Clinical correlates, Psychiatric morbidity and Quality of Life in patients of Pulmonary Tuberculosis: A cross-sectional study from a tertiary care hospital in rural North India.

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Abstract

Background: Tuberculosis is the leading cause of infectious death in India and has multidimensional ramifications on an individual. Prevalence of psychiatric morbidity is high in Tuberculosis and is often neglected. Untreated psychiatric morbidity can adversely affect the treatment compliance, long term outcome and Quality of Life of such patients.

Aims & Objectives: To determine the prevalence of psychiatric morbidity, its impact on Quality of Life in patients of pulmonary TB and study the relationship between psychiatric morbidity with its clinical correlates.

Material & Methods: This was a cross sectional study conducted at a tertiary care hospital among 100 patients of Pulmonary Tuberculosis attending the OPD of Respiratory Medicine between Jan 2021 to Jan 2022, using a semi structured proforma and International Classification of Disease (ICD)-10 criteria were used to confirm the diagnosis. Rating scales such as Hamilton Anxiety Rating Scale (HAM-A), Hamilton Depression Rating Scale (HAM-D) were used to assess the severity of anxiety and depression respectively. WHO- QOL BREF - World Health Organization- Quality of life Scale was used to assess the quality of life of patient. Data was analysed using Microsoft SPSS 20.00 Version.

Results: The prevalence of Major Depressive Disorder accounted for 42% and Generalised Anxiety Disorder constituted 30% of the TB patients. Among socio-demographic variables, there was positive statistical association of Depression with unemployment, unmarried marital status and Muslim religion. Among clinical variables presence of medical comorbidity, sputum positivity, dyspnoea, past history of tuberculosis and substance abuse showed positive association with psychiatric morbidity. All the domains (Physical, Psychological, Environmental, Social) had better QoL scores in TB cases without psychiatric morbidity and this difference was found to be statistically significant.

Conclusions: Psychiatric morbidity has very high prevalence in patients of pulmonary tuberculosis. Thorough evaluation and management of psychiatric morbidity and strengthening of consultation-liaison services can improve the treatment adherence, long term outcome and overall quality of life of patients suffering from tuberculosis.

Key words: Psychiatric morbidity, Pulmonary Tuberculosis, Quality of Life

Introduction

Tuberculosis (TB) is a chronic infectious disease which afflicts multiple systems of the body (it can be pulmonary, extra-pulmonary or miliary TB) and is caused by Mycobacterium tuberculosis, an aerobic non-motile bacillus. Among chronic infectious diseases, Tuberculosis is one of the important causes of morbidity and mortality worldwide[1].

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South-East Asian countries including India accounts for the major global burden of tuberculosis[2]. Since time immemorial, tuberculosis has evoked plethora of emotions among public, notably apprehensions and anxiety regarding its course and outcome. Lots of myths and stigma surrounds tuberculosis in rural India, despite advancement in its treatment.

Mental illness has very intricate relationship with chronic physical diseases as their presence can significantly affect the compliance, quality of life and long-term outcome of the chronic physical disease[3,4]. High prevalence of psychiatric morbidity, especially depression and anxiety has been noted in patients of pulmonary tuberculosis[5-7]. Multiple complex mechanisms can be attributed to development of psychiatric morbidity in tuberculosis like stigma, prejudice and discrimination faced by such patients. Moreover, financial burden, social isolation and side effects of ATT (Anti tubercular treatment) further compounds the depression and anxiety in such patients[8-10]. This adversely affects multiple domains of patient's life like psychological, financial and social[11]. Hence, apart from routine clinical evaluation of such patients, thorough assessment of psychiatric morbidity and quality of life is the need of the hour. Only handful of studies have been published, reporting the relationship between tuberculosis and psychiatric morbidities and its impact on quality of life from rural India. Therefore, this study was carried out to study the prevalence of psychiatric morbidity and quality of life in patients of pulmonary tuberculosis attending tertiary care centre in rural North India.

Materials & Methods

Our study was a descriptive cross-sectional study which was conducted in the Department of Respiratory medicine in collaboration with Department of Psychiatry, in a tertiary care teaching hospital in rural North India over a period of 1 year from Jan 2021 to Jan 2022. The study group consisted of 100 patients diagnosed with pulmonary tuberculosis presenting to the Department of Respiratory Medicine.

A semi structured proforma was used to collect socio-demographic details like (Name, age, sex, marital status, education) and clinical details (sputum positivity, duration of illness, grades of dyspnoea, H/O default, relapse or failure, presence of medical comorbidity). All the patients diagnosed with pulmonary tuberculosis, underwent detailed psychiatric assessment by a consultant psychiatrist. ICD-10 (International classification of diseases) criteria were used to make psychiatric diagnoses and it was clinically confirmed by psychiatrists.

Hamilton Depression Rating Scale (HDRS) was used to assess and rate the severity of depressive symptoms. It is a popular scale containing 21 items related to symptoms of depression. Score is calculated from first 17 items. Interpretation is; 0-7=Normal; 8-13=Mild Depression; 14-18=Moderate Depression; 19- 22=Severe Depression and >23=Very Severe Depression. It has sensitivity of 86.4% and specificity of 92.2% and has good internal, inter-rater, and retest reliability[12].

Hamilton Anxiety Rating Scale (HARS) was used to assess and rate the symptoms of anxiety. It consists of 14 items which measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0-56, where <17 indicates mild severity, 18-24 indicates mild to moderate and 25-30 indicates severe symptoms of Anxiety. It has sensitivity of 85.7% and specificity of 63.5% and has good reliability and validity[13].

WHO-QOL BREF - World Health Organization- Quality of life Scale (Brief Indian Version) in the present study, WHO QoL (BREF) was used to assess the impact of TB on the QoL. It is a 26-item scale designed by WHO. It has four domains viz: physical health, psychological health, social relationships, environment[14].

Inclusion Criteria

Patients were selected based on the basis of the following criteria:

1. Inpatients and Outpatients who are confirmed cases of TB based on sputum analysis for Acid Fast Bacilli and chest X - ray.

2. Age: 20 to 65 years.

3. Sex: Both male and female.

4. Patients who gave consent to participate in the study.

Exclusion Criteria

Patients were excluded based on the basis of the following criteria:

1. Patients with previous history of any psychiatric illness before developing tuberculosis.

2. Multi drug resistant TB.

3. Extra pulmonary tuberculosis, especially CNS involvement are often very sick (Focal neurological deficits, altered sensorium, behavioural changes).

Statistical Analysis

Statistical analysis was done using SPSS software, to determine the association between psychiatric comorbidity and different sociodemographic and clinical correlates. Chi-squared test and Fisher's exact

probability test were used for the analysis. P value was taken to be significant if it was <0.05. Independent t-test was used to compare between mean scores of groups for assessment of quality of life.

Observation and results

Table No: 1 (Presence/Absence of psychiatric morbidity)

Psychiatric Morbidity	Frequency	Percentage
Depression	42	42%
Anxiety	30	30%

Table No: 2 (Hamilton Depression Rating Scale)

Scoring	Frequency	Percentage
Mild (8-13)	12	28.57%
Moderate (14-18)	15	35.71%
Severe (19-22)	10	23.80%
Very Severe (>23)	5	11.90%

Table No: 3 (Hamilton Anxiety Rating Scale)

Scoring	Frequency	Percentage
Mild (<17)	12	40%
Moderate (18-24)	14	46.66%
Severe (>25)	4	13.33%

In our study, out of 100 patients of pulmonary tuberculosis, 42 patients had Major Depressive disorder and 30 patients were suffering from generalized anxiety disorder (Table No: 1). Among depressive patients, mild depression was present in 28.57%, moderate depression in 35.71% and severe depression was found in 23.80% of the patients (Table No: 2) Similarly, in patients suffering from anxiety, mild anxiety was observed in 40%, moderate anxiety in 46.66% and severe anxiety in 13.33% of the patients (Table No: 3).

Table No: 4 Patient's perception about their illness

Explanatory model related to Tuberculosis	Frequency (N=100)
Poor diet	13
Addiction	27
Germs	32
Magico-religious beliefs	28
Morbid fear about illness	
Untimely death	39
Will spread infection to family members	21
Worsening of disease	16
Financial Insecurity	24
Perception regarding ATT	
Get completely cured	30
Only symptomatic relief	25
Lots of side effects	30
Residual disability	15
Reasons for coming to the OPD	
For free medicines	32
For symptomatic relief of symptoms	40
Brought by co-villager	28

We also assessed patient's explanatory model and beliefs about tuberculosis (Table No: 4). 28% of the patients believed in magico-religious factors as causative factor for tuberculosis followed by addiction (27%) and poor diet (13%). Only 32% of the patients believed that TB is caused by germs. About 39% of the patients had morbid fear of untimely death. Only 30% had trust in getting completely cured with ATT, while 30% of the patients believed that ATT has lots of side effects. Most common reason for consultation was symptomatic relief of symptoms (40%) followed by availability of free medicines (30%).

Table No: 5 Sociodemographic profile of the participants and Depression

(Variables)	Categories	Frequencies (N=100)	Depression (N=42)	Mean Hamilton Depression Score	Chi-Square (p value)
Age	<30 Years	35 (35%)	13	20.53 ± 3.06	6.7382 (p=0.08)
	30 -45 Years	25 (25%)	8	18.42 ± 3.25	
	45-60 Years	12 (12%)	9	15.43 ± 2.10	
	>60 Years	28 (28%)	12	12.03 ± 2.01	
Gender	Male	72 (72%)	26	18.59 ± 5.411	3.6607 (p = 0.055)
	Female	28 (28%)	16	17.32 ± 4.140	
Education	Illiterate	09 (9%)	5	17.59 ± 5.411	3.1248 (p=0.37)
	High School	37 (37%)	18	18.32 ± 4.140	
	Intermediate	30 (30%)	9	18.47 ± 3.784	
	Graduate	24 (24%)	10	18.53 ± 3.672	
Occupation	Employed	78 (78%)	24	18.53 ± 3.672	18.3575 (p<0.05)
	Unemployed	22 (22%)	18	19.47 ± 3.784	

Marital Status	Married	76 (76%)	26	17.13 ± 4.901	7.8875 (p= 0.04)
	Unmarried	24 (24%)	16	21.09 ± 4.451	
Religion	Hindu	72 (72%)	22	18.13 ± 4.901	13.8257 (p<0.05)
	Muslim	28 (28%)	20	22.09 ± 4.451	

Socio-demographic profile of the study is depicted in the table no: 5. Among 100 patients, 72% were males (n= 72) and 28% (n=28) females. Majority of the participants (35%) belonged to 18 to 30 years of age group. Around 37% of the patients were educated till high school and 78% of the patients were employed. 76% of the patients were married and majority of the study sample belonged to Hindu religion (72%).

Table No: 6 Clinical Profile of the Participants and Depression

Clinical Profile	Categories	Frequencies (N=100)	Depression (N=42)	Mean Hamilton Depression Score	Chi- Square (p value)
Medical comorbidity	Diabetes	26 (26%)	15	24.10 ± 4.442	12.1176 (p<0.05)
	Hypertension	18 (18%)	9	23.13 ± 4.450	
	COPD	14 (14%)	8	20.48 ± 3.788	
	Asthma	02 (2%)	1	19.59 ± 4.452	
	Renal Disease	01 (1%)	1	20.18 ± 4.450	
Sputum Positivity	Positive	86 (86%)	32	18.48 ± 3.784	5.7875 (p<0.05)
	Negative	14 (14%)	10	18.33 ± 4.140	
Duration of Illness	<1 Year	80 (80%)	32	18.42 ± 3.25	0.6568 (P=0.41)
	>1 Year	20 (20%)	10	25.10 ± 4.451	
Past history of Tuberculosis	Present	28 (28%)	18	23.56 ± 4.451	7.928 (p<0.05)
	Absent	72 (72%)	24	17.59 ± 5.411	
History of default	Present	10 (10%)	5	23.09 ± 4.451	0.2919 (p=0.5889)
	Absent	90 (90%)	37	22.12 ± 4.451	
Chest X-ray	Typical	72 (72%)	30	20.47 ± 3.784	0.0117 (p=0.9137)
	Atypical	28 (28%)	12	19.13 ± 4.901	
Dyspnea	Present	40 (40%)	24	24.10 ± 4.451	8.8670 (p<0.05)
	Absent	60 (60%)	18	21.47 ± 3.784	
Substance Abuse (Tobacco/Alcohol)	Present	43 (43%)	29	25.10 ± 4.451	20.0454 (p<0.05)
	Absent	57 (57%)	13	21.42 ± 3.784	

Table No: 7 Sociodemographic profile of the participants and Anxiety

(Variables)	Categories	Frequencies (N=100)	Anxiety (N=30)	Mean Hamilton Anxiety Score	Chi-Square (p value)
Age	<30 Years	35 (35%)	8	19.30 ± 1.45	3.2449 (p=0.3553)
	30 -45 Years	25 (25%)	7	19.42 ± 2.22	
	45-60 Years	12 (12%)	6	24.42 ± 2.25	
	>60 Years	28 (28%)	9	22.20 ± 1.414	
Gender	Male	72 (72%)	20	24.59 ± 3.411	0.6047 (p=0.4367)
	Female	28 (28%)	10	28.32 ± 3.140	
Education	Illiterate	09 (9%)	5	22.59 ± 3.411	3.7166 (p=0.2937)
	High School	37 (37%)	10	20.32 ± 3.140	
	Intermediate	30 (30%)	7	19.46 ± 2.784	
	Graduate	24 (24%)	8	17.53 ± 2.672	
Occupation	Employed	78 (78%)	14	22.53 ± 2.672	24.5199 (p<0.05)
	Unemployed	22 (22%)	16	28.47 ± 2.784	
Marital Status	Married	76 (76%)	13	22.13 ± 2.901	25.0731 (p<0.05)
	Unmarried	24 (24%)	17	29.09 ± 3.451	
Religion	Hindu	72 (72%)	12	24.13 ± 3.901	21.7687 (p<0.05)
	Muslim	28 (28%)	18	26.09 ± 3.451	

Table No: 8 Clinical Profile of the Participants and Anxiety

Clinical Profile	Categories	Frequencies (N=100)	Anxiety (N=30)	Mean Hamilton Anxiety Score	Chi- Square (p value)
Medical comorbidity	Diabetes	26 (26%)	9	29.10 ± 3.442	8.9854 (p<0.05)
	Hypertension	18 (18%)	8	28.13 ± 2.450	
	COPD	14 (14%)	6	27.48 ± 2.788	
	Asthma	02 (2%)	1	29.59 ± 2.452	
	Renal Disease	01 (1%)	1	20.18 ± 4.450	
Sputum Positivity	Positive	86 (86%)	23	26.68 ± 2.684	3.1008 (p=0.0782)
	Negative	14 (14%)	7	20.33 ± 2.11	
Duration of Illness	<1 Year	80 (80%)	22	28.12 ± 2.35	1.1905 (p=0.2752)
	>1 Year	20 (20%)	8	20.40 ± 2.351	
Past history of Tuberculosis	Present	28 (28%)	20	28.56 ± 3.451	31.7838 (p<0.05)
	Absent	72 (72%)	10	21.59 ± 3.411	
History of default	Present	10 (10%)	5	24.09 ± 3.481	2.1164 (p=0.1457)
	Absent	90 (90%)	25	23.12 ± 2.491	
Chest X-ray	Typical	72 (72%)	19	20.47 ± 3.784	1.5967 (p=0.2063)
	Atypical	28 (28%)	11	19.13 ± 4.901	
Dyspnea	Present	40 (40%)	22	29.10 ± 3.451	19.8413 (p<0.05)
	Absent	60 (60%)	8	21.47 ± 2.784	
Substance Abuse (Tobacco/Alcohol)	Present	43 (43%)	26	28.82 ± 2.35	33.3411 (p<0.05)
	Absent	57 (57%)	4	21.77 ± 2.784	

Clinical profile of the study is depicted in the table no: 6. Around 61% of the study sample had medical comorbidity. Type-2 Diabetes Mellitus (26%) was most common medical comorbidity followed by Hypertension (18%). Majority of the patients were sputum positive (86%) and in 80% of the patients, duration of illness was less than 1 year. Around 28% of the patients had past history of TB and history of default to ATT was present only in 10% of the patients. Typical findings on chest x-ray were present in 72% of the patients and dyspnoea was present in 40% of the patients. History of substance abuse (tobacco and alcohol) was present in 43% of the patients.

In our study the association of Major Depressive Disorder (MDD) and Generalised Anxiety Disorder (GAD) was found to be statistically significant with unemployed, unmarried/single status and Muslim religion (P<0.05). Similarly, presence of medical comorbidity, sputum positivity, past history of TB, Dyspnoea, history of substance abuse had statistically significant association with MDD (P<0.05), while GAD had statistically significant association with presence of medical comorbidity, past history of TB, Dyspnoea and history of substance abuse (Table No: 6-8).

Table No: 9 Comparison of Quality of Life

Quality of life Scores	TB Cases with Psychiatric Morbidity (N=72)	TB Cases without Psychiatric Morbidity (N=28)	Mean difference	t-value	P-value
Physical Mean (SD)	9.43 (1.75)	12.23 (0.93)	2.8	8.0204	P<0.05
Psychological Mean (SD)	9.62 (1.92)	13.56 (1.42)	3.94	9.8489	P<0.05
Social Mean (SD)	11.35 (2.20)	15.78 (1.76)	4.43	9.7410	P<0.05
Environmental (SD)	11.23 (1.51)	14.64 (1.24)	3.41	10.6276	P<0.05
Overall QOL Mean (SD)	10.40 (1.84)	14.05 (1.33)	3.65	9.5576	P<0.05

In Table No: 9 Quality of Life was compared between patients of TB with psychiatric morbidity and patients of TB without psychiatric morbidity. The overall QOL mean in TB cases without psychiatric morbidity was 14.05, while QOL mean in TB cases with psychiatric morbidity was 10.40 and this difference was found to be statistically significant.

Discussion

This study was conducted to assess the prevalence of psychiatric morbidity, sociodemographic correlates, clinical correlates and Quality of Life in patients of pulmonary TB. Around 42% of the patients had depressive disorder and 30% were suffering from anxiety disorders. These findings have been

supported in the past by various studies. A study by Yadav et al[15] showed 53 cases of depression, 18 cases of anxiety out of the 80 patients who had psychiatric morbidities. Nathani et al[16] conducted a study which showed depression in 49% of hospitalised tuberculosis patients. Immerman et al[17] reported 64.7% psychiatric morbidity in his study. Bhatia et al[18] found 78% psychiatric comorbidity and they reported mixed anxiety and depressive disorders as the commonest co morbid psychiatric illness. Tandon et al[19] found that 32% of patients had depressive disorder. John Mathai et al[20] documented 29% psychiatric morbidity in patients of tuberculosis. Srivastava et al[21] documented depression in 84% of the TB patients. Another study from India reported presence of depressive symptoms in 44% of the TB patients[22]. In the same study[22], anxiety disorder was present in 38% of the patients. van den Heuvel et al reported that 30.8% of the TB patients were suffering from anxiety disorder[23]. Multiple complex mechanisms can be attributed to development of psychiatric morbidity in tuberculosis like stigma and discrimination faced by such patients. Moreover, financial burden, social isolation and incapacitation induced by chronic disease further compounds the depression and anxiety in such patients.

There was a male preponderance in the study sample (72%). Recent WHO Global Tuberculosis report has stated that 56% of the patients who developed TB in 2019 were males[24]. Lesser accessibility of health services by women in rural areas can be one explanation for this finding. However, differences in notification rates may be largely due to epidemiological differences and not due to differential access to health care[25].

In our study the association of Major Depressive Disorder (MDD) and Generalised Anxiety Disorder (GAD) was found to be statistically significant with unemployed, unmarried/single status and Muslim religion (P<0.05). Unemployment can lead to financial constraints, which in turn can negatively impact the regular follow up and access to treatment. Ultimately, patient can get trapped in vicious cycle, giving rise to despair, low frustration tolerance and depressive symptoms. Such patients have poor diet, generally belong to lower socioeconomic status and are more prone to develop various complications of TB[26]. Social support is known to have positive influence on health outcomes. Studies have shown that patients suffering from pulmonary TB are vulnerable to social isolation which has detrimental effects on accessing medical care and drug compliance[27,28]. In our study, unmarried status in patients of TB was significantly associated with depression and anxiety. Unmarried/ Single individuals generally have poor social support. Social support acts as a cushion against various stressors induced by incapacitating effects of chronic diseases like TB. Previous studies have also supported our finding that marital status is important predictor of psychiatric morbidity in patients suffering from chronic diseases[29,30]. In our study, psychiatric morbidity was significantly associated with Muslim religion. Internalised stigma related to diagnosis and less preference for modern medical treatment among Muslims in rural areas might be the reason for this phenomenon. Our finding was supported by one of the Indian study published in 2020[31].

In our study, presence of medical comorbidity in TB patients was significantly associated with depressive and anxiety disorders. The most common medical comorbidity was Type-2 DM followed by Hypertension. Presence of a medical comorbidity in patients of TB makes them vulnerable to develop plethora of medical complications. Additionally, presence of co-existing chronic medical diseases in patients of TB will have multiple burdens like pain, reduced quality of life, premature death, financial costs and emotional trauma to the family members. Hence, such patients are more susceptible to develop psychiatric morbidity. Many studies in the past have reiterated the fact that psychiatric illness was more frequent among those tuberculosis (TB) patients who had other co-morbid physical conditions[32-36]. We found a positive association between sputum positivity and depressive disorder, though no association was found between anxiety disorder and sputum positivity. Relationship between sputum positivity in tuberculosis and psychiatric disorders has been studied in past studies. One study found a significant association with sputum positivity[26], while others found no significant association[31,37]. This can be explained by the fact that AFB positive sputum status has detrimental effect on interpersonal relationships of an individual and very often they are ridden with inner guilt and fear of spreading the infection to their close family members. In our study past history of pulmonary tuberculosis was found to have positive association with psychiatric morbidity. Studies in the past have supported this finding as longer duration and relapse of tuberculosis can cause significantly disability, medical complications, financial hardships[18,26,38]. There was significant association between presence of dyspnoea in TB patients and psychiatric morbidity in our study. This finding was supported by one study done in 2014[37].

We found a positive association between history

of substance abuse in TB patients and psychiatric morbidity in our study. About 43% of the patients in our study had history of substance abuse (Alcohol/ tobacco). Alcohol use has also been independently associated with adverse drug reactions during TB treatment and with unsuccessful treatment[39]. Peltzer in his study reported that observed that alcohol abuse was associated with psychological stress in the TB patients[40]. Deribew et al documented that depression in TB patients had positive association with alcohol abuse[41]. Similarly, smoking has been statistically associated with poor treatment outcome and non-adherence in TB treatment.

The patient's explanatory model of their illness depicted that majority of the patients in rural areas have poor awareness regarding aetiology, pathogenesis and treatment of TB. Many patients held superstitious beliefs and were ignorant about the DOTS programme run by the government for treatment. Similar findings have been reported by other studies from developing countries. Poor awareness coloured by socio-cultural beliefs among rural population is an important predictor for poor medication adherence in tuberculosis[44-47].

In our study, Quality of Life (QoL) was compared between patients of TB with psychiatric morbidity and patients of TB without psychiatric morbidity. All the domains (Physical, Psychological, Environmental, Social) had better QoL scores in TB cases without psychiatric morbidity. The overall QoL mean in TB cases without psychiatric morbidity was 14.05, while QoL mean in TB cases with psychiatric morbidity was 10.40 and this difference was found to be statistically significant. Presence of psychiatric morbidity in patients of tuberculosis has negative impact on overall QoL of patients. This finding was in concurrence with other studies where all the four domains were significantly affected[48-51].

Limitations of the study

It was a single centre, cross sectional study. Hence, only associations could be studied. Recall bias and response bias can be present in cross sectional studies. No prospective long-term follow-up of the patient was done, so information about long term sequelae of pulmonary tuberculosis is lacking. This study was done at rural medical college. Therefore, findings of the study cannot be generalised to the whole population. Co-morbid medical illnesses and Neuro psychiatric side effects of ATT can act as confounding factors.

Conclusions

A high prevalence of psychiatric morbidity in patients

with tuberculosis (72%) has been observed in our study and also in previous studies. Multiple complex mechanisms can be attributed to development of psychiatric morbidity in tuberculosis like stigma, prejudice and discrimination faced by such patients. Tuberculosis is not only a medical disease but it also has social dimensions in a developing country like India. Medical complications, psychiatric morbidity coupled with stigma, social isolation significantly impacts the QoL of an individual.

Recommendations

Thorough evaluation and management of psychiatric morbidity in patients of TB is the need of the hour. Strengthening of consultation-liaison services will go a long way in improving the treatment adherence, long term outcome and overall quality of life of patients suffering from tuberculosis. Longitudinal follow-up studies are needed to determine the long-term impact of tuberculosis on mental health and quality of life of such patients.

Acknowledgement

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