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PREVALENCE OF TUBERCULOSIS AMONGST PATIENTS ATTENDING TWO SECONDARY HOSPITALS IN ABEOKUTA OGUN STATE.

[1]Babajide TI, [2]Nwadike VU, [1]Ojo DA, [3]Onasanya OA, Ojide KC, Kalu IE

1. Dept of Microbiology, Federal University of Agriculture Abeokuta. 2. Division of Medical Microbiology

Dept of Pathology Federal Medical Center Abeokuta. 3. Dept of Public and allied health Babcock University Ilishan Ogun state. . Dept of Medical Microbiology FTH Abakaliki. 5.Dept of Medical Microbiology FMC Umuahia.

Correspondence: email: victornwadike@yahoo.com

ABSTRACT

This study was conducted to examine the rate of *Mycobacterium tuberculosis* infection among individuals attending the outpatient clinic of two hospitals in Abeokuta Metropolis in Southwestern Nigeria. Of the 132 individuals examined, the overall rate of tuberculosis infection was 16.7%. Infection was highest among patients in the 21-40 year age group (11.4%). Results also showed that 10.6% of male patients were infected with tuberculosis and 6.1% of female patients infected with tuberculosis. There was no significant difference between the sex and *Mycobacterium tuberculosis* infection. There was also no significant difference between age-groups and *Mycobacterium tuberculosis* infection. But there was a significant difference between the ESR and tuberculosis infection.

PREVALENCE DE TUBERCULOSE PARMI LES PATIENTS SUIVIS DANS DEUX HOPITAUX DE SOINS SECONDAIRES DE ABEOKUTA, ETAT DE OGUN

[1]Babajide TI, [2]Nwadike VU, [1]Ojo DA, [3]Onasanya OA, Ojide KC, Kalu IE

1. Département de Microbiologie, Université Fédéraled'Agriculture, Abeokuta. 2. Division de Microbiologie Médicale

Département de Pathologie de CentreFédéralMédical, Abeokuta. 3. Département de Santé publique et alliés, Babcock Université d'Ilishan, Etat d'Ogun. Département de Microbiologie Médicale, FTH Abakaliki. 5. Départementde Microbiologie Médicale, FMC Umuahia.

Adresse de correspondent: email: victornwadike@yahoo.co

Résumé

Cette étude a été menée afin d'examiner le taux d'infections à *Mycobacteriumtuberculosis*chez les individus suivis à la clinique externe de deux hôpitaux de métropole de Abeokuta au Sud-ouest du Nigéria. Sur les 132 individus examinés, le taux global d'infection de la tuberculose était de 16,7%. L'infection était plus élevée chez les patients âgés de 21-40 ans (11,4%). Les résultats ont également montré que 10,6% des patients de sexe masculin ont été infectés par la tuberculose et 6,1% des patientes infectées par la tuberculose. Il n'y avait pas de différence significative entre le sexe et l'infection à *Mycobacteriumtuberculosis*. Il n'y avait pas de différence significative entre les groupes d'âge et l'infection à *Mycobacteriumtuberculosis*. Mais il y avait une différence significative entre l'ESR et la tuberculose.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacterium Mycobacterium tuberculosis. It was first described in 1882 by Robert Koch, who won the Nobel Prize in Physiology/ Medicine for this discovery in

1905 (1). It essentially attacks the lungs in more than 80% of the cases, leading to primary tuberculosis.

Extra-pulmonary tuberculosis occurs in less than 20% of cases and affects various organs such as lymph

nodes, meninges, intestine, bone and joints among others(2).

Tuberculosis is an infectious disease causing mortality in humans. Timely detection of the disease permits

the institution of effective, life-saving treatment, and thereby reduces transmission to close contacts. Despite

the technical advancement in tuberculosis research, improved environmental conditions especially in the

developed countries and the discovery of effective treatment half a century ago, the disease remains a health

problem worldwide (3). *M. tuberculosis* infection remains the leading infectious killer of youth and adults.

Tuberculosis (TB) is the leading cause of death in the world from a bacterial infectious disease. The disease

affects 1.8 billion people per year which is equal to one-third of the entire world population (4).

Mycobacterium tuberculosis, along with *M. bovis*, *M. africanum* and *M. microti* all cause the disease known as

tuberculosis and are members of the Mycobacteria tuberculosis complex. Each member of the complex is

pathogenic, but *Mycobacterium tuberculosis* is for humans while *Mycobacterium bovis* is usually pathogenic for

animals (5). Tuberculosis usually attacks the lungs but can also affect other parts of the body. It is spread

through droplet or aerosol (6).

M. tuberculosis is classified as an acid fast bacterium and it divides every 15- 20 hours, which is slow when

compared to other bacteria, which tend to have division times measured in minutes. It's a small, rod-like

bacillus that can withstand weak disinfectants and can survive in dry state for weeks (7). *Mycobacterium*

tuberculosis is identified microscopically by its staining characteristics; it retains stains after being treated

with acidic solution, and is thus classified as an acid fast bacillus (AFB). In Ziehl-Neelsen staining

procedure, AFB are stained a bright red, and can also be visualized by fluorescent microscopy and diagnosis

can be made using polymerase chain reaction (PCR) (8).

Most infections in humans result in an asymptomatic, latent infection and about one in ten latent infections

eventually progresses to active disease which if left untreated, kills more than 50% of its victims.

The classic symptoms are a chronic cough with blood-tinged sputum, fever, night sweats, and weight loss

(the last giving rise to the formerly prevalent colloquial term "consumption"). Infection of other organs

causes a wide range of symptoms (9). Diagnosis relies on radiology (commonly chest X-rays), a skin

test, blood tests, as well as microscopic examination and microbiological culture of bodily fluids. Treatment

is difficult and requires long courses of multiple antibiotics. Contacts are also screened and treated if

necessary (6). Antibiotic resistance is a growing problem in (extensively) multi-drug-resistant tuberculosis.

Prevention relies on screening programs and vaccination, usually with Bacillus Calmette-Guérin vaccine

(10).

Although, one third of the world's population is thought to be infected with *M. tuberculosis* (11), new

infections occur at a rate of about one per second (12). The proportion of people who become sick with

tuberculosis each year is stable or falling worldwide but, because of population growth, the absolute

number of new cases is still increasing (12). In 2007 there were an estimated 13.7 million chronic active cases, 9.3 million new cases, and 1.8 million deaths, mostly in developing countries (13). In addition, more people in the developed world are contracting tuberculosis because their immune systems are compromised by immunosuppressive drugs, substance abuse, or AIDS. The distribution of tuberculosis is not uniform across the globe; about 80% of the population in many Asian and African countries test positive in tuberculin tests, while only 5-10% of the US population test positive (14).In another study conducted in umuahia by Nwachukwu et al it was reported that the overall prevalence of *M. tuberculosis* infections was 21.6% (15). The objective of this study is to determine the prevalence of tuberculosis among patients using two major hospitals in Abeokuta, Ogun State.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Abeokuta, the capital city of Ogun State, Southwest Nigeria. The hospitals selected for this study were Sacred Heart Hospital, Lantoro and State General Hospital, Ijaiye, Abeokuta. The hospitals were selected because they are reference centers for the diagnosis and treatment of tuberculosis (TB).

SAMPLE COLLECTION

The samples were collected randomly among suspected TB patients attending the outpatient clinic at Sacred Heart Hospital, Lantoro and State General Hospital, Ijaiye, Abeokuta within the period of March to April, 2011. The samples collected were blood and sputum.

Sputum Collection

One hundred and thirty two sputum samples were collected for this study. Three sputum specimens were collected from each patient. These were 'first spot' specimen, an early morning specimen and a 'second spot' specimen. The selected patients were given two dry clean, universal containers each. They were instructed to produce sputum from a deep cough into one of the containers on the first day of visitation to the clinic (first spot specimen). The patients took the second container home and were instructed to produce early morning sputum from a deep cough before food (early morning specimen). On arrival to the laboratory with the early morning specimen, another sputum specimen (second spot specimen) was collected from each patient.

MICROSCOPIC EXAMINATION OF THE SPUTUM

Equal volume of sputum specimen and 4% sodium hydroxide were mixed together, centrifuged at 3000 rev/ min for 15 minutes and a wooden applicator was used to transfer an appropriate part of the sediment onto the slide and smeared in a repeated coil type on the middle of a clean microscope slide over an area approximately 2cm by 1cm. The smear was allowed to dry on the bench for 15 minutes and it was fixed by passing through flame 3-4 times with the smear uppermost. The fixed smear was flooded with Ziehl-Neelsen Carbol Fuchsin and slide was heated slowly until it was steamed. Steaming was maintained for 3-5 minutes by using low or intermittent heat. The slide was rinsed in a gentle stream of running water until the excess stain is washed away. The slide was flooded with decolorizing solution (3% acid-alcohol) and it was left for 3 minutes. The slide was rinsed thoroughly with water and excess was drained. The slide was flooded with methylene blue to counter stain and was left for 1 minute. The slide was rinsed thoroughly with water and excess water was drained. The slide was allowed to air dry and was viewed under the oil immersion microscope. The results of sputum examination can either be positive or negative.

Positive results include: 1+, 2+ and 3+

The explanation of indices is as follows;

TABLE 1: INTERPRETATION OF RESULTS

(0): means no AFB is seen in at least 100 fields, therefore it's reported as negative.

(1+): means 10-99 AFB are seen in 100 fields.

(2+): means 1-10 AFB per field are seen in at least 500 fields.

(3+): means more than 10 AFB per field are seen in at least 20 fields

The Erythrocyte Sedimentation Rate (ESR) of each patient was determined by Westergen-micro method using EDTA anticoagulated blood and the reading was taken at the end of one hour. The normal value for ESR is 0-10 mm/hr.

RESULTS

A total number of one hundred and thirty two (132) individuals attending outpatient clinic at Sacred Heart Hospital and State General Hospital, Ijaiye in Abeokuta participated in this study. Out of the total number 72(54.5%) were males while 60(45.5%) were females.

The highest number of patients were in the age group 21-40 years, 64(48.5%) and the least in the age group 61-81 years, 10(7.6%). The prevalence of *Mycobacterium tuberculosis* infection in relation to age is shown table 2. The most infected individuals were seen in the age group 21-40 years, 15(11.4%) while the least infected individuals were seen in the age group 61-81 years, 1(8.0%). Age did not contribute significantly to mycobacteria infection. (P= 6.752)

TABLE 2: *MYCOBACTERIUM TUBERCULOSIS* INFECTION IN RELATION TO AGE

Age (year)	Total number examined (%)	*Mycobacterium tuberculosis* infection	
		Positive (%)	Negative (%)
0-20	18 (13.6)	4 (3.0)	14 (10.6)
21-40	64 (48.5)	15 (11.4)	49 (37.1)
41-60	40 (30.3)	2 (1.5)	38 (28.8)
61-81	10 (7.6)	1 (8.0)	9 (6.8)
Total	132 (100.0)	22 (16.7)	110 (83.3)

X^2= 6.752 P= 0.080

Table 3, Showed that the overall prevalence of *M. tuberculosis* was 22(16.7%) of which 14(10.6%) were males and 8(6.1%) were females. Sex did not contribute significantly to *M. tuberculosis* infection (P= 0.880)

Table 5 Showed the results of the cross-tabulation between M.tuberculosis infection and Erythrocyte Sedimentation Rate (ESR). It showed that none of the patient with *M. tuberculosis* infection had normal Erythrocyte Sedimentation Rate (2-10mm/hr). ESR is significantly affected by mycobacterium tuberculosis (P=0.001)

TABLE 3: *MYCOBACTERIUM TUBERCULOSIS* INFECTION IN RELATION TO SEX

Sex	Total number examined (%)	*Mycobacterium tuberculosis* infection	
		Positive (%)	Negative (%)
Male	72 (54.5)	14 (10.6)	58 (43.9)
Female	60 (45.5)	8 (6.1)	52 (39.4)
Total	132 (100.0)	22 (16.7)	110 (83.3)

X^2= 0.880 P= 0.348

TABLE 4: *MYCOBACTERIUM TUBERCULOSIS* INFECTION IN RELATION TO PCV (PACKED CELL VOLUME)

PCV (Range)	Total number examined (%)	*Mycobacterium tuberculosis* infection	
		Positive (%)	Negative (%)
Normal (35-54)	94 (71.2)	0 (0.0)	94 (71.2)
Moderate (26-34)	21 (15.9)	5 (3.8)	16 (12.1)
Severe (< 26)	17 (12.9)	17 (12.9)	0 (0.0)
Total	132 (100.0)	22 (16.7)	110 (83.3)

X^2= 95.895 P= 0.001

TABLE 5: *MYCOBACTERIUM TUBERCULOSIS* INFECTION IN RELATION TO ESR (ERYTHROCYTE SEDIMENTATION RATE)

ESR	Total number examined (%)	*Mycobacterium tuberculosis* infection	
		Positive (%)	Negative (%)
2-10	107 (81.1)	0 (0.0)	107 (81.1)
11-40	5 (3.8)	2 (1.5)	3 (2.3)
41-70	9 (6.8)	9 (6.8)	0 (0.0)
71-100	11 (8.3)	11 (8.3)	0 (0.0)
Total	132 (100)	22 (16.7)	110 (83.3)

X^2= 112.218 P= 0.001

DISCUSSION

This study showed an overall prevalence of 16.7% of Mycobacterium tuberculosis infection among patients in Abeokuta, Ogun State, South–Western Nigeria. In another study in Abeokuta, South-western Nigeria[3] a lower prevalence of *M. tuberculosis* among HIV pregnant women attending antenatal clinics and Onifade et al in Lagos, South-west, Nigeria also recorded a lower prevalence of *M. tuberculosis* infection although they employed mantoux test for screening.(16).

In Maiduguri, Northern Nigeria, Ukwandu et al reported higher prevalence of *M. tuberculosis* infection (17). In Minna, Ibrahim *et al.* also

obtained a higher prevalence of *M. tuberculosis* and Okodua *et al.* obtained higher prevalence for TB-HIV co-infection in Edo State, Nigeria (18,19). Other states in Nigeria like Kano, Enugu, Borno, Plateau and Benue recorded prevalent rates of 12.0, 14.0, 27.0, 30.0 and 35.0% respectively (20).

There was a higher prevalence rate in males (10.6%) when compared to females (6.1%). This higher rate could be due to higher exposure to HIV infection which inadvertently predisposed more of the affected males to TB disease. Though results of this study show that there was no significant difference between the sex and *M. tuberculosis* infection. This supports the report of Nwachukwu et al[15]. Although the highest rate of infection was among the age group 21-40 years, there was no significant difference between age group and *M. tuberculosis* infection for this study. This is in agreement with the previous report of Lawn et al (21). The lowest rate of infection in age group 61-81 may be due to diminished social habits. In the report of Campbell *et al.* which is similar to this study, *M. tuberculosis* infection significantly caused extreme increase in erythrocyte sedimentation rate (ESR). Studies also carried out by Ojo *et al.* supports this finding 3).

This study has been able to determine sputum smear positivity amongst patients who attended tuberculosis diagnosis and treatment clinics in Abeokuta. The infection was observed to affect mostly the economically supportive group of the society. The outcome of this project revealed that the prevalence of tuberculosis has been on decreasing side and the previous report of Ojo *et al.*[3] lend credence to this study.

CONCLUSION

In conclusion more enlightenment campaigns should be carried out in the state to help curtail the infection. The control of tuberculosis therefore should involve the government at all levels.

RECOMMENDATION

We recommend that improved diagnostic facilities be deployed to various tertiary and secondary health facilities for rapid diagnosis of TB and also susceptibility testing for Multidrug resistant tuberculosis.

International collaborations with low resource countries where TB is rampant should be established so that personnel can be trained to diagnose and treat TB appropriately.

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