

ASSOCIATED RISK FACTORS OF PULMONARY TUBERCULOSIS IN EKITI STATE

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ABSTRACT: *Pulmonary Tuberculosis (PTB) persists as a major public health challenge in Nigeria. The study examined pulmonary tuberculosis and associated risk factors in Ekiti State. The study identified the presumed risk factors for PTB; examined the association between presumed risk factors and occurrence of pulmonary tuberculosis; and determined the association between the demographic variables and occurrence of pulmonary Tuberculosis in Ekiti State. This study was a retrospective, quantitative, non-experimental study. The research was conducted at Ekiti State ministry of health Tuberculosis, Leprosy, and Buruli Ulcer Control Centre. The sample was 2045 patients recorded from January 2015 to December 2019 in the Tuberculosis Central Register. The sample for the study was selected through a consecutive sampling technique. Descriptive and inferential statistics were used to analyze the data collected. The results were presented in tables as percentages, means, and standard deviation. Chi-square was used to test the hypotheses at a 0.05 level of significance. The study revealed that identified risk factors through patients treated in Ekiti State were alcohol/smoking, overcrowding, HIV, malnutrition diabetes, and unknown cause. A significant association was observed between presumed risk factors and the development of pulmonary tuberculosis. A significant association was also observed between the demographical variables and the development of pulmonary tuberculosis in Ekiti State. It was recommended among others that there should be more awareness of the risk factors of Tuberculosis in every community. Government should improve infrastructure, health policies, human resources development, services delivery at all health centers and Directly Observed Treatment Short-course (DOTs) clinics, and trained nurses, doctors, community health workers should be encouraged to work in rural areas.*

KEYWORDS: risk factor, pulmonary tuberculosis, Ekiti state

INTRODUCTION

Tuberculosis is a major public health challenge in Nigeria. This infectious disease has become a major threat to the life and survival of people with or without health issues. According to WHO, PTB is a significant worldwide health concern that causes millions of people to suffer from poor health each year, especially in low-income and middle-income countries. The transmission of tuberculosis is through inhalation of tuberculosis-infected air. When individuals with TB are coughing, sneezing, speaking or spitting, TB is released into the air. As a consequence, in congested, low ventilation locations with little UV (sunlight), the transmission is more strong because germs are easily absorbed in the air. Without treatment, an individual with active tuberculosis will infect on average between 15 and 20 others each year (WHO, 2017, 2018).

A good knowledge of the risk of progression to infection and illness is important for developing effective TB control strategies (Felix et al, 2018). Following TB exposure, the risk of infection is primarily governed by exogenous factors, which are determined by an intrinsic combination of the infectiousness of the source case, proximity to the contact, and social and behavioral risk factors such as smoking, alcohol consumption, and indoor air pollution. Transmission will be strong in environments where there is a greater likelihood of social mixing (as a result of overpopulation). The same is true for circumstances that increase the length of time a patient is exposed to an infected patient, such as health-system-related factors such as a delay in diagnosis. The majority of the factors that contribute to the development of infection to illness are endogenous (host related). Disease progression with HIV coinfection is increased by conditions that affect the immune response, the most serious of which is HIV risk alone (Felix et al, 2018). However, the effect of this risk factor at the population level may differ depending on the incidence of HIV in the area. The following factors have a greater effect on a wider part of the population and have been shown to accelerate the development of tuberculosis disease: diabetes, alcohol, malnutrition, cigarette smoking, and indoor air pollution.

The Nigerian Federal Ministry of Health's Nationwide Tuberculosis and Leprosy Control Program (NTBLCP) was the first national cost research to determine the magnitude and main driver of TB patients' and their family's expenditures in 2017. The cross-sectional research comprised 1190 individuals with tuberculosis (1095 for tuberculosis sensitive to drugs and 95 for tuberculosis resistant to drugs) from all 36 countries in the country. The following were among the important results: 66% of tuberculosis-sensitive patients and 89% of tuberculosis-resistant patients (greater than 20% of their annual family's incomes) experienced catastrophic expenses; after the treatment, people' average yearly income for medicinal tuberculosis was down by 63%, while the income for medicinal tuberculosis dropped by 59%; more over one third(37%) of the patients with TB lived at diagnostic time below the poverty threshold, which increased substantially to 58% throughout the course of treatment; at the time of the research 74% of patients who had tuberculosis were unemployed, and 30% stated that they lost employment because of tuberculosis; over half (54%) of patients could not afford to pay for TB treatment on income alone and had to borrow (45 percent)

or sell assets (29 percent) to meet expenditures; 37% sold animals and 25% sold farmed goods in the latter group; less than 4% of tuberculosis patients examined were insured; and although some kind of social support has been given to 39% of patients with drug-resistant tuberculosis (e.g. food or transportation vouchers), just 12% of individuals with drug-reliable tuberculosis are receiving such help.

Tuberculosis is seen as one of major public health problem in Ekiti state despite the fact that the state is ranked as 37th in TB burden in the country (EKMOH 2019). Oluwadare and Ibirinde (2010) reported that, when compared with the national estimate, the Ekiti state's tuberculosis outbreak is rather better. They stressed that the prevalence of TB is measured at 40/100,000 against 536/100,000. The number of cases is estimated at 7,000 and the mortality rate is 5.7% as against national 76%. In addition, HIV-positive TB cases was 13 percent compared with a nationwide estimate of 19 percent. In all the sixteen local governments TB-DOTS services are also available, but in fact the quality of the service continues to decrease as distance from the State Capital increases (Oluwadare & Ibirinde, 2010).

Anyone of any age, ethnicity, or nationality may develop tuberculosis, although some risk factors enhance the likelihood of disease. These considerations include the following:

- Proximity to someone who has contagious tuberculosis;
- Age: Older people are at an increased risk of tuberculosis;
- Substance abuse: Chronic drug or alcohol misuse erodes the immune system and makes you more susceptible to tuberculosis (Alao, Maroushek, Chan, Asinobi, Slusher, & Gbadero, 2020);
- Malnutrition may be a bigger risk factor for tuberculosis than HIV infection in the general population. Malnutrition has a significant effect on cell-mediated immunity (CMI), which is the primary host defense against tuberculosis (TB);
- Working or living in a residential care facility: Persons who are working or living in prisons, immigrants or nursing homes are all vulnerable to tuberculosis. This is because the risk of the disease contract rises when overpopulation and insufficient ventilation are present;
- Living in a refugee camp or shelter: People are weakened by inadequate nourishment, bad health, and overcrowding;
- Health care work: Regular contact with sick individuals raises the risk of infection with tuberculosis germs;
- International travel: As individuals move and travel extensively, they may expose others to tuberculosis germs or get infected themselves;
- Impairment of immunity: The body's ability to self-defend may also be impaired by a disease that affects immunity, such as HIV/AIDS, diabetes or silicosis from lung disease and treatment with corticosteroids, rheumatoid arthritis, etc.

- Both smoking and traditional beer intake may be linked with an increased risk of tuberculosis (TB) through increased iron concentration in broncho-alveolar macrophages, which results in host defense against intracellular microorganisms (Gabriel-Job & Paul, 2019);
- Poverty may be associated with many of the risk factors listed above. This is by no means a comprehensive list, since more risk factors are added on a regular basis.

The aim of this research was to investigate the associated risk factors of pulmonary tuberculosis in Ekiti State Nigeria. Specifically, the study:

1. identified the presumed risk factors for PTB;
2. examined the association between presumed risk factor and occurrence of pulmonary tuberculosis; and
3. determined the association between the demographic variables and occurrence of pulmonary Tuberculosis in Ekiti State.

Research Question

1. What are the presumed risk factors of pulmonary tuberculosis?

Research Hypotheses

1. There is no significant association between presumed risk factor and occurrence of pulmonary tuberculosis in Ekiti State.
2. There is no significant association between the demographic variables and occurrence of pulmonary Tuberculosis in Ekiti State.

METHODOLOGY

This study was a retrospective, quantitative, non-experimental study. Research was conducted at Ekiti State ministry of health Tuberculosis, Leprosy and Buruli Ulcer Control Centre. The healthcare sector works on three levels in Ekiti State; primary, secondary and third-party healthcare. Primary health care offers preventive, protective, restorative and rehabilitation services primarily, while secondary health services provide precautionary, protection and rehabilitation services in a certain manner. Specialized healthcare services are provided primarily through the Tertiary Health Care. The Tuberculosis patients' records in Ekiti State were used for this study. The sample was 2045 patients recorded from January 2015 to December 2019 in the Tuberculosis Central Register. The sample for the study was selected through consecutive sampling technique.

The information supplied during the time under consideration was provided by an updated central registry for pulmonary tuberculosis from January 2015 to December 2019. The data was gathered by the researcher using a self-developed prototype comprising of two sections. In Section A, demographic data of PTB patients for the year under review such as gender and age were sought

for whereas in Section B the information on the risk factors and results of treatment were sought for.

After obtaining the ethical approval, the researcher visited the Ministry of Health Tuberculosis, Leprosy and Buruli Ulcer Control Programme to examine the pulmonary tuberculosis central register using the self-developed checklist. The researcher trained four (4) research assistants by organizing a day seminar on how to use the self-developed checklist to collect data. During the seminar the research assistants were presented with sample of the checklist while the researcher demonstrated to them on how use it. By the end of the training the research assistants were given copies of the checklist which were used to collect the data within a period of 4weeks. The instrument was later retrieved from the research assistants by the researcher at the expiration of the 4 weeks. In addition, being a retrospective study where information was extracted from records, validity and reliability seems not be necessary. Data were collated, tallied and analyzed with the aid of a Statistical Package for Social Sciences (SPSS). Descriptive and inferential statistics were used to analyze the data. The results were presented in tables as percentages, means and standard deviation. Chi-square was used to test the hypotheses at 0.05 level of significance.

RESULTS

Research Question 1: What are the risk factors of pulmonary tuberculosis?

Table 1: Pulmonary Tuberculosis by Risk Factors N=2,045

Variables	2015	2016	2017	2018	2019	Total	(%)	X	SD	P-value
Risk Factor										
Unknown Cause	186	117	130	116	73	622	30.4	124.4	36.3	0.000
Alcohol & Smoking	106	92	73	66	80	417	20.4	83.4	14.2	
Overcrowding	74	74	46	35	46	275	13.4	55	16.0	
Malnutrition	49	96	67	84	76	372	18.2	74.4	15.8	
HIV	29	25	24	25	27	130	6.4	26	1.7	
Diabetes	65	32	66	38	28	229	11.2	45.8	16.4	

Table 1 shows that on the average within a year, the prevalence of PTB by the risk factors are found to be 20.4%, 13.4%, 18.2%, 6.4% and 11.2% with Alcohol & Smoking, Overcrowding, Malnutrition, HIV and Diabetes respectively. About 30.4% were indicated with unknown cause. It was also indicated on the table that alcohol and smoking has the highest mean of 83.4 which represent 20.4% of the population while HIV has the lowest mean of 26 which represent 6.4%. This is an indication that people found of alcohol and smoking are more likely to get infected PTB than any other person.

Hypotheses Testing

Hypothesis 1: There is no significant association between presumed risk factor and occurrence of pulmonary tuberculosis in Ekiti State.

Table 2: Chi-square test for association between presumed risk factor and occurrence of pulmonary tuberculosis

	Value	Df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	95% Confidence Interval		Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	313.954 ^a	5	.000	.000 ^b	.000	.001			
Likelihood Ratio	338.584	5	.000	.000 ^b	.000	.001			
Fisher's Exact Test	332.479			.000 ^b	.000	.001			
Linear-by-Linear Association	.220 ^c	1	.639	.653 ^b	.633	.674	.333 ^b	.313	.353
N of Valid Cases	2045								

From table 2 for the chi-square test for hypothesis one it shows that $\chi^2 = 313.945$, $p = 0.000$ at 0.05 level of significance. This shows that there was significant association between presumed risk factor and occurrence of pulmonary tuberculosis since the P-value (0.000) is less than 0.05. Therefore the null hypothesis was rejected. Hence, there is significant association between the presumed risk factor and development of pulmonary tuberculosis in Ekiti State.

Hypothesis 2: There is no significant association between the demographic variables and occurrence of pulmonary Tuberculosis in Ekiti State.

Table 3: Chi-square Test for Association between Demographic Variables and Occurrence of PTB

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)			
				Sig.	95% Confidence Interval		Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	499.936 ^a	30	.000	.000 ^b	.000	.001			
Likelihood Ratio	544.565	30	.000	.000 ^b	.000	.001			
Fisher's Exact Test	514.663			.000 ^b	.000	.001			
Linear-by-Linear Association	.337 ^c	1	.561	.574 ^b	.553	.596	.292 ^b	.272	.312
N of Valid Cases	2045								

Table 3 shows that the $\chi^2 = 499.936$, $p = 0.000$, P-value (0.000) is less than 0.05 (i.e. $P < 0.05$) at 0.05 level of significance. This implies that there was significant association between the demographic variables and occurrence of pulmonary Tuberculosis in Ekiti State at 0.05 level of significance. Hence, the null hypothesis was rejected.

DISCUSSION

Malnutrition as a risk factor for pulmonary tuberculosis also accounted for 372 cases in the study which shows that the patients' dietary lifestyles were poor or they were under feeding, and this could lower their level of immunity, making them susceptible to tuberculosis. Underlining this risk factor is poverty making individuals concerned to eat what they see and not what is nutritionally beneficial to their systems. This, according to The National Tuberculosis and Leprosy Control Programme (NTBLCP) of the Federal Ministry of Health of Nigeria which conducted the first national TB patient cost survey in 2017, was a major determinant of poor TB control in Nigeria.

Pulmonary Tuberculosis and HIV sero-positive individuals among the studied population within the five year period were 130. The co-infection of HIV usually destroys the immune system thereby exposing them to pulmonary tuberculosis as an opportunistic infection. As earlier reported in the New TB outbreak in Africa 2007, most especially in Sub Saharan Africa, this constituted a major area of concern as the two infections are chronic. The drug-drug interactions that occur between the antiretroviral drugs and the anti TB drugs in the management of this co-infection

constitute a major challenge likewise the side effects that ensue. In order to reduce the burden and mortality associated with the co- infection, TB prophylaxis has been introduced while initiating treatment in PLWHIV with low CD4 count. With the extremely resistant strain of TB, in PLWHIV, mortality is as high as 100 percent (WHO, 2019).

Diabetes, as one of the risk factors for pulmonary tuberculosis, as observed in this study, accounted for 229 cases. This was even higher than the cases attributable to HIV as a risk factor. Farah, Tverdal, Steen, Heldal, Brantsaeter and Bjune (2015), in their study observed a comparable risk of TB in patients with HIV and those with diabetes mellitus. The higher value for diabetes mellitus observed in this study might be due to increased awareness of TB complicating Diabetes, hence early screening (Alao et al., 2020). In HIV individuals, unless the CD4 count is below 50 cells/ μ L, TB as an opportunistic infection does not manifest; not even on chest X-Ray (Jo et al., 2020). Physicians should, therefore, be more vigilant and screen for TB in individuals on management for Diabetes Mellitus.

As identified risk factors for PTB in the hospitals reviewed, HIV co- morbidity, as an immunosuppressant predisposes to other immune lowering conditions such as cancers, further increasing the burden of the disease. In line with the study carried out by Kigozi, Heunis and Engelbrecht (2019), HIV also posed a high risk and exposing to risk of being infected with Tuberculosis. The common type of TB found among HIV patients affected by tuberculosis was pulmonary tuberculosis this is also in agreement with this study as reported by Affusim, Kesieme and Abah (2012).

In particular in a social combination environment (with overpopulation). Conditions extending the length of exposure to infectious patients, such as health system-related factor, including delay in diagnosis may increase Tb transmission. Tuberculosis is exclusive based on environmental and personal risk factors (Singh, et al., 2013).

The risk of TB infection is mainly controlled by external variables and intrinsic combinations of source infectivity, contact closeness, social and behavioral risks, including smoking, drinking and indoor air pollution (Singh, et al., 2013). This research also showed malnutrition as a risk factor for the development of pulmonary tuberculosis, and this is comparable to the studies carried out by Khaliq, Khan, Akhtar and Chaudhry (2019) in Tanzania and Denkinger et al (2015) in Pakistan. The reason for this may be a nutritional impairment or nutritional impairment that may lead to latent infection development to the acute TB disease.

CONCLUSION

Identified risk factors through patient treated in Ekiti State were alcohol/smoking, overcrowding, HIV, malnutrition diabetes and unknown cause. Significant association was observed between presumed risk factor and development of pulmonary tuberculosis. Significant association was also

observed between the demographical variables and the development of pulmonary tuberculosis in Ekiti State.

Recommendations

Based on the findings from this study, the following recommendations are made:

1. Every family should maintain proper environmental hygiene, cough etiquette, and regular hospital check-ups.
2. Individuals with immunosuppressive diseases like HIV, diabetes mellitus, cancers should ensure they go for TB prophylaxis and commence anti-TB medications at the slightest suspicion or diagnosis of TB
3. There should be more awareness to risk factor of Tuberculosis in every community. That is government should improve infrastructure, health policies, human resources development, services delivery at all health centers and DOTs clinics and trained nurses, doctors, community health workers should be encouraged to work in rural areas.
4. There should be a wide coverage of DOTS in all the Local Government Areas.

Implication of the Study

Nursing Education:

1. There should be separate module for tuberculosis in Mandatory Continuing Professional Development Programme (MCPDP).

Nursing Practice:

2. Nursing should teach the importance of adherence to TB drugs.
3. There should be seminar for new trend of management of Tuberculosis for all nurses and stakeholders.

Research:

4. Study on pulmonary tuberculosis and associated risk factors could be carried out in south west Nigeria.
5. A comparative study on pulmonary tuberculosis and associated risk factors could be carried out across the geopolitical zones of Nigeria.

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