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PREVALENCE AND OCCURRENCE OF *MYCOBACTERIUM TUBERCULOSIS* IN OUTPATIENT DEPARTMENT OF STATE SPECIALIST HOSPITAL, OKITIPUPA, ONDO STATE, NIGERIA.

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Abstract

This study investigated the prevalence and occurrence of *Mycobacterium tuberculosis* in outpatient department of State Specialist Hospital Okitipupa, Ondo State. A total of one hundred (100) and ten (10) patients participated in the study, ten were however excluded because of incomplete data remaining hundred (100). Participant age ranged from 4 to 102 years with mean age of 36.35 years and standard deviation of 18.68. The total number of patients in different age groups reported varied; 3(3.0%) were less than 11years of age; 22(22.0%) were within 11-20 years age group; being the highest age group participants, 21(21.0%) were within 21-30 years age group; A total of 15(15.0%) were within 31-40 years age group; 20(20.0%) were within 41-50years age group; 12(12.0%) were within 51-60years age group; 3(3.0%) were within 61-70years age group; 2(2.0%) were within 71-80years age group; while the remaining 2(2.0%) was above 80years of age. The prevalence was higher in the males 8%, than the females 6%. The percentages of pulmonary tuberculosis positive patients were high in females of age group of (11-20) years 3%, while that of males were high in age group of (31-40) years 3% in this study. The results indicate that the TB disease is more prevalent in males than the females.

Keywords: *Mycobacterium tuberculosis,* Prevalence, occurrence, treatment, prevention

Introduction

Tuberculosis is a life-threatening disease. It ranks second in causing adult mortality among infectious diseases (WHO, 2008). It accounts for about 2 million deaths, 50 to 100 million infections and 8 to 9 million new cases every year worldwide (Fitzgerald *et al.*, 2009; Lienhardt *et.al.*, 2012a,b). Lienhardt *et.al.,* 2012b). It is caused by the bacterium, *Mycobacterium tuberculosis* described first by Robert Koch (Brudney and Dobkins *et al.*, 2008) but other species of Mycobacterium such as *M. bovis* and *M. africanum* , *M. canetti* , *M. microti* , *M. capsae and M. pinnipedii* can also cause tuberculosis which are collectively called as *Mycobacterium tuberculosis* complex (Philippe *et.al.*, 2015). Tuberculosis (TB) is a chronic infectious disease caused by bacteria generally referred to as *Mycobacterium tuberculosis*; almost every organ in the body can be affected, but involvement of the lungs account for more than 80% of tuberculosis cases. Tuberculosis affecting the lungs is called Pulmonary Tuberculosis (PTB), while

those affecting other organs are called Extra Pulmonary Tuberculosis (EPTB) (Federal Ministry of Health, 2010). The most important source of infection is an untreated Pulmonary Tuberculosis (PTB) patient. When such a person coughs, spits or sneezes, tiny droplet nuclei containing the tubercles are released. Transmission is through inhaling these droplet nuclei, (Federal Ministry of Health ,2010). Treatment success is measured by a standardized process of treatment outcome monitoring (TOM) is one of the pillars of TB control and along with case detection, is recognized as a key programmatic output. It is against this rationale that World Health Assembly (WHA) resolution was passed in 1991, adopting two targets for global tuberculosis control to detect at least 70% of new infectious cases and to cure at least 85% of those detected. These targets were linked to the Millenium Development Goals, and stop TB partnership set the year 2005 as the dead line for achievement (Dye and Floyd, 2006, Dye *et.al.*, 2013).

Globally, the treatment success rate exceeded the 85% target for the first time in 2008 since the target was set in 1991, with a percentage of 87% for patients starting treatment in 2007 (WHO, 2011). Further, more treatment success rates were not maintained nor improved between 2006 and 2007 in all World Health Organisation regions with the exception of the European region which recorded the lowest success rate globally at 67% (WHO, 2011). The importance of strengthening treatment outcome monitoring (TOM) in Europe has long been recognized. A statement put forward by the WHO and the International Union Against Tuberculosis, and Lung Disease underlined in 1998 the need for standardization and evaluation of treatment results for TB patients in the WHO European region including those in low and intermediate incidence countries (Veen *et al.,* 2008, CDC, 2011, Corbett *et.al.,* 2004)

Nigeria's TB control programme adopted the global target of detecting 84% of the estimated TB cases, and curing 87% of the detected cases by the year 2015 using the Directly Observed Treatment Short course therapy (DOTS) strategy, (WHO, 2013). While the latter target appears more readily achievable with Nigeria recording 73% treatment success by 2004 cohort, the case detection rate remained at low level of 22% compared to the global figure of 37% (WHO, 2008).

Ondo State is among the States being sponsored by the German Leprosy Relief Association, a Non-Governmental Organization for Tuberculosis Control. The German Leprosy Relief Association provides logistics for the effective control of tuberculosis in Ondo State. Recently the indigenes of Okitipupa a major community in Ondo State where the hospital is located seem to be very much concerned about the wide spread of *Mycobacterium tuberculosis* infection because of the number of TB patients seen in their locality and death cases recorded in Okitipupa. Therefore, the aim of the present study is to assess the prevalence and occurrence of *Mycobacterium tuberculosis* in outpatient department of state specialist hospital, Okitipupa, Ondo State, Nigeria.

Mycobacterium Tuberculosis pose a global threat to public health, therefore the findings from the study will help the Ondo State government to plan for training of more health workers to strategize in case finding and case holding. Also the findings from the study will enable health workers who are involved in the tuberculosis control programme to embark on health education as regards socio-demographic characteristics and prevalence using evidence based information. Findings

from the study will also assist all stakeholders to properly carry out evaluation of patients such as cohort analysis to give correct data which will enable health workers to reduce the prevalence and the incidence rate to the lowest level. Finding of the prevalence of TB in the State Specialist hospital, Okitipupa, Ondo State will provide useful information on both the prevalence and management outcome of MTB in Nigeria and other developing countries. Finally, the result will add to the existing body of knowledge in this area of study and provide some information to future researchers.

Nigeria is currently ranked 10th among the 22 high TB burden countries in the world (Federal Ministry of Health, 2010). Despite the support of Donor organizations such as the German Leprosy Relief Association and the introduction of DOTS, tuberculosis cases seem to be on the increase in most communities in Nigeria. Tuberculosis accounts for about 2 million deaths, 50 to 100 million infections and 8 to 9 million new cases every year worldwide (Frieden *et al.*, 2003). African region with a population estimate of 836,670,000 as at 2010, TB incidence was 2,300,000, prevalence of 2,800,000 and deaths of 250,000 (World Health Organisation, 2008). TB ranks second in causing adult mortality among infectious diseases (WHO, 2008). In Nigeria, it has the prevalence of 133 per 100,000 and 93,050 cases been registered in 2010 (FMoH, 2010). Almost every organ in the body can be affected, but involvement of the lungs (Pulmonary Tuberculosis) account for more than 80% of TB cases (Federal Ministry of Health, 2010). Also, the observed number of patients that troop into Okitipupa specialist hospital for diagnosis, follow-up and treatment is raising a public health concern. Some of these cases result to treatment failure due to inappropriate use of drugs absconding from treatment, which also result to development of drug resistance strain, relapse, return after default and can also result to economic loss.

Materials and Methods

Sample Collection

The patients were given two clean and grease free containers. One of the containers was used for "spot sample", while the second container was for early morning sputum sample. The patients were educated on the sample collection technique.

Population of the Study

The population for the study is all the outpatients (100) coming for clinic at the State Specialist Hospital Okitipupa, Ondo State.

Test Procedure

The purulent part of sputum was taken out with applicator stick and spread on the slide, kept to air dry. The dried smear was heat-fixed by passing the smear three times over the flame of the bursen burner, then placed on a staining rack and covered with strong carbol fulchsin stain. The smear was heated until vapour rises at three different times (not over heated) within 5minutes. On cooling, the slide was rinsed in water until excess stain was removed. The slide was decolorized with 3% acid alcohol for three minutes and was gently washed in water then covered with methylene blue for 30 seconds to one minute and was again rinsed with water. The stained slide was allowed to air dry and was examined under the microscope using x100 objective.

Data Analysis

Data were collated and analyzed with the aid of Epidemiology Info 3.5.1. Descriptive and inferential statistics were used to analyze the data. The results were presented in tables and figures logistic regression test was used to determine the association between age, sex and pulmonary tuberculosis at 0.05 level of significance.

Results

Demographic Characteristic of the Studied Group

A total of one hundred and ten (110) patients participated in the study but ten were excluded because of incomplete data, remaining hundred (100). Participant age ranged from 4 to 102 years with mean age of 36.35 years and standard deviation of ±18.68.

The total number of patients in different age group reported varied; 3 (3.0%) were less than 11years of age; 22 (22.0%) were within 11-20 years age group; being the highest age group participants, 21(21.0%) were within 21-30 years age group; A total of 15(15.0%) were within 31-40 years age group; 20(20.0%) were within 41-50 years age group; 12(12.0%) were within 51-60 years age group; 3(3.0%) were within 61-70 years age group; 2 (2.0%) were within 71-80 years age group; while the remaining 2(2.0%) was above 80 years of age (Table 1a) while the classification of all the participants by sex is shown on Table 1b.

Prevalence of Pulmonary Tuberculosis

A total of 100 patients participated out of which 14 (14.0%) were found to be positive for TB by microscopy, using Ziehl- Neelsen technique as shown in table 2 while table 3 showed the classification of pulmonary tuberculosis positive patients by sex. Table 4 showed that Out of 14 participants that were positive for pulmonary tuberculosis, non was positive for those less than 11 years of age; 4(28.6%) were within 11-20 years age group; being the highest age group of participants, 3(21.4%) were within 21-30 years age group;. A total of 4(28.6%) were within 31-40 years age group; 2(14.3%) were within 41-50 years age group; 1(7.1%) were within 51-60 years age group; while those above 60 years of age has no record of TB. Table 5 showed the distribution of pulmonary positive patients by sex and age.

Discussions

The Prevalence rate of Tuberculosis Among Outpatient Department Participants

The prevalence rate of pulmonary tuberculosis detection in this study of prevalence and occurrence of *Mycobacterium tuberculosis* in outpatient Department of State Specialist Hospital Okitipupa, in Ondo State was 14.0% by microscopy. This prevalence 14.0% was similar to the study done on a retrospective study of pulmonary tuberculosis (PTB) prevalence amongst patients attending infectious diseases hospital (IDH) in Kano, Nigeria which reported prevalence of 14.7%. A similar study that was done in Abeokuta, Ogun State, Nigeria which looked at the prevalence of tuberculosis amongst patients attending two secondary hospitals reported a little higher prevalence of 16.7% when compared to this study (Babajide *et al.*, 2014). Another study that was done in Benin City, Nigeria by Ehiaghe et *al* reported a much higher prevalence of 37.4% (Ehiaghe *et al.,* 2013). This lower percentage from Okitipupa may most likely be that there is under reporting of the cases as the number of patients reporting at the health facilities are just a fraction of the population in any community while it may also be that the people are taking adequate precaution against the disease due to sensitization against the sickness in the state.

The prevalence of tuberculosis among the sex

Our study found that the prevalence of pulmonary tuberculosis was higher in the males 8(57.1%) than the females 6(42.9%)**.** This was in consonance with the study done by Taura and others in Kano, Taura *et al;* (2008) concluded that males had the highest prevalence of pulmonary tuberculosis. A

similar study on report of first national TB prevalence reported that TB prevalence among men was 484 (95% of 333-635) per 100,000 higher than that among woman estimated to be 198 (95% of 108-289) per 100,000 (TB Prevalence survey 2010) the same was observed for bacteriologically – confirmed TB with 751 (538-965) and 359 (213-505) per 100,000 among men and women respectively (Ottman and Uplekar, 2008). Another study also revealed that, out of 25 positives for TB, 17 (68.0%) were found to be male and the remaining 8 (32.0%) were found to be female (Straetemans *et al.*, 2011). In all, males were having the higher incidence than their female counterparts (Stybio *et al* 1986, Borgdoff *et.al.*, 2011). In another similar study by Babajide *et al,* (2014) their result showed that 63.5% of male patient were infected with Tuberculosis and 36.5% of female patients infected with tuberculosis. Though, there was no significant different between the sex and *Mycobacterium tuberculosis* infection (Babajide *et al* 2014).

Prevalence of Tuberculosis Among Age Group

The prevalence was higher among two different age groups 11-20, 4.0% and 31-40, 4.0%. It also showed that age groups 11-20years were females while the age groups 31-40 years were males. A similar study done in Ethiopia by Abdul *et al*, (2013) showed the percentages of TB positive and suspected patients were high in both males and females in age group of 11-20 years (Abdul-Qayyum, 2013), but a study from a South –South Nigeria reported higher prevalence in ages 21-30 years. A similar study reported an age differential in TB prevalence was observed, with groups between 24-54 years carrying the highest burden of disease. This age group (31-40) included the one found in our study age group, but with ours also find a higher TB burden within a group 11-20 years' age group (Ehiaghel *et.al.*, 2013). The age group 31 – 40 (11.40%) is the highest infected age group most probably because this age group is the most active working age group with funds to get exposed to the tuberculosis risk factors. There was also no significant difference between age-groups and *Mycobacterium tuberculosis* infection (Babajide *et al.*, 2014). The age group 30-43 years had the highest prevalence of 145 (17.0%) out of 858 of PTB positive subjects. There was no significant

Table 1a: Distribution of participants by age groups

AGE GROUP	Frequency	TOTAL
<11	3	3
11-20	22	22
21-30	21	21
31-40	15	15
41-50	20	20
51-60	12	12
61-70	3	3
71-80	2	2
>80	2	2
TOTAL	100	100

Table 1b: Classification of Participant By Sex

Sex	Frequency	Percent	Cum percent
Female	39	39.0%	39.0%
Male	61	61.0%	61.0%
TOTAL	100	100.0%	100.0%

Table 2: Prevalence of pulmonary tuberculosis among participants

Result	Frequency	Percent	Cum percent
Negative	86	86.0%	86.0%
Positive	14	14%	14%
Total	100	100%	100%

Table 3: Classification of pulmonary tuberculosis by sex

Sex	Positive	Percentage
Male	8	57.14%
Female	6	42.86%
Total	14	100.0%

Table 4: Participants tested for pulmonary tuberculosis by age group

Age group	Negative	Positive	Total
<11	3	0	3
11-20	18	4	22
21-30	18	3	21
31-40	11	4	15
41-50	18	2	20
51-60	11	1	12
61-70	3	0	3
71-80	2	0	2
>80	2	0	2
TOTAL	86	14	100

Table 5: Participants tested for pulmonary tuberculosis by age group and sex

Age group	Positive		Total
	Male	Female	
<11	0	0	0
11-20	1	3	4
21-30	2	1	3
31-40	3	1	4
41-50	1	1	2
51-60	1	0	1
61-70	0	0	0
71-80	0	0	0
>80	0	0	0
TOTAL	8	6	14

difference between age groups and sex of subjects with PTB positivity (Imam *et al.*, 2008). Pulmonary tuberculosis infection was significantly affected by age among the male and female subjects studied. Subjects within the age group of 21 - 30 years and 41 - 50 years had the highest risk of acquiring TB amongst the male and female population respectively (Daniel *et.al.,* 2006., Ehiaghe *et al.*, 2013;).

Conclusion

The prevalence rate of pulmonary tuberculosis among patients attending the outpatient Department Clinic at the State Specialist Hospital Okitipupa in this study was high at 14%. The prevalence was higher in the males 8%, than the females 6%. The percentages of pulmonary tuberculosis positive patients were high in females of age group of (11-20) years 3%, while that of males were high in age group of (31-40) years 3% in this study. It is noteworthy that PTB is still a serious disease in this part of the world, thus, there is need for stepping up TB awareness, treatment and control program.

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Addendum

Variable Age group	P-value
(<21/<11)	0.342641
(<31/<11)	0.450458
(<41/<11)	0.783407
(<51/<11)	0.883216
(<61/<11)	0.662959
(<71/<11)	0.823579
(<81/<11)	0.692491
(81+years/<11)	0.692491
Sex (F/M)	0.454161
Sex(M/M)	0.826990