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Original Article

Psychiatry/Mental Health Section

# Prevalence and Associated Factors of Major Depressive Disorder among Pulmonary Tuberculosis Patients

RAMYA KEERTHI PARADESI[1], SHAIK EKRAMULLA[2], NARASIMHA REDDI KAMUJU[3], NAGESWARA RAO NALLAPANENI[4], SHARATH SRIKANTA[5]

## ABSTRACT

**Introduction:** The prevalence of psychiatric morbidity in patients with pulmonary Tuberculosis (TB) is significantly high. Major depressive disorder is the most common among them. The psychiatric morbidity is related to the duration of illness, the degree of incapacitation and the knowledge of (sputum) Acid Fast Bacilli (AFB) positive status.

**Aim:** To assess the prevalence of depression in patients suffering from pulmonary TB and to study the relationship between depression and socio-demographic variables.

**Materials and Methods:** The study sample consisted of 120 patients suffering from pulmonary TB. The socio-demographic data was individually collected from them. Mini International Neuropsychiatric Interview (MINI) scale was used for screening Psychiatric morbidity in pulmonary TB patients and International Classification of Disease (ICD)-10 criteria were used to confirm the diagnosis and to assess the severity of depression in the study group. The data was analysed by using 'descriptive' and 'inferential' statistics. For categorical variables, the values were represented as number and percentages. To test association between the groups chi-square test was used. The p-value <0.05 was considered as statistically significant.

**Results:** Total 43.3% of patients suffering from pulmonary TB showed psychiatric morbidity. The mean age of the population was 38.41 years. No significant statistical correlation was found between socio-demographic variables and depressive disorders except socio-economic status. Class III socio-economic status (Sodhi and Sharma scale) had significant influence on prevalence of depression. The clinical variables, duration of illness, type of treatment, sputum status and complications of pulmonary TB showed statistically significant relationship on prevalence of depression.

**Conclusion:** As depression ominously influences the course and outcome of the pulmonary TB with serious consequences, an early identification and intervention will prove productive.

**Keywords:** Acid fast bacilli positives, Mini international neuropsychiatric interview scale, Sodhi and sharma scale

## INTRODUCTION

Psychiatric disorders occur very frequently in the medically ill patients. Mood disorders, anxiety disorders, delirium, dementia and substance abuse are the most common psychiatric disorders. Presence of a psychiatric disorder may be coincidental and aetiologically unrelated to a disease but it complicates the diagnosis and management of each other. The Fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-V) has the phrase "due to general medical condition" as a part of its resolve to eliminate the long standing but misleading distinction between organic disorders and functional disorders [1].

Slater E and Mayer RM in their famous book "Gross Slater and Roth Clinical Psychiatry" mentioned that generalised somatic disorders likely to be complicated by depression are certain infectious diseases like infective hepatitis, influenza, infective mononucleosis, atypical pneumonia, rheumatic fever, TB and psychosomatic disorders such as ulcerative colitis, asthma, neurodermatitis, rheumatoid arthritis, endocrine diseases [2]. Trenton AJ and Currier GW studied the co-morbidity of TB and mental disorders and also suggested diagnostic and treatment guidelines for TB and co-morbid mental disorders [3]. Common psychiatric co-morbidity was mood disorders which led to non-compliance to treatment resulting in multidrug resistance.

Global TB Report 2016 found, India with the highest burden of TB and Multidrug-Resistant (MDR) TB [4]. TB epidemic may be on the decline, but the absolute number of new cases is still the highest. India accounts for about 24% of the global prevalence, 23% of the global incident cases, and 21% of the global TB deaths [5]. The aim of the study was to assess the prevalence of major depressive disorder in patients suffering from pulmonary TB and to study the relationship between depression and socio-demographic variables.

## MATERIALS AND METHODS

This cross-sectional study was conducted for the period of two years i.e., from October 2013 to September 2015 in Department of Psychiatry, Maharajah's Institute of Medical sciences (MIMS), Vizianagaram, Andhra Pradesh, India. The sample of patients was obtained from those attending the outpatient clinic. After getting the approval of the Institutional Ethics Committee (MIMS/IEC//PSY/002) the study was commenced. All patients fulfilling the selection criteria were approached and explained about the purpose of the study. Written informed consent was obtained from all potential participants.

The sample comprised of 120 patients who were diagnosed as having pulmonary TB by TB and Chest diseases Department and referred to the outpatient clinic, Department of Psychiatry. The pulmonologists referred all cases in this stipulated study time period as a part of the Consultation liaison protocol in the hospital. The patients were in the stage of already using treatment with Revised National Tuberculosis Control Programme (RNTCP)/ Non-RNTCP as they have an impact on psychiatric morbidity. The pulmonary TB diagnosis was made by Pulmonologists and Psychiatric diagnosis of major depressive disorder was made by Psychiatrists.

The random method of sampling was used to derive the sample. The selection of sample unit was based on chance and every element of study group had a known, non-zero probability of being selected. Sample size was estimated by using the formula.

N=4PQ/L2, where, P=Positive factor/prevalence/proportion, Q=100-P, L=Allowed error or precision or variability.

**Inclusion criteria:** Patients diagnosed as having pulmonary TB by X-ray and/or sputum examination, aged between 18-55 years and patients who have given written informed consent.

**Exclusion criteria:** Patients of pulmonary TB with extra pulmonary TB, patients having psychiatric illness prior to the diagnosis of pulmonary TB and patients suffering from medical and surgical co-morbidities.

## Materials

The socio-demographic data and clinical variable data were collected. Sodhi and Sharma scale was used for assessment of socio-economic status, MINI for screening psychiatric morbidity and ICD-10 criteria were used to confirm the diagnosis of depression.

**1.Socio-demographic profile sheet:** It was developed for the purpose of the study. It consists of a semi-structured proforma to record certain variables regarding the patient, such as age, sex, marital status, education, occupation, income, place of residence etc.

**2. Clinical profile sheet:** This was used to collect data regarding, duration of illness, type of treatment, complications, X-Ray status, Sputum status.

**3. Sodhi and Sharma Scale [6]:** for assessment of socio-economic status

**4. MINI [7]**: a short structured diagnostic interview, designed as a brief structured interview for DSM-IV and ICD-10 psychiatric disorders.

**5. ICD-10:** is the most widely used statistical classification system for diseases in the world. The ICD-10 was developed in 1992. It applies to both physical and mental disorders. It is produced by World Health Organisation by a multidisciplinary, multilingual and multicultural group and it is approved by World Health Assembly. There are 21 chapters in ICD-10 and Mental and Behavioural disorders come under chapter V and they are given coding from F00-F99. In present study, ICD-10 criteria were used to confirm the diagnosis of depression in the patients suffering from pulmonary TB.

## STATISTICAL ANALYSIS

The data was analysed by using 'descriptive' and 'inferential' statistics. Descriptive and appropriate statistics were used to analyse the compiled data using the Statistical Package for the Social Sciences (SPSS) 16 version. For categorical variables, the values were represented as number and percentages; to test association between the groups chi-square test was used. The p-value <0.05 was considered as statistically significant.

## RESULTS

The sample of 120 patients who were diagnosed with pulmonary TB and were already on treatment. The family history of Psychiatric disorders was taken and all the patients were on RNTCP or NON-RNTCP regimens.

[Table/Fig-1] There were 52 patients with depressive disorders. The percentage of patients suffering from depressive disorders were more among 41-50 years age group, males, Muslims (Though the

| Sociode-mographic variable | Nil | Mild | Moderate | Severe | Chi-square | p-value |
|---|---|---|---|---|---|---|
| **Age (in years)** | | | | | | |
| 18-20 | 10 (76.9%) | 2 (15.4%) | 0 (0%) | 1 (7.7%) | 10.920 | 0.536 |
| 21-30 | 13 (72.2%) | 2 (11.1%) | 2 (11.1%) | 1 (5.6%) | | |
| 31-40 | 17 (54.8%) | 3 (9.7%) | 7 (22.6%) | 4 (12.9%) | | |
| 41-50 | 20 (47.6%) | 3 (7.1%) | 13 (31%) | 6 (14.3%) | | |
| 51-60 | 8 (50.0%) | 3 (18.8%) | 3 (18.8%) | 2 (12.5%) | | |
| **Sex** | | | | | | |
| Male | 45 (55.6%) | 8 (9.9%) | 20 (24.7%) | 8 (9.9%) | 2.730 | 0.435 |
| Female | 23 (59%) | 5 (12.8%) | 5 (12.8%) | 6 (15.4%) | | |
| **Religion** | | | | | | |
| Hindu | 45 (58.4%) | 7 (9.1%) | 16 (20.8%) | 9 (11.7%) | 2.265 | 0.894 |
| Muslim | 10 (45.5%) | 3 (13.6%) | 6 (27.3%) | 3 (13.6%) | | |
| Christian | 13 (61.9%) | 3 (14.3%) | 3 (14.3%) | 2 (9.5%) | | |
| **Domicile** | | | | | | |
| Urban | 34 (64.2%) | 4 (7.5%) | 11 (20.8%) | 4 (7.5%) | 5.900 | 0.434 |
| Semi-urban | 10 (55.6%) | 2 (11.1%) | 5 (27.8%) | 1 (5.6%) | | |
| Rural | 24 (49%) | 7 (14.3%) | 9 (18.4%) | 9 (18.4%) | | |
| **Education** | | | | | | |
| Illiterate | 10 (38.5%) | 2 (7.7%) | 9 (34.6%) | 5 (19.2%) | 18.323 | 0.435 |
| Primary | 11 (45.8%) | 3 (12.5%) | 5 (20.8%) | 5 (20.8%) | | |
| Middle | 11 (57.9%) | 2 (10.5%) | 4 (21.1%) | 2 (10.5%) | | |
| Secondary | 16 (64.0%) | 4 (16%) | 3 (12%) | 2 (8%) | | |
| PUC | 14 (64%) | 2 (16%) | 3 (12%) | 0 (0%) | | |
| Diploma | 1 (50%) | 0 (0%) | 1 (50%) | 0 (0%) | | |
| Graduate | 5 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | | |
| **Occupation** | | | | | | |
| Unemployed | 10 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | 30.643 | 0.080 |
| Business | 7 (87.5%) | 0 (0%) | 1 (12.5%) | 0 (0%) | | |
| Coolie/farmer | 20 (37%) | 7 (13%) | 17 (31.5%) | 10 (18.5%) | | |
| Productive worker | 10 (90.9%) | 0 (0%) | 1 (9.1%) | 0 (0%) | | |
| Service | 2 (66.7%) | 0 (0%) | 1 (33.3%) | 0 (0%) | | |
| Student | 2 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | | |
| House wives | 12 (54.5%) | 4 (18.2%) | 3 (13.6%) | 3 (13.6%) | | |
| Non agricultural laborer | 5 (50%) | 2 (20%) | 2 (20%) | 1 (10%) | | |
| **Marital status** | | | | | | |
| Unmarried | 20 (71.4%) | 1 (3.6%) | 4 (14.3%) | 3 (10.7%) | 4.733 | 0.579 |
| Married | 43 (52.4%) | 11 (13.4%) | 19 (23.2%) | 9 (11%) | | |
| Widow/ widower | 5 (50%) | 1 (10%) | 2 (20%) | 2 (20%) | | |
| **Socio-economic status** | | | | | | |
| Class- II | 7 (70%) | 1 (10%) | 0 (0%) | 2 (20%) | 20.682 | 0.002* |
| Class-III | 44 (72.1%) | 6 (9.8%) | 7 (11.5%) | 4 (6.6%) | | |
| Class-IV | 17 (34.7%) | 6 (12.2%) | 18 (36.7%) | 8 (16.3%) | | |
| **Clinical variable** | **Nil** | **Mild** | **Moderate** | **Severe** | **Chi-Square** | **p-value** |
| **Duration of illness** | | | | | | |
| <3 months | 62 (78.5%) | 5 (6.3%) | 8 (10.1%) | 4 (5.1%) | 45.112 | 0.0001** |
| >3 months | 6 (14.6%) | 8 (19.5%) | 17 (41.5%) | 10 (24.4%) | | |
| **Complications** | | | | | | |
| Without | 59 (65.6%) | 8 (8.9%) | 15 (16.7%) | 8 (8.9%) | 11.657 | 0.009* |
| With | 9 (30%) | 5 (16.7%) | 10 (33.3%) | 6 (20%) | | |
| **Type of treatment** | | | | | | |
| Non RNTCP | 20 (36.4%) | 8 (14.5%) | 19 (34.5%) | 8 (14.5%) | 18.563 | 0.0001** |
| RNTCP | 48 (73.8%) | 5 (7.7%) | 6 (9.2%) | 6 (9.2%) | | |
| **Sputum status** | | | | | | |
| Positive | 51 (68%) | 8 (10.7%) | 9 (12%) | 7 (9.3%) | 12.962 | 0.005* |
| Negative | 17 (37.8%) | 5 (11.1%) | 16 (35.6%) | 7 (15.6%) | | |
| **X-Ray** | | | | | | |
| Positive | 18 (69.2%) | 0 (0%) | 7 (26.9%) | 1 (3.8%) | 6.851 | 0.077 |
| Negative | 50 (53.2%) | 13 (13.8%) | 18 (19.1%) | 13 (13.8%) | | |

**[Table/Fig-1]:** Relationship between sociodemographic variables, clinical variables and major depressive disorder.
*p-value is significant at the 0.05 level; **p-value is significant at the 0.01 level; PUC: Pre univeristy course

percentage of patients suffering from depression was more among Muslims, it was statistically not significant) and persons belonging to rural background, illiterates, coolie/farmers, widower (Though the percentage of patients suffering from depression was more among widow/widower it was not statistically significant), class-IV patients. No significant statistical correlation was found between socio-demographic variables and depressive disorders, except socio-economic status. It was reported that socio-economic status had significant influence on the prevalence of depression. This could be explained by the fact that low socio-economic status of the individuals suffering from pulmonary TB was more prone for developing depression.

The percentage of patients suffering from depressive disorders was more among patients with duration of illness > 3 months, patients on Non-RNTCP treatment, sputum negative and chest radiograph-negative status patients. The prevalence of depressive disorders was statistically significant with the duration of illness. Longer the duration of illness more was the prevalence of depressive disorders. Prolonged duration of illness might develop fearfulness towards pulmonary TB that may lead to feelings of helplessness and depression. Financial burden may also contribute to some extent. It was found that the prevalence of depressive disorders was statistically significant with the type of treatment. The prevalence of depressive disorders was more in patients receiving Non-RNTCP drug regimen. This may be because of prolonged duration of treatment that may lead to financial burden and the use of Anti-Tubercular Drugs (ATT) drugs like Isoniazid for a long period.

It was reported that the prevalence of depressive disorders was statistically significant with the complications of pulmonary TB. The complications associated with pulmonary TB may lead to more suffering and frustration that result in psychiatric morbidity.

## DISCUSSION

The present study was conducted to determine the prevalence of depression in patients suffering from pulmonary TB and to study the relationship between depression and socio-demographic variables like age, sex, marital status, domicile, education, religion, occupation, socio-economic status and clinical variables like duration of illness, type of treatment and complications associated with pulmonary TB. The overall findings have been compared with literature in [Table/Fig-2] [8-25].

In the present study, majority of the subjects suffering from depression were in between the age group of 41-50 years. The prevalence of depression in different age group varied and was not statistically significant. Similar findings were seen in some other studies [8,12,16,20,21]. The difference in the prevalence of depression among different age groups in different studies may be because of unequal distribution of the sample.

Males showed more prevalence of depression than females in the present study. It was probably because, duration of illness more than three months was more in males compared with females but it was not statistically significant and similar kind of findings were observed in some studies [8,20,21]. Dissimilar reports also exist, as in the study done by [12] found prevalence of depression more in females (82%) but the study sample consisted more number of females.

In the present study, Muslim community showed more prevalence of depression, similar to other studies [20,21] except one [16] in which Hindus were more depressed.

Prevalence of depression was more among patients belonging to rural background. It was probably because the number of patients belonging to class IV socio-economic status, duration of illness above three months and complications were more among rural background patients but it was not statistically significant. Similar findings were observed in some studies [20,21].

| Authors | Year of study | Place of study | Study sample | Prevalence rate of psychiatric morbidity |
|---|---|---|---|---|
| Dasa TT et al., [25] | 2019 | Eastern Ethiopia | 403 | 51.9% depression |
| Wang XB et al., [24] | 2018 | China | 1252 | 70% depression |
| Bhaware GM et al., [8] | 2014 | India | 267 | 51.89% depression |
| Adem A et al., [9] | 2014 | Ethiopia | 222 | 19.82% depression |
| Chaudhri S et al., [10] | 2013 | India | 214 | 85.2% depression |
| Basu G et al., [11] | 2012 | India | 110 | 62% depression |
| Panchal SL et al., [12] | 2011 | India | 600 | 82% depression |
| Aamir S and Aisha [13] | 2010 | India | 65 | 72% depression |
| Moussas G et al., [14] | 2008 | Argentina | 132 | 49.2% depression |
| Vega P et al., [15] | 2004 | Lima | 37 | 13.3% depression |
| Manoharam E et al., [16] | 2001 | Pakistan | 108 | 46.3% depression |
| Westaway MS, Wolmarans L [17] | 1992 | South Africa | 100 | 68% depression |
| Meghnani MI et al., [18] | 1988 | India | 110 | 53.6% depression |
| Natani GD et al., [19] | 1985 | India | 110 | 49% depression |
| Mathai PJ et al., [20] | 1981 | India | 70 | 28.87% depression |
| Yadav BS et al., [21] | 1980 | India | 272 | 29.4% depression |
| Tandon AK et al., [22] | 1980 | India | 100 | 32% depression |
| Purohit DR et al., [23] | 1978 | India | 96 | 54.17% depression |

**[Table/Fig-2]:** Literature compilation on major depressive disorder in patients suffering from pulmonary Tuberculosis (TB) [8-25].

There was a significant relation between depression and socio-economic status and associated complications. Prevalence of depression was more among Illiterates but was not satistically significant. Similar findings were observed in other studies [20,21], but one study [12] found more prevalence of depression among Middle school patients. In the present study prevalence of depression was more among widowed patients. It was probably because the number of patients with Class IV socio-economic status and duration of illness above three months were more among widowed patients but it was statistically not significant and it is different from some other studies [20,21] in which married were more depressed.

In the present study prevalence of depression was more among patients belonging to class IV. As most of the class IV people were illiterates and the compliance of treatment and approach to the doctor in earliest stage of disease is poor, so they might have had higher prevalence of depression. In addition to that the majority of patients with duration of illness above three months and Non-RNTCP type of treatment were more among this class IV group and it was statistically significant, and similar to literature [20,21,24,25]. In the present study prevalence of depression was statistically highly significant among patients having illness >3 months. As expected more the duration pulmonary TB, more the chance of developing the depressive features. Prolonged duration of illness and greater incapacitation would imply greater helplessness and hence greater depression. Similar findings were observed by some authors [8,9,12,20]. It differs from the findings of one study [21] which reported that duration of illness was not related to the psychiatric morbidity.

Similar findings were observed in the study done by Purohit DR et al., [23] in which complications were associated with depressive disorders and it was different from the studies done by Mathai PJ et al., [20]. Yadav BS et al., [21] in which complications were not associated with the prevalence of depression. It is probably because associated complications had more impact on the psychological well being of the individual and that may also increase the duration of hospital stay which contradicts other studies [20,21].

In the present study prevalence of depression was statistically more among patients on NON-RNTCP treatment. This may be because

of the longer duration of treatment and thereby higher cost of the treatment.

In this study more number of sputum negative pulmonary TB patients were associated with depressive disorders. This finding is not consistent with some studies [20,21], in which the knowledge of AFB sputum status was significantly associated with psychiatric morbidity and they explained that AFB positive sputum status would impose greater restrictions on a person's interpersonal relationships and invoke a dread of infecting others. The contradiction may be probably because more number of sputum negative patients were taking NON-RNTCP treatment, in the index study, which was associated with more prevalence of depression [Table/Fig-2].

### Limitation(s)

The psychiatric morbidity induced by the antitubercular drugs was not eliminated. The long term implications of TB as well as ATT was also not studied and being a cross-sectional study, the temporal sequence of exposure and effect may be difficult or impossible to determine.

## CONCLUSION(S)

Total 43.3% of patients suffering from pulmonary TB showed psychiatric morbidity. The mean age of the population was 38.41 years. No significant statistical correlation was found between socio-demographic variables and depressive disorders except socio-economic status. Socio-economic status (Sodhi and Sharma scale) had significant influence on prevalence of depression. The clinical variables, duration of illness, type of treatment, sputum status and complications of pulmonary TB showed statistically significant relationship on prevalence of depression.

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**PARTICULARS OF CONTRIBUTORS:**
1. Assistant Professor, Department of Psychiatry, Sri Venkateswara Medical College, Tirupati, Andhra Pradesh, India.
2. Assistant Professor, Department of Psychiatry, Kurnool Medical College, Kurnool, Andhra Pradesh, India.
3. Professor, Department of Psychiatry, Maharajah's Institute of Medical Sciences (MIMS), Vizianagaram, Andhra Pradesh, India.
4. Professor, Department of Psychiatry, Sri Venkatewara Medical College, Tirupati, Andhra Pradesh, India.
5. Postgraduate, Department of Psychiatry, Sri Venkatewara Medical College, Tirupati, Andhra Pradesh, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**
Dr. Shaik Ekramulla,
Assistant Professor, Department of Psychiatry, Kurnool Medical College,
Kurnool-518001, Andhra Pradesh, India.
E-mail: pramyakeerthi@gmail.com



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