



PREVALENCE STUDY OF *MYCOBACTERIUM TUBERCULOSIS* INFECTION AMONG PATIENTS ATTENDING HADEJIA GENERAL HOSPITAL, JIGAWA STATE-NIGERIA.

*SHEHU, A.A, JAMILU, I and ABDULLAHI, A.M.

Department of Microbiology, Faculty of Science and Science Education, Kano University of Science and Technology, Wudil

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Correspondence author:

e-mail: aashehudbt2012@yahoo.com

Phone:

ABSTRACT

A Study on the prevalence of *Mycobacterium tuberculosis* among patients attending Hadejia General Hospital was conducted. A total of 150 sputum samples comprising of 93 males and 57 females with age range between 19 to 70 years were collected and brought to Northwest TB reference laboratory Hadejia for analysis. A method of Ziehl Neelsen stain for the detection of acid fast bacilli (AFB) was employed to determine the presence of acid fast bacteria. Result shows that 21 (63.6%) of male and 12 (36.4%) of female were AFB positive. The result of AFB positive ranged from 3.0 to 48.5% in age group 10-19 and >40. The result of AFB positive in relation to level of education ranged from 12.1 to 54.4% in tertiary institution and uneducated group respectively. Prevalence of *Mycobacterium tuberculosis* in relation to occupation ranged from 6.1 to 27.3% in civil servants and unemployed respectively. The result of the current study had shown that males were more prevalent to AFB than females, the highest AFB positive in relation to age group was obtained in age group of >40 years, while the highest AFB positive in relation to education and occupation was obtained in uneducated and unemployed group respectively. The prevalence of tuberculosis among patients in the study area though very low (33%) but has been reportedly being on the increase over the years especially in those patients who run the highest risk of developing active tuberculosis. The result had confirmed that prevalence is a direct indicator of the burden of tuberculosis indicating the number of people suffering from the disease at a given point in time. In view of the above, early diagnosis and adequate treatment should be done to prevent morbidity and mortality as well as person-to-person transmission. Residents of long-term care facilities such as hospitals, prisons, nursing homes, clinics and mental institutions should take precautions to prevent the spread of tuberculosis. Federal, State and Local Government should provide drugs free to patients suffering from tuberculosis.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* which was first isolated by German physician, Robert Koch in 1882, and characterised by the formation of nodular lesion (tubercles) in the tissue. The reservoir of the infection is human. Today, TB tends to

be concentrated among inner city dwellers, ethnic minorities and recent immigrants from the areas of the world where the illness is still common (WHO, 2002). Alcoholic who obtains malnourished are at high risks of developing the disease as people who are infected with HIV, it can occur anywhere and no one is exempted from the threat of the infection.

HIV infection weakens the immune system and thus makes active tuberculosis disease more likely in an individual infected with the tubercle bacilli (Tripathy and Ibrahim, 1992) as a result of the spread of HIV. An estimate of 1.4 million worldwide case of active tuberculosis are expected to occur annually in people co-infected with HIV by the end of the century. Tuberculosis is the leading worldwide cause of death among individuals who are HIV positive (WHO, 2008).

Tuberculosis is primarily an air borne disease. The bacteria are spread from person to person in tiny microscopic droplets. When TB patient coughs, sneezes, speaks, sings, or laughs, the bacteria are released in a large number in aerosols. Tuberculosis is one of the most serious disease and considerable public health problem due to high risks of person to person transmission, morbidity and mortality. In view of the above, the study was conducted to determine the prevalence of *Mycobacterium tuberculosis* among patients attending Hadejia General Hospital.

MATERIALS AND METHODS

The Study Area

The study was conducted at Northwest TB Reference Laboratory, which is a specialized Tuberculosis diagnostic laboratory located in Hadejia General Hospital, Jigawa State.

Sample Collection

Consent forms attached to the questionnaire forms were given to the patients to fill after whom the patients were consoled to provide 2 to 3 sputum samples at different times depending on either diagnosis or follow-up treatment respectively. For diagnosis treatment, the first sample was collected when the patients attended the hospital for the first time, an empty sputum containers were provided to the patients for collecting an early morning samples at home by the next day, and the samples for follow-up treatment, two early morning samples were collected for 2 consecutive days. The samples were treated with solution potassium hydroxide KOH against liquefaction and contamination and were properly kept in the laboratory for analysis.

Acid Fast Bacilli (AFB) Test

Preparation of smear-A purulent particles of the specimen was selected, using a sterile wire loop, a loopful of the sputum was spread on a clean grease free slide uniformly in an oval shape by smearing repeatedly in coil-like pattern, and approximately 2x3cm wire loop was dipped in wash bottle containing washed san and 5% cresol. The wire loop was sterilized by heating in a pilot flame Bunsen burner till red hot (Monica, 2000).

Drying and fixation of the smear- The smear was allowed to air dry completely at room temperature protecting it from dust, insect and sunlight. It was then fixed by passing it through the flame of Bunsen burner 3 times for 2-3 seconds each, and the slide was placed in a staining rack (Monica, 2000).

Acid fast staining procedure- A strong carbol fuchsin stain was poured to cover the whole surface of the slide, the slide was heated at 60°C until vapour just begins to rise. The heated stain was allowed to remain on the slide for about 5 minutes. The slide was then tilted to drain off excess stain, and the staining solution was gently washed off with a clean tap and the slide was tilted again to drain off excess rinse water (Monica, 2000).

Decolourization- The whole surface of the slide was covered with 3%V/V acid alcohol until the smear becomes sufficiently decolourized (colourless). The slide was then washed with water and was tilted to drain off excess water (Monica, 2000).

Counterstaining- The slide was covered with 0.1% Methylene blue for about 30-60 seconds. It was then washed with clean tap water, the slide was tilted again for the last time to drain off excess water. The back of the slide was cleaned using cotton wool and it was placed on a draining rack to air-dry completely (Monica, 2000).

Microscopic Examination- A drop of immersion oil was placed on the stained smear, the smear was examined microscopically using 100 X objective lens, and the results were observed and recorded (Monica, 2000).

RESULTS AND DISCUSSION

A total of 150 patients were examined for Acid Fast Bacilli (AFB), among which 33 (22%) were AFB positive.

Table 1 shows the prevalence of tuberculosis among patient attending Hadejia General Hospital in relation to sex. Males were more prevalence 21 (63.6%) than females with prevalence rate of 12 (36.4%). Table 2 shows the prevalence of tuberculosis in relation to age among patients attending Hadejia General Hospital. Age group of >40 years had the highest percentage (50%) of AFB positive while the least percentage of 0% of AFB positive was obtained from age group of 1-9 years. Table 3

shows the prevalence of tuberculosis in relation to level of education among patients attending Hadejia General Hospital revealed that uneducated with 54.6% had the highest percentage of AFB positive, while the least percentage (12.12%) of AFB positive was obtained from tertiary institution. Table 4 shows the prevalence of tuberculosis in relation to occupation among patients attending Hadejia General Hospital. The highest prevalence (27.27%) of AFB positive was obtained from unemployed while the lowest prevalence (0%) of AFB positive was obtained from students.

Table 1: Prevalence of Tuberculosis among Patients Attending Hadejia General Hospital in Relation to Sex

Sex	Number of AFB Examined (%)	Number of AFB Positive (%)
Male	93 (62)	21 (63.6)
Female	57 (38)	12 (36.4)
Total	150 (100)	33 (100)

Key:

AFB = Acid Fast Bacilli

Table 2: Prevalence of Tuberculosis in Relation to Age among Patients Attending Hadejia General Hospital.

Age Group	Number of Males AFB Positive (%)	Number of Females AFB Positive (%)
1-9	0(0)	0(0)
10-19	1 (4.76)	0(0)
20-29	4 (19.05)	2 (16.67)
30-39	6 (28.57)	4 (33.33)
40 and above	10 (47.62)	6 (50)
Total	21 (100)	12 (100)

Key:

AFB = Acid Fast Bacilli

- = Nil

Table 3: Prevalence of Tuberculosis in Relation to Level of Education among Patients Attending Hadejia General Hospital.

Level of Education	Number of AFB Examined (%)	Number of AFB Positive (%)
Primary	25 (16.67)	5 (15.15)
Secondary	32 (21.33)	6 (18.18)
Tertiary	31 (20.67)	4 (12.12)
Uneducated	62 (41.33)	18 (54.55)
Total	150 (100)	33 (100)

Key:

AFB = Acid Fast Bacilli

Table 4: Prevalence of Tuberculosis in Relation to Occupation among Patients Attending Hadejia General Hospital.

Occupation	Number of AFB Examined (%)	Number of AFB Positive (%)
Farming	40 (26.67)	8 (24.24)
Business	21 (14)	6 (18.18)
Students	4 (2.67)	0 (0)
Unemployed	29 (19.33)	9 (27.27)
Artisan	19 (12.67)	4 (12.12)
House wives	20 (13.33)	4 (12.12)
Civil service	17 (11.33)	2 (6.01)
Total	150(100)	33(100)

Key:

- AFB = Acid Fast Bacilli
- = Nil

There is more prevalence in males may be attributed to males being more exposed to high risk of socio-epidemiological factors than females. This result is in agreement with the work of Johnbullet *al.* (2013) on TB referral centre in South-South Nigeria which shows that prevalence is more among men than women. This result also agrees with the study conducted by Obiora (2004) which indicated higher rate of TB infection among men than women. Nnorom *et al.* (1996) also reported that higher infection is among males than females in urban and rural communities in Nigeria. 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 Thompson, 1999).

Prevalence of tuberculosis in relation to age had shown that the older age groups are increasingly becoming exposed to tuberculosis infection than the younger age groups. This could be as a result of their living habits and cultural practices which are compelled by the current economic crises in the country. Johnbullet *al.* (2013) pointed out that this result is similar to the finding in TB referral centre in South-Southern Nigeria between January, 2003 and December, 2012 which showed prevalence of 38.1%.

The highest prevalence of tuberculosis in relation to level of education could be as a result of level of illiteracy which is an important risk factor of tuberculosis. The low prevalence of TB positive could be as a result of more awareness of educated group

through social networks, lectures and similar platforms which made them to have knowledge on the danger of *Mycobacterium* which causes TB and tried to avoid it.

The highest prevalence rate of tuberculosis in relation to occupation could be attributed to poverty which is also an important risk factor that contributes to the spread of tuberculosis infection. Oluwale (2012) pointed out that pulmonary TB has a higher prevalence of 95.69% compared to extra pulmonary TB that has only 4.31%. The current study had shown higher result of AFB positive than that obtained in Ado-Ekiti, Nigeria.

Due to the increasing number of person to person transmission with tuberculosis infection in the last years (Roos *et al.*, 2000), the worldwide dissemination of HIV infection which is the strongest risk factor for tuberculosis development (Lucas and Nelson, 1994), and the continues migration of peoples from area with high incidence of tuberculosis to highly industrialized countries, tuberculosis is considered a global emergency and to counter act and control this epidemic, the current global tuberculosis control efforts should be based on diagnosis of AFB positive patients followed by adequate treatment.

CONCLUSION AND RECOMMENDATIONS

Even though the prevalence of tuberculosis among patients was low (33%), but has been reportedly being on the increase over the years especially in those patients who run the highest risk of developing active tuberculosis disease.

The study had also shown that prevalence is a direct indicator of the burden of tuberculosis indicating the number of people suffering from the disease at a given point in time.

Based on the current study, the following recommendations were made:

1. Early diagnosis and adequate treatment should be done to prevent morbidity and mortality as well as person-to-person transmission.
2. Treatment should be based on directly observed therapy to prevent the development of multi-drug resistance strains tuberculosis.
3. Patients should be enlightened on the needed to cover their mouth and nose while coughing or sneezing.
4. Hospitalized TB patients should be isolated in rooms with controlled ventilation and flow until they can no longer spread the disease.
5. Preventive measures should be adopted, such as administering BCG vaccines to infants
6. Residents of long-term care facilities such as hospital, prisons, nursing homes, clinics and mental institutions for high risk population should take precautions to prevent the spread of tuberculosis.

REFERENCES

- Diwan, K. and Thompson, A. (1999). Sex and gender and tuberculosis. *Lancet*, **353**:1000-1001.
- Johnbull, J; Daniel, O.O. and Peter, O.I. (2013). Tuberculosis and gender parity in a TB Referral Centre, South-South, Nigeria. *G J of Med. Sci.* **3(7)**:270-275.
- Lucas, S. and Nelson, A.M. (1994). Pathogenesis of TB in HIV infected people. Vol. 2. ASM Press, Washington, DC.
- Monica, C. (2000). District Laboratory in Tropical Countries. Part 2. Pp.62-249. Cambridge.
- Nnorom, J.A; Williams, E. and Tilley-Gyado, A. (1996). HIV, tuberculosis and syphilis in Nigeria: A descriptive study. International conference on AIDS. **11**:138.
- Obiora, G. (2004). Comparative Study of HIV-associated Pulmonary Tuberculosis in Chest Clinics from two regions of Edo State, Nigeria. *Online Journal of health and Allied Sciences.* **5(2)**:120-125.
- Oluwale, A.B. (2012). Two year trend analysis of Default Rate in Tuberculosis patients in federal medical centre, Ado – Ekiti, Ekiti State, Nigeria. *Journal of Asian Scientific Research.* **3(1)**:10-15.
- Roos, B.R; Vancleef, M..R..A; Githui, W.A; Kivihya, L. and Ndugga, D.K. (2000). New Diagnostic Tool for tuberculosis. Cost effectiveness of the polymerase chain reaction versus smear Examination for the diagnosis of tuberculosis in Kenya. **2**:235-241.
- Tripathy, S.P. and Ibrahim, K. (1992). New diagnostic tools for tuberculosis. *European Journal of Clinical Microbiology and Infectious Diseases.* **8**:168-170.is
- World Health Organization (2002). Global tuberculosis control, surveillance, planning, and financing. WHO report, Geneva. 290-295.
- World Health Organization (2008). Antituberculosis resistance in the world. Report number 4, Geneva. 355-365.