

Research Article

Suicidality in Tuberculosis Patients and their Non-Tuberculosis Family Contacts in Nigeria

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ABSTRACT

Objective: This study aimed at determining the prevalence and correlates of suicidal behavior in patients with tuberculosis as compared with their non-tuberculosis control, and to determine its association with disease pattern.

Method: One hundred and fifteen patients with tuberculosis and 115 caregivers/family members visiting the Multi-drug Treatment Resistant (MDR) Treatment Centre at University College Hospital, Ibadan Centre were screened for suicidal behavior, depression, psychosis, alcohol or drug use, using the Mini International Neuropsychiatric Interview (MINI) and patient's records. Physician's report was used to determine the presence of a co-morbid general medical condition. Data were analyzed using SPSS version 20.0.

Results: A significantly higher proportion of the TB cases compared to controls had suicidal ideation (44.3% versus 3.5%, $p < 0.001$), suicidal plan (21.7% versus 1.7%) and attempt (14.8% versus 0.9%). Five patients (4.3%) of the TB cases completed suicide in the course of the study. A significantly

higher proportion of the TB cases had Suicidality Scores in the moderate to high range (44.3%) compared to the controls (3.5%). Predictors of suicidality in TB were extra-pulmonary spread, $p < 0.01$, any substance use disorder, $p < 0.01$, lung abscess, $p < 0.01$, HIV/AIDS, $p < 0.01$ and depression, $p = 0.01$.

Conclusion: The high prevalence of suicidal behavior and its association with several disease severity indicators in this study reinforces the existing evidence for increased risk of suicidal behaviors in chronic physical illnesses, necessitating more robust consultation-liaison services for MDR-TB patients.

MeSH Headings/Keywords: Tuberculosis, Suicide, Chronic Health Condition, Consultative-liaison, Psychiatry, Suicide Prevention Programs

Acronyms: MDR- Multidrug Resistant Tuberculosis; TB- Tuberculosis; HIV/AIDS- Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome; MINI- Mini International Neuropsychiatric Interview

Introduction

Tuberculosis (TB) is a major global health problem with 9.6 million new cases in 2014 alone [1]. It is also a leading cause of death, with 95% of the death occurring in developing countries [1]. Nigeria, with a population of about 170 million [2], ranks second highest among the countries with TB burden in Africa. Factors responsible for the resurgence of TB include lack of commitment to TB control on the part of governments, poor management of TB control programs, exponential population growth, uncontrolled urbanization and widespread poverty, which are the realities in developing countries like Nigeria [3]. It has also been found that medical co-morbidity such as HIV-AIDS, extra-pulmonary disease and severity of illness are some of the factors identified as being associated for the high prevalence of Multi-drug Treatment Resistant tuberculosis (MDR-TB) in Nigeria [4]. These factors have also been found to increase the risk of psychological distress, depression [5] and psychosis [4] in MDR TB in our setting. Furthermore, studies elsewhere have found that social factors such as poverty and alcohol use problems act through poor compliance with anti-TB drugs to increase the prevalence of MDR TB [6].

Suicidal behavior in TB patients is an area of growing interest in developing countries of the world. In India, suicidal thoughts have been reported in about 9% of a sample of patients with TB [7]. In another study in South Africa, among selected primary care clinics, suicidal ideation was reported in 9% of the sample

and attempted suicide in 3.1% [8]. This figure is expected to be higher in the MDR-TB units, given its high co-morbidity with diabetes mellitus, smoking, alcohol abuse or dependence, chronic lung diseases, malignancies, immunosuppressive treatment, malnutrition [9] and HIV/AIDS [10]. Therefore, presence of suicidal behavior in MDR-TB treatment units could be partly determined by these medical comorbidities; yet, physicians are less likely to routinely look for them.

Beyond clinical factors, MDR TB is associated with profound social difficulties with its attendant emotional and psychological problems [11]. These factors have been reported to be a challenge to medication adherence as well as contributing to poor outcome in the treatment of MDR TB, thereby setting up a vicious cycle. For example, a study from Peru [11] noted that MDR TB patients, the majority of whom were poor *abs initio*, could not work or perform many social roles due to illness symptoms, medication side effects and the restrictive nature of MDR TB treatment settings. Other authors report significant stigma, rejection and discrimination directed at both the patient and their relatives [12]. Psychological distress and depression are also potential risk factors for suicide in MDR-TB which could also be precipitated by medical comorbidities [13], extra pulmonary spread [14] and discrimination [15].

Aims of the study: Thus, our main objectives were to determine the prevalence and correlates of suicidal behaviors in patients with MDR-TB as compared with their non-tuberculosis

control, and to determine the predictors of increased suicidality in TB.

We hypothesized that patients with tuberculosis would have moderate or high suicidality than the control group.

We also hypothesized that medical comorbidities in patients with MDR-TB, will be accompanied by high suicidality than those patients without medical comorbidities.

Methods

Study design: This is a case-control study. However, we recruited the study samples between January 2010 and November 2014

Place of Study: The study location is the MDR-TB treatment center, chest unit, department of medicine, University College Hospital, Ibadan. This special unit was established in Nigeria as a 25-bed facility. It is the first MDR-TB treatment center in Nigeria and started treatment in July 2010.

The treatment guideline is that all culture- and drug susceptibility test- (DST) positive for multidrug resistant (MDR) -TB patients were admitted for a 6 month intensive phase treatment, this was followed by a 12 month ambulatory phase. During the intensive phase, the standard regime was in accordance with the National Tuberculosis Control Program (NTCP) and this comprises of Amikacin, Levofloxacin, Pyrazinamide, Prothionamide, Cycloserine and Pyridoxine. All drugs except Amikacin were continued during the ambulatory period.

The MDR treatment center is located in Ibadan, capital of Oyo state, Nigeria. It is located in the southwestern part of Nigeria, where the predominant ethnic group is Yoruba. The center, however caters for persons from the other parts of the country.

Ethical consideration: We obtained ethical approval from the ethical review committee of the Research Division of the University College Hospital, Ibadan. The ethical approval was in accordance with the ethical principles of the Committee on Publication Ethics (COPE). Written informed consent was obtained from all participants and we also maintained utmost confidentiality during the course of the study.

Study sample: We interviewed 115 patients attending the MDR-TB treatment center and 115 family caregivers who served as controls. The patients constitute a total sample of all the patients who had received treatment at the MDR-TB treatment center since it was established in July 2010 in Nigeria. Both the patients and the caregivers (cases/controls) were consecutively recruited into the study.

Inclusion: The patients with tuberculosis attending MDR-TB (pulmonary) served as the "cases", while the caregivers served as controls.

We defined a "principal caregiver" as a person who was involved with the everyday care of the case and would be very likely to respond to any request for special assistance at any time, if such a request was made by the case. He could be a family member or not.

Exclusion: Excluded were participants who were not literate in English and Yoruba languages (the languages of instruction during the study), as well as participants with a past history of suicidal behavior prior to the onset of TB. We also excluded caregivers with a past or current history of tuberculosis.

Measures: All respondents were assessed within the first seven days of admission. During this period, they were all physically examined and accordingly investigated. Consults were written to various specialists to review and manage all patients with any comorbidity as per standard operating procedure of the center. Patients were reviewed weekly to detect new cases of medical or psychiatric comorbidity while on admission in the MDR treatment facility.

Instruments of Assessments

Socio-demographic questionnaire: This yielded information on age, gender, occupation, marital status, education, ethnicity, duration of tuberculosis, and severity of TB. The method of determination of TB severity is described in subsequent sections.

Mini International Neuropsychiatric Interview (M.I.N.I.) 5.0: The Mini-International Neuropsychiatric Interview (M.I.N.I.) is a brief structured interview designed to make a diagnosis according to DSM-IV and ICD-10 criteria [16]. The instrument has been found to have similar psychometric properties in different parts of the world and different modules of the MINI have been used in the past in Nigerian studies [17-19]. In this study, the suicidality, psychosis, depression, alcohol and drug modules were used.

Suicidality: The suicidality module of the MINI 5.0 was used to explore suicidal behavior and risk of suicide in the participants. Moderate to high suicide risk was defined as a score of > 8 on the suicidality module of the MINI 5.0. The module has item questions on suicidal thoughts (B5), suicidal plan or method (B7) and suicidal attempt (B12).

Detecting psychopathology: The depression and psychosis modules of the MINI 5.0 were used to obtain a diagnosis of depression or any psychosis.

Detecting substance use disorder: The alcohol and drug modules of the MINI 5.0 were used to generate a 12 month diagnosis of alcohol or drug use disorder

Medical comorbidity: Information about the current general medical condition was obtained from the treating physician's note, for the specific general medical condition. This was available in the case files of the respondent with a general medical condition. The health conditions were thereafter listed and a "Yes" or "No" option used to determine the presence or absence of the general medical conditions.

Multi Drug Resistant Tuberculosis (MDR-TB): The MDR-TB treatment unit has two classes of cases, the primary MDR-TB and secondary MDR-TB cases. The primary MDR-TB cases were never exposed to the TB medications in the past, but acquired the disease by contacts with MDR-TB cases. The secondary MDR-TB cases are treatment failure cases, relapses, and defaulters, who require re- treatment. The two categories of patients are treated using the second line anti-tuberculosis medications [20].

The severity of TB was assessed according to the National Tuberculosis Program and WHO guidelines. This is based on, extent of disease, bacillary load and anatomical site that carries a significant acute threat to life or a risk of subsequent severe handicap, or both [21].

Extent of the TB was classified thus, mild (located to a zone, moderate: more than a zone but one side of the lung and severe was classified as both lungs affected [21]. Also TB was classified into categories and 2 respectively, Category 1 being freshly diagnosed smear-positive pulmonary TB, smear negative pulmonary TB with extensive parenchymal involvement or new cases with severe forms of TB, e.g. military TB, tuberculous meningitis, tuberculous pericarditis, tuberculous peritonitis, intestinal TB, genitourinary TB, bilateral or extensive TB pleurisy, spinal disease with neurological complications and category II being relapsed and treatment failure (smear-positive) cases; and treatment after substantial interruption [21]. These patients are at risk of developing multidrug resistant TB (MDR-TB).

Destroyed Lung Score (DLS): A radiologist (AA), with almost 20 years clinical experience with a special interest in tuberculosis examined the chest radiographs for the presence of calcified lesion, cicatricial lesion, cavity lesion in order to determine the extent of lung destruction. He was blind to patients' identity and clinical characteristics. Each film was assessed, and according to the percentage area showing destroyed lung, both lungs were separately graded. This was in accordance with the modified Goddards classification [22]. A score of 0 was assigned if there was no abnormality; 1 was given if for less than 25% of lung parenchyma destruction, 2 for 25–50% destruction, 3 for 50–75% destruction and 4 if more than 75% of lung parenchyma was destroyed. A DLS was then calculated by adding the scores for each slice and dividing by the total number of slices. The median score was used as cut-off point for statistical purposes.

There is a routine consultation liaison service involving all clinical departments in the MDR units.

Pilot Study: A pilot study was carried out in June 2009, at the State Hospital, Ring Road, Ibadan. During this period, all instruments of data collection were pilot tested among a group of 15 patients suffering from chronic obstructive airway disease and their respective caregivers. This was to determine the feasibility of the study and the applicability of the research instruments.

Analyses

We recruited 118 patients attending the MDR-TB treatment center and 118 caregivers (control). Our data were complete for 115 patients and 115 controls; therefore, final analysis was carried out on 115 cases and 115 controls.

We used both descriptive and inferential statistics to present our results. For the univariate analysis, we used the McNemar test to determine significant differences in binary variables between the cases and the control and conditional logistic analyses for multilevel categorical data.

Primary Outcome (Dependent) Variables was suicidality in MDR-TB patients, while socio-demographic factors, psychosis,

depression, alcohol or drug use disorder, any general medical condition, extent of disease, stage of disease were independent variables.

Poisson loglinear regression analysis was carried out to determine the effect multiple confounding independent variables, using variables that were significantly associated with the primary outcome variables during the initial univariate analysis, $p < 0.01$. This enabled us not to exceed the statistically acceptable 10 independent variables per dependent variable of outcome, in this instance, two independent variables deafness and arthralgia were not included in the regression model. Alcohol use disorder and any drug use disorder were coalesced into any substance use disorder. Thus, only 9 independent variables were entered into the regression model.

The level of statistical significance was set at 0.05, 95% confidence interval for all other analyses. All analyses were carried out using SPSS 20.0.

Results

In this study, 115 patients with TB and 115 non-tuberculosis accompanying family persons/caregivers were studied. Caregivers were generally older. Their median age was 41 years and 34 years for the patients. This was significant, $Z = -3.7$ $p < 0.001$ (not shown in any table).

Significantly higher proportion of patients were in the age band 25–34 years compared with the caregivers, $p = 0.01$, while significantly higher proportion of caregivers were above 54 years of age.

Compared with the caregivers (control group), a higher proportion of the TB cases were men, $p < 0.001$. On the other significantly fewer TB patients had no formal education compared with the caregivers, $p = 0.003$ (Table 1).

Of all the cases, 83 (72.2%) had pulmonary TB, the rest had extra-pulmonary TB; 79 (68.7%) had category 1 TB while the rest had category 2 TB; 42 (36.5%) had mild disease extent (located to a zone), 60 (52.2%) had moderate disease extent (more than a zone, but on one side of the lung), and the remaining 13 (11.3%) had severe disease extent (both lungs affected) (Not in any table).

Compared with the control, a significantly higher proportion of patients had suicidal thoughts, plan, or attempt, or moderate/high suicidality score, $p < 0.001$ respectively. Five (4.3%) patients completed suicide in the course of the study. While significantly lower proportion of patients had no suicidality compared with the caregivers, $p < 0.001$, a significantly higher proportion of them had mild or moderate suicidality, $p < 0.03$, $p < 0.001$ respectively. Severe suicidality was reported by 4.3% of patients and none among the caregivers (Table 2).

Also suicidality was significantly more reported among TB patients who were younger, $p = 0.01$ and among those of the Yoruba ethnic group, $p = 0.005$ (Table 3). Post hoc multiple pairwise comparisons show that the significant age difference was accounted for by a significantly higher suicide rate among patients in the age bracket 25–34 years compared with those between 44 and 54 years, FE p value = 0.03 (Not in any table). In terms of ethnicity, post hoc multiple

Table 1: Socio-demographic Characteristics of Patients and Family Caregivers (Controls).

Demography	Patients (N = 115)		Control (N = 115)		OR ^{RC}	p
	n	%	n	%		
Age						
<25	18	15.7	14	12.2	1.14 (0.76-3.05)	0.40
25-34	40	34.8	23	20.0	1.43 (1.10-2.11)	0.01
35-44	30	26.1	25	21.7	1.12 (0.84-1.54)	0.54
45-54	23	20.0	28	24.3	0.88 (0.63-1.24)	0.53
>54	4	3.4	25	21.7	0.23 (0.10-0.67)	< 0.001
Gender						
Male	44	38.3	20	17.4	2.16 (1.51-3.09)	< 0.001
Female	71	61.7	95	82.6		
Education						
No formal	58	50.4	81	70.4	0.67 (0.53-0.87)	0.003
Some primary	20	17.4	12	10.4	1.29 (0.96-1.76)	0.18
Primary	21	18.3	10	8.7	1.43 (1.08-1.90)	0.05
Some secondary	8	7.0	8	7.0	1.0 (0.60-1.67)	1.0
Secondary	7	6.0	4	3.5	1.29 (0.82-2.06)	0.55
Post-secondary	1	0.9	-	-		
Marital status						
Married	40	34.8	60	53.6	0.80 (0.57-1.14)	
Unmarried	75	65.2	52	46.3		0.23
Employment						
Employed	40	34.8	57	49.6	0.76 (0.54-1.07)	0.13
Unemployed	75	64.2	58	50.4		
Religion						
Christianity	54	47.0	50	43.5	0.82 (0.65-1.19)	0.34
Islam	61	53.0	65	56.5		
Ethnicity						
Yoruba	76	66.1	76	66.1	1.0 (0.76-1.31)	1.0
Hausa	15	13.0	16	13.9	0.96 (0.65-1.42)	1.0
Igbo	14	12.2	13	11.3	1.09 (0.74-1.62)	0.69
Minority Tribes	10	8.7	10	8.7	1.0 (0.63-1.58)	1.0

RC: Reference category is control group

Table 2: Profile of Suicidality.

Profile of Suicidality	Patients		Control		OR(95% CI)	P
	N = 115		N = 115 ^{RC}			
	N	%	N	%		
Think about Suicide	51	44.3	4	3.5	2.18(1.56-3.03)	< 0.001
Have a suicide method or plan in mind	25	21.7	2	1.7	4.52 (2.93-7.28)	< 0.001
Suicidal attempt	17	14.8	1	0.9	6.71 (4.03-11.16)	< 0.001
Completed Suicide	5	4.3	-	-	-	-
Suicidality						
None	64	55.7	111	96.5	0.04(0.01-0.15)	< 0.001
Mild	12	10.4	3	2.6	4.35(1.19-15.82)	0.03
Moderate	34	29.6	1	1.7	42.14 (6.49-356.74)	< 0.001
Severe	5	4.3	-	-	-	

RC: Reference category is control group

pairwise comparisons show that the significant difference was accounted for by a significantly higher suicide rate among patients from the Yoruba ethnic group compared with the

Hausas, FE, p value < 0.01 and the minority group, FE p < 0.001 or all combined Hausas, Igbos and other minority groups, FE p Value = 0.003 (Not in any table).

Table 3: Demographic Correlates of Suicide in Tuberculosis.

Demography	Cases N = 115		Suicide N = 51		P
	n	%	N	%	
Age (Years)					
< 25	18	15.6	8	44.6	0.01 ^{BS}
25-34	40	34.8	26	65.0	
35-44	30	26.1	10	33.3	
44-54	24	20.9	7	29.2	
>54	3	2.6	-	-	
Gender					
Male	71	61.7	32	45.1	0.8
Female	44	38.3	19	43.2	
Marital Status					
Married	40	34.8	19	47.5	0.6
Unmarried	75	65.2	32	42.7	
Employment					
Employed	40	34.8	16	40.0	0.5
Unemployed	75	65.2	35	46.7	
Religion					
Christianity	54	47.0	24	44.4	1.0
Islam	61	53.0	27	44.3	
Education					
No formal	59	51.3	24	40.7	0.048 ^{BNS}
Primary uncompleted	20	17.4	11	55.0	
Primary	21	18.3	13	61.9	
Secondary Uncompleted	8	7.0	3	37.5	
Secondary	7	6.0	-	-	
Ethnicity					
Yoruba	76	66.1	42	55.3	0.005 ^{BS}
Hausa	16	13.9	3	18.8	
Igbo	13	11.3	5	38.5	
Minorities	10	8.7	1	10.0	

BNS: Not Significant after Bonferonni Adjustmentsnt; BS: Significant after Bonferonni Adjustment.

There were significant associations between having a mild/moderate/high suicidality in TB patients and comorbid deafness, $p = 0.04$; lung abscess, $p < 0.001$; Arthralgia, $p = 0.04$, HIV/AIDS, $p = 0.002$; extra-pulmonary TB, $p < 0.001$; category 2 TB, $p < 0.001$; moderate/severe extent TB; $p < 0.001$, alcohol use disorder, $p < 0.001$; any drug use disorder, $p < 0.001$, alcohol or drug use disorder, $p < 0.001$, and depression, $p = 0.003$ (Table 4).

Predictors of suicidality in TB were extra-pulmonary spread, $p < 0.01$, any substance use disorder, $p < 0.01$, lung abscess, $p < 0.01$, HIV/AIDS, $p < 0.01$ and depression, $p = 0.01$ (Table 5).

Discussion

In this study, we found that 44.3% of patients with TB and 3.5% of caregivers met the criteria for moderate/high suicidality as determined by the Mini International Neuropsychiatric Interview. Although comparison of suicide rate is flawed with differences in method of assessment, population sampled and the period in question, the suicide rates as presented in this report seem higher than what have been reported in previous

studies. For example, the prevalence rate of moderate/high suicidality (44.3%), suicidal ideation (44.3%) and suicidal attempt (14.8%) was much higher than the 9.0% for suicidal ideation and the 3.1% for suicidal attempt reported in a cross sectional survey of primary care clinics in South Africa [8] and the 9% reported for suicidal thoughts in two government TB units in south India [7]. There are several plausible reasons for these high rates of suicidal behavior in our MDR- TB sample, first, is the instrument of measurement. In the current study, a structured instrument, the suicidality module of MINI, was used to capture the profile of suicide and also in establishing a graded diagnosis of risk of suicide. Thus, a much higher detection rate is expected from this current methodology, as opposed to the study in South Africa that used a "Yes" or "No" option for a non-structured interview [8], and the report from South India that used the 36-Item Short Form Health Survey (SF 36) [7].

Beyond methodological issues, suicidal behavior in humans has been conceptualized as a consequence of life being unbearable [23], as a result of physical, psychological or social factors. Pain, impairment and disability are an intrinsic part of tuberculosis, or any other comorbid chronic medical condition.

Table 4: Clinical Correlates of Suicide in Tuberculosis N = 115.

Clinical Variables	Present	Cases		Suicide		P
		N = 115	N = 51	N = 115	N = 51	
		n	%	N	%	
Anemia	No	102	88.7	42	41.2	0.06
	Yes	13	11.3	9	69.2	
Heart Failure	No	110	95.7	49	44.5	0.8
	Yes	5	14.3	2	40.0	
Pleural Effusion	No	82	71.3	35	47.2	0.6
	Yes	33	18.7	16	48.5	
Hypertension	No	81	70.4	43	42.6	0.3
	Yes	14	19.6	8	57.1	
Diabetes	No	96	83.5	42	43.8	0.8
	Yes	19	16.5	9	47.4	
Cancer	No	113	98.3	50	44.2	0.9
	Yes	2	1.7	1	50.0	
Glaucoma	No	103	89.6	42	40.8	0.05 ^{FE}
	Yes	12	10.4	9	75.0	
Deafness	No	80	69.6	30	37.5	0.04
	Yes	35	10.4	21	60.0	
Lung Abscess	No	97	84.3	36	37.1	< 0.001
	Yes	18	15.7	15	83.3	
DLS# < Median Score	No	106	92.2	49	46.2	0.2
	Yes	9	7.8	2	22.2	
Renal Failure	No	102	88.7	45	44.2	0.9
	Yes	13	11.3	6	46.2	
Arthralgia	No	80	69.6	30	37.5	0.04
	Yes	35	10.4	21	60.0	
Gastritis	No	61	53.0	28	45.9	0.7
	Yes	54	47.0	23	42.6	
HIV/AIDS	No	98	85.2	37	37.8	0.002
	Yes	17	14.8	14	82.4	
Empyema	No	107	93.0	46	43.0	0.2
	Yes	8	7.0	5	62.5	
Bronchiectasis	No	105	91.3	47	44.8	0.8
	Yes	10	8.7	4	40.0	
Extra pulmonary	No	73	63.5	16	21.9	< 0.001
	Yes	42	36.5	35	83.3	
Category	1	76	66.1	19	25.0	< 0.001
	2	39	33.9	32	82.1	
Extent of TB	Mild	36	31.3	6	16.7	< 0.001 ^{BS}
	Moderate	52	45.2	31	59.6	
	Severe	27	23.5	14	51.9	
Depression	No	62	53.9	19	30.7	0.003
	Yes	53	46.1	32	60.4	
Psychosis	No	77	67.0	38	23.4	0.2
	Yes	38	33.0	13	34.2	
Alcohol use disorder	No	90	78.3	32	35.0	< 0.001
	Yes	25	21.7	19	76.0	

Any drug use disorder	No	94	81.7	34	36.2	< 0.001
	Yes	21	18.3	17	81.0	
Any substance use disorder	No	89	77.4	31	34.8	< 0.001
	Yes	26	22.6	20	76.9	

DLS: Destroyed lung score; FE: Fishers Exact P value; BS: Significant after Bonferonni adjustment; Mild: located to a zone, moderate: more than a zone but one side of the lung, severe: both lungs; Category 1: freshly diagnosed smear-positive pulmonary TB, smear negative pulmonary TB with extensive parenchymal involvement; or new cases with severe forms of TB, e.g. military TB, tuberculous meningitis, tuberculous pericarditis, tuberculous peritonitis, intestinal TB, genitourinary TB, bilateral or extensive TB pleurisy, spinal disease with neurological complications; Category II TB: relapsed and treatment failure (smear-positive) cases; and treatment after substantial interruption. These patients are at risk of developing multidrug resistant TB (MDR-TB).

Table 5: Predictors of Suicidality in Tuberculosis.

Independent Variables	Exp (B)	95% CI		P
		Lower Bound	Upper Bound	
Age				
< 25	1.43	0.87	2.98	0.08
25-34	1.73	0.95	3.43	0.07
35-44	1.36	0.81	2.49	0.18
44-54	1			
>54				
Ethnicity				
Yoruba	1.54	0.95	2.34	0.07
Hausa	1.42	0.71	2.73	0.23
Igbo	1.149	0.43	1.13	0.35
Minorities	1			
Extra-pulmonary				
No	0.26	0.19	0.62	< 0.01
Yes	1			
Category				
1	0.87	0.23	1.10	0.09
2	1			
Extent of TB				
Mild	0.23	0.009	1.07	0.06
Moderate	0.47	0.23	1.98	0.34
Severe	1			
Any Substance use disorder				
No	0.21	0.12	0.53	< 0.01
Yes	1			
Lung Abscess				
No	0.35	0.19	0.78	< 0.01
Yes	1			
HIVAIDS				
No	0.39	0.17	0.73	< 0.01
Yes	1			
Depression				
No	0.43	0.21	0.87	0.01
Yes	1			

Psychological to the diagnosis, the fear of the uncertain course and outcome of the illness, the shame, guilt and stigma associated with TB are other important issues in the discourse [24]. Treatment of MDR-TB in the intensive phase requires 6 months in a closed facility with restricted access to the public. This immediately brings about social problems such as inability to work, rejection and social isolation, excessive dependence

on others, and general limitations in social functioning. These broad factors sometimes not only act synergistically, they also act interactively as to cause a vicious cycle and worsen the outcome of illness in Tuberculosis.

Another potential reason for the high prevalence of suicidal behavior in our MDR TB cohort is the high prevalence of medical comorbidities in them, with their own inherent risk

of suicide [25]. For example, we found that 84 of the 115 TB patients (73.0%) had at least one comorbidity. Specifically, we found significantly high rates of deafness, lung abscess, Arthralgia, HIV/AIDS, extra-pulmonary spread, moderate/severe TB among the patients with suicidality in this study. It has been reported in a general medical setting that about 1 in 7 individuals with chronic health problems have suicidal behavior [26].

The final pathway through which the comorbidity act may be any of pain and discomfort. Indeed, studies have found an increased risk of suicidal behavior in conditions associated with pain [27].

We found that being of the Yoruba ethnic group increased the risk of suicide. Studies that have been conducted on suicide among the Yoruba of western Nigeria in the past have concluded that suicidal behavior is a by-product of mental and cognitive states that are brought about by adverse life event (such as receiving a diagnosis of TB and treatment of same), and facilitated by the biological and psychological make-up of individuals (such as depressive reaction to TB) [28, 29]. However, the finding by Asuni [29] in 1962 of a nearly uniform suicide rate in the Yoruba countryside suggests that other factors might be at play. Indeed, Atilola and Ayinde [30] have theorized that important drivers of suicidal behavior among Yoruba are two related social cognitions indicating that death is preferable to shame, indignity and dishonor, which a highly stigmatizing illness like TB represents.

We also found that suicidal behavior was highest in the age band, 25-34 years. Given the limited literature on suicide in TB, this finding is not far from the male suicide rate in England and Wales [31]; although we did not find any gender variability in our sample. Nevertheless, this seems a paradox to well documented evidence that the suicide rate increases with age [32]. In general, age associated trends in suicide rates is different in different countries of the world and there are indications that suicide is increasing in the younger age group to such an extent that they are the highest at - risk population in about one-third of both developed and developing countries [33]. A plausible explanation for our result however is the tendency for MDR TB patients to believe that the treatment of MDR TB would “go on forever”, which could make them abandon all future educational and career aspirations [24].

We also found that depression was associated with suicidality in TB. Depression has been reported to be a strong predictor of suicide [34]. Thus, it is expected that suicidal behavior in patients who had depression in TB will be very high. Also in this study, we found that alcohol and drug use disorders were significantly associated with suicidality. This echoes earlier work that found alcohol use disorder to be a risk factor for suicide in Tuberculosis [8]. Alcohol is a risk factor for suicide because of its disinhibitory effects. Alcohol also induces a low level of serotonin, which could also trigger impulsive behavior, in this instance suicide [35] and addiction itself can be conceptualized as a form of chronic suicide or deliberate self-harm [36].

Regression analysis: The results of our regression analysis show that extra-pulmonary spread, alcohol or drug use disorders, lung abscess, HIV/AIDS and depression were risk factors for

moderate/high suicidality. These findings indicate the enormity of the medical burden of MDR-TB, which poses huge economic and societal implications. These findings suggest that early intervention that focuses on prevention of complications such as extra-pulmonary spread, lung abscess, alcohol and drug use prevention programs as well as screening for depression are potential ways of preventing suicidal behavior in MDR-TB patients.

Our findings, underscore the need for suicide prevention programs for patients with tuberculosis. These patients require to be followed up after the completion of their treatment for tuberculosis, as five of the patients reported in the current study completed their suicide after discharge from the hospital during the continuation phase of their treatment. Thus, suicide prevention strategies must focus on the patients and the potential site of the suicide. Beyond this, interpersonal factors and social contexts that create suicidal behavior require attention. Attention must also be given to the age band, perhaps early middle years, and the age group with the greatest overall burden [37].

A significant public health approach to suicide prevention in TB is early identification, prompt and proper treatment of pulmonary TB as well as medication adherence. These measures are salient in the prevention of spread and chronic course of the disease. One of the measures that have been reported to target adequate treatment and medication adherence include the Directly Observed Therapy Short Course (DOTS) [38], the DOTS approach being practiced in Nigeria.

Furthermore, addressing psychosocial issues has been reported to be successful in ameliorating suicidal phenomenon in a low- resource environment among MDR TB patients [24]. Although, to the knowledge of the authors, not currently existing in Nigeria, the “gatekeeper training program”, which teaches community members to understand suicidal behavior and symptoms of severe depression with heightened risk for suicide [39], is also a feasible approach in our setting. These programs can take advantage of the high level of social support within the culture [40].

A suicidal ideation rate of 3.5% and the suicidal attempt rate of 0.9% among the caregivers is important epidemiological information. This is relevant considering that the suicide rate in adult Nigerian population has been estimated as 3.1% and attempt as 0.7% [36]. Thus, suicide prevention programs should be extended to the caregivers. This is very relevant, given reports that 13.4% of caregivers of patients with MDR-TB have depression [5] and 2.7% of them have psychosis [14].

This study has a number of limitations. This study was carried out in one study center, therefore, findings may not be generalizable to other multidrug resistant tuberculosis treatment facilities in Nigeria or elsewhere or other non- multidrug resistant tuberculosis treatment centers. We also did not take into consideration, adverse drug reaction as a potential cause of suicidal behavior.

An important strength of this study is the use of a structured instrument, the MINI in exploring suicidal behavior in our sample. The MINI in its short form was found to be easy to administer, with the added advantage of usefulness in a busy clinical setting, in this case, among our subjects. Also, this

study chose family contacts as controls to account for shared biological and environmental factors. Thus, our estimates of suicidality are not “mere estimates”.

In conclusion, the rate of suicide in MDR-TB, according to this report is very high. Our findings, therefore, underscore the need for suicide prevention programs for patients with tuberculosis.

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Conflict of Interest

Nil

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REFERENCES

- World Health O. Global Tuberculosis Report 2015 2015 [updated 2015 2015/11/08/13:04:07]. Available from: http://www.who.int/tb/publications/global_report/en/.
- National Population Commission of N. National Population Facts and Figures 2003 [updated 2003]. Available from: www.population.gov.ng/index.php.htm.
- Organization. Compendium of Indicators for Monitoring and Evaluating National Tuberculosis Programs. 2004.
- Lasebikan VO, Ige OM. Prevalence of psychosis in tuberculosis patients and their nontuberculosis family contacts in a multidrug treatment-resistant treatment center in Nigeria. *Gen Hosp Psychiatry*. 2015.
- Ige OM, Lasebikan VO. Prevalence of depression in tuberculosis patients in comparison with non-tuberculosis family contacts visiting the DOTS clinic in a Nigerian tertiary care hospital and its correlation with disease pattern. *Ment Health Fam Med*. 2011; 8: 235-241.
- Tanrikulu AC, Hosoglu S, Ozekinci T, Abakay A, Gurkan F. Risk factors for drug resistant tuberculosis in southeast Turkey. *Tropical doctor*. 2008; 38: 91-93.
- Rajeswari R, Muniyandi M, Balasubramanian R, Narayanan PR. Perceptions of tuberculosis patients about their physical, mental and social well-being: a field report from south India. *Soc Sci Med*. 2005; 60: 1845-1853.
- Peltzer K, Louw J. Prevalence of suicidal behaviour & associated factors among tuberculosis patients in public primary care in South Africa. *The Indian journal of medical research*. 2013; 138: 194-200.
- Marais BJ, Lonnroth K, Lawn SD, Migliori GB, Mwaba P, et al. Tuberculosis comorbidity with communicable and non-communicable diseases: integrating health services and control efforts. *The Lancet Infectious Diseases*. 2013; 13: 436-448.
- Chikezie UE, Otakpor AN, Kuteyi OB, James BO. Suicidality among individuals with HIV/AIDS in Benin City, Nigeria: a case-control study. *AIDS Care*. 2012; 24: 843-845.
- Becerra MC, Pachao-Torreblanca IF, Bayona J, Celi R, Shin SS, et al. Expanding tuberculosis case detection by screening household contacts. *Public Health Rep*. 2005; 120: 271-277.
- Sweetland A, Albújar JA, Echevarria DG. Enhancing Adherence. In: Cohen A, Kleinman A, Saraceno B, editors. *World Mental Health Casebook: Springer US* 2002; 51-79.
- Lamar JE, Malakooti MA. Tuberculosis outbreak investigation of a U.S. Navy amphibious ship crew and the Marine expeditionary unit aboard, 1998. *Mil Med*. 2003; 168: 523-527.
- Xavier PB, Peixoto B. Emotional distress in Angolan patients with several types of tuberculosis. *African Health Sciences*. 2015;15(2):378-384.
- Deribew A, Tesfaye M, Hailmichael Y, Apers L, Abebe G, et al. Common mental disorders in TB/HIV co-infected patients in Ethiopia. *BMC Infectious Diseases*. 2010; 10: 201.
- Sheehan DV, Lecrubier Y, Sheehan KH, Janavs J, Weiller E, et al. The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *Eur Psychiatry*. 1997; 12: 232-241.
- Adewuya AO. Prevalence of major depressive disorder in Nigerian college students with alcohol-related problems. *Gen Hosp Psychiatry*. 2006; 28: 169-173.
- Adewuya AO, Afolabi MO, Ola BA, Ogundele OA, Ajibare AO, et al. Relationship between depression and quality of life in persons with HIV infection in Nigeria. *Int J Psychiatry Med*. 2008; 38: 43-51.
- Adewuya AO, Ola BA, Aloba OO, Mapayi BM. Anxiety disorders among Nigerian women in late pregnancy: a controlled study. *Arch Womens Ment Health*. 2006; 9: 325-328.
- World Health O. Multidrug and Extensively Drug-Resistant Tb. 2010.
- National Tuberculosis Programme and WHO guide lines. Available from: http://whqlibdoc.who.int/publications/2010/9789241547833_eng.pdf.
- Lee EJ, Lee SY, In KH, Yoo SH, Choi EJ, et al. Routine Pulmonary Function Test Can Estimate the Extent of Tuberculous Destroyed Lung. *The Scientific World Journal*. 2012; 2012: 5.
- Stenager E, Stenager E. Somatic diseases and suicidal behaviour. In: Wasserman D, Wasserman C, editors. *Oxford Textbook of Suicidology and Suicide Prevention: Oxford University Press*; 2009; 294-300.
- Acha J, Sweetland A, Guerra D, Chalco K, Castillo H, et al. Psychosocial support groups for patients with multidrug-resistant tuberculosis: five years of experience. *Glob Public Health*. 2007; 2: 404-417.
- Conwell Y, Lyness JM, Duberstein P, Cox C, Seidlitz L, et al. Completed suicide among older patients in primary care practices: a controlled study. *J Am Geriatr Soc*. 2000; 48: 23-29.
- Treharne GJ, Lyons AC, Kitas GD. Suicidal ideation in patients with rheumatoid arthritis. Research may help identify patients at high risk. *BMJ*. 2000; 321: 1290.

27. Fishbain DA. The association of chronic pain and suicide. *Seminars in Clinical Neuropsychiatry*. 1999; 4: 221-227.
28. Odejide AO, Williams AO, Ohaeri JU, Ikuesan BA. The epidemiology of deliberate self-harm. The Ibadan experience. *The British Journal of Psychiatry*. 1986; 149: 734-737.
29. Asuni T. Suicide in Western Nigeria. *British Medical Journal*. 1962; 2: 1091-1097.
30. Atilola O, Ayinde O. A cultural look on suicide: the Yorùbá as a paradigmatic example. *Mental Health, Religion & Culture*. 2015; 18: 456-469.
31. McClure GM. Changes in suicide in England and Wales, 1960-1997. *Br J Psychiatry*. 2000; 176: 64-67.
32. Shah A. The relationship between suicide rates and age: an analysis of multinational data from the World Health Organization. *Int Psychogeriatr*. 2007; 19: 1141-1152.
33. Pompili M, Serafini G, Innamorati M, Dominici G, Ferracuti S, et al. Suicidal behavior and alcohol abuse. *Int J Environ Res Public Health*. 2010; 7: 1392-1431.
34. Gureje O, Kola L, Afolabi E. Epidemiology of major depressive disorder in elderly Nigerians in the Ibadan Study of Ageing: a community-based survey. *Lancet*. 2007; 370: 957-964.
35. Kamali M, Oquendo MA, Mann JJ. Understanding the neurobiology of suicidal behavior. *Depress Anxiety*. 2001; 14: 164-176.
36. Menninger KA. Man against himself. 1938.
37. Caine ED. Forging an agenda for suicide prevention in the United States. *Am J Public Health*. 2013; 103: 822-829.
38. Kochi A. Tuberculosis control--is DOTS the health breakthrough of the 1990s? *World Health Forum*. 1997; 18: 225-232.
39. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, et al. Suicide prevention strategies: a systematic review. *JAMA*. 2005; 294: 2064-2074.
40. Lasebikan VO, Owoaje ET, Asuzu MC. Social network as a determinant of pathway to mental health service utilization among psychotic patients in a Nigerian hospital. *Ann Afr Med*. 2012; 11: 12-20.

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