

## THE OCCURRENCE OF MYCOBACTERIUM TUBERCULOSIS AMONG STUDENTS LIVING AT THE UNIVERSITY OF CALABAR HOSTELS, CALABAR, NIGERIA

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### ABSTRACT

**Background:** Tuberculosis, (TB) in the past also known as phthisis palmonalis, is widespread, and in many cases fatal, infectious disease caused by various strains of mycobacteria, usually *Mycobacterium tuberculosis*. The disease is spread through droplet nuclei during coughing or sneezing. This study aimed to determine the prevalence of TB among students, and also to assess the risk factors for the infection among study subjects. **Methods:** Sputum smears stained with Ziehl Neelsen stain were examined microscopically for the detection of the Acid Fast Bacilli (AFB). A structured questionnaire was also administered to get information on the risk factors associated with TB. **Results:** A total of 350 healthy and unhealthy subjects were recruited into the study. A prevalence of 2 (1%) was recorded. Two subjects who were positive for TB infection were in the age group 21-25, whereas other age groups had no infection. The differences in the infection rate by age group was not significant statistically ( $p > 0.0915$ ). The occurrence of TB infection by gender shows that males had 2(1%) infection rate and females had no infection. The difference in the infection rate by gender was not statistically significant ( $p > 0.1572$ ). The distribution of TB infection base on the Hostels shows that Hall 4 had an infection rate of 2(3%) while hall 5,7,8 and 9 recorded no infection. The difference in the infection rate by halls was not significant statistically ( $p > 0.09157$ ). **Conclusion:** This study shows that overcrowded places like prisons, hostels, barracks, and schools contributed to the spread of TB through cough, sneezing or singing through aerosols. Infected persons should be isolated and treated to stop further spread of the infection and screening examinations of sputum for AFB should be employed in schools hostel to check for the asymptomatic carriers of TB infection before being admitted into the hostels.

**Keywords:** Tuberculosis, Hostels, Calabar, Nigeria.

### INTRODUCTION

Tuberculosis, MTB or TB (Tubercle bacillus) in the past also known as phthisis palmonalis or consumption, is widespread, and in many cases fatal, infectious disease caused by various strains of mycobacteria, usually *Mycobacterium tuberculosis* [1]. Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It is spread through the air when people who have an active tuberculosis infection cough, sneeze, or otherwise transmit respiratory fluids through the air [2].

In 2007, the prevalence of TB per 100,000 people was highest in Sub-Saharan Africa and was also relatively high in Asia [3]. Roughly one-third of the world's population has been infected with *M. tuberculosis* [2]. With new infections occurring in about 1% of the population each year [4]. Tuberculosis is the second-most common cause of death from infectious diseases after those due to HIV/AIDs [5].

Most infections do not have symptoms, known as latent tuberculosis. About one in ten latent infections eventually progresses to active disease which if left untreated, kills more than 50% of those so infected. The classic symptoms of active tuberculosis infection are a chronic cough with blood-tinged sputum, fever, night sweats and weight loss (the latter giving rise to the formerly common term for the disease "consumption"). The infection of other organs causes a wide range of symptoms. Diagnosis of active tuberculosis relies on radiology (commonly chest x-rays), as well as microscopic examination and microbiological culture of body fluids. Over a century ago, Robert Koch identified *Mycobacterium tuberculosis* as the causative agent of tuberculosis (TB). At the time, TB was rampant, causing one-seventh of all deaths in Europe and one-third of deaths among young adults. Today TB remains a global health problem of enormous dimensions. Those at high risk for developing TB disease include; People with HIV infection, People who become infected with TB bacteria in the last two years, Babies and young children, People who inject illicit drugs, People who are sick with other diseases that weaken the immune system, Elderly people, People who were not treated correctly for TB in the past [5].

Treatment of TB uses antibiotics to kill the bacteria. Effective TB treatment is difficult, due to the unusual structure and chemical composition of the mycobacterial cell wall, which hinders the entry of drugs and makes antibiotics ineffective [6]. The two antibiotics most commonly used are isoniazid and rifampin, and treatments can be prolonged, taking several months [7].

This work aimed to determine the prevalence of tuberculosis (TB) among asymptomatic and symptomatic students in University of Calabar.

### METHODOLOGY

#### Study Area

This study was carried out in the University of Calabar male and female Hostels, Calabar, Cross River State, Nigeria. Calabar lies between 4° 34' 27" North and 6° 58' 32" East. Calabar has a population of approximately 372,000 [8]. The major occupation of the citizens is farming.

#### Ethical Approval

Ethical approval was obtained from the Health Research Ethics Committee of the University of Calabar Teaching Hospital, Calabar.

#### Informed Consent

Informed consent was signed by the subjects before being recruited into the study population.

#### Study population

Asymptomatic and symptomatic students living in the University of Calabar Hostels.

#### Questionnaire Administration

A structured questionnaire was administered to consenting students to obtain information on the following Bio-data, the

causative agent of TB, signs/symptoms and preventive measures for TB.

#### Inclusion criteria

Students who stayed in the University of Calabar Hostel for at least 6months.

#### Exclusion criteria

Students who do not stay in the University of Calabar Hostel for at least 6months.

#### Sample Size

The number of samples for this research was determined using the formula by Daniel [9]. A total of 350 samples was collected.

#### Sputum Collection/Processing

Early morning sputum was collected into a universal wide mouth screw cap container before eating or brushing of mouth. Smears were made on a clean grease-free slide and allowed to air-dry. The smears were stained using the Ziehl Neelsen staining method. The stained slides were examined under the light microscope using X 100 oil immersion objective for the presence of Acid Fast Bacilli.

#### Data Analysis

Data obtained from this study were analyzed using the statistical package for the Social Science Program (version 22.0 Chicago).

#### RESULTS

A total of 350 healthy and unhealthy subjects were recruited into the study with and without signs and symptoms of respiratory tract infections. Of the 350 sputum samples examined microscopically, 2 (1%) were positive for tuberculosis infection whereas 348 (99%) were negative for tuberculosis infection as shown in Table 1. This is lower than the 24.8% reported by Mary et al in 2016 [10] in Calabar among subjects visiting Dr. Lawrence Henshaw Memorial Hospital (Tuberculosis diagnostic and treatment center) Calabar.

Table 2 shows the prevalence of Tb among the study subjects by age. The 2 subjects positive for TB infection were in the age group 21-25, whereas other age groups had no infection. The differences in the infection rate by age group was not significant statistically ( $X^2=8.0$ ;  $df=4$ ;  $p=0.0915$ ).

The occurrence of TB infection by gender shows that males had 2(1%) infection rate and females had no infection as shown in Table 3. The difference in infection rate by gender was not statistically significant ( $X^2=2.0$ ;  $p=0.1572$ ).

The distribution of TB infection based on Hostels shows that Hall 4 had an infection rate of 2(3%) while hall 5,7,8 and 9 recorded no infection. The difference in the infection rate between the difference halls was not significant statistically ( $X^2=8.000$ ;  $df=4$ ;  $p=0.09157$ ), as shown in Table 4.

**Table 1.** The occurrence of Tuberculosis among the study subjects

No Examined	No (%) Positive	No (%) Negative
350	3	297

**Table 2.** The prevalence of Tuberculosis among study subjects by age

Age (years)	No Examined	No positive (%)	No negative (%)
15-20	63	0 -	63 (100)
21-25	166	2 (1.2)	164 (98.7)
25-30	91	0 -	91 (100)
31-40	21	0 -	21 (100)
>41	9	0 -	9 (100)
Total	350	2 (1)	348 (99)

**Table 3.** The prevalence of Tuberculosis among study subjects by gender

Gender	No Examined	No positive (%)	No negative (%)
Male	138	2 (1)	136 (99)
Female	212	0	212 (100)
Total	350	2 (1)	348 (99)

**Table 4.** The frequency of Tuberculosis according to Hostels

Hostels (Halls)	No Examined	No positive (%)	No negative (%)
4	70	2 (3)	68(97)
5	70	0 -	70 (00)
7	70	0 -	70 (100)
8	70	0 -	70 (100)
9	70	0 -	70 (100)

#### Discussion

Tuberculosis is an infectious disease that affects mostly the lungs and other parts of the body. TB is one of the major public health infectious diseases in the world and Africa in particular. It is the second cause of death after HIV/AIDS [11].

Symptoms of TB include persistent cough for more than three weeks, catarrh, high fever, night sweating, and weakness. Other infections like HIV/AIDS also exposes people to TB infection because of its role in the reduction of immunity. Tuberculosis infection is higher among people staying in an enclosed area without proper ventilation, these include hostels, barracks, daycare centers, prisons, motherless baby homes, internally displaced camps(IDPs) and crowded classrooms.

Samples were collected from healthy and unhealthy subjects living in the hostels. Other unhealthy subjects that were not infected with TB might have other bacterial, viral or parasitic infections other than TB. This study shows that the 2 infected subjects were males, which aligns with the report of Dye et al., (2008) [11], which states that TB is a disease of adult and mostly with the male gender. Other factors like smoking and consuming too much alcohol also exposes the male gender to infection.

HIV/AIDS is the most widely recognized risk factor associated with TB according to WHO (2014) [12], about 13% of people infected with TB had Hiv infection. TB is a disease principally linked with poverty and overcrowding.

Other disease conditions that increase the chance of developing TB include diabetes mellitus, alcoholism, and drugs such as corticosteroids and infliximab [13].

Rifampicin, Isoniazid, Pyrazinamide, and ethambutol is the treatment of choice for new cases of TB, for the first two months and only rifampicin and isoniazid is given during the last four months [14].

#### Conclusion

Tuberculosis remains the second cause of death from infectious disease after those caused by HIV/AIDS, though the number of cases has been reduced since 2005.

Bacillus Calmette Guerin (BCG) is the vaccine of choice for prevention of TB, which decreases the risk of acquiring the infection. This shows the need for all the newborn children to be vaccinated.

Overcrowded places like prisons, hostels, barracks, schools should be avoided since TB infection can be transmitted through cough, sneezing or singing through aerosols.

#### Recommendations

Screening examinations of sputum for AFB should be employed in schools hostel to check for the asymptomatic carriers of tuberculosis infection by being admitted into the hostels.

Overcrowding in hostels, prisons, and barracks should be discouraged as the disease is easily transmitted through coughing and sneezing.

Infected persons should be isolated and treated to further spread.

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