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BURDEN OF PULMONARY TUBERCULOSIS IN ABEOKUTA CITY OF SOUTH-WEST NIGERIA: ANALYSIS OF ASSOCIATED SOCIO-DEMOGRATPIC FACTORS

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ABSTRACT

The study was set up to ascertain the level of Pulmonary tuberculosis (PTB) in Abeokuta city after over two decades of implementation of directly observed treatment supervision (DOTS) regime. Study was a cross-sectional study. Patients attending General hospital Abeokuta with signs and symptoms of PTB and HIV were consecutively recruited into the study between June and December, 2009. Sputum samples were collected and processed using standard laboratory procedures for TB detection; venous blood samples were collected using standard procedures and sera tested for the presence of HIV antibodies and proteins using Enzyme linked immunosorbent assey (ELISA). Questionnaires were administered to obtain relevant information such as age, gender, occupation, educational levels and housing standards. The incidence of pulmonary tuberculosis (PTB) among residents of Abeokuta city was found to be 36.2% with no significant gender difference (P> 0.05). There were no strong occupational correlations,

however, HIV/AIDS, patterns of housing and overcrowding were identifiable associated factors. TB surveillance should be strengthened through deployment of home visitors, establishment of more TB centres with adequate facilities for the control of HIV/AIDS, and health education of caregivers on benefits of proper housing and impact of overcrowding.

Keywords: Abeokuta City, Demographic Factors, Pulmonary Tuberculosis

INTRODUCTION

At least 2 billion of the entire world's 7 billion people are infected with *Mycobacterium tuberculosis* and other species of Mycobacteria, the causative agents of pulmonary tuberculosis (PTB) with about 8-10 million new infections yearly **[1, 2]**. Over 80% of these active cases of tuberculosis are located in sub-saharan Africa and south-east Asia **[3, 5]**. Pulmonary tuberculosis (PTB) has remained the leading cause of morbidity and mortality among people living with HIV/AIDS while over 75% of the people with AIDS in Africa have this lung disease **[6-8]**.

PTB was on the verge of near perfect global control until the mid 80' when the advent of HIV dramatically changed the course of its control and has re-surged in countries and regions where it was hitherto no more a major health issue **[9-11]**. Nigeria on the contrary had at no time in recorded history perfectly controlled PTB before the arrival of HIV/AIDS which has thrown additional challenge to the nation's health system **[12, 13]**. It is estimated that at least 2 million of the country's 3.4 million people living with HIV/AIDS have active tuberculosis which has contributed to the mortality of AIDS in the country pegged at about 220,000 annually **[14,15]**.

The government of Nigeria through the Federal ministry of Health has adopted the WHO proposal of Directly Observed Therapy Strategy (DOTS) meant to fast track both the prompt diagnosis and supervised treatment of tuberculosis in resource poor countries of the world **[16, 17]**. DOTS has been implemented for close to two decades in both rural and urban health centers across the country with mixed outcomes due to HIV/AIDS epidemic **[18-20]**.

This study was therefore set up to ascertain the impact of pulmonary tuberculosis in Abeokuta city as well as associated medico-social factors influencing the spread of the disease. The findings would serve as reference information for policy makers on how to build on the present control methods.

MATERIALS AND METHODS

Setting

The study was carried out at Abeokuta the capital city of Ogun state in south-western Nigeria. The city is occupied predominantly by the Yoruba ethnic group who constitute about 98% of the population while the remaining are shared by Ibos, Hausas and Binis. Based on 2006 population census the city has an estimated population of 850,000 people while civil service and farming are her major occupations. The city pays host to several universities and other higher academic institutions, tertiary, secondary and primary health centres, one of which is General hospital, Abeokuta.

Sampling Procedure

Patients attending General hospital Abeokuta presenting with chronic cough or prolonged chest pain, prolonged fever, wasting or other symptoms of TB and HIV/AIDS were recruited into the study consecutively over a period of six months (June to December, 2009) after obtaining informed consent from them. Test run questionnaires were self or interviewer administered to the respondents where relevant information such as age, gender, occupation, educational background, pattern of housing standard and type of food eaten were obtained.

Sample Collection

Three separate sputum samples were collected at intervals from each volunteer; each subject produced a first spot specimen and was given two sterile wide mouthed containers with instructions on production of early morning sputum sample after a deep cough. A second spot sputum specimen was collected on submission of sputum sample collected at home. Venous blood samples were collected by tying a tourniquet round the arm of the subjects where 3-5 mls of blood was collected into EDTA bottles and gently mixed **[18]**.

Laboratory Procedures: Sputum samples were decontaminated with 5% Sodium hypochlorite and concentrated by centrifugation at 3000 rpm for 15 minutes in a biological safety cabinet type I. Also smears were made from the sputum samples, air dried and fixed with burning flame, and stained using Ziehl-Neelsen staining procedure. Stained smears were air dried and examined using X1000 magnification using oil immersion objective. Acid fast bacilli (AFB) were quantified based on the International Union against Tuberculosis and Lung disease grading system as thus **[19-20]**.

10-99 AFB seen in at least 100 fields= +

01-10 AFB seen per field in at least 50 fields= ++

>10 AFB seen per field in at least 20 fields= +++.

HIV screening was carried out on the blood samples using Immunetics qualicode HIV ½ kit, Lot # DK0711002 from IMMUNETICS Inc, 27 Dry dock Avenue, Boston, NA 02210-2377, USA based on the kit manual. Confirmatory tests on reactive or borderline samples were carried out using Immunetics qualicode from IMMUNETICS from Boston USA **[21-23]**.

Data Management

Data obtained was compiled using Microsoft excel 2007 version while analysis was carried out using SPSS 16 statistical software. Chi square was used to compare association among linear and dependent variables while Regressiom and Anlysis of variance (ANOVA) were used to compare association among independent variables where applicable **[21]**.

Ethical Considerations

Ethical approval for the study was obtained from the ethical committee of the Ogun state Health Sevices Management board Ethical committee while approval to use General hospital Abeokuta for the study was obtained from the hospital management.

RESULTS

From the 389 subjects comprising 185 (47.6%) males and 204 (52.4%) females, the incidence of pulmonary tuberculosis (PTB) was found to be 36.2% (141/389). The rate of infections among males was 47.0% (87/185) and that among females 26.5% (54/204) with no significant gender difference {X^2 (Yates Corrected)= 3.44, df=1, P > 0.05} **(Table 1)**.

The highest numbers of infections were recorded among those aged 21-30 years old and the lowest among those 10 years and below. The rate of infections was however highest among those aged 41-50 had the highest rate of infections 81.0% (30/37), followed by those 51-60 years old 77.8% (7/9) and then those 11-20 years old 72.6% (37/51) while those aged 10 and below had the lowest rate 20.0% (1/5). There was no significant age difference among respondents (P > 0.05) **(Table 1)**.

Based on educational levels, 56.0% (28/51), 37.3% (68/236) and 44.1% (45/102) of those who acquired primary, secondary and tertiary education were infected with no significant

educational association (RR=3.7, CI=2.44) **(Table 1)**.

Analysis of occupational distribution of the respondents in relation to depth of PTB showed that 25.2% (25/111), 38.1% (37/97), 23.4% (15/64) and 53.1% (17/32) of those who were civil servants, doing business, students and farmers were respectively infected. The rates of infections among artisans 65.5% (19/29) and applicants 80.0% (4/5) were among the highest even though there was no strong correlation in rate of infections among occupations (RR=8.3, CI= 5.4) **(Table 1)**.

A review of the contributions of HIV/AIDS to rate of PTB showed that 65.6% (93/141) of those with PTB had HIV/AIDS compared to 34.4% (48/141) of the PTB patients who were HIV negative ($P < 0.05$) **(Figure 1)**.

Analysis of the housing patterns among the respondents showed that 80.0% (4), 73.0% (59) and 50.8% (31) of those who respectively lived in hostel, one room, and in family compound had PTB compared to those who lived in self contained apartment 20.4% (25) and flat 17.8% (19). There was strong correlation between decreasing housing standard and increasing rate of tuberculosis (RR= 1.25, CI= 2.22) **(Table 2)**.

Based on the number of persons per bed room among the respondents it was found that 66.4% (93) of the respondents lived four and above in a bed room compared to 33.6% (48) who live three or less in a bedroom. This difference is statistically significant ($P < 0.05$) **(Figure 2)**.

Table 1: Socio-Demographic Patterns of Sputum Smear Positive Pulmonary Tuberculosis Among Patients in Abeokuta City, Nigeria (N=389)

Demographic Varriable	Positive	Negative	Total	X^2/RR	P Value/CI
Gender					
Male	**87 (47.0)**	**98 (53.0)**	**185**		
Female	**54 (26.5)**	**150 (73.6)**	**204**	**1.2**	**> 0.05**
Age (Years)					
≤10	**1 (20.0)**	**4 (80.0)**	**5**		
11-20	**37 (72.6)**	**14 (27.5)**	**51**		
21-30	**34 (20.4)**	**133 (74.6)**	**167**	**6.7**	**>0.05**
31-40	**23 (26.1)**	**65 (73.9)**	**88**		
41-50	**30 (81.1)**	**7 (18.9)**	**37**		
51-60	**7 (77.8)**	**2 (22.2)**	**9**		
≥61	**9 (28.1)**	**23 (71.9)**	**32**		

Educational Level					
Primary	**28 (56.0)**	**23 (43.0)**	**51**		
Secondary	**68 (37.3)**	**168 (62.7)**	**236**	**2.44**	**3.7**
Tertiary	**45 (44.1)**	**57 (55.9)**	**102**		
Occupation					
Civil service	**28 (25.2)**	**83 (74.8)**	**111**		
Business	**37 (38.1)**	**60 (61.9)**	**97**		
Student	**15 (23.4)**	**49 (76.6)**	**64**		
Farming	**17 (53.1)**	**15 (46.9)**	**32**	**8.3**	**5.4**
Artisans	**19 (65.5)**	**10 (34.5)**	**29**		
Driving	**11 (39.3)**	**17 (60.7)**	**28**		
Housewife	**6 (42.9)**	**8 (57.1)**	**14**		
Teaching	**4 (44.4)**	**5 (55.6)**	**9**		
Applicant	**4 (80.0)**	**1 (20.0)**	**5**		

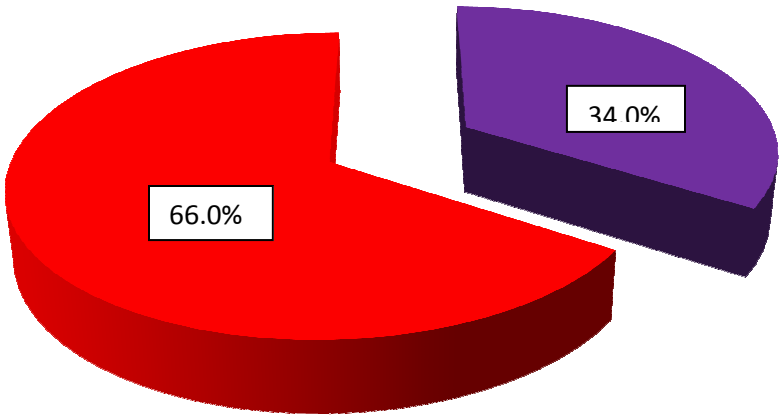

Figure 1: Distribution pattern of Sputum smear positive pulmonary tuberculosis vis-à-vis HIV serostatus among patients in Abeokuta city, Nigeria (N=389)

Table 2: Housing patterns Among Residents of Abeokuta City and Incidence of Pulmonary Tuberculosis

Housing Type	PTB Positive (%)	PTB Negative (%)	Total
One room	**59 (73.8)**	**21 (26.2)**	**80**
Self contained	**28 (20.4)**	**109 (79.6)**	**137**
Flat	**19 (17.8)**	**87 (86.2)**	**106**
Family Compound	**31 (50.8)**	**30 (49.2)**	**61**
Hostel	**4 (80.0)**	**1 (20.0)**	**5**
Total	**141**	**248**	**389**

RR= 1.25, CI= 2.22

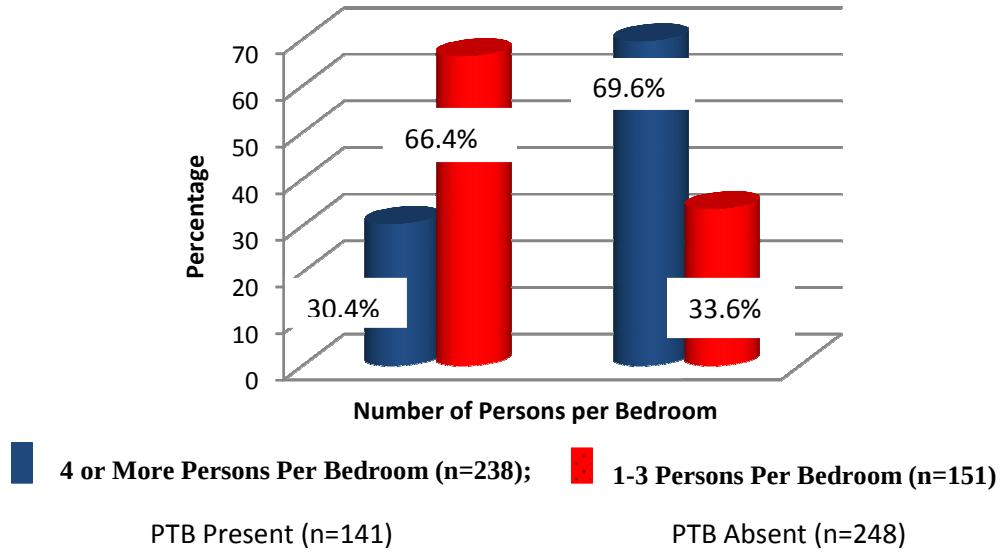

Figure 2: Association of Overcrowding with Pulmonary Tuberculosis among Residents of Abeokuta city, Nigeria (N=389)

DISCUSSION

The incidence of pulmonary tuberculosis (PTB) among residents of Abeokuta city was found to be 36.2% with no significant gender difference (P> 0.05). There were no strong occupational correlations, however, HIV/AIDS, patterns of housing and overcrowding were identifiable associated factors.

Although the findings from present study being hospital based and targeted at symptomatic patients may not be a true reflection of the depth of the disease in the wider society. This nevertheless shows that despite the efforts targeted at controlling the disease through DOTS much still need to be done. The employment and deployment of home TB monitors and supervisors with adequate logistics and hardwares to carry out house to house mobilization as well as effective community surveillance may significantly help in prompt identification of new cases as well as bringing old cases under non-infectious states within a short time **[24-26]**.

The finding of about 66.0% smear positive PTB in Abakaliki in an earlier study, 21.0% in Abuja, and Ilorin where 5,926 cases were recorded over a ten year period, and in Calabar where 14.0% of the 6,737 cases of PTB died over a ten year period clearly shows that PTB is still endemic in many parts of Nigeria **[27-30]**. This scenario appears similar

to that of findings from several parts of sub-saharan Africa **[31-33]**. The re-evaluation of TB control programme in the country with the probable establishment of TB treatment centres across the country may help increase accessibility of the target populations to qualitative services towards its control **[34, 35]**.

Furthermore, the contributions of caregivers (mothers, guardians, spouse, parents, institutions etc) towards enhancing early detection and treatment of TB should be strengthened through disease oriented health education of informal community based organizations and assemblies.

Human immunodeficiency virus infection was found to be a major driving force towards the spread of PTB. Even though the prevalence of HIV in Abeokuta city is comparatively lower than that in other cities in Nigeria, a renewed control of HIV through free counseling, testing and treatment with adequate anti-retroviral drugs would help reduce PTB incidence in the community [**36, 37]**. Enhancement of socio-economic status of the people through creation of job opportunities would also boost their abilities to promptly attend their medical needs including PTB and HIV **[36-38]**.

CONCLUSION

The present study has shown that PTB is still high in Abeokuta city and the major contributing factors are HIV infections, poor housing conditions, overcrowding and socio-economic. The TB control programme should therefore be strengthened to include home visitors and supervisors to, among other services, identify treat and follow up promptly new cases of TB and intensify the control of HIV. Also social security services should be provided for the most vulnerable groups in the society especially the un-employed so to boost their capacity towards securing quality medical attentions in the events of both PTB and HIV.

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