Original Article

Prevalence and Predictors of Depression among Tuberculosis Patients in Kano, North-West Nigeria

Taiwo Gboluwaga Amole[1,2], Abdulrasheed Hassan Yusuf[1], Auwal Sani Salihu[2,3], Fatima Ismail Tsiga-Ahmed[1]

Departments of [1]Community Medicine and [3]Psychiatry, Aminu Kano Teaching Hospital/Bayero University Kano, [2]Africa Center of Excellence for Population Health and Policy, Bayero University Kano, Kano, Nigeria

Abstract

Background: The magnitude of depression as comorbidity militating against a positive outcome in the management of tuberculosis (TB) patients in northern Nigeria is largely unknown. This study assessed the magnitude of depression and its predictors among TB patients in Kano metropolis, northern Nigeria. **Materials and Methods:** A cross-section of 325 TB patients attending directly observed treatment, short-course (DOTS) clinics in Kano metropolis were studied using a pro forma and the Patient Health Questionnaire-9, which obtained information on depression. Data were analyzed using SPSS v. 21.0. **Results:** Among the 325 respondents, the prevalence of depression was 48.6% (n = 158). Of those who were depressed, the majority had the mild form (n = 120; 75.9%). The predictors of depression were: the age group <30 years, (adjusted odds ratio [aOR] = 0.33, 95% confidence interval [CI] = 0.14–0.85), being HIV negative (aOR = 0.34, 95% CI = 0.15–0.64), persistence of TB symptoms (aOR = 3.58, 95% CI = 1.92–6.90), presence of side effects of anti-TB drugs (aOR = 2.11, 95% CI = 1.46–5.99), and smoking cigarette (aOR = 3.49, 95% CI = 1.22–9.81). **Conclusion:** The prevalence of comorbid depression among TB patients is high. Achieving cure and preventing undesirable treatment outcomes in this region would involve a holistic approach that considers the interplay of patient's behavioral, social, and medical factors.

Keywords: Depression, patients, predictors, prevalence, tuberculosis

Introduction

Globally, tuberculosis (TB) remains one of the leading causes of mortality due to infectious diseases.[1,2] In 2018, a total of 1.5 million people died from TB and eight countries accounted for two-thirds of the new cases; India was first followed by China, Indonesia, the Philippines, Nigeria, Bangladesh, and South Africa.[2] Although TB is curable requiring a daily combination chemotherapy for at least 6 months, its management is often affected by comorbid or other underlying factors. These factors contribute to the TB burden and range from the presence of other diseases to social determinants of health.[3] The global burden of TB remains enormous mainly because of poor control in South-Eastern Asia, Sub-Saharan Africa, and Western Pacific, the emergence of multidrug-resistant TB (MDR-TB) and the high rates of TB/HIV co-infection in some African countries.[2,4] Although some progress has been made in TB control, the burden of HIV/AIDS and the emergence of MDR-TB, pose some form of treatment challenge as these may decrease compliance and increase the probability of depression occurring as comorbidity among TB patients.[5,6]

Unfortunately, TB often affects vulnerable groups such as the poor, malnourished, and immuno-compromised, especially those with HIV/AIDS, among whom it remains the leading killer disease.[2] Nigeria has a high prevalence of TB and ranks 6th among the 30 TB high-burden countries in the world that accounted for up to 87% of the global new TB cases in 2018.[2] Studies have shown that chronic diseases such as TB, HIV/AIDS, diabetes mellitus, and hypertension often coexist with psychiatric illnesses such as depression,

Address for correspondence: Dr. Taiwo Gboluwaga Amole, Department of Community Medicine Aminu Teaching Hospital/ Bayero University Kano and Africa Center of Excellence for Population Health and Policy, Bayero University Kano, Kano, Nigeria.
E-mail: tgamole.cmed@buk.edu.ng

Access this article online

Quick Response Code:

Website: www.njmonline.org

DOI: 10.4103/NJM.NJM_9_20

How to cite this article: Amole TG, Yusuf AH, Salihu A, Tsiga-Ahmed FI. Prevalence and predictors of depression among tuberculosis patients in Kano, North-West Nigeria. Niger J Med 2020;29:369-76.

Submitted: 18-Feb-2020 **Revised:** 29-Mar-2020
Accepted: 19-Jun-2020 **Published:** 18-Sep-2020

oftentimes requiring frequent hospitalizations and posing a great challenge to patient care.[7,8] In Nigeria, the effect of depression on TB can be potentiated among groups of people with a vulnerability background of poverty, depressed immunity, diseases that require chronic management as well as other health determinants.

The prevalence of depression and anxiety disorders among patients with TB is estimated to range between 40% and 70%.[7] Studies carried out in different parts of the world on the prevalence of depression among TB patients showed a lower prevalence (26.3%) in India;[9] a comparable proportion in Nigeria (45.5%)[8] and Ethiopia (51.9%);[5] and a higher prevalence rate of 80% in Pakistan.[10] Although the actual cause of the depression occurring as comorbidity remains unclear, the presence of chronic unexplainable pain, frequent hospital admissions, hospital dependency, stigmatization, drug resistance and chronic drug use are believed to be some of the factors associated.[3,5,6]

This study sought to determine the prevalence and determinants of depression among TB patients in hospitals in Kano. Findings from this study will be useful for health-care providers in seeing the necessity of early detection and treatment of depression, thereby improving TB treatment outcomes.

Materials and Methods

Study setting

This study was conducted in three hospitals located within Kano metropolis, namely, Aminu Kano Teaching Hospital (AKTH), Murtala Mohammed Specialist Hospital (MMSH), and Infectious Disease Hospital (IDH).

AKTH is a tertiary health institution supervised by the Federal Ministry of Health Abuja, Nigeria. It provides specialist and general curative medical services, as well as serving as a referral center for various peripheral hospitals within Kano and its neighboring states. The hospital has 500 beds capacity with various clinical departments. The DOTS clinic of AKTH commenced in June 2007, and it serves as a tertiary referral center for patients from Tarauni and surrounding local government areas (districts). Activities in the clinic are coordinated by 2 consultants (Health Specialist), 1 nurse, 3 Community Health Extension Workers (CHEWs), record staff, pharmacist, acid-fast bacilli microscopist, and laboratory assistants. Complicated cases are referred to the Respiratory Unit of the teaching hospital.

MMSH, Kano is a secondary health facility that was established in 1926 in the core Kano city and is one of the oldest and largest hospitals in Nigeria. The hospital became a specialist hospital in the year 1997. The hospital is enclosed within the walls of old Kano city. It is about 200 meters away from the Kofar Mata gate to the east and about 500 m to the west of Emir's palace. The hospital serves both the people within Kano and those from neighboring states such as Jigawa, Katsina, and Zamfara, among others. It also receives patients from neighboring countries such as Niger and Mali republics. It has 20 departments and a bed capacity of about 250. The DOTS clinic of the hospital is located within the hospital close to the accident and emergency unit, and an average of 25 TB patients are seen daily. Patients that require special attention, for example, those with adverse drug reactions, are referred to the pulmonology unit of the hospital.

IDH is also a secondary health facility designated by the state government to treat and manage infectious diseases. The hospital is located in Fagge Local Government area along France road about 300 m from Fagge central mosque. The hospital receives patients from Northern Nigeria and neighboring countries such as Niger and Cameroon. It serves as a referral center in the management of TB and HIV/AIDS patients. All TB and HIV/AIDS-related medical care are provided free of charge to the patients. The hospital has a chest clinic that runs every day and receives an average of 100 patients per day. There are wards for in-patients admission, laboratory services, HIV counseling and testing, and TB and HIV collaborative activities.

Study participants

The study population comprised TB patients who were 10 years old and above and attending the DOTS clinic in AKTH, MMSH, and IDH. Patients who were enrolled in the DOTS clinic of any of the three hospitals had commenced anti TB medications for at least 2 weeks, were not acutely ill, and assented or consented to participate were included in the study.

Study design and methods

The study was a cross-sectional descriptive study. A sample size of 308 was estimated using the following: 95% confidence level, 5% precision, and the prevalence of depression among TB patients obtained in a previous study.[11] The estimated sample size was inflated by 10% to adjust for nonresponse to arrive at a minimum sample of the patients to participate in this study. These subjects were selected using a multistage sampling technique. In Stage 1, the three hospitals with the largest number of patients in their DOTS clinic in Kano metropolis were selected purposively to give a wide representation of patients in the environs and those referred from other clinics. In Stage 2, a systematic sampling technique was used to select patients from each of the three hospitals. The average monthly attendance at the DOTS clinic of AKTH, MMSH, and IDH was estimated using the clinic record and estimated to be 200, 400, and 240, respectively. Proportionate allocation of patients was done, and 81, 162, and 97 patients were selected from AKTH, MMSH, and IDH, respectively. Subsequently, the sampling fraction and interval were calculated. The first patient for each day in each of the institutions was selected by simple random sampling, and every subsequent n^{th} patient selected. Eligible patients were recruited until the sample size was achieved.

Study instrument and data collection

Data were collected using two tools: both were structured and self-administered questionnaires. The first one was designed to elicit responses on sociodemographic and clinical characteristics of respondents, whereas the second

tool was the nine-item tool for screening for depression; Patient Health Questionnaire (PHQ-9).[12] The tools elicited information on the prevalence, pattern, and determinants of depression among TB patients. The tool was also translated into Hausa language and back-translated by another person to ensure the accuracy of translation and information obtained. Trained research assistants administered the "Hausa version" of the questionnaire to non-literate patients. Data were analyzed using SPSS version. 21.0 software (Armonk, NY: IBM Corp). Quantitative variables were summarized using mean and standard deviation, whereas qualitative variables were summarized using frequencies and percentages. Factors associated with depression were determined using the Chi-square test, and predictors identified using logistic regression analysis. A value of $P < 0.05$ was considered statistically significant.

Ethical consideration

All participants were given information about the research, its objectives and potential benefits. Respondents <18 years signed assent forms, caregivers and other adult respondents signed consent forms and non-literate respondents appended their thumbprints to the forms. Participation for all was voluntary and nonparticipation did not affect the care given. They were assured of confidentiality and were free to withdraw from the study at any stage of the questionnaire administration. Ethical clearance was obtained from the Research and Ethics Committee of AKTH.

Results

Of the 340 questionnaires administered, 325 were completed giving a response rate of 95.6%. The age of the respondents ranged from 11 to 101 years, with a mean of 40.99 ± 22.06 years. Majority were of the Islamic faith (*n* = 295; 90.8%), were Hausa (*n* = 245; 75.4%); with more than half being males (*n* = 192; 59.1%) and married (*n* = 179; 55.1%) [Table 1].

Majority (*n* = 278; 85.5%) of the respondents were on treatment for pulmonary TB and a few for other forms of TB which included TB spine (*n* = 15; 4.6%), TB adenitis (*n* = 20; 6.2%), TB abdomen (*n* = 7; 2.2%), and disseminated TB (*n* = 3; 0.9%). Slightly more than half (*n* = 169; 52.0%) were in the intensive phase of treatment and the others (48%) in the continuation phase. About a quarter (*n* = 76; 23.4%) were retroviral positive, more than a third (*n* = 121; 37.2%) had persistence of some of the TB symptoms, of which majority had cough (64.8%) and another third (*n* = 105; 32.3%) had at one time or the other experienced side effects of the anti-TB medications. About a quarter (*n* = 81; 24.9%) were on other medications apart from the anti-TB drugs. Of those taking other drugs, most of them were on anti-retroviral drugs (48.1%), 17.3% on anti-hypertensive, 6.2% on anti-diabetic, and 9.9% on contraceptive agents. The social habits of the respondents included smoking (*n* = 33; 10.2%) and alcohol consumption (*n* = 11; 3.4%) [Table 2].

Table 1: Sociodemographic characteristics of respondents

Characteristic	Frequency (*n* = 325), *n* (%)
Age group (years)	
10-19	56 (17.2)
20-29	67 (20.6)
30-39	53 (16.3)
40-49	55 (16.9)
50-59	23 (7.1)
≥60	71 (21.8)
Gender	
Male	192 (59.1)
Female	133 (40.9)
Ethnicity	
Hausa/Fulani	274 (84.3)
Others*	51 (15.7)
Religion	
Islam	295 (90.8)
Christianity	30 (9.2)
Marital status	
Married	179 (55.1)
Single	98 (30.2)
Widowed/divorced	48 (14.8)
Educational Qualification	
None	19 (5.8)
Qur'anic	95 (29.2)
Primary	53 (16.3)
Tertiary	40 (12.3)
Main occupation	
Trader/businessman	91 (28.0)
House wife	45 (13.8)
Tailoring	26 (8.0)
Schooling	51 (15.7)
Civil service	34 (10.5)
Unemployed	41 (12.6)
Others	37 (11.4)
Estimated monthly income (₦)	
No income	100 (30.8)
<10,000	89 (27.4)
10,001-20,000	48 (14.8)
20,001-30,000	38 (11.7)
30,001--40,000	14 (4.3)
40,001-50,000	19 (5.8)
Above 50,000	17 (5.2)
Cigarette smoking status	
Yes	33 (10.2)
No	292 (89.8)
Alcohol consumption status	
Yes	11 (3.4)
No	314 (96.6)

*Others: Yoruba, Igbo, Idoma, Nupe, Igbira

Prevalence of depression

Almost half (*n* = 158; 48.6%) of the respondents had depression as a comorbidity [Figure 1]. Of these, the PHQ-9 score ranged from 5 to 19, and majority (*n* = 120; 75.9%) had the mild form, few (*n* = 6; 3.8%) had the moderately severe form, and none had severe depression [Table 3].

Factors associated with depression

At bivariate level, depression was significantly associated with

Table 2: Clinical characteristics of respondents

Characteristic	Frequency (*n*=325), *n* (%)
Type of tuberculosis	
PTB	278 (85.5)
TB spine	15 (4.6)
TB lymph node	20 (6.2)
TB abdomen	7 (2.2)
Disseminated TB	3 (0.9)
Others	2 (0.6)
Phase of TB treatment	
Intensive	169 (52.0)
Continuation	156 (48.0)
HIV status	
Positive	76 (23.4)
Negative	248 (76.6)
Persistence of TB symptoms	
Yes	121 (37.2)
No	204 (62.8)
Experienced side effects of anti-TB medication	
Yes	105 (32.3)
No	220 (67.7)
Usage of other medications other than anti-TB	
Yes	81 (24.9)
No	244 (75.1)
Registration group	
New case	272 (83.7)
Return after default	31 (9.5)
Failure of treatment	21 (6.5)
Transfer-in	1 (0.3)

TB: Tuberculosis, PTB: Pulmonary tuberculosis

Table 3: Pattern of depression among the respondents

Depression status	PHQ-9 score	Frequency (*n*=158), *n* (%)
Mild depression	5-9	120 (75.9)
Moderate depression	10-14	32 (20.3)
Moderately severe depression	15-19	6 (3.8)
Severe depression	20-27	0 (0.0)

PHQ: Patient Health Questionnaire

older age (≥60 years) (Chi-square test [χ^2] = 18.4; P = 0.001); being widowed or divorced (χ^2 = 15.7; P = 0.0001); having primary or informal education (χ^2 = 16.3; P = 0.003); and smoking cigarette (χ^2 = 6.5; P = 0.01) [Table 4]. Respondents' clinical characteristics associated with depression included: having extrapulmonary TB (χ^2 = 8.34; P = 0.004); being HIV positive (χ^2 = 27.6; P = 0.0001); having persistence of TB symptoms (χ^2 = 28.3; P = 0.0001); experiencing side effects of anti-TB drugs (χ^2 = 6.8; P = 0.009); and taking other medications aside anti-TB drugs (χ^2 = 18.2; P = 0.0001) [Table 5]. After adjusting for potential confounders, respondents < 30 years were 67% less likely (adjusted odds ratio [aOR] = 0.33, 95% confidence interval [CI] [0.04–0.89]) to be depressed. Respondents who smoked had more than

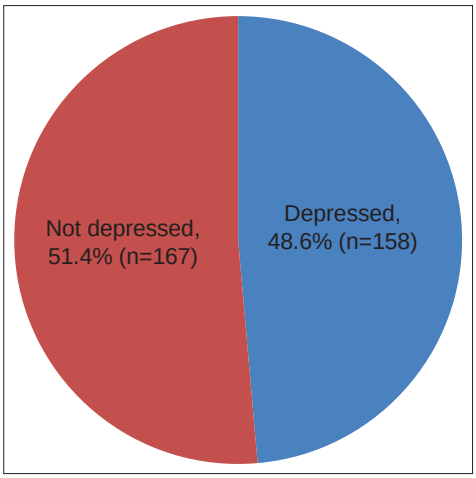

Figure 1: Prevalence of depression among respondents

threefold (aOR = 3.49, 95% CI [1.22–9.81]) the odds of being depressed. Clinical characteristics were also associated with depression. Those who were HIV negative were 66% less likely (aOR = 0.34, 95% CI [0.15–0.64]) to experience depression while those who had the presence of side effects of anti-TB drugs and the persistence of TB symptoms had more than two-fold (aOR = 2.11, 95% CI [1.46–5.99]) and three-fold (aOR = 3.58, 95% CI [1.92–6.90]) the odds of being depressed, respectively [Table 6].

Discussion

This study observed a high prevalence of comorbidity among the TB patients as one in two of them had depression. While the majority had the mild form, which may resolve spontaneously and not require management with anti-depressants, a few with moderate and moderately severe depression would require medication (11.6%, n = 38 patients). The predictors of depression among the patients included sociodemographic (age, cigarette smoking) and clinical characteristics (being HIV positive, experiencing persistence of TB symptoms and side effects of anti-TB drugs).

The additional burden of depression superimposed on chronic diseases such as TB may interfere with the quality of life of such patients. Failure to take medication during TB treatment is a known cause of treatment failure and subsequent development of MDR-TB, which is difficult to treat and often associated with more depression.[6,13,14] This may create a vicious cycle of increasing prevalence and severity of depression if not properly addressed. The patients with moderate and moderately severe depression would require a holistic approach to management as prognosis in them may be poorer if depression remains undiagnosed and untreated. The additional burden of depression can also militate against adherence, limit the chances of curability, and increase the probability of progression to MDR-TB.

At bivariate analysis, this study noted factors that affect social interactions such as old age, being widowed or divorced, low

Table 4: Characteristics associated with depression status of respondents

Characteristic	No depression	Depressed	χ^2	*P*
Age group (years)				
<30	73 (59.3)	50 (40.7)	18.4	0.001
30-39	30 (56.6)	23 (43.4)		
40-49	32 (58.2)	23 (41.8)		
50-59	11 (47.8)	12 (52.2)		
≥60	21 (29.6)	50 (70.4)		
Gender				
Male	106 (55.2)	86 (44.8)	2.8	0.10
Female	61 (45.9)	72 (54.1)		
Ethnicity				
Hausa/Fulani	146 (53.3)	128 (46.7)	2.5	0.11
Others	21 (41.2)	30 (58.8)		
Religion				
Islam	156 (52.9)	139 (47.1)	2.9	0.09
Christianity	11 (36.7)	19 (63.3)		
Marital status				
Married	101 (56.4)	78 (43.6)	15.7	0.0001
Single	54 (55.1)	44 (44.9)		
Widowed/divorced	12 (25.0)	36 (75.0)		
Educational qualification				
None	9 (47.4)	10 (52.6)	16.3	0.003
Qur'anic	39 (41.1)	56 (58.9)		
Primary	20 (37.7)	33 (62.3)		
Secondary	73 (61.9)	45 (38.1)		
Tertiary	26 (65.0)	14 (35.0)		
Occupation				
Employed	96 (51.6)	92 (48.4)	0.02	0.89
Unemployed	71 (57.8)	66 (42.2)		
Income				
No Income	46 (46.0)	54 (54.0)	5.7	0.46
<10,000	50 (56.2)	39 (43.8)		
10,001-20,000	28 (58.3)	20 (41.7)		
20,001-30,000	17 (44.7)	21 (55.3)		
30,001-40,000	5 (35.7)	9 (64.3)		
40,001-50,000	11 (57.9)	8 (42.1)		
Above 50,000	10 (58.8)	7 (41.2)		
Cigarette smoking				
Yes	10 (30.3)	23 (69.7)	6.5	0.01
No	157 (53.8)	135 (46.2)		
Alcohol consumption				
Yes	3 (27.3)	8 (72.7)	2.7	0.10
No	164 (52.2)	150 (47.8)		

or no formal educational training, and cigarette smoking to be significantly associated with depression. So also, clinical characteristics such as having extra-pulmonary TB, reported persistence of TB symptoms, being HIV positive, experience of side effects of anti-TB drugs, and taking medications for other medical conditions were significantly associated with depression among the TB patients. Of the predictors of depression, interestingly, younger respondents were somewhat protected against depression. These young people are characteristically vibrant, energetic, and full of life. The array of interesting activities that they engage in may offer some immediate fun and hope for the future. Some attributes of increasing age such as decreased quality of life from loneliness, unemployment, poverty, presence of comorbidities, and the overall decline in body functions were noted in similar studies conducted in Nigerian University Teaching Hospitals of Ibadan,[8] Ilorin[11] and Enugu;[15] and linked to depression. Similar findings were earlier documented in Greece,[16] India[14] and in South Africa[17] to contribute to depression.

This study noted smoking as a predictor of depression. However, the study did not describe the temporal sequence of depression and cigarette smoking, as smoking is considered

Table 5: Clinical characteristics associated with depression status of respondents

Characteristic	No depression	Depressed	χ^2	*P*
TB type				
Pulmonary	152 (54.7)	126 (45.3)	8.3	0.004
Extra-pulmonary	15 (31.9)	32 (68.1)		
Treatment phase				
Intensive	88 (52.1)	81 (47.9)	0.07	0.80
Continuation	79 (50.6)	77 (49.4)		
HIV status				
Positive	19 (25.0)	57 (75.0)	27.6	0.0001
Negative	148 (59.4)	101 (40.6)		
Persistence of TB symptoms				
Yes	39 (32.2)	82 (67.8)	28.3	0.0001
No	128 (62.7)	76 (37.3)		
Presence of side effects of anti-TB drugs				
Yes	43 (41.0)	62 (59.0)	6.8	0.009
No	124 (56.4)	96 (43.6)		
Intake of other medications				
Yes	25 (30.9)	56 (69.1)	18.2	0.0001
No	142 (58.2)	102 (41.8)		

TB: Tuberculosis

an adaptive mechanism by many depressed individuals.[18,19] Smoking as a risk factor for TB has been documented among patients with mental disorders such as depression.[7]

Clinical characteristics of patients that were related to the disease TB and/or medications as well as other medical conditions such as HIV, also predicted the depression status of the respondents. Those that had TB/HIV co-infection were significantly more depressed than their HIV negative counterparts. This may be attributed to the fact that HIV infection alone carries a huge emotional and clinical burden, let alone when it coexists with another chronic infection such as TB. This result is similar to what was noted in South Africa[17] and in Ethiopia.[20]

Respondents with persistent TB symptoms (cough, night sweat, fever, neck swelling, lower limb weakness, etc.) were significantly more depressed when compared to those who were free of TB symptoms. In general, the persistence of symptoms may suggest to patients that they are not getting cured, are getting worse or failing treatment. The stigmatization that follows the persistence of such symptoms may also worsen a depressive state. This persistence of symptoms being associated with a depressive state was also reported from India[14] and Ilorin, Nigeria.[12] Respondents that had experienced side effects from their anti-TB medications were significantly more depressed than those who did not. The presence of side effects from medications may likely increase the clinical and emotional burden on the already existing disease state and further precipitate depression episodes.

This study compares with other studies. The observed prevalence (48.6%) is higher than what was reported in different parts of Nigeria: Ibadan (45.5%),[8] Enugu (41.9%),[15] and Kwara (27.7%).[11] It is, however, comparable to what was reported in Greece (49.2%)[16] in a study among patients with TB and other chronic pulmonary diseases such as asthma and chronic obstructive pulmonary disease. While the prevalence reported by a study conducted in Romania (38.98%) was lower than what this study noted,[21] others reported prevalence that was slightly higher in Ethiopia (51.9%),[5] and much higher proportions in Pakistan (80%).[10] The pattern of depression found in this study is similar to what was reported in the University of Ilorin Teaching Hospital, in which the majority (77.8%) had mild form, and none had a severe form.[11] Studies in Ethiopia, however, showed a much lower proportion of the patients studied had mild depression (34.2%),[5] and (37.1%).[20] Other studies reported the significant contributions of factors such as gender,[8,16] education,[13,17] occupation,[13,15] and marital status[4,15,17] on depression.

This study is limited as the cultural influences and beliefs may have influenced the responses of the participants hence preventing them from giving candid responses; for example, some respondents might have concealed their depression symptoms due to religious beliefs. Future studies need to follow-up and explore management options with changing mental states of the patients. Health-care givers and managers would need to use innovative approaches to screen and monitor closely patients with social factors or other clinical characteristics that can precipitate or potentiate depression and approach management holistically. Patients with TB who have a greater risk of developing depression (old age, HIV co-infected, with the persistence of TB symptoms or side effects of medications and cigarette smokers) should be screened routinely for depression and referred for further evaluation if there is a need.

Table 6: Logistic regression model for predictors of depression among respondents

Characteristic	Crude OR (95% CI)	Adjusted OR (95% CI)	*P*
Age group (years)			
<30	0.29 (0.15-0.54)	0.33 (0.14-0.85)	0.03
30-39	0.32 (0.15-0.68)	0.50 (0.12-2.06)	0.09
40-49	0.30 (0.14-0.63)	0.41 (0.10-1.75)	0.23
50-59	0.46 (0.17-1.20)	1.59 (0.26-7.05)	0.79
≥60	Referent		
Educational qualification			
None	Referent		
Quranic	1.29 (0.48-3.47)	1.75 (0.35-3.89)	0.75
Primary	1.49 (0.52-4.28)	1.36 (0.57-6.35)	0.59
Secondary	0.55 (0.21-1.47)	0.99 (0.15-2.10)	0.30
Tertiary	0.48 (0.16-1.47)	0.45 (0.39-1.79)	0.18
Marital status			
Married	0.26 (0.13-0.53)	0.39 (0.21-1.29)	0.13
Single	0.27 (0.13-0.58)	1.41 (0.36-7.22)	0.55
Widowed/divorced	Referent		
HIV status			
Positive	Referent		
Negative	0.23 (0.13-0.41)	0.34 (0.15-0.64)	0.001
TB type			
Pulmonary	0.39 (0.20-0.75)	0.66 (0.29-1.53)	0.48
Extrapulmonary	Referent		
Persistence of TB symptoms			
Yes	3.54 (2.20-5.70)	3.58 (1.92-6.90)	0.0001
No	Referent		
Presence of side effects of anti-TB drugs			
Yes	1.86 (1.16-2.98)	2.11 (1.46-5.99)	0.001
No	Referent		
Intake of other medications			
Yes	3.12 (1.83-5.33)	0.81 (0.39-2.01)	0.70
No	Referent		
Cigarette smoking			
Yes	2.67 (1.23-5.82)	3.49 (1.22-9.81)	0.03
No	Referent		

TB: Tuberculosis, CI: Confidence interval, OR: Odds ratio

Conclusion

Depression as a comorbidity is prevalent among TB patients. This study highlights the importance of screening 'at risk' TB patients for depression. This will positively enhance case management and prevent complications.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Stop TB Partnership. The Paradigm Shift: 2016-2020. The Global Plan to End TB. Geneva; 2015. Available from: http://www.stoptb.org/assets/documents/global/plan/GlobalPlanToEndTB_TheParadigmShift_2016-2020_StopTBPartnership.pdf. [Last accessed on 2019 Jun 11].
2. World Health Organization. Tuberculosis; 2019. Available from: https://www.who.int/news-room/fact-sheets/detail/tuberculosis. [Last accessed on 2020 Jan 04].
3. World Health Organization. TB Comorbidities and Risk Factors; 2019. Available from: https://www.who.int/tb/areas-of-work/treatment/risk-factors/en/. [Last accessed on 2020 Jan 04].
4. GBD Tuberculosis Collaborators. Global, Regional, and national burden of tuberculosis, 1990–2016: Results from the global burden of diseases, injuries, and risk factors 2016. Lancet Infect Dis 2018;18:1329-49.
5. Dasa TT, Roba AA, Weldegebreal F, Mesfin F, Asfaw A, Mitiku H, *et al*. Prevalence and associated factors of depression among tuberculosis patients in Eastern Ethiopia. BMC Psychiatry 2019;19:82.
6. Jawad K, Mehreen S, Haq ZU, Amin M, Iqbal Z, Yousaf M. The frequency of depression in the treatment of multi drug resistant tuberculosis. Pak J Chest Med 2017;23:134-8.
7. World Health Organization. Tuberculosis. 2017. Available from: https://www.who.int/tb/features_archive/whd2017_TB/en/. [Last accessed on 2019 Sep 13].
8. 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;8:235-41.
9. Salodia UP, Sethi S, Khokhar A. Depression among tuberculosis patients attending a DOTS centre in a rural area of Delhi: A cross-sectional study.

Indian J Public Health 2019;63:39-43.
10. Sulehri MA, Dogar IA, Sohail H, Mehdi Z, Azam M, Niaz O, *et al*. Prevalence of depression among tuberculosis patients. APMC 2010;4:133-7.
11. Issa BA, Yussuf AD, Kuranga SI. Depression comorbidity among patients with tuberculosis in a university teaching hospital outpatient clinic in Nigeria. Ment Health Fam Med 2009;6:133-8.
12. Kroenke K, Spitzer RL. The PHQ-9: A new depression diagnostic and severity measure. Psychiatr Ann 2002;32:509-21.
13. Panchal SL. Correlation with duration and depression in TB patients in rural Jaipur district. Int J Pharma Bio Sci 2001;2:263-6.
14. Revised National Tuberculosis Control Programme DOTS-plus guidelines. Central TB Division, Directorate General of Health Services. New Delhi, India: Ministry of Health and Family Welfare, Nirman Bhavan; 2010.
15. Aniebue PN, Okonkwo KO. Prevalence of depressive symptoms amongst TB patients at University of Nigeria Teaching Hospital, Enugu. J Coll Med 2006;11:120-4.
16. Moussas G, Tselebis A, Karkanis A, Stamouli D, Ilias I, Bratis D, *et al*. A comparative study of anxiety and depression in patients with bronchial asthma, COPD, and TB in a general hospital of chest diseases. Ann Gen Psychiatry 2008;7:7.
17. Peltzer K, Naido P, Matseke G, Julia L, Gugu M, Bomkazi T. Prevalence of psychological distress and associated factors in TB patients in public primary care clinics in South Africa. BMC Psychiatry 2012;12:89.
18. Michael W, Rebecca C. Smoking and depression perpetuate one another. J Consult Clin Psychol 2001;32:464.
19. Murphy JM. Cigarette smoking in relation to depression: Historical trends from the stirling country study. Am J Psychiatry 2003;160:1663-9.
20. Deribew A, Tesfaye M, Hailmichael Y, Apers L, Abebe G, Duchateau L, *et al*. Common mental disorders in TB/HIV co-infected patients in Ethiopia. BMC Infect Dis 2010;10:201.
21. Adina MM, Necrelescu OL, Bondor C, Tronfor A, Alexandrescu D, Dentes E. Depressive syndrome, anxiety and illness perception in tuberculosis patients. Recent Res Modern Med 2010. Available from: http://www.wseas.us/e-library/conferences/2011/Cambridge/MEDICAL/MEDICAL-28.pdf. [Last accessed on 2019 Dec 02].