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Prevalence of Tuberculosis among Presumptive Tuberculosis Patients Offered HIV Testing Services in Federal Capital Territory, Abuja Nigeria

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Abstract

Tuberculosis is a communicable disease caused by Mycobacterium tuberculosis, considered a major risk to global health security. This study determined the prevalence, treatment outcomes, and factors associated with tuberculosis among 737 presumptive tuberculosis patients in Federal Capital Territory Abuja, Nigeria from 1st April 2019 to 30th May 2021 through retrospective cross-sectional study and multi-stage sampling. From Non-Municipal Area Councils, Bwari was selected while from Health Facilities, General Hospital Bwari and Gwarimpa were selected from Bwari and Abuja Municipal Area Council respectively by simple random sampling and data abstractions were done and analyzed using Statistical Package for Social Sciences version 23.0 Software. The prevalence of tuberculosis amongst the patients was 19.4%. The tuberculosis treatment outcome showed that 66.4% were cured, 14.7% completed treatment, 7.0% failed treatment, 5.6% lost to follow-up and 0.7% removed from the Register. The prevalence of tuberculosis in the Bwari Area Council was 8.2%. The association between Area Council of Resident and tuberculosis was significant (p = 0.001). Patients that reside in Bwari Area Council were 0.078 times less likely to have tuberculosis compared to those who reside in Abuja Municipal Area Council and, Area Council of Residence was a predictor of tuberculosis (aOR = 0.001; 95% C.I. = 0.043 - 0.141). The prevalence of tuberculosis amongst patients with Human Immunodeficiency Virus was 29.6%. The association was significant (p = 0.001) but not a predictor of tuberculosis (aOR = 0.840; 95% C.I. = 0.617 - 1.810).

Keywords: *Human Immunodeficiency Virus, Presumptive, Tuberculosis.*

Introduction

Tuberculosis (TB) is a communicable disease caused by bacteria (Mycobacterium tuberculosis), which most often affect the lungs [1-7]. Tuberculosis is often spread from person to person through the air and a person needs to inhale only a few of these germs over prolonged periods in close contact to become infected as commonly occurs between family members who live in the same house [8-11].

Tuberculosis can affect anyone anywhere, though most people who develop the disease are adults, with more cases among men than women and 30 highest TB burden countries account for 90% of TB each year. It is associated with poverty and economic distress and vulnerability, marginalization, stigma, and discrimination of people affected [3-5].

The use of rapid molecular diagnostic tests (the Xpert MTB/RIF, Xpert Ultra, and Truenat assays) are recommended by World Health

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Organization (WHO) as the initial diagnostic test in persons with signs and symptoms of TB as they have high diagnostic accuracy and will lead to major improvements in the early detection of TB and drug-resistant TB [5].

Tuberculosis is the commonest cause of death among People with HIV who have higher HIV-associated deaths [3, 5, 6, 12]. In 2019, the largest number of new TB cases occurred in the WHO South-East Asian region (44%), followed by the WHO African region (25%), then WHO Western Pacific (18%). 87% of new TB cases occurred in the 30 high TB burden countries and Eight countries accounted for two thirds of the new TB cases (India, Indonesia, China, Philippines, Pakistan, Nigeria, Bangladesh, and South Africa) [6, 13].

Globally, many high TB burden countries couldn't reach the global targets set at the United Nations high-level meeting on TB. For achievements between 2018 and 2019 with regards to the 5-year (2018-2022) targets, only 35% (14.1 million) people were treated for TB against 40 million, and 21% (6.3 million) people were started on TB preventive treatment out of the 30 million. The Covid-19 pandemic threatened to reverse progress in reducing the global burden of TB. The sub-targets for TB was slower than overall progress: 30% (1.04 million) children were treated for TB out of the 3.5 million, 22% (333,304) people were treated for MDR/RR-TB out of the 1.5 million, 8% (8,986) children were treated for MDR/RR-TB of the 115 000 [14].

Geographically, the distribution of TB in 2019 were in the WHO regions of South-East Asia (44%), Africa (25%), and the Western Pacific (18%), with smaller percentages in the Eastern Mediterranean (8.2%), the Americas (2.9%) and Europe (2.5%). The global two-thirds are contributed by eight countries: India (26%), Indonesia (8.5%), China (8.4%), the Philippines (6.0%), Pakistan (5.7%), Nigeria (4.4%), Bangladesh (3.6%) and South Africa (3.6%). The other 22 countries accounted for 21% of the global total. The TB incidence rate at national level varies from less than 5 to more than 500 new and relapse cases per 100,000 population per year. In 2019, 54 countries had a low incidence of TB (50% in previously treated cases) were in countries of the former Soviet Union [3-5].

In West Africa, the incidence of tuberculosis is high considering the high rate of factors which propagate its spread. The occurrence of TB/HIV co-infection is an issue in this region evidenced by high burdens in Nigeria, Ghana, Liberia, and Guinea Bissau. Nigeria has the highest TB burden in West Africa and accounts for about 4% of the TB incidence globally [15]. In Nigeria, tuberculosis is an ancient disease that still constitutes major public health problems where it has been estimated that about 460,000 new cases occur yearly. Also, the social stigma associated with it compounds the problem [8]. Tuberculosis affects mostly adults in their most productive years. All age groups are at risk and over 95% of cases and deaths are in developing countries [8, 13]. In 2019, globally, tuberculosis was responsible for about 8.2% deaths among HIV-positive people. Men (aged ≥15 years) were about 56% of the people who developed TB; women accounted for 32% and children (aged <15 years) for 12% [3-5].

In Nigeria, the control and prevention of Tuberculosis faces several challenges which include the impact of HIV/AIDS and the emergence of multi-drug resistant tuberculosis (MDR-TB). The HIV/AIDS pandemic fuels the burden of TB and poses great challenge to its diagnosis and management and the prevalence of TB among HIV cases in Nigeria is estimated at 17.8% [14, 16]. In FCT, TB/HIV co-infection is 44.3%, with 19.5% defaulted, 11.5% deaths, and 0.7% treatment failures [17]. It has been documented that HIV-positive TB patients suffer significant HIV-related morbidity during TB treatment. Adverse reactions to anti-TB drugs are frequent and lead to interruptions and fatalities. They have a much higher mortality rate during and after anti-TB treatment than HIV-negative patients [18]. This may change

with ART without which, 20 to 30% of HIV-positive and smear-positive TB patients die before completion of treatment, and 25% of survivors die during next 12 months [18].

There is partnership between WHO, countries, partners and civil society towards scaling up TB response, pursued to achieve the targets of United Nations (UN) declaration, SDGs, End TB Strategy and WHO priorities [3, 5]: This includes provision of global leadership through strategy development, political and multi-sectoral engagement, strengthening review and accountability and, advocacy to end TB; shaping innovative TB research for dissemination of knowledge [3, 5]. Others include setting norms and standards on TB prevention and facilitating implementation, promoting ethical and evidence-based policies for TB prevention and care [3, 5]. Also, provision of technical support to Member States and partners jointly with WHO and building sustainable capacity and monitoring the status of TB epidemic, financing, and implementation of the response at all levels [3, 5].

About 85% of people who develop TB disease can be treated with a 6-month drug regimen which curtails onward transmission of infection. Since 2000, TB treatment has averted more than 60 million deaths, although access falls short of Universal Health Coverage (UHC) [3-5]. The number of people developing infection and disease including deaths can be reduced by multi-sectoral action to address TB determinants (poverty, under-nutrition, HIV infection, smoking and diabetes). Research on a new vaccine is needed to rapidly reduce TB incidence worldwide to levels achieved in low-burden countries [3-5].

A wide range of interventions towards finding cure and preventing TB, including innovative approaches to find and treat about 4 million people yearly who develop TB has shown that many are either undiagnosed, unreported, or inappropriately treated [19]. Thus, the burden of TB represents an estimate due to paucity of data from ineffective surveillance. The decline of TB incidence is slow due to challenges with its eradication like poverty, endemicity of causative agents, drug resistant tuberculosis and inefficient diagnostic methods [15].

Therefore, it is necessary to strengthen laboratory networks and surveillance systems for fast and accurate diagnosis of TB cases; identify the best methods towards diagnosis of TB among children and PLHIV; conduct research to identify better regimens that cure patients faster and shoring up TB prevention and control efforts to break transmission and prevent drug resistance [19]. Also, providing HIV testing to TB patients and supporting HIV treatment for people with TB and HIV co-infection and expansion of TB preventative treatment, whose weakened immune systems make them vulnerable to being ill from TB [19]. This study will determine the prevalence of tuberculosis among presumptive TB patients and it's determinants in FCT, Abuja. It is hoped that the study will help towards strengthening strategies on prevention and control of TB through public health interventions in FCT.

Materials and Methods

The Federal Capital Territory (FCT) Abuja, the capital of Nigeria [20] has six area councils (Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area (AMAC)) covering 8000 square kilometers [21, 22]. The 2019 projected population of FCT is 4,464,785 people [23], and AMAC 1,894,513 [20]. The Tuberculosis Case Notification Rate of FCT is 89 (89/100,000) [24].

A retrospective cross-sectional study was conducted among presumptive tuberculosis patients who accessed care in in FCT, Abuja from 1st April 2019 to 30th May 2021 who met the inclusion criteria and were eligible for this study while those excluded had incomplete records of age, sex, Xpert MTB/RIF results and HIV status. A multi-stage sampling technique was used to select Health facilities offering DOTS services. The area councils in FCT Abuja were stratified into Municipal Area council and

five Non-Municipal Area councils. The study was conducted in the AMAC and in Bwari Area Council (a Non-Municipal Area Council). Bwari Area Council was selected from the list of Non-Municipal Area Councils in FCT [20-22], by simple random sampling technique through a computer-generated table of random numbers by WINPEPI statistical software. One (1) health facility providing ART and DOTS services in AMAC (General Hospital Gwarimpa) and Bwari Area Council (General Hospital Bwari) [25] respectively was selected through a simple random sampling technique by a computer-generated table of random numbers by WINPEPI statistical software.

From the selected Health facilities, data abstraction for all presumptive TB patients who received care during the study period of 1st April 2019 to 30th May 2021 and met the inclusion criteria and not excluded were retrieved for the research.

The tuberculosis data were extracted from presumptive TB Registers, Health facility central TB register and; PLHIV presumptive and TB diagnostic evaluation and treatment register using quantitative tool (checklist) by trained six (6) Research Assistants after advocacy visits to the Chief Medical Directors of the selected facilities with introductory letter from the University and ethical clearance granted by the FCT Health Research Ethics Committee for support and permission to conduct the study. All data were entered, processed, and analyzed using Statistical Package for Social Sciences (IBM SPSS) version 23 software. Data were cleaned and double entry done for the variables and analyzed using SPSS version 23. Statistical analyses were done for frequencies and percentages (proportions) of TB status. Proportions of TB status of clients with and without HIV were compared using chi-square test or Fisher exact test (when the value of any of the cells was < 5 or more than 20% of any of the expected cells was < 5) to calculate the p value; statistical association tested at a significant level of 0.05 [p=0.05 (95% confidence interval)]. The association between factors influencing TB status of clients were assessed by Chi-Square and logistic regression was done and adjusted Odds ratio and Confidence Intervals were computed for determinants of TB.

Results

Only 737 presumptive tuberculosis patients whose data met the inclusion criteria had extraction done from the presumptive tuberculosis and tuberculosis registers from General Hospital Gwarimpa and General Hospital Bwari and the findings are presented below.

Socio-demographic Characteristics of Patients

The mean age of the presumptive TB patients was 36.66±14.2 years, the age range was ≤30 to ≥51 years. Other results are as presented below. Most of the presumptive TB patients were in the age group ≤30 years (36.0%) with being in majority (64.5%). The Area Council of the presumptive TB patients showed that 64.9% are in Bwari Area Council (Table 1).

Prevalence of Tuberculosis among Presumptive Tuberculosis Patients

The prevalence of tuberculosis amongst the 737 presumptive tuberculosis patients was 19.4% consisting of 143 patients in Federal Capital Territory, Abuja (Table 2).

Tuberculosis Treatment Outcomes

The tuberculosis treatment outcome showed that 66.4% were cured, 14.7% completed treatment, 7.0% failed treatment, 5.6% lost to follow up and 0.7% were removed from Register (Table 3).

Table 1. Socio-demographics of the Participants

Demographic characteristics	Frequency	Percentage
Age group		
≤30	265	36.0
31-40	217	29.4
41-50	136	18.5
≥51	119	16.1
Gender		
Male	262	35.5
Female	475	64.5
Area Council		
Bwari	478	64.9
AMAC	259	35.1
Total	**737**	**100.0**

Table 2. Prevalence of Tuberculosis among Presumptive Tuberculosis Patients

Tuberculosis	Frequency	Percentage
Positive	143	19.4
Negative	594	80.6
Total	737	100.0

Table 3. Tuberculosis Treatment Outcome

Outcome	Frequency	Percentage
Cured	95	66.4
Treatment completed	21	14.7
Treatment failed	1	0.7
Died	5	3.5
Loss to follow up	8	5.6
Not evaluated	10	7.0
Removed from register	1	0.7
Transfer out	2	1.4
Total	**143**	**100.0**

Factors Associated with Tuberculosis

The prevalence of tuberculosis amongst the presumptive tuberculosis patients in Bwari Area Council was 8.2%. The association between Area Council of Resident and tuberculosis was significant (p = 0.001). About 17.6% of the presumptive tuberculosis patients with tuberculosis were within the age group 41 – 50 years. The association was not statistically significant (p = 0.113). For the gender of the presumptive tuberculosis patients, 23.1% of them with tuberculosis were males. The association was, however, not statistically significant (p = 0.252). The prevalence of tuberculosis among presumptive TB patients with HIV was 29.6%. The association was statistically significant (p = 0.001) (4).

Table 4. Factors Associated with Tuberculosis among Presumptive Tuberculosis Patients

Demographic characteristics	Tuberculosis patients		χ^2	p-value
	Yes	No		
Area council				
Bwari	39(8.2)	439(91.8)	124.761	0.001
AMAC	111(42.9)	148(57.1)	-	-
Age group				
≤30	53(20.0)	212(80.0)	5.977	0.113
31-40	55(25.3)	162(74.7)	-	-
41-50	24(17.6)	112(82.4)	-	-
≥51	18(15.1)	101(84.9)	-	-
Gender				
Male	61(23.1)	203(76.9)	1.312	0.252
Female	89(18.8)	384(81.2)	-	-
HIV status				
Positive	67(29.6)	159(70.4)	17.366	0.001
Negative	83(16.2)	428(83.8)	-	-

The Odds Ratio (aOR) showed that presumptive tuberculosis patients that reside in Bwari Area Council were 0.078 times less likely to have tuberculosis compared to those who reside in AMAC, Abuja and, Area Council of Residence was a determinant of tuberculosis (aOR = 0.001; 95% C.I. = 0.043 - 0.141) Table 5).

Table 5. Logistic Regression of Predictors of Tuberculosis among Presumptive TB Patients

Factors	AOR	95% C. I. of AOR	p-value
Area council			
Bwari	0.078	0.043-0.141	0.001
AMAC	1	-	-
HIV status			
HIV positive	1.057	0.617-1.810	0.840
HIV negative	-	-	-

Discussion

The study involved secondary data analysis of presumptive tuberculosis patients of Gwarimpa General Hospital and Bwari General Hospital Abuja Municipal Area Council (AMAC) and Bwari Area Council respectively of Federal Capital Territory Abuja, Nigeria to determine the prevalence of tuberculosis among presumptive tuberculosis patients. About 19.4% of presumptive tuberculosis patients had tuberculosis out of 737 in Federal Capital Territory, Abuja.

Findings from the study indicated that the prevalence of tuberculosis among presumptive tuberculosis patients from this study is relatively higher than the prevalence of tuberculosis revealed from studies in North Central Nigeria where FCT Abuja Nigeria is located and the studies with lower prevalence of tuberculosis include studies from Benue State Nigeria where the overall prevalence of tuberculosis was 16.93% and 15.9% [26] respectively. Additionally, studies on the prevalence of pulmonary Tuberculosis in presumptive tuberculosis patients conducted in Bida, North-

Central Nigeria showed that 11.1% of the participants were diagnosed with TB which is also lower than the findings from this study [27] and, another study on suspected TB patients in North central Nigeria revealed a prevalence of TB of 13.25% [28].

More studies with lower prevalence of tuberculosis compared to the prevalence of tuberculosis from this study include a study in Port Harcourt Nigeria revealed the prevalence of TB of 2.1% [28], another study in Southern Nigeria revealed an overall TB prevalence of 0.8% (0.5% were known TB cases and 0.3% new cases of TB) [29]. And a study among presumptive TB patients in Kebbi state, Nigeria reported a lower prevalence of TB of 17.3% (Ibrahim et al., 2020) and that in Ataye District Hospital, North East Ethiopia revealed about 9.0% prevalence of TB [30]. The possible reason for the higher prevalence of tuberculosis among presumptive tuberculosis patients in FCT Abuja is due to awareness on tuberculosis and referral of presumptive tuberculosis patients from the communities to DOTs sites by patent medicine practitioners and from other service delivery points in health facilities.

However, the prevalence of tuberculosis among presumptive tuberculosis patients from this study in FCT Abuja, Nigeria is relatively lower than the prevalence of tuberculosis from other studies in Enugu south-east Nigeria, which had overall TB prevalence of 21.3% [31]. The possible reason for the lower prevalence of tuberculosis among presumptive tuberculosis patients in FCT Abuja compared to other studies from elsewhere is the strict implementation of tuberculosis preventive measures by FCT Tuberculosis and Leprosy Control Programme (TBLCP) which reduced transmission of tuberculosis from those infected to the general population.

Considering tuberculosis treatment outcomes among patients with TB in FCT, Nigeria, the presumptive tuberculosis patients who had tuberculosis showed these treatment outcomes; 66.4% were cured, 14.7% completed treatment, 7.0% failed treatment, 5.6% lost to follow up, 3.5% died, 1.4% were transferred out and 0.7% had treatment failure and removed from Register. Findings from this study of 3.5% deaths indicated similarity with those from other studies including that from Eastern Ethiopia 3.9% deaths, Southern Ethiopia 4.7%, Cameroun 3.5% and Addis Ababa Ethiopia 3.7% deaths [32-35]. There is dissimilarity with studies from Northern and southeast Ethiopia and Bauchi Nigeria with regards to the proportion of deaths from TB of 0.3%, 1.7% and 6.5% respectively which are higher and lower than 3.5% from this study [36, 37, 38] which may be attributable to variation in study population between this study and the others.

For those cured, finding from this study of 66.4% cured is in agreement with those from Cameroun 76.4% [34] but however far higher than those cured in Eastern Ethiopia 30.4% [32], Southern Ethiopia 28% [33], Northern Ethiopia 10.8% [36], 35.2% Bauchi Nigeria [37], Southeastern Ethiopia 25.9% [38] and 18.1% Addis Ababa Ethiopia [35]. The possible reasons for the variations between this study and those above could be due to poor adherence by the patients and likelihood that the population studied could be patients with Multi-Drug Resistant tuberculosis.

For patients that completed treatment, 14.7% completed from this study which is lower that the treatment completion from Eastern Ethiopia (62.1%), Southern Ethiopia (54.3%), Northern Ethiopia (64.8%), Bauchi (28.2%), Southeast Ethiopia (62.2%), Addis Ababa Ethiopia (64.6%) [32, 33, 35-38,] but higher than the treatment completion from Cameroun of 2.2% [34]. The possible reasons for differences in treatment completion between this study and others could be due to poor communication between the health workers and the patients or relatives to ascertain definite outcomes in other studies which could be in network challenged areas.

Considering factors associated with tuberculosis among presumptive TB patients

and, for the area council of residence the prevalence of tuberculosis amongst the presumptive tuberculosis patients in Bwari Area Council was 8.2%. The association between Area Council of Resident and tuberculosis was significant (p = 0.001). The Odds Ratio (aOR) showed that presumptive tuberculosis patients that reside in Bwari Area Council were 0.078 times less likely to have tuberculosis compared to those who reside in AMAC, Abuja and, Area Council of Residence was a determinant of tuberculosis (aOR = 0.001; 95% C.I. = 0.043 - 0.141). The finding from this study agrees with a study from Benue state Nigeria which showed that the prevalence of TB was significantly ($\chi 2$ = 4.751; P = 0.029) higher in rural areas than urban areas amongst patients (23.8% vs 14.1%) [26].

For the association between age and tuberculosis, about 17.6% of the presumptive tuberculosis patients with tuberculosis were within age group 41 – 50 years. The association was not statistically significant (p = 0.113). The finding from this study is dissimilar to findings from studies including in Benue state Nigeria which showed that the prevalence of TB significantly (χ^2 = 8.458; P = 0.003) highest in the 15-34 years age group (22.0%) compared to other age groups [26]. Also, in Port Harcourt Nigeria, the age-specific infection rate had a higher Tb in the age group >25 years (2.8%) than in <25 years (2.3%) and Age was the main correlate (P<0.05) of TB [39]. The possible reason for the dissimilar findings between this study and other studies may be due to variation in study populations between the studies.

For the association between gender and tuberculosis, about 23.1% of the presumptive tuberculosis patients with tuberculosis were males. The association was, however, not statistically significant (p = 0.252). There is non-statistical association between this study and a study in Port Harcourt Nigeria which showed that females had higher TB (2.3%) than males (1.7%) and sex was the main correlate (P<0.05) of TB [39]. For the association between HIV and tuberculosis, the prevalence of tuberculosis among presumptive TB patients with HIV was 29.6%. The association was statistically significant (p = 0.001). The finding on the association between HIV and tuberculosis agrees with the study by Moglad which showed that the association between HIV and TB was not significantly significant ($P > 0.05$) [40]. However, there is dissimilarity between this study and that by Yonatan Mesfin which showed that HIV is associated with tuberculosis (estimated Pooled OR 1.24; 95%, 1.04–1.43) [41]. The possible difference between this study and the one by Yonatan Mesfin is the presence of othe factors that suppress immunity like malnutrition in the study participants.

Conclusion

The prevalence of tuberculosis among presumptive Tuberculosis patients in Federal Capital Territory Abuja, Nigeria was relatively low. The treatment outcomes among patients with TB in FCT, Nigeria those cured, completed treatment, failed treatment, lost to follow up, died, transferred out and had treatment failure. Residing in Bwari Area Council (non-Municipal Area Council) by the presumptive tuberculosis patients was associated with having less tuberculosis which was statistically significant compared to those who resided in Abuja Municipal Area Council and, Area Council of Residence was a predictor of tuberculosis. Furthermore, tuberculosis status with Human Immunodeficiency Virus but was not a predictor of tuberculosis in Federal Capital Territory Abuja, Nigeria.

Conflict of Interest

The authors declare that there is no conflict of interest.

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