

Outcome of Community-Initiated Treatment of Drug-Resistant Tuberculosis Patients in Akwa Ibom State, Nigeria

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Abstract

Drug-resistant Tuberculosis (DRTB) occurs when the drugs used to treat TB are misused or mismanaged by, WHO 2018 Examples of misuse or mismanagement include People who do not complete a full course of TB treatment, Health care providers prescribing the wrong treatment (the wrong dose or length of time), Drugs for proper treatment are not available, and poor quality of drugs. The study aimed at determining the treatment outcome of Community-Initiated Drug-Resistant Tuberculosis Patients registered between January 2017 and December 2020 in Akwa Ibom State, Nigeria. The study design was a retrospective cohort study; a total sampling technique was employed to review patients that were diagnosed and registered during the period of study. The demographic and clinical data of each patient were retrieved from the DR-TB patient treatment cards, DR-TB patient treatment progress notes from directly observed treatment short-course (DOTS) providers in the community, the state DR-TB central register, and treatment card. Data were analyzed using Statistical Package for Social Sciences (SPSS) Software (Version 23; SPSS, Chicago, IL, USA). The median age of clients that participated in the study was 34 years [27- 49.5]. Most of the participants were male (56.2%), and a greater proportion of the enrollees were all new cases (76.3%). The study determined some of the sociodemographic characteristics of patients that received treatment for drug-resistant tuberculosis using the Community-Initiated model, their health outcomes, and assessed the predictors of some of the health outcomes.

Keywords: *Outcome of Community- initiated Drug-resistant Tuberculosis Treatment. Nigeria.*

Introduction

Tuberculosis is an infectious disease that has plagued humanity for centuries. It is caused by *Mycobacterium tuberculosis*, which primarily affects the lungs and various parts of the human body. Tuberculosis [1] has been identified as the 13th leading cause of mortality globally and the second leading cause of death second only to COVID-19 [2]. In 2020, the World Health Organization (WHO) reported that 1.5 million persons died of the disease across the world. In the same year, [2] 10 million people were diagnosed with TB, with 5.6 million men, 3.3 million women, and 1.1 million children affected globally. [2] Tuberculosis is a preventable and curable disease but is complicated by the

occurrence of diseases like Human Immunodeficiency Virus (HIV), diabetes, etc. The advent of the COVID pandemic has resulted in poor access to TB treatment and other services and this has increased mortality from the disease which also includes patients with drug-resistant tuberculosis. [2] As the impact of several interventions to eliminate tuberculosis sets in, the global burden of tuberculosis is falling at 2% per year, and within the space of 5 years (2015-2020), the cumulative reduction has been 11%. [2] However, the rising cases of drug-resistant tuberculosis threaten the gains made on the control of tuberculosis.

Drug-resistant Tuberculosis (DRTB) occurs when the drugs used to treat TB are either misused or mismanaged. Drug-resistant

tuberculosis [3] (DR-TB) has emerged as a significant public health problem globally and has threatened the progress made in tuberculosis (TB) control over the years. In 2017, the World Health Organization (WHO) estimated that 3.5% of new and 18% of previously treated TB cases have multidrug-resistant or rifampicin-resistant TB(DR/RR-TB), which translated to an estimated 558 000 new cases and 230 000 deaths. However, only 161 000 new cases were reported globally in 2017, while 131000 were enrolled in treatment, which is about a quarter of the estimated number of MDR/RR-TB cases. [4] In more recent years, the number of cases of DR-TB has been unstable, with over 60% of cases of DR-TB diagnosed from cases in 2019 and 50% in 2018. In 2020, [2] it was reported that there were 132,222 cases of MDR-TB and 25,681 cases of Pre-XDR TB cases. Nigeria is one of the 30 high MDR-TB burden countries, [2] with an estimated MDR/RR-TB proportion of 4.3% among new cases and 15% among previously treated TB cases in 2018.2 A total of 2275 cases were laboratory-confirmed, and 1895 (83.3%) patients were enrolled into treatment within the country [3].

Problem

Tuberculosis has been identified as a leading cause of morbidity and mortality globally. In the 2020 World TB report, the World Health Organization (WHO) reported that 1.5 million persons died of the disease across the world. While tuberculosis remains a major public health challenge, with an estimated 10 million persons diagnosed in 2019 [5], its incidence is reducing. Drug-resistant tuberculosis (DR-TB) presents a present major challenge that cannot be ignored. Multiple drug-resistant TB, which is one of the commonest forms of drug resistance to Tuberculosis, was a major public health problem in Europe and the Americas in the late 20th twentieth century [6]. Since then, it has extended globally, causing significant morbidity and mortality. Since the turn of the new millennium, the prevalence of drug-resistant tuberculosis has

continued to rise. In 2017, 3.6% of new cases of tuberculosis were diagnosed with MDR tuberculosis. [4] Despite the availability of free drug-resistant tuberculosis (DR-TB) care in Nigeria, the country continues to tackle low case notification and treatment rates. In 2018, 11% of an estimated 21,000 cases of DRTB were diagnosed, and 9% were placed on treatment. These low rates are nevertheless a marked improvement from 2015 when only 3.4% were diagnosed, and 2.3% were placed on treatment for an estimated 29,000 cases.

The community-based approach to the management of DR-TB has become a veritable strategy that could lead to increased case notification and treatment, as seen in populations where the intervention has been used. The predictors of the treatment outcomes following the employment of this intervention have been poorly studied in Nigeria and many parts of sub-Saharan Africa [7].

Justification

This study is justified because it fills the knowledge gap of the importance of Community-based DR-TB intervention in health outcomes and evaluates the impact of the strategy in Akwa Ibom State, Nigeria. The study will enable policymakers and stakeholders who directly or indirectly play a critical role in the management of drug-resistant tuberculosis to identify the predictors of the outcomes of drug-resistant tuberculosis using a community-based approach and mitigate identified challenges where necessary. The study will also add to the body of knowledge and evidence of the impact of community-based DT-TB management.

Limitations of the study

The study had the following limitations.

1. Some of the sociodemographic characteristics of the patients that would have been explored in the study were not clearly inputted in the records of the patients. There is a need to review the

registers used for community DR-TB to capture some aspects of the demography.

2. Some of the patients that met the inclusion criteria for the study were not clearly evaluated in the various groups, and this affected some of the results gotten from the study. However, the results may not be widely different from what was gotten in this study.

Significant of study

This research will be important to the Akwa Ibom State Tuberculosis and Leprosy Control Program in general and, by extension, the National Tuberculosis and Leprosy Control Program in particular, as it will create awareness on the importance of community DR-TB management and its outcomes for further improvement of TB management as a whole. The findings of this study will also be meaningful to the society and country as it will help reduce the spread of Drugs-Resistant Tuberculosis.

Methodology

The study was carried out in Akwa Ibom State [8], Nigeria. The study design was a retrospective cohort study, and the study population included all patients diagnosed with MDR-TB between January 2018 and December 2020 in the State. The total sampling technique was employed to review patients that were diagnosed and registered between 1 January 2018 to December 20.

The demographic and clinical data of each patient were retrieved from the DR-TB patient treatment cards, DR-TB patient treatment progress notes from directly observed treatment short-course (DOTS) providers in the community, and the state DR-TB central register, baseline, and routine investigation results cards. Data were checked for correctness and duplicity. The patient's treatment outcomes recorded within the period of January 1st 2018, to December 2020 were documented. The drug regimen for MDR-TB

started initially for the patients and changes have been made, and the duration of the treatment was recorded.

The Statistical Package for Social Sciences (SPSS) Software (Version 23; SPSS, Chicago, IL USA) was used for the analysis of data. Descriptive statistics were computed, and this included mean and standard deviation, median and interquartile ranges as appropriate. Data was represented using bar charts, as appropriate. Chi-squared and Fisher's exact test were used for categorical data as appropriate. Univariate and multivariate logistic regression was computed to determine predictors of treatment outcome. For multivariate regression, variables with $p < 0.15$ were included in the model. Confidence intervals (CI) were computed at 95% CI, while the p-value was set at <0.05 for statistically significant data.

Results

A total of two hundred and fifty-three (253) respondents were extracted from the registers and records from 2018 to 2020. However, only two hundred and thirty-three respondents met the inclusion criteria for the study. Some aspects of the sociodemographic data of respondents were not included in the results because they were not well presented in the registers. The majority of respondents were between the ages of 25-and 34 years (34.8%) and 35-44years (21.5%). Most of the participants were male (56.2%). A greater proportion of enrollees in the program were new cases (76.3%). Most of the cases were HIV negative (66.1%).

A greater proportion of the outcome among clients who received treatment (42.5%) were cured of the disease. While 9.9% of the total outcome of respondents died during the period under review. The proportion of clients that were declared cured after treatment was 42.5%. The odds of being cured of drug-resistant TB when a client was HIV positive increased two-fold relative to negative clients but was not statistically significant. [OR=2.130. 95% CI 0.853-5.319].

Discussion

This study sought to identify the demographic and clinical characteristics of patients that enrolled in the community-based DR-TB program in Akwa Ibom State [8] between January 2018 to December 2020 and to determine the health-related outcomes of DR-TB patients' undergoing treatment within the same period in the community. The study sought to determine predictors associated with treatment outcomes of community-initiated DR-TB treatment in Akwa Ibom State.

The median age of clients that participated in the study was 34 years [27- 49.5]. This was similar to a study that was carried out in Zaria, North-Western Nigeria, to identify predictors of the intensive phase treatment outcomes among patients with multidrug-resistant tuberculosis. [9] The predominant age grouping in the study was those between the ages of 25 to 34 years, which was comparable to a study that was carried out in Northern Nigeria that showed similar age groups as the predominant group in the study [10]. The study showed that there were about an equal number of males and females in the study with a ratio of 1.3: 1, which was similar to a study done in Peru where an equal number of males and females participated in the study [11]. A study in Ethiopia, however, reported that most of the clients seen in their study were female. Getachew [12] newly diagnosed cases of drug resistance formed the larger group of participants that were enrolled in the community treatment program, and this goes to show that there is an increasing burden of patients with drug resistance in our population and increasing

surveillance could help to identify these group of clients. The proportion of respondents that were positive for Human immunodeficiency virus (HIV) was 28.8% within the study period, and this was lower than findings in another study that showed a very high prevalence of HIV among patients with drug resistance tuberculosis [13].

The cure rate within the period of the study was 42.5%. This was lower than the report of findings from a study that was carried out in Zaria, which showed a cure rate of over 78.2%. [9] In a study in Kenya to assess treatment outcomes of drug-resistant tuberculosis patients, the researchers reported a higher cure rate (82.4%) than the index study. [14] The low reporting of cure rate in this study may result from the non-allocation of treatment outcomes to those who had completed treatment and the non-evaluation of some patients who participated in the study. The proportion of patients that were lost to follow-up within the period was lower compared to findings from other studies. In Kenya, in some studies, 9% of enrollees to the program were lost to follow up during treatment.

The study assessed the predictors of some of the outcomes experienced by the patients. All the patients used in the student utilized the short regimen for treatment of drug-resistant tuberculosis. The study showed that the odds of being declared cured were higher for those positive for HIV, which was statistically significant. This was similar to findings in Kenya, where the researchers reported similar findings [14]. This may be because those who were HIV positives were more able to adhere to treatment because they were already on long-term treatment for HIV.

Table 1. Characteristics of respondents and their health status

Variable	n=233	f(%)
Age(years)		
15-24	36	15.5
25-34	81	34.8
35-44	50	21.5
45-54	30	12.9
≥55	36	15.5
Median [IQR] 34.0 [27-49.5]		

Sex		
Male	131	56.2
Female	102	43.8
Male: Female ratio	1.3:1	
Enrollees		
New cases	178	76.3
Previous treatment	24	10.3
Treatment failure	31	13.4
HIV status		
Negative	154	66.1
Positive	67	28.8
Not Known	12	5.1

IQR=Interquartile range

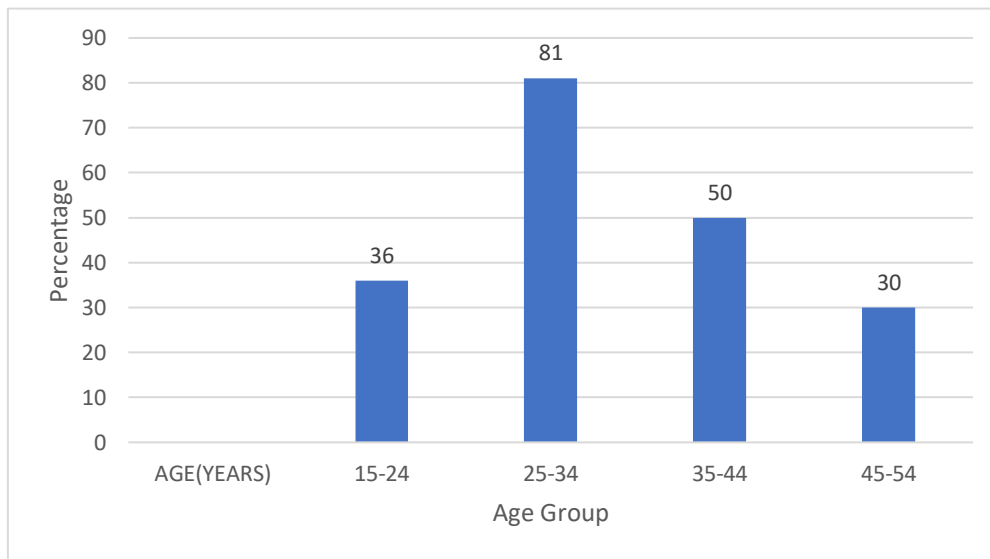


Figure 1. Percentage Distribution of Patients by Age

This chart show that majority of respondents were between the ages of 25-34 years (41%) and 35-44years (26%).)

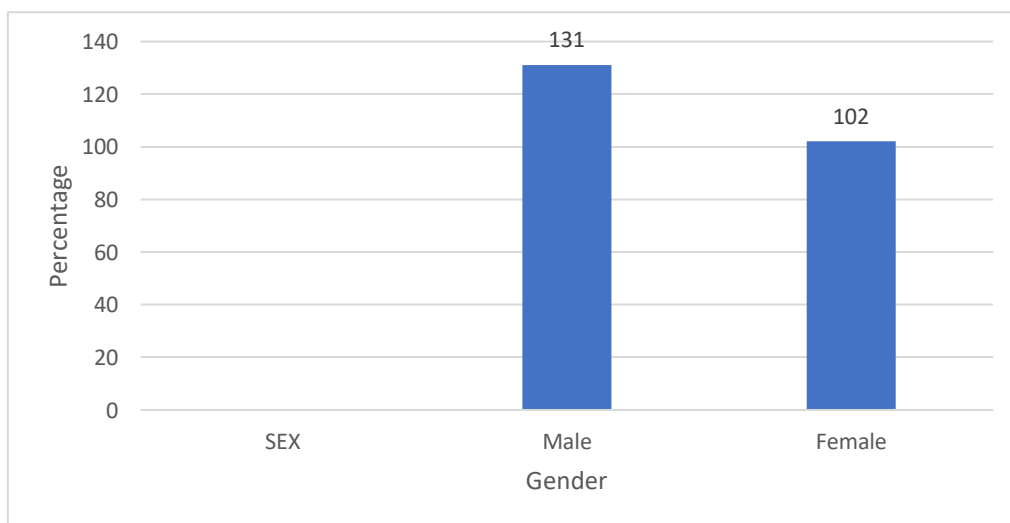


Figure 2. Percentage distribution of patients by sex

(Most of the participants were males (56.2%).)

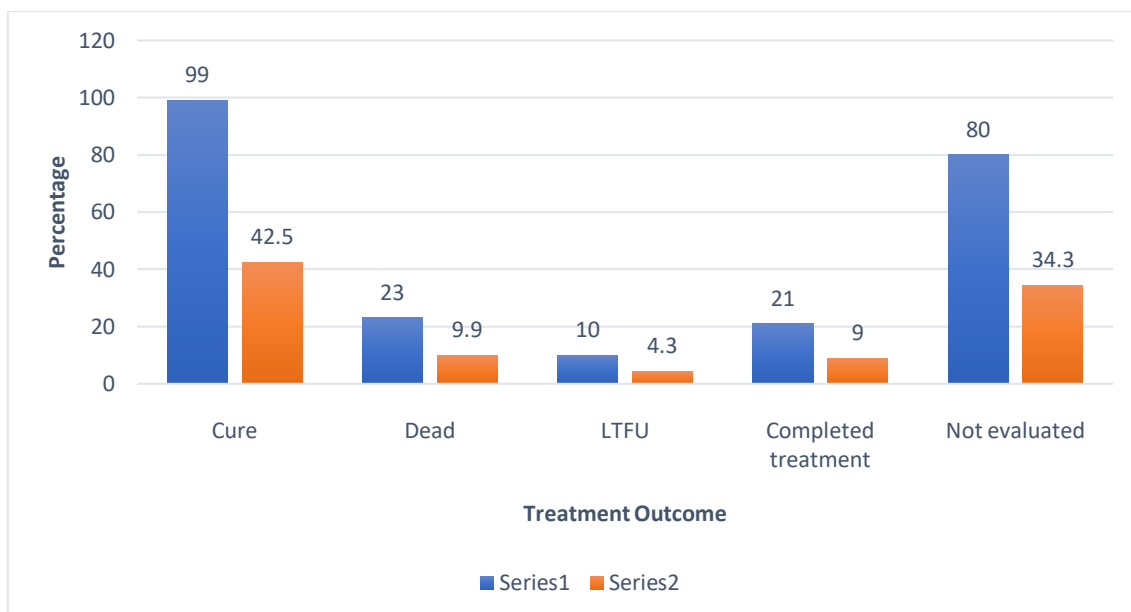


Figure 3. Treatment Outcome of Patients Enrolled

Table 2. Treatment Outcome of Drug Resistant Tuberculosis between 2018 to 2020

Variables	n=233	f (%)
Cure	99	42.5
Dead	23	9.9
LTFU	10	4.3
Completed treatment	21	9
Not evaluated	80	34.3

LTFU= Lost to follow-up; TC= Treatment completed

Table 3. Treatment Outcome (Cure rate)

Treatment outcome (Cure)	n=233	F (%)
Cure	99	42.5
Not cure	134	57.5

Table 3 displays the cure rate for the period under study. The proportion of clients that were declared cured after treatment was 42.5.

Table 5. Univariate regression of treatment outcome (Cure) with some independent variables

Variables	Crude odds ratio	95% CI		Tests/statistics	
		Lower	High	χ^2	P
Age (Year)					
15-24	1			1.604	0.808
25-34	1.641	0.545	4.943		
35-44	0.944	0.316	2.820		
45-54	1.077	0.313	3.710		
≥55	0.732	0.374	4.045		

Sex					
Male	1				
Female	1.114	0.564	2.200	2.236	0.135
Status before starting care					
New	1			2.578	0.276
Previous treatment of TB	1.289	0.418	3.970		
Treatment failure	2.489	0.784	7.904		
HIV status					
Negative	1				
Positive	1.897	0.813	4.427	2.236	0.135

Table 5 displays the univariate regression of variable (cure). some independent variables with the outcome

Table 6. Multivariate Regression of Treatment Outcome (cure) with Some Independent Variables

Variables	OR	Significance	95% CI	
			Low	High
HIV Status				
Negative (Ref)	1			
Positive	2.130	0.105	0.853	5.319
SEX				
Male (Ref)	1			
Female	0.767	0.502	0.353	1.664

Table 6 displays the multivariate regression of treatment outcome (cure) and predictors that meet the criteria for the logistic model. The odds of being cured of drug-resistant TB when a client was HIV positive increased two-fold relative to negative clients but was not statistically significant. [OR=2.130, 95% CI 0.853-5.319].

Conclusions

The study determined some of the sociodemographic characteristics of patients that received treatment for drug-resistant tuberculosis using the Community-Initiated model, their health outcomes and assessed the predictors of some of the health outcomes. The study found that the odds of being cured of drug-resistant tuberculosis increased in patients that were HIV positive. The study also found that the odds of mortality occurring during treatment were associated with the HIV status of the patients and the state in which they initiated treatment.

Recommendations

The following are recommendations based on the findings of this study.

There is a need to strengthen and encourage the community model for the treatment of drug-resistant tuberculosis because of the reduced mortality and morbidity associated with the model. More communities need to be sited to ensure wider coverage and increase case detection.

Patients that have previously received treatment for TB and are undergoing treatment for DR-TB, need to be given more attention during care to reduce the risks of mortality.

The TB register should be updated and more information about the predictors of treatment outcome inputted.

There should be frequent training and retraining of DOT officers to build their capacity for inpatient care, adequate follow-up, and

proper documentation in both the DR-TB presumptive and treatment register.

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Running Title

Assessment of Predictors of Cure in Community-Initiated Treatment of Drug-Resistant Tuberculosis Patients in Akwa Ibom State. Nigeria.

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