



## **KNOWLEDGE OF DRUG-RESISTANT TUBERCULOSIS (TB) AMONG TB PATIENTS ATTENDING PHCCs IN JALINGO: IMPERATIVE FOR BOOSTING ADHERENCE AND COMPLIANCE FOR EFFECTIVE CONTROL OF DRUG-RESISTANT TB IN TARABA STATE, NIGERIA**

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### **ABSTRACT**

The continuing spread of drug-resistant tuberculosis (TB) is one of the most urgent and difficult challenges facing global TB control. Patients who are infected with strains resistant to isoniazid and rifampicin, called multidrug-resistant (MDR) TB, are practically incurable by standard first-line treatment. The main causes of the spread of resistant TB are weak medical systems, amplification of resistance patterns through incorrect treatment and transmission in communities and facilities. This study aimed at assessing the knowledge of TB patients on direct observation therapy program towards multidrug-resistant tuberculosis in health Centre's of Jalingo metropolis, Taraba State. Tuberculosis patients' overall knowledge of drug-resistant tuberculosis was evaluated using a structured questionnaire which was analyzed using Statistical Package for Social Sciences (SPSS). The study found that 129 TB patients representing 57.6% of patients assessed scored below the mean, and thus had poor knowledge about drug-resistant tuberculosis. Multivariate analysis showed a significant association of overall knowledge with educational status as those with tertiary level educational status had more likeliness of good knowledge compared to the illiterate patients. Female TB patients were 1.6 times more likely to have good knowledge than males. There is a need for open health campaigns to enlighten the general populace on the risk of MDR-TB.

Keywords: Tuberculosis, Drug-resistant, TB-Patients, MDR-TB

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### **Introduction**

Tuberculosis (TB) is a highly infectious disease caused by *Mycobacterium tuberculosis*, which primarily affects the lungs to cause pulmonary TB and affects

other body parts to cause extra pulmonary TB (Lee and Yeo, 2015; WHO, 2018). It is the leading cause of death from single infectious agent, ranking above HIV/acquired immune deficiency syndrome (AIDS) (WHO, 2018).

The probability of developing TB disease is much higher among individuals with medical conditions that weaken the immune system such as HIV/AIDS, diabetes, cancer, organ transplantation, renal disease, alcohol abuse, malnutrition, severe fungal infections, tumor necrosis factor alpha (TNF- $\alpha$ ) antagonist therapy, tobacco use, air pollution, malignancies, an aging population and many others (Hameed *et al.*, 2018). The currently recommended treatment for drug-susceptible TB is a 6–9 month long regimen of combination of four first-line drugs: isoniazid, rifampicin, ethambutol and pyrazinamide (Lienhardt *et al.*, 2010; Conde and Silva, 2011; Nasiri *et al.*, 2017; Honeyborne *et al.*, 2019).

Despite aggressive international efforts, tuberculosis remains a leading infectious cause of death, with an estimated 8.6 million incident cases per year. In 2012, an estimated 1.3 million people died from the disease. These death rates, however, only partially depict the global TB threat; more than 80% of TB patients are in the economically productive age of 15 to 49 years (WHO, 2013). However, emergence of drug-resistant TB still remains a challenge to TB therapy and effective disease management and is a major threat to global public health (Raviglione and Sulis, 2016; WHO, 2018).

Global tuberculosis control efforts have been threatened by the emergence of multidrug-resistant tuberculosis (MDR-TB). MDR-TB is defined as strains of *Mycobacterium tuberculosis* that show high-level resistance to both isoniazid and rifampicin, with or without resistance to other anti-TB drugs. MDR-TB is estimated to cause 4% of new tuberculosis cases in the developing world. Patients infected with MDR strains are not

only difficult to cure but also more likely to remain sources of infection for a longer period than those with drug-susceptible organisms (WHO, 2013). MDR-TB requires a longer duration of treatment (up to 2 years) to achieve a cure, in comparison with a 6-month treatment for drug-susceptible TB, with lower cure rates, and even higher default rates. The cost of drugs to treat an MDR-TB case can be up to 100 times more expensive than the cost of treating a drug-susceptible TB case (WHO, 2020). Because of its increasing prevalence, MDR-TB is now subdivided into basic MDR-TB, with resistance only to rifampicin and isoniazid, and extensively drug resistant TB (XDR-TB), with a similar resistance pattern but with resistance to one or more additional first and/or second line drugs. Various perturbations in the individual drug target genes are responsible for the genesis of anti-TB drugs resistance. These mutations are not directly connected, and so separate mutations are required for organisms to change from a drug susceptible isolate to MDR-TB (Conde and Silva, 2011). Drug Resistance TB can occur as primary drug resistance, when a person is directly infected by a drug resistant mycobacterium tuberculosis strain, or as secondary or acquired drug resistance occurring due to the acquisition of resistance-conferring mutations during failed treatment of drug-susceptible TB (Dookie *et al.*, 2018). In addition, Drug Resistance in mycobacterium tuberculosis is commonly believed to be caused by single-step chromosomal mutations.

However, there are evidences suggesting that, at least for certain anti-TB drugs, acquired drugs resistance is the result of a step wise acquisition and fixation of mutations leading to a gradual increase in

resistance, initiated with the acquisition of isoniazid resistance, subsequently followed by rifampicin or ethambutol resistance. It was found that 558 000 TB cases reported worldwide in 2017 were rifampicin resistant (RR-TB) and of these, 82% were multidrug-resistant TB (MDR-TB). Treatment for RR-TB and MDR-TB is usually longer, for 18 months or more and consists of selected first-line drugs along with different combinations of second-line drugs, which are more expensive and toxic. WHO has reported a global success rate of 55% for MDR-TB treatment, XDR-TB is a form of TB which is defined as MDR-TB plus resistance to at least one drug from each of the two important classes of second-line agents (fluoroquinolones and injectables) used in MDR treatment regimen. This implies that it involves resistance to isoniazid and rifampicin, in addition to resistance towards any of the fluoroquinolones (such as levofloxacin or moxifloxacin) and to at least one of the three injectable second-line drugs (amikacin, capreomycin or kanamycin) (Tabarsi and Mardani, 2012; Seung *et al.*, 2015).

The emergence of drug resistance in *M. tuberculosis* has been associated with a variety of management, health provider, and patient-related factors. These include (i) Insufficient TB control programs resulting in inadequate administration of effective treatment; (ii) poor case holding, administration of sub-standard drugs, inadequate or irregular drug supply, and lack of supervision; (iii) ignorance of health care workers in epidemiology, treatment, and control; (iv) improper prescription of regimens; (v) long treatment duration (vi) non-adherence of patients to the prescribed drug therapy; (vii) availability of anti-TB

drugs across the counter, without prescription; (viii) illiteracy and low socio economic status of the patients; (ix) the epidemic of HIV infection; (x) late diagnosis (xi) use of no standardized laboratory techniques, poor quality drug powders and lack of quality control measures; and (xii) lack of timely and proper administration of effective drugs (Nguyen, 2016). Although some individuals who have not had previous TB treatment are infected by MDR-TB, this is not the case for most patients. Many new cases of MDR-TB are created each year by a combination of physician error and poor patient compliance with treatment, which turn fully susceptible organisms, or those with less complex resistance patterns, into MDR-TB.

## **METHOD**

### **Design, Study Area, Population and Sampling, Data Collection and Analysis**

A facility-based cross-sectional study was conducted in public health centers of Jalingo metropolis between April and June 2023. All TB patients, who attended the DOT program in public health centers between April and June 2023, were sources of the data for the study. However, all TB patients who attended the DOT program in hospitals and private health institutions were excluded from the study. Jalingo Local Government Area is roughly located between latitudes of 80470 to 90010 and longitudes of 110090 to 11030E. It is bounded to the north by Lau Local Government Area, to the East by Yorro Local Government Area, to the South and west by Ardo Kola Local Government Area. It has a total land area of about 195 km<sup>2</sup>. Jalingo LGA has a population of 139,945 people according to the 2006 population census, with a projected growth of 3% presently. It has a projected population of 165,774 in

2014. The population for this study comprises 402 TB patients according to Tuberculosis and Leprosy supervisor (TBLS) of the Jalingo local government Area who registered under Taraba State National Tuberculosis, Leprosy and Buruli Ulcer Control Programme, and the study targeted both males and females. In selecting the sample for this study, simple random sampling technique was used to select the 224 respondent calculated using Taro Yamane's formula. A structured, pretest, and self-administered questionnaire was used for data collection. Data were entered and cleaned using EPI-info version 3.5.1 and exported to SPSS version 26.0 for analysis. Simple descriptive statistics including mean,

percentage, and standard deviations were computed to summarize categorical variables. Possible associations between the variables of interest were explored using logistic regression as significant at  $p < 0.05$ .

### Ethical considerations

The study was reviewed and approved by the Taraba State Health Research Ethics Committee. Informed consent was obtained from all participants, and participation was made voluntary. Respondents' identifiers were not obtained to ensure the anonymity and confidentiality of the information collected.

## Results

**Table 1 Socio-demographic profile of the studied participants (n=224)**

Variables	Responses	Frequency	Percentage
<b>Age</b>	Below 18	11	4.9
	19-30	36	16.1
	31-50	79	35.3
	51-70	62	27.7
	71 Above	36	16.1
<b>Sex</b>	Male	121	54.0
	Female	103	46.0
<b>Level of Education</b>	None	69	30.8
	Primary	53	23.7
	Secondary	39	17.4
	Cert/diploma	34	15.2
	University	23	10.3
	Others	6	2.7
<b>Marital status</b>	Married	123	54.9
	Single	74	33.0
	Divorced	17	7.6
	Separated	10	4.5
<b>Occupation</b>	Business	81	36.6
	Student	40	17.9
	Civil servant	11	4.9
	House wife	30	13.4
	Retired	35	15.6
	Applicant	27	12.1
<b>Family income</b>	High	3	1.3
	Medium	101	45.1
	Low	120	53.6

Table 1 presents the personal information of the respondents. Based on the items, the majority of respondents (35.3%) were between the age of 31 to 50 years. A higher proportion of respondents (54.0%) were male. About one-third (30.8%) of respondents never attended any school and less than 3% had attended university. Majority (54.9%) of the respondents were

married. Business people made up the highest proportion of respondents. Lastly, the table also shows the economic income of the respondents where 3 (1.3%) were high, 101 (45.1%) had medium economic income and 120 (53.6%) had low economic income. This implies that the majority of the respondents have low economic income.

**Table 2: Respondents' awareness and knowledge about Drug-Resistant Tuberculosis**

Variable	Parameters	Frequency	Percentage
Have you ever heard of Tuberculosis?	Yes	172	77.1
	No	51	22.9
Have you ever heard of drug-resistant Tuberculosis?	Yes	43	19.2
	No	181	80.8
Drug-resistant Tuberculosis is a form of TB infection that is resistant to isoniazid and rifampicin	Yes	47	21.0
	No	177	79.0
Is it important to complete the treatment of tuberculosis?	Yes	176	78.6
	No	48	21.4
Repeated interruption of treatment leads to drug resistance and treatment failure	Yes	90	40.2
	No	134	59.8
Which group of people do you think are affected by DR-TB mostly?	Anybody	118	52.7
	Poor	102	45.5
	Rich	4	1.8
What is the duration of treatment of DR-TB?	0-6 Months	153	68.3
	6-12 Months	53	23.7
	1-3 Months	18	8.0
Smoking cigarettes cannot lead to drug-resistant tuberculosis	Yes	79	35.3
	No	145	64.7
Those who are drinking alcohol are at risk of getting drug-resistant tuberculosis	Yes	94	42.2
	No	129	57.8
What are the signs and symptoms of Drug-Resistant tuberculosis	Persistent cough	163	72.8
	Headache	44	19.6
	Chest pain	89	39.7
	Weight loss	43	19.2
	Abdominal pain	15	6.7
	Persistent fever	40	17.9
What are the common ways of transmitting MDR-TB	Infected person to another	126	56.3
	Blood	94	42.0
	Sexual contact	4	1.8
What is the cause of Drug Resistant Tuberculosis	Virus	95	42.4
	Bacteria	38	17.0
	From God	76	33.9
	Cold weather	15	6.7

Source: Field survey, 2023

Table 2 shows Tuberculosis patients' overall knowledge of DR-TB by summarizing the twelve questions, and the study showed that the mean knowledge score was  $6.0 \pm 0.5$ . This study identified that 129 (57.6%) of patients scored below the mean, and they had poor knowledge about drug-resistant tuberculosis. Multivariate analysis showed a significant association of overall knowledge with educational status where those with tertiary level educational status were more likely of good knowledge 57(25.5%) compared to the illiterate patients. Female TB patients were 1.6 times more likely to have good knowledge than males. Respondents whose family incomes were low had poor overall knowledge 120 (53.6%) compared with respondents whose family incomes were medium and high. On the other hand, multivariate analysis showed that the age, marital status, and occupational status of respondents were not significantly associated with the knowledge of patients about DR-TB.

Regarding the duration of treatment of DR-TB, 171 (76.3%) TB patients did not know the duration of treatment of DR-TB, and 54

(23.7%) of TB patients knew the duration of treatment of DR-TB which is between 6 to 12 months, 63 (72.8%) of the respondents mentioned persistent cough as a sign of drug-resistant tuberculosis, 89 (39.7%) mentioned chest pain, 44 (19.6%) said headache, 43 (19.2%) mentioned weight loss, 40 (17.9%) mentioned persistent fever while 15 (6.7%) said abdominal pain is a sign of drug-resistant tuberculosis. This implies that more than half of the respondents 165 (73.7%) know the signs and symptoms of drug-resistant tuberculosis, Concerning transmission of DR-TB, 126 (56.3%) of the TB patients mentioned that through infected droplet nuclei during coughing, sneezing, and talking was the way of transmission, 94 (42.0%) said blood, while 4 (1.8%) said it can be transmitted through sexual contact, Regarding the causes of DR-TB, 95 (42.4%) of TB patients said that the causes of DR-TB are virus or germs that cannot be seen with the naked eyes, while 76 (33.9%) respondents said that the causes of DR-TB were God, bacteria and cold weather, respectively. Overall, almost more than half (57.8%) of TB patients did not know the exact causes of DR-TB.

**Table 3 Association of Knowledge of drug Resistant Tuberculosis among patients with Tuberculosis based on Gender in selected PHCCs, Jalingo, Taraba State.**

Parameter	Male	Female	Total	Percentage
<b>High</b>	48	47	95	42.4%
<b>Low</b>	73	56	129	57.6%
<b>Total</b>	121	103	224	100%

The table above shows that 48 (39.6%) males have a high level of knowledge of drug-resistant tuberculosis while 73 (60.3%) have

low knowledge of drug-resistant tuberculosis 47 (45.6%) females have a high level of drug resistance 56(54.3%) female have low

knowledge of knowledge of drug-resistant tuberculosis. This indicates that the female gender with 47 (45.6%) has a better knowledge of drug-resistant tuberculosis than the male gender with 48 (39.6%).

### **Discussion**

The findings of this research are consistent with previous studies that from 422 tuberculosis patients, only 284 (67.9%) TB patients ever heard about drug-resistant tuberculosis, and of these, only 178 (62.7%) heard it from healthcare professionals (Kusheno *et al.*, 2020). This is less than that of a study conducted in Southwest Ethiopia in which 83% of tuberculosis patients have heard about drug-resistant tuberculosis and this could be due to the insufficiency in the provision of health education about DR-TB that should be given to all health centers and tuberculosis patients (Seid *et al.*, 2018; Kusheno *et al.*, 2020).

The finding of this study also revealed that the level of knowledge about MDR-TB was positively associated with the educational status of TB patients. The odds of good knowledge in TB patients who attended a tertiary level of education was 4.3% times higher than the odds of TB patients who did not attend any level of education or were illiterate. This was attributed to relatively better awareness about MDR-TB and better access to health information in those who attended tertiary level of education (19.7%) in Jalingo, metropolis, compared with a study conducted in Ulaanbaatar, Delta state, Nigeria where (53.9%) of patients did not know about drug-resistant tuberculosis (Kusheno *et al.*, 2020).

Finally, the statistical tests conducted in this study on the overall Knowledge of TB patients toward MDR-TB was poor as only

95 (42.3%) of TB patients had good knowledge about drug-resistant tuberculosis. This still needs to be improved. Hence, efforts should be made to implement health education to improve awareness of TB patients about MDR-TB. This was not surprising because many studies in Africa and other parts of the world have documented that TB patients lack basic knowledge of etiology, transmission, prevention, and duration of treatment of drug-resistant tuberculosis but it is better than the study conducted in Nigeria which only 18.4% of patients had good knowledge of drug-resistant tuberculosis. It is also a common practice for patients to seek information from other sources like neighbors, traditional healers, and churches and this at times might worsen their condition by creating the wrong perception about the disease and unsupported health-seeking behaviors. In the case of TB, it has been shown in many studies that poor knowledge and wrong perceptions were responsible for the delay in seeking health care in a health facility, treatment default, and stigmatization of tuberculosis patients and all these were contributing factors to the rising prevalence of MDR-TB, and this poses a major challenge to many National Tuberculosis Control Programs. (WHO 2018).

### **Conclusion**

Based on the results of this study we can conclude that the vast majority of patients have heard of tuberculosis but never heard of drug-resistant tuberculosis. A significant proportion of patients believe that drug-resistant tuberculosis is caused by viruses and God. Patients with lower incomes are more likely to be infected with tuberculosis than those with higher incomes.

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