

Effect of Age on Treatment Outcomes Among MDR-TB Patients in Nigeria

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Abstract

Introduction: Globally, Nigeria is one of the countries with the highest burden of Multidrug-resistant tuberculosis (MDR-TB) [1]. As a result of the increasingly high burden of MDR-TB in the country, treatment capacities to manage MDR-TB patients has been expanded rapidly. It is therefore crucial to ensure that the quality of MDR-TB treatment is optimal and delivered in a patient-centred approach. An in-depth understanding of the factors associated with treatment outcomes of MDR-TB may inform better treatment guidelines towards improving the quality of care.

Objective: This study investigated the relationship between demographic factors such as age, gender, and marital status; and the treatment outcomes of MDR-TB patients managed in Nigeria.

Methods: A retrospective cohort study based on the analysis of secondary data retrieved from the electronic health records of MDR-TB patients managed between 2013 and 2014. 402 patients were included in the study and data was analysed using SPSS.

Results: The results of the study, at the bivariate level, showed that age was significantly associated with treatment outcomes; age greater than 40 years was identified as a risk factor associated with unsuccessful treatment outcomes among MDR-TB patients at a p-value of 0.026. Age was also found to be significantly associated with treatment outcomes at the multivariate level using logistics regression analysis at a p-value of 0.043 after adjusting for factors such as HIV co-morbidity, gender and marital status. Marital status, gender, and HIV co-morbidity were not associated with poor MDR-TB treatment outcome. The implications of the findings of this study in a health care program include the introduction of age-specific policies in the treatment guidelines for MDR-TB.

Conclusion: The result of this study suggests that old age is a predictor of poor treatment outcomes among MDR-TB patients. Hence, age-sensitive interventions should be included in MDR-TB packages to address geriatric illnesses and other factors that may be responsible for the poorer treatment outcomes seen among the older population.

Keywords: Age; MDR-TB; Treatment Outcomes

Introduction

MDR-TB is a public health issue in Nigeria [1,2]. MDR-TB is described as strains of Mycobacterium tuberculosis that have developed resistance to Isoniazid and Rifampicin; two of the medications used as first line treatment for Tuberculosis [3]. The country has expanded MDR-TB treatment capacities to ensure that all diagnosed cases are enrolled for care, however it is critical that the care provided is optimal and delivered in a patient-centered approach. This study seeks to investigate the relationship between demographic factors such as age, gender and marital status and the treatment outcomes of MDR-TB patients managed in Nigeria. The effect of HIV co-morbidity on MDR-TB

treatment outcome was also investigated in this study. An in-depth understanding of the factors associated with treatment outcomes of MDR-TB will inform programmatic interventions that can improve the overall treatment success rate among MDR-TB patients in Nigeria.

The ever increasing incidence of MDR-TB in Nigeria has constituted a critical public health issue with negative impacts on the quality of life of those affected by the disease [4]. The treatment of MDR-TB is longer, costlier and has more gruesome side effects when compared with the treatment for drug-susceptible TB [5]. The strain of MDR-TB treatment on the healthcare system and the affected individual is enormous, hence the need for a critical assessment of the factors that can influence the treatment outcomes. The international standard of Tuberculosis care recommends a patient-centred approach to TB management towards optimizing the outcomes of the MDR-TB treatment regimen [6]. In light of this, National TB programs need to ensure that their policies and treatment guidelines are tested empirically to establish their efficacy and aptness within the context of the country. A deep understanding of the risk factors associated with poor treatment outcomes among MDR-TB patients is essential towards reducing the scourge of the disease.

The findings of this study may be useful in providing guidance on how the MDR-TB treatment can be optimized by addressing some of the key factors that are associated with poor treatment outcomes [7]. In addition, the result of this study may provide the empirical evidence required to update the current national policies and treatment guidelines used for managing MDR-TB patients.

Study design

This study was conducted as part of a quantitative study to determine the factors that affect the outcomes of treatment among MDR-TB patients in Nigeria. Secondary data of 402 MDR-TB patients was collected from the National Electronic TB Information Management Systems (NETIMS). SPSS was used for data analysis; data collected was subjected to logistics regression analysis and a chi square test to determine the association between the independent variables which are age, gender, HIV co-morbidity and marital status and the dependent variable which is MDR-TB treatment outcome. Age was analyzed both as a continuous and as a categorical variable. As a categorical variable, age was recoded into age equals or is less than 40 years and age is greater than 41 years. Marital status was classified as single and married with those divorced, widowed, separated or single falling under the single category while those married or cohabitating were coded as married.

Table 1 below shows the age distribution of the sample population. This is also described further in the form of bar chart as shown below. The age distribution is a reflection of the findings of the TB prevalence study conducted in Nigeria in 2012 with the age groups 25–44 years having the highest frequency. The cut-off of age 40 years and below; and age above 40 years applied in this study was informed by the preponderance of the age group 25–44 years.

Results

According to the results of the logistics regression analysis, age was found to be significantly associated with MDR-TB treatment outcome; with an odds ratio of 1.027 (95% CI: 1.006-1.049) at a p -value of 0.013. It can therefore be inferred that old age is a risk factor for poor MDR-TB treatment outcome. Older patients therefore have a higher odd of having unsuccessful MDR-TB treatment outcome. There is a 3% increase in the chances of having a poor or unsuccessful treatment outcome for each additional year added to the MDR-TB patient's age. The results of the chi-square analysis also showed that age was significantly associated with MDR-TB treatment outcome with a Pearson chi-square statistics test value of 4.967 and a p -value of 0.026. The chances of having a positive treatment outcome is 86% more for patients aged 40 years and below compared to the older patients. Gender and marital status were not significantly associated with treatment outcomes based on the results of the chi-square analysis. Table 2 shows the result of cross-tabulation of age and treatment outcomes while tables 3 and 4 show the results of cross-tabulation of gender and treatment outcomes and marital status and treatment outcomes respectively.

Variables	Count (N)	Percentage
Age (years)		
7-14	5	1.3%
15-24	76	19.5%
25-34	143	36.7%
35-44	95	24.4%
45-54	46	11.8%
55-64	18	4.6%
65 and over	7	1.8%
Total	390	100%
Gender		
Male	262	65.7%
Female	137	34.3%
Total	399	100%
Marital Status		
Married	214	56.8%
Single	163	43.2%
Total	377	100%

Table 1

Age and treatment outcome

Treatment outcome	Age		Total
	1-40yrs N (%)	>=41yr N (%)	
Successful	248 (83.5%)	68 (73.1%)	316
Unsuccessful	49 (16.5%)	25 (26.9%)	44
Total	297	93	390

Table 2: Association between Age and Treatment Outcome.
p=0.026.

Gender and treatment outcome

Treatment outcome	Gender		Total
	Female N (%)	Male N (%)	
Successful	110 (80.3%)	215 (82.1%)	325
Unsuccessful	27 (19.7%)	47 (17.9%)	74
Total	137	262	399

Table 3: Association between Gender and Treatment Outcome.
p = 0.186, N=399.

Marital status and treatment outcome

Treatment outcome	Marital status		Total
	Married N (%)	Single N (%)	
Successful	176 (82.2%)	134 (82.2%)	310
Unsuccessful	38 (17.8%)	29 (17.8%)	67
Total	214	163	377

Table 4: Association between marital status and treatment outcome.
P=0.993. Note: N=377.

Multivariate analysis

At the multivariate level, age was found to be significantly associated with MDR-TB treatment outcome after adjusting for other variables such as gender, marital and HIV status; odds ratio of 1.948 (95% C1: 1.021, 3.716) at a *p*-value of 0.043. This result suggests that patients older than 40 years are almost twice more likely to have a poor or unsuccessful treatment outcome compared to their younger counterparts. Other variables included in the model namely; gender, marital and HIV status were not significantly associated with MDR-TB treatment outcome. Table 5 shows the summary result of the fully adjusted logistics regression model.

Description	B	S.E.	Wald	df	Sig.	aOR	95% C.I. for OR	
							Lower	Upper
Age	.667	.330	4.089	1	.043	1.948	1.021	3.716
Marital status	-.201	.302	.444	1	.505	.818	.452	1.478
Gender	.139	.292	.228	1	.633	1.149	.649	2.035
HIV+	-.158	.496	.102	1	.750	.854	.323	2.255

Table 5: Result of Multivariate Binary Logistics Regression Analysis.

Age is a predictor of treatment outcome with p-values less than 0.05. Reference categories are age= \geq 40 years, male, single and HIV+.

Discussion

The findings of this study suggest that old age is a risk factor for poor MDR-TB treatment outcomes. Patients aged over 40 years were about twice more likely to have an unsuccessful treatment outcomes relative to the younger patients. This result is similar to the findings from existing literature which showed that age older than 45 years was significantly associated with unsuccessful MDR-TB treatment outcome [8,9]. This finding is in agreement with existing evidence that old age is a risk factor for many illnesses [10]. On the other hand, some studies found that younger age was a risk factor for poor MDR-TB treatment outcome [11].

Considering that older patients may have other co-morbidities, this may have been a confounding factor to the results of this study. Co-morbidities also lead to other complications such as adverse drug reactions from other medications, drug-drug interactions and other factors that may interfere with the efficacy of the MDR-TB medications. It was however not possible to determine the effect of other co-morbidities on MDR-TB treatment outcome in this study. Poor adherence to treatment due to use of several medications, mental health disorders and social isolation may also be responsible for the poorer treatment outcomes observed among the older MDR-TB patients.

The result of this study may have huge implications for the way MDR-TB patients are managed in Nigeria. It may inform more patient-centred approaches to MDR-TB management by ensuring that treatment guidelines are more robust to accommodate the other health complications experienced by older patients. Intentional and specific efforts by the National TB program may be needed to invest in more age-appropriate MDR-TB treatment packages.

Limitations of the Study

This study employed a retrospective design and used secondary data therefore it was impossible to collect information on potential confounding factors. Other relevant data such as weight, and height of patient, previous history of TB, smoking history and smoke exposure index were not available in the electronic records accessed. Also, data quality issues could not be addressed at the point of analysis; incomplete data were therefore excluded from the final analysis. Similarly, it was impossible to ascertain the main cause of death among the MDR-TB patients, all patients who died during the treatment period regardless of the cause were generally classified under death by MDR-TB. Additionally, co-morbidities such as hypertension, diabetes and other geriatric-related illnesses; and other social factors such as health workers' attitude were not investigated in this study due to limitations with the secondary data.

Implication for Professional Practice and Social Change

It can be inferred from the results of this study that age older than 40 years is a predictor of poor treatment outcome among MDR-TB patients in Nigeria. In light of this, the National TB program should include age-specific packages in the MDR-TB program. These should include management of other health conditions, provision of health education, and social support from family and non-family members as well as counselling sessions with care providers to ensure early identification of adverse drug reactions.

Conclusions

The results of this study suggest that old age is associated with poor MDR-TB treatment outcome, hence, there is need for the inclusion of age-specific packages in the MDR-TB program. These should address the management of other co-morbidities associated with old age, provision of psychosocial support and the use of age-appropriate health education programs to address treatment non-adherence.

Recommendations for Future Studies

There is need for a deeper understanding of the social factors that may be responsible for the association between age and MDR-TB treatment outcomes. A few of the social factors include the psychosocial support available to the patient during treatment, health worker's attitude, the costs associated with managing MDR-TB and the impact of the treatment in general on the patient's quality of life. Also, it is crucial to understand the reasons for the non-adherence to treatment from the patients' perspectives using a qualitative study design.

It may also be useful to investigate the effect of other co-morbidities, experienced usually in old age such as diabetes, hypertension, dementia, Alzheimer's on MDR-TB treatment outcome.

Bibliography

1. WHO. Global TB Report (2019).
2. Onyedum CC., *et al.* "Prevalence of drug-resistant tuberculosis in Nigeria: A systematic review and metaanalysis". *PLoS ONE* 12.7 (2017).
3. Falzon D., *et al.* "WHO guidelines for the programmatic management of drug-resistant tuberculosis: 2011 update". *European Respiratory Journal* 38.3 (2011): 516-528.
4. Daniel O and Osman E. "Prevalence and risk factors associated with drug resistant TB in South West, Nigeria". *Asian Pacific Journal of Tropical Medicine* 4.2 (2011): 148-151.
5. NTLP. National Tuberculosis and Leprosy Programme. Manual for the Management of TB and Leprosy. 2013 (2017).
6. TB CARE1. International Standards for Tuberculosis Care, Edition 3. TB CARE I, The Hague (2014).

7. Drobniewski F, *et al.* "A national study of clinical and laboratory factors affecting the survival of patients with multiple drug resistant tuberculosis in the UK". (2002): 810-817.
8. Li D., *et al.* "Risk Factors of Treatment Outcomes for Multi-drug Resistant Tuberculosis in Shanghai, 2009-2012". *Procedia Environmental Sciences* 36 (2016): 12-19.
9. Wai PP, *et al.* "Patients with MDR-TB on domiciliary care in programmatic settings in Myanmar: Effect of a support package on preventing early deaths". *PLoS ONE* 12.12 (2017): 1-19.
10. Deeks A., *et al.* "The effects of gender and age on health related behaviors". *BMC Public Health* 8 (2009): 1-8.
11. Skrahina A., *et al.* "Multidrug-resistant tuberculosis in Belarus: the size of the problem and associated risk factors". *Bulletin of the World Health Organization* 91.1 (2013): 36-45.

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