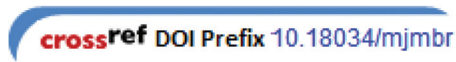


Research Article

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Statistical Analysis of Tuberculosis in Jigawa State, North-Western Nigeria

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ABSTRACT

Studies on Tuberculosis (TB) in Jigawa, a Northwestern state in Nigeria, is very scarce as Tuberculosis and Leprosy Control Center in the state started functioning properly only recently in 2009. Since then, there has been a hike in the number of TB patients visiting the center. This study is conducted to analyze the incidence of Tuberculosis in the state. Data used is obtained from Tuberculosis and Leprosy Control Center, Ministry of Health, Jigawa State, Nigeria. Questioners are used for the collection of the available data for the period of six years (2009–2014). Linear regression is used to analyze the trend of the disease from the same period. Trends within various age groups were recorded. HIV co-infection is analyzed and its trend is also recorded over the years. Gender parity is also analyzed using a t-test. There is an increase in the number of patients from 2009 to 2014. Out of the 9590 patients seen in the period, 6538 (68.18 %) are males and 3052 (31.82%) are females. At-test is used to show the significance in the difference between the number of males and females. It is also found that, there is an increase in the number of HIV co-infection over the said years. The study shows the prevalence of TB is highest among the age group of 25 – 34 (30.15%). The commonest type of TB in the population was smear positive pulmonary TB, with 5853 patients (61.03%). TB in Jigawa state was found to be significantly increasing. Out of all the 9590 patients seen at the center, 6538 (68.18 %) are males and 3052 (31.82%) are females. HIV co - infection with Tuberculosis occurred in 9.94% of the patients considered. This study shows a high percentage of infection: 30.14% between the age group of 25-34. In general, Pulmonary TB has a higher prevalence of 95.69% compared to Extra Pulmonary TB that has 4.31%.

Key Words: Tuberculosis, HIV, Jigawa, Prevalence, t-test, Trend

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INTRODUCTION

Throughout the world, tuberculosis (TB) is among the serious diseases that kill human beings (Lancelot, et al, 2012). In 2011 alone, there were about 8.7 million new cases of TB and about 1.4 million deaths caused by TB. The threat of TB is felt more in the low and middle-income countries (Johnbull et al, 2013).

The Nigerian population is over 130 million people. Nigeria is the 4th among 22 countries with higher TB burden in the world (WHO, 2006). Nigerian annual number of TB new cases is about 368,000, making it the largest among African countries (WHO, 2005). Various statistical researches were carried out on TB in Nigeria but mostly from South-southern, Southeastern, and Southwestern states of the country (Johnbull et al, 2013; WHO, 2006; WHO, 2005). Jigawa State is one of the Northwestern states in Nigeria. It lies between longitude 11^o to 13^o North and Latitude 8^o to 10^o East, with a land mass of 22, 140 km² and with 27 local government areas (Diagnosis of Jigawa Agriculture, 2000). According to National Population Commission (NPC, 2006) the number of people living in the area is estimated to reach 4.3 million. Studies on Tuberculosis in Jigawa state is very limited as Tuberculosis and Leprosy Center in the

state started functioning properly only recently in 2009. However, there is an increase in the number of TB patients visiting the center.

This study was conducted to analyze Tuberculosis in Jigawa State North-western Nigeria, by statistical means. In order to achieve that, a review of all the patients with TB in the six-year-period (2009 – 2014) was taken to determine the prevalence of the disease in the period. The analysis is conducted between age groups, type of TB, gender parity, HIV co-infection, and to also determine new cases and retreatment.

METHODS

Study site and study design

All the six (6) years TB data available in the Tuberculosis and Leprosy Control Center, Ministry of Health, Jigawa State, Nigeria was collected.

DATA COLLECTION

Sample size

The sample size includes all the TB patients treated in the center within the period of 2009 to 2014.

Data collection

A standard questioner was prepared to obtain details from the TB laboratory and TB treatment registers. Variables considered include Period (2009 – 2014), Number of patients in each year, Gender, Age, Type, and HIV co-infection.

Statistical analysis

Data generated from the study were entered and recorded in Microsoft Excel computer software. The analysis of the data was performed using Statistical Package for Social Sciences (SPSS) version 20.0. Simple linear regression analysis is used to analyze the trend of the disease from 2009 – 2014. The trend within various age groups is recorded. Gender parity is analyzed and found to be significant using t-test and assuming unequal variance. HIV co-infection is also studied and analyzed.

Results

Between 2009 and 2014, 9590 cases of TB are recorded in the center as summarized in (Table 1). There is an increase in the number of TB cases over the years (Graph 1).

Table1: Prevalence of TB over the years

Years	2009	2010	2011	2012	2013	2014	Total
Number of Cases	1283	1371	1495	1643	1779	2019	9590

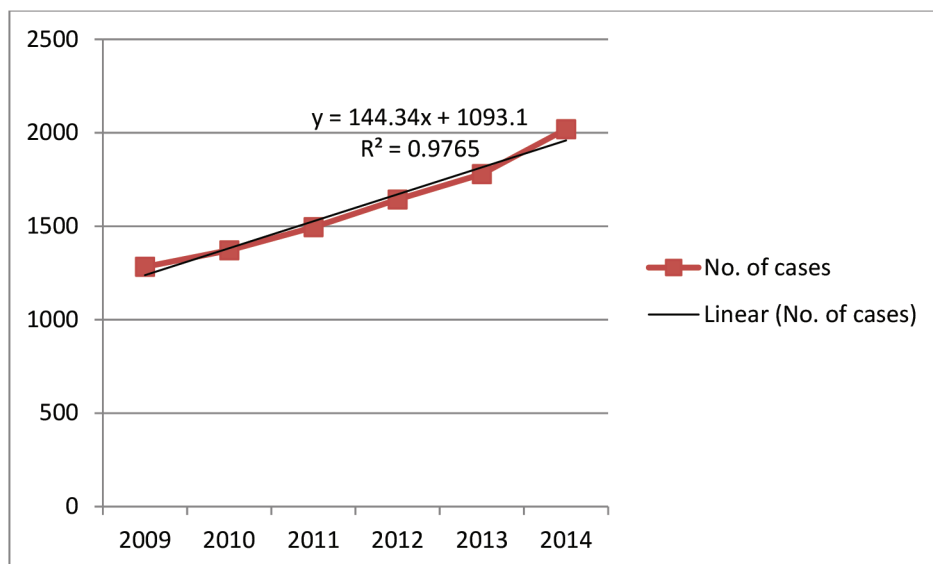


Figure 1: TB trend over the years

Our study shows a difference in TB infection rate between the genders, out of the 9590 patients seen in the center. The difference being 6538 (68.18 %) males and 3052 (31.82) females is found to be statistically significant (Table 2).

Table 2: Prevalence of TB with respect to gender

	Levene's Test for Equality of Variances		t-test for Equality of Means							
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
Patients	Equal variances assumed	7.320	.022	6.646	10	.000	581.000	87.417	386.223	775.777
	Equal variances not assumed			6.646	6.523	.000	581.000	87.417	371.186	790.814

The number of HIV co-infection increases over the years (Table 3). The regression equation and the value of R^2 are shown below (Graph 2).

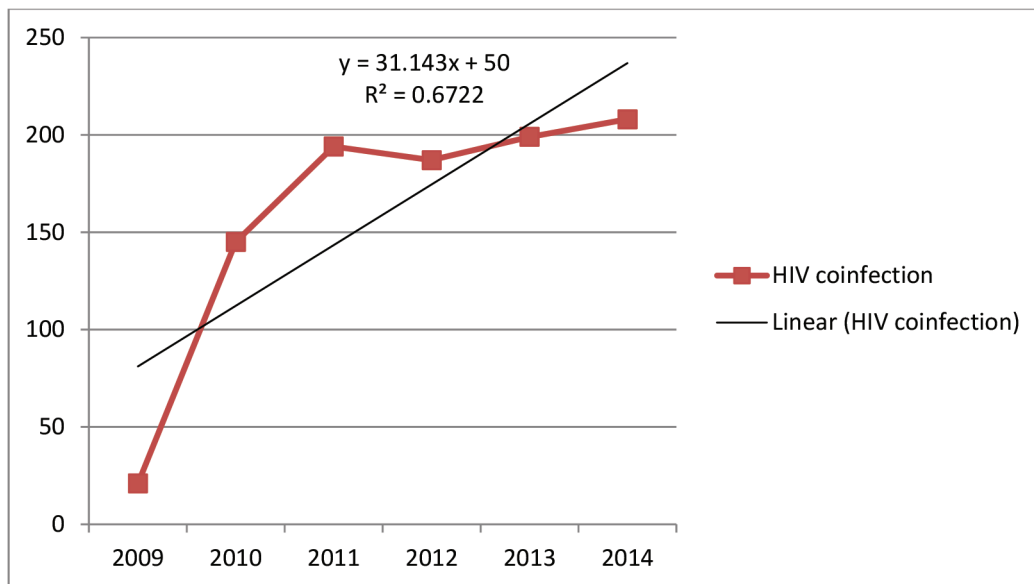


Figure 2: HIV co - infection

Table 3: The prevalence of HIV in the study population

HIV co - infection	2009	2010	2011	2012	2013	2014	Total	Percentage
Present	21	145	194	187	199	208	954	9.9478624
Absent	1262	1226	1301	1456	1580	1811	8636	90.052138
Total	1283	1371	1495	1643	1779	2019	9590	100

The prevalence of TB is highest among the age group of 25 – 34 (30.15%). The age group with lowest prevalence is 0 – 4 (1.78 %). Details of the prevalence are shown in Table 4.

Table 4: Proportion of TB with respect to age group

Age group	2009	2010	2011	2012	2013	2014	Total	Percentage
0-4	15	19	26	43	44	24	171	1.78
4-14	49	53	63	75	82	70	392	4.09
15-24	182	206	245	250	214	300	1397	14.56
25-34	421	443	453	488	525	561	2891	30.15
35-44	298	328	343	342	362	422	2095	21.85
45-54	200	192	207	218	256	278	1351	14.09
55-64	80	82	101	143	175	202	783	8.16
> 64	38	48	57	84	121	162	510	5.32
Total	1283	1371	1495	1643	1779	2019	9590	100

The commonest presentation was smear positive pulmonary TB, with 5853 patients (61.03%), followed by Smear Negative Pulmonary TB, with 3324 patients (34.66%). The least is Extra Pulmonary TB, with 413 patients (4.31%) table 5.

Table 5: Distribution of the type of TB found

Type		2009	2010	2011	2012	2013	2014	Total	Percentage
Pulmonary TB	Smear Positive	792	868	914	1070	1026	1183	5853	61.03
	Smear Negative	446	474	528	499	649	728	3324	34.66
Extra Pulmonary		45	29	53	74	104	108	413	4.31
Total		1283	1371	1495	1643	1779	2019	9590	100

DISCUSSIONS

In this research, the prevalence of TB in Jigawa state was found to be significantly increasing. This doesn't agree with the finding in Abia State (Nigeria) between 2005 and 2006 that shows a decrease in the prevalence of the disease (Christopher et al, 2012).

This result may be as a result that Tuberculosis and Leprosy center in Jigawa State, started functioning much later in 2009. Therefore, TB patients began to visit the center for awareness, medication and other purposes en mass.

Out of all the 9590 patients seen at the center, 6538 (68.18 %) were males and 3052 (31.82 %) were females. This is in agreement with the study in TB referral center in South-Southern Nigeria, which shows that prevalence is more among men than women (Johnbull et al, 2013). It is also in line with the study by Obiora et al. which indicates higher rate infection among males in Benin, Nigeria (Obiora et al, 2004). Nnorom et al. also reported that higher infection is among males than females in urban and rural communities in Nigeria (Nnorom, et al, 1996).

The reason for the gender parity is perhaps due to the biological and immunological evidence that suggest men may have more smear-positive TB than women (Diwan and Thorson, 1999).

HIV co-infection with Tuberculosis occurred in 9.94% of the patients surveyed. This is an improvement compared to a value 33.9% in a study carried out in Benin City, Nigeria in 2007 (Nnorom, et al, 1996).

This improvement can be associated to the awareness about the disease as well as the danger of its association with HIV/AIDS been carried out by different NGOs.

This study shows a high percentage of infection: 30.14% between the age group of 25-34. The result is similar to the finding in TB Referral Center in South-Southern Nigeria between January 2003 to December 2012 that shows 38.1% (Johnbull et al, 2013).

The above finding can be linked with to the fact that, people in that age group tend to have more awareness often via social networks and similar platforms. They perhaps have knowledge about Mycobacterium which causes TB and try to avoid it.

In general Pulmonary TB has a higher prevalence of 95.69% compared to Extra Pulmonary TB that has only 4.31%. This result is a little bit higher than that of the TB patients seen in Ado-Ekiti, Ekiti State, Nigeria (Oluwale et al, 2012). It is also higher than that of HIV-Seropositive patients seen at Benin City Nigeria in 2007 (Nnorom, et al, 1996).

STUDY LIMITATIONS

Although this study offers significant findings, there are still a few limitations notable of which might be the absence of mortality rate due to TB.

CONCLUSION

The prevalence of TB in Jigawa state was found to be increasing. Out of all the 9590 patients seen in the center 6538 (68.18 %) are males and 3052 (31.82) are females. HIV co-infection with Tuberculosis occurred in 9.94% of the patients considered.

This study shows a high percentage of infection 30.14% between the age group of 25-34. In general Pulmonary TB has a higher prevalence of 95.69% compared to Extra Pulmonary TB 4.31%.

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