, P. (2004): Initial drug resistance among tuberculosis patients under DOTS Programme in Bangalore City. *Indian J Tuberc.*, 51: 17-21.
- [18.] World Health Organization (2006): Emergence of XDR-TB. WHO concern over extensive drug resistant TB strains that are virtually untreatable.

- <http://www.who.int/mediacentre/news/notes/2006/np23/en/index.html>. Accessed 17 January 2012
- [19.] World Health Organization (2000): Tropical Diseases Research; World Health Organization, Geneva, Switzerland.
- [20.] World Health Organization (2008): TB and Children in: Communicable disease: tuberculosis fact sheet. Geneva, Switzerland.
- [21.] World Health Organization (2010): Multidrug and extensively drug-resistant TB (M/XDR-TB); Available:http://whqlibdoc.who.int/publications/2010/9789241599191_eng.pdf. Accessed 26 March, 2013, global report on surveillance and response.
- [22.] World Health Organization (2011): Global Tuberculosis Control: WHO report, Available: http://www.who.int/tb/publications/global_report/gtbr11_full.pdf. Accessed 26 March, 2013
- [23.] World Health Organization (2012): Tropical Diseases Research; World Health Organization report, Africa.
- [24.] World Tuberculosis Day (2008). Country 3rd in Global TB Prevalence. Daily Trust (Abuja), 21 March 2008.