FACTORS IN TUBERCULOSIS PREVENTION AMONG STUDENTS OF BENUE STATE UNIVERSITY MAKURDI, NORTH CENTRAL NIGERIA

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ABSTRACT

Background: *Tuberculosis is endemic in our various communities in Nigeria; and constitutes a major health emergency globally. Nigeria is the 7th high burden Tuberculosis country in the world. A high level of community awareness and positive perception towards tuberculosis and its management is important for any effective control strategy.*

Method; *This was a descriptive, cross-sectional survey, of Benue State University students, Makurdi during the month of January 2020. The sample size was 427 and all were over 15 years of age. All the survey items were extracted from WHO Guideline. It was adjusted and tested to meet the needs of this study.*

Results: *The mean age of the respondents was 23 years, and over 54% were between the ages of 21-25 years. The level of tuberculosis knowledge showed that 93.8% were aware of tuberculosis disease, 48.5% implicated bacteria as the cause and 60.3% said the main sources of infection were coughing, sneezing and talking. Ninety seven percent said tuberculosis was preventable and 38.5% identified BCG as an agent for preventing tuberculosis. In terms of practice, over 54% used hands to cover their mouth while sneezing, 59.3% used handkerchief and 67.4% took drugs prescribed by doctors. There were significant associations between knowledge and practice.*

Conclusion: *Our study revealed association of knowledge and practice in most areas studied except in terms of taken all drugs prescribed by doctors. A health education strategy with raising of awareness and social mobilization actions should be planned and implemented.*

Key words: *Knowledge, Nigeria, Tuberculosis, Prevention, Practice, Students.*

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INTRODUCTION

Tuberculosis (TB) is a major health problem in the world. TB is an infectious airborne disease caused by bacterium known as Mycobacterium tuberculosis affecting mostly the economically viable age group (15 – 49 years).[1,2] The World Health Organization (WHO) declared tuberculosis as an epidemic over 24 years ago and it remains one of the world's causes of illness and death.[3]The World Health Organization estimates that one third of the world's population is infected with tuberculosis (latent tuberculosis) and also estimated that between 2000–2020, nearly one billion people will be infected with tuberculosis.[3,4]

In 2017, there were an estimated 10 million new TB cases world wide of which 5.8 million were men, 3.2 million were women and 1 million were children. People living with HIV/AIDS accounted for 9% of the total. Eight countries accounted for 66% of the new cases; India, China, Indonesia, Philippines, Pakistan, Nigeria, Bangladesh and South Africa.[3, 5] In the same year, 1.6 million people died from TB including 0.3 million among people with HIV. Globally, TB mortality rate fell by 42% between 2000 and 2017.[1], [5]In 2012, WHO reported that 8.6 million fell ill with tuberculosis and 1.3 million died from tuberculosis. Over 95% of this deaths occurred in low and middle income countries.[1,3,4]

The most important source of infection is an untreated pulmonary TB patient, who can infect about 10 – 15 persons in a year, if left untreated.[1] Transmission occurs when such person coughs, spits or sneezes. Tiny droplets nuclei containing the tubercle germ are released and inhalation of the nuclei causes the disease. High Burden Countries (HBC) are Afghanistan, Angola, Bangladesh, Brazil, Cambodia, Democratic People's Republic of Korea, China, Democratic Republic of Congo, Ethiopia, India, Indonesia, Kenya, Lesotho, Liberia, Mozambique, Myanmar, Nigeria, Pakistan, the Philippines, the Russian Federation, South Africa, Thailand, Tanzania, Uganda, Vietnam and Zimbabwe.[3, 6] These countries account for 80% of the burden of TB in the world. African and Asian continent bears the highest burden 30% and 50% respectively.[7,8]

Nigeria currently ranked 7th in the world and second in Africa amongst the 30 countries with the highest burden of TB.[6,9]WHO estimated that 97,799 cases were notified in 2012 in the country. The most affected states were Lagos, Kano, Oyo and Benue States. TB was declared an epidemic in Nigeria in 2006 and since then, there have been a number of attempts aimed at lowering the burden of the disease in the country.[7, 8, 10, 11]Benue State had a total of 6,262 cases, with the lowest incidence of 6/100,000 in Ohimini Local Government Area and Katsina Ala Local Government Area had the highest incidence of 183/100,000 in 2012. Makurdi local government area where the state headquartersis situated had a prevalence of 181/100,000.[15]

Tuberculosis is an ancient disease that still constitutes a major Public Health problem in Nigeria.[2] The goal of the national TB program is to reduce significantly the burden of TB by 2035 in line with The End TB Strategy and Sustainable Development Goals (SDGs). The

objectives are to detect at least 90% of the estimated infectious (smear positive) cases, to reduce TB deaths by 95%, to reduce new cases by 90% between 2015 and 2035, and to ensure that no family is burdened with catastrophic expenses due to TB.[7,12,13]

HIV/AIDS is yet another challenge in curbing TB. Persons co-infected with TB and HIV are29.6 times more likely to develop active TB disease compared to persons without it.[14,16] Nigeria National prevalence of HIV/AIDs currently stands at 1.4%. Benue State has a prevalence rate of 5.3% of people living with HIV (PL HIV).[15]Also the housing conditions of undergraduate students who usually live in relatively overcrowded condition is a risk factor for TB infection.[17]This study considered knowledge and practice of undergraduates of Benue State University as major factors in TB prevention.

Study Area

Benue State University Makurdi is a State owned University which was founded in1992. The University operates two campuses first and second and has a College of Health Sciences situated between the two campuses. There are 8 faculties, 21 academic departments and a Postgraduate School. It also runs a remedial program, staff school and a clinic in the first campus. The university is situated along Makurdi-Gboko road, with the first campus being less than 1 kilometer from the Wurukum market round about. It has a land mass of approximately four square kilometers and students population of over 20,000.

Methodology

Study Design

A cross sectional descriptive study design was employed to assess the knowledge, and practice of preventive measures of tuberculosis among the undergraduate students of Benue State University.

Study Population

The population for this study was undergraduate students of Benue State University, Makurdi. All undergraduate students of Benue State University who consented were included in the study. Postgraduate and remedial students of Benue State University Makurdi were excluded from the study. This study was carried out in the month of January 2020.

Sample Size Determination

Sample size was calculated using; 95% confidence interval(CI) , 5% margin of error (d), p as 45.9% taken from a study done by WHO in Libya[(18)]. Based on the above assumptions and by adding 10% non-response rate to the initials sample size, the sample was 427.

Sampling Technique

A multi stage sampling technique was adopted for this study. The first stage was the selection of faculty of education by balloting out of the eight faculties in the university. The second stage was the selection of the departments of curriculum and teaching and vocational and technical education by balloting. Then, lists of all the students from the two departments were made and respondents allocated proportionally based on the population of each department. Two

hundred and fifty seven respondents and 170 of those who met the inclusion criteria were allocated to the departments of curriculum and teaching and vocational and technical education respectively. There was a short interview session with the students in addition to reviews of the departmental documents then disaggregated by arms of each department respectively. Thereafter, proportion to size technique was applied to determine the number of respondents to be selected per arm of the two departments by dividing the number of respondents to be selected per arm over the total number of students that met the inclusion criteria in the department multiplied by the sample size which gave a total of 66, 76, 60, 57 and 43, 50, 36 and 41 for departments curriculum and teaching and vocational and technical education respectively. Following which a separate list of the students who had met the inclusion criteria in each arm was made with numbers allocated to each student on the list and computer generated table of random numbers was used to select the appropriate number of student in each arm for the study.

Grading of response

Understanding the concept of adequate knowledge of prevention of TB was adjudged as good if the respondents provided information with similar contents in which bacteria is mentioned as the cause of TB and the major sources of infection are coughing, sneezing and talking. The practice on the prevention of TB was graded as good if the respondents gave favorable responses to the component of practice of having to use handkerchief to cover nose and mouth each time he or she coughs or sneezes, ensure cross ventilation in rooms by opening windows all the time to ensure adequate ventilation and comply to prescribed drugs by doctors when there is chest infection. A total of 5 stem questions were used to assess the respondents' knowledge on TB prevention with maximum possible responses of 14 out which 10 were correct. One mark was allocated to every correct response while zero mark to the incorrect ones giving a maximum attainable score of 10 marks. A percentile graph was then applied to the scores of the respondents and scores responding to the 50^{th} percentile and above were graded as good knowledge while those below the 50^{th} percentile as poor knowledge.

Data Collection

An adapted structured interviewer administered questionnaires were used for data collection.[18] The data collection instrument had three sections. Information on the first section were used to collect data on socio-demographic characteristics, the second section on knowledge on TB prevention and the third on practice of TB prevention. Three research assistants were trained on the content and method of administration of the questionnaires prior to the commencement of the study by the Research Team Lead. The data collection instrument was pretested on 30 students of the University of Agriculture Makurdi; a similar university 20 kilometers away.

Ethical Consideration

Ethical clearance was obtained from Benue State University Teaching Hospital institutional health research committee. Verbal informed consent was obtained from

all the respondents.

RESULTS

All the respondents participated in this study given a response rate of 100%. Majority 63.2% were males and most of them fell in the age group of 21-25 years. The mean age of the respondents was 23 years and Tiv ethnic group constituted the majority. Almost all the respondents were Christians (Table 1).

Table 1: Socio-demographic Characteristics of Respondents (n=427)

Characteristics	Frequency	Percent
Age group (years)		
15-20	122	28.6
21-25	233	54.6
26-30	59	13.8
Above 30	59	13.8
Sex		
Male	270	63.2
Female	157	36.8
Ethnicity		
Tiv	236	55.3
Idoma	117	27.4
Igede	38	8.9
Igbo	8	1.9
Yoruba	8	1.9
Others	4	0.9
Religion		
Christianity	223	99.8
Muslim	04	0.02
Total	427	100.0

Table 2: Respondents Knowledge About tuberculosis infection (n=427)

Knowledge	Frequency	Percent
Heard about TB		
Yes	400	93.7
No	27	6.3
Total	427	100
Cause		
Witchcraft	18	2.75
Bacteria	201	48.5
Virus	153	36.5
	55	12.3
Total	427	100
Source of Infection		
Eating and Drinking with Infected Persons	75	18.0
Coughing, Sneezing and Talking	251	60.3
Inheritance from Parents	79	16.8
Witchcraft and Magic	7	0.5
Don't Know	15	4.5
Total	427	100
Complaints of People with tuberculosis		
Cough	307	74.4%
Chest Pain	92	21.3
Asthma	15	2.3
Diarrhea	13	1.8
Total	427	100
Conditions That Increases Chances of Developing Tuberculosis		
Diabetes	70	15.8
HIV	168	40.3
Tobacco smoking	172	41.3
Others	17	2.8
Total	427	100

Respondents' knowledge about tuberculosis infection is shown in Table 2. Of the respondents who heard about TB most 48.5% mentioned that bacteria were the cause of TB infection while over 60 % indicated that the main source of infection was through coughing, sneezing and talking. Slightly above 74% of the students said cough was the main complaints of people with TB infection and almost equal number of students 40.3% and 41.3% respectively gave

HIV and diabetes as aggravating factors for TB infection.

Table 3: Respondents Knowledge on Ways and Measures of Preventing tuberculosis infection (n=390)

Ways of Prevention	Frequency	Percent
Can be prevented	414	97.0
Healthy nutrition	130	32.5
High Level of Personal Hygiene	120	30.0
Fitness and Sports	59	14.8
Covering nose with Handkerchief when sneezing	49	12.3
Staying in well ventilated rooms	10	2.5
Measures for Prevention		
BCG (Tuberculosis vaccine)	150	38.5
Proper Taking of Tuberculosis drugs	120	30.8
Health Education about tuberculosis	59	15.2
Not Smoking	13	3.33
Multiple response answers		

Table 3 showed the knowledge of respondents on ways of preventing tuberculosis infection. Majority 97.0% were of the opinion that TB was preventable. Almost 33% of the respondents were of the view that healthy nutrition was a way of preventing tuberculosis, 30.0%opined that high level of personal hygiene helped in the prevention of tuberculosis while 12.3% and2.5% were of the view that covering of nose with handkerchief when sneezing and staying in well ventilated rooms respectively were ways of preventing tuberculosis infection. Majority of the respondents 38.5% reported that taking BCG vaccine was a useful measure in tuberculosis prevention. Almost thirty one percent of the respondents reported that proper taking of tuberculosis drugs was a useful measure in tuberculosis prevention while 15.2% and 3.3% of the respondents opined that health education about tuberculosis and not smoking were useful measures of tuberculosis prevention respectively.

Table 4: Practice of respondents towards preventive measures of Tuberculosis.

Practices	Frequency	Percent
Use Hands to Cover Mouth When Sneezing		
Yes	233	54.6
No	61	14.3
Sometimes	133	31.1
Total	427	100
Use Handkerchief to cover Mouth while Sneezing		
Yes	253	59.3
No	47	11.0
Sometimes	127	29.7
Total	427	100
Wash Hands After sneezing or Coughing		
Yes	140	32.8
No	126	29.5
Sometimes	149	34.9
Always	12	2.8
Total	427	100
Ensure cross ventilation in your room by opening Windows or doors		
Yes	306	71.7
No	19	4.4
Sometimes	90	21.1
Always	12	2.8
Total	427	100
Take all Prescribed drugs by Doctor		
Yes	288	67.4
No	52	12.2
Sometimes	85	19.9
Always	2	0.5
Total	427	100
Tuberculosis patients get discriminated?		
Yes	212	49.6
No	112	26.2
Not sure	103	24.1
Total	**427**	**100.0**
Tuberculin test		
Yes	87	12.8
No	340	87.2
Total	**427**	**100**

Table 4 showed the practices of respondents towards preventive measures of tuberculosis. Results obtained showed that 54.6% of the respondents used hands to cover mouth when sneezing while 59.3% of the respondents used handkerchiefs to cover mouth while sneezing. Also, 32.8% of the respondents washed their hands after sneezing or coughing, 71.7% of them ensured cross ventilation in their rooms by opening windows and doors while 67.4% took all

prescribed drugs by their doctors. Furthermore, 49.6% of the respondents revealed that tuberculosis patients were discriminated against while 12.8% had done a tuberculin test.

Table 5: a) Relationship between Knowledge and Practice of tuberculosis Prevention b) Knowledge and practice scores.

a)				
Practice	Knowledge	**Not Heard (%)**	χ^2	**P**
Cover mouth with hands while sneezing	**Heard (%)**	14 (51.85)	3.51	1.73
Cover mouth with handkerchief while	219 (54.75)	23 (85.18)	8.60	0.01
sneezing	230 (57.50)			
		14 (51.85)	9.43	0.02
Wash hands after sneezing or coughing	141 (35.25)	27 (100.00)	9.80	0.02
Ensure cross ventilation in room	291 (72.75)	17 (62.96)	2.98	0.39
Take all prescribed drugs by doctor	273 (68.25)			
b)				
Variable		**Scores (%)**		
Knowledge	**Poor**		**Good**	
Practice	12.3		87.7	
	16.2		83.8	

Table 5 showed the relationship between knowledge, and practice of tuberculosis prevention; knowledge and practice scores among respondents. In terms of relationship between knowledge and practice of tuberculosis prevention among respondents, it was shown that there was no significant relationship between knowledge of TB and covering of mouth with hands while sneezing as well as taking all prescribed drugs by doctor ($P>0.05$).There was however a significant relationship between knowledge of TB and covering of mouth with handkerchief after sneezing, washing of hands after sneezing or coughing and ensuring cross ventilation in rooms ($P<0.05$). The results also showed that majority of the respondents 87.7% and 83.8% had good knowledge and practice score respectively towards TB prevention.

Discussion

The upsurge of TB infection as a result of HIV infection has become a major challenge to public health globally. Nigeria's ability to meet the Sustainable Development Goals of ending TB by 2030, and WHO target of achieving a 100% decline in incidence and TB related deaths by 2035 are also threatened by upsurge of TB infection. Majority of the respondents in this study had heard about tuberculosis. This is similar to some studies done in India and Lagos, but deferred from a study done in North Eastern Libya were a very low rate of awareness was recorded.[5,18,21] The high knowledge could be due to regular health talks given by officials of the state ministry of health concerning some endemic diseases such as TB and HIV to the undergraduates. Education is a powerful mechanism for improving knowledge.[18,21]

In this study majority of the respondents opined that tuberculosis was a bacterial infection; while slightly above 12% did not know the cause of the infection. This compared favorably with studies done in South Africa and Sudan.[4,7,10] Knowledge of the causal agent of an infection is essential to devising suitable means of preventing the disease as well as having good attitude towards its prevention.[6,7,10] A wide range of knowledge on tuberculosis as depicted in this study was similar to what had been presented in Ilorin where a high variability of knowledge pertaining to tuberculosis, the causes and its interaction with HIV/AIDS were reported[22].

Regarding nutrition over thirty two percent of the students ascertained that nutrition is a

way of preventing TB infection. This agreed with some studies done in Nigeria, Liberia and India.[2, 20, 23] Before the advent of anti-tuberculosis chemotherapy, a diet rich in calories, proteins, fats, minerals, and vitamins was generally considered to be an important, if not essential factor in treatment of TB.[12, 24] The prevalence of widespread malnutrition in the population may be expected to pose some special problems with regard to the control of TB in the developing countries.[2,3]The direct evidence of effect of nutrition on TB is difficult because of the whole complex of coincident environmental factors. Despite these limitations, the weight of evidence still favours the view that malnutrition maybe an important factor in the high mortality and morbidity from TB in population subjected to food shortage.[9, 12, 15] High prevalence of HIV infection in Nigeria further aggravates the problem of malnutrition and TB. HIV infection is an important risk factor for development of TB and adversely affects the nutritional status of patients.[2,14,16]

Knowledge on the use of BCG vaccine as a means of TB infection control was high amongst the respondents. This agreed with some studies done in the United States of America (USA).[5,8]This is significant in designing TB control programmes. It has been confirmed that the protective efficacy of BCG for preventing serious forms of TB in children is over 80%.[8, 13] It has been recommended by the USA study that BCG vaccination should be considered as a preventive strategy for infants that reside in settings in which the likelihood of Mycobacterium TB infection is high as in most developing countries.[5,8,13]

In this study, the practice of proper taking of TB drugs for the prevention of TB infection was high. This agreed with some studies done by WHO in Libya[13, 15] There is a need to stop the transmission of TB from one adult to another. This is done by identifying people with active TB, and then curing them through the provision of drug treatment. With proper TB treatment someone with Tb will very quickly not be infectious and so can no longer spread TB to others.[5,8,15]

Ensuring cross ventilation to increase airflow in this study was good. This is similar to a study done in Geneva were it was shown that a major determinant of transmission of TB infection was room ventilation with fresh air, which served to dilute the concentration of airborne infectious particles. TB infection control guidelines recommend 6-12 air changes per hour.[1,3] Previous studies had shown that the area contributing to ventilation such as the area of an open window, have an impact on ventilation; even intermittent window openings may significantly improve ventilation and air quality within a room.[3,4]However airborne transmission depends on a number of factors, including source strength example cough frequency of undiagnosed TB patient. Majority of the respondents were of the view that hands and handkerchief should be used to cover mouth when sneezing and coughing. This finding compared favorably with some studies done in some urban slums in Nigeria and elsewhere[2,6,8].

The overall knowledge and practice scores

recorded in this work about TB prevention were good. This knowledge score is far higher than studies done in Iran and Thailand.[5,15] The differences in the knowledge gap could be due to the fact that this study was done in an urban setting and among undergraduates of a university while the above studies were done in rural areas. Furthermore the respondents practice towards TB prevention in this study was over 87%. This is far higher than some studies done in Nigeria and Asia.[6, 20] The differences could be due to exposure in health education program design, health literacy and access to health workers and medias. This study revealed statistically significant association between knowledge of TB and covering of mouth with handkerchief after sneezing, washing of hands after sneezing or coughing and ensuring cross ventilation in rooms (P<0.05). This contrasted other studies done in Cape Town, South Africa where there was no relationship between knowledge and practice.[8,15] However there was no significant relationship between knowledge of TB and covering of mouth with hands while sneezing as well as taking all prescribed drugs by doctor (P>0.05). This had shown that some concepts about knowledge and practice about TB prevention was not fully understood by the respondents. This also might be an indication of the fact the current health education interventions on TB were not enough or addressing the target population. These findings, therefore, justify the intensification of health awareness and educational intervention, in order to address the observed gap in knowledge, misconception, and erroneous beliefs that exist amongst students.

CONCLUSION

Compared to other studies knowledge and practice on TB prevention is good. The findings from this study showed that majority of the respondents were aware of TB disease and this translated into good practices in TB prevention. Furthermore majority of the respondents agreed that BCG is cardinal in the prevention of TB and therefore can be used as a tool in the control of TB. This study also showed that provision of standard houses that ensured cross ventilation will go a long way in reducing TB infection.

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