

Research Article

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Depression in Tuberculosis: Patients versus Attendants

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Abstract: **Introduction:** Tuberculosis with depression is a vicious cycle of underdiagnosed syndemic. Reported number of cases vary widely - may be due to ambiguity in defining family support, and/or different depression measuring scales. **Aim:** Aim of this study is to find 1. Incidence and extent of depression in tuberculosis inpatients 2. Estimate and correlate the same in attendants 3. To compare two depression scores in each case. **Materials and methods:** A cross-sectional study of quantitative distribution of depression score on 2 different scales, in 19 newly diagnosed tuberculosis inpatients, apropos their one attending family member was assessed. Wilcoxon's Signed Rank Test was used to compare the 2 scale outcomes. **Results:** Patients' depression score was never negligible (≤ 16). One borderline clinical depression, 10 moderate depressions, 4 severe depressions, and 4 extreme depressions were elicited. There was an age-wise bimodality of depression in patients – unseen among attendants. The depression scores in 19 patient-attendant pairs didn't match. Among attendants, 8 normal ups-and-downs, 5 mild mood disturbances, 3 mild depressions, and 3 moderate depressions were elicited. The two depression scores were statistically similar (in patients: $p = 0.3866$; in attendants: $p = 0.6318$) at 95% confidence level. As per patient-attendant relation, in brother-brother, father-son, son father, mother daughter, and daughter-mother – but for few exceptions – a rising trend was seen. **Conclusion:** Depression-tuberculosis syndemic was nearly universal. Attendants' mental health was an ancillary concern. Age-wise bimodality of depression in patients indicated an extra thrust area. Among attendants, depression score matched more with emotional parentality and gender.

Keywords: Tuberculosis, Depression, Beck Depression Inventory, CES-D.

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INTRODUCTION

In chronic and/or incurable diseases, depression is a usually expected and well established comorbidity [1, 2]. Respiratory diseases are in general [3] and tuberculosis is in particular [4], also well associated with depression, and is well correlated in terms of prevalence and risk factors [5, 6].

Tuberculosis and depression – a syndemic – implicate a vicious cycle – aggravates each other's etiopathology, and mutually mimicking each other's clinical presentation/ diagnosis [7] and worsening prognosis [8]. It is further complicated by poverty, and ensuing insufficient hygiene/treatment/ nutrition – or negative coping behaviors like substance/ process addiction [9, 10].

Extent of depression has also been correlated to the treatment phase [11]. For instance, in patients of multi-drug resistant tuberculosis (in whom cycloserine-like second and third line drugs lead to iatrogenic depression), patients were reluctant to treatment saying that they would rather choose death over treatment [1, 2].

The drug regimen of tuberculosis is thus, an important iatrogenic confounder in the syndemic (depression & tuberculosis) [7, 11, 12]]. So, only newly diagnosed (non-resistant) cases who were susceptible to the first line of therapy were included in this study.

Several studies have been designated to assess the disease burden in India [13] and proposals of integrating depression management in tuberculosis patients were also suggested [14].

However, even in studies having well-established methodologies and protocols [15], lots of variations were seen in the outcome so far, leading to lack of uniformity which might have been also due to different depression measuring scales used [16]. Therefore, this study will concurrently use two different scales to measure severity of depression in each patient as well as an attending family member.

As the syndemic duo is known to aggravate each other, early cases of either one may be isolated and subclinical which leads to failure in early diagnosis. Therefore, this study aims to cover inpatient department (with established chronicity and severity) cases of tuberculosis, to assess the impact of comorbidity.

The attending family members are also an integral part of prolonged treatment ordeals (economy/effort/emotion/ infective exposure) – and several studies aimed at assessing the role of family support as an ameliorative confounder [17-20]. In all such cases, family support was vaguely and variously defined, and/or indirectly measured.

Instead, this study was conducted on the inpatients, who were typically supported by some or the other attending family member – assessing depression in tuberculosis patients vis-à-vis their attendants (evidently utmost family support) was planned for direct assessment.

AIM AND OBJECTIVE

Aim: To estimate the extent of depression tuberculosis syndemic in inpatients apropos their attendants.

Objective: To assess cross sectional quantitative distribution of depression score on 2 different scales in tuberculosis inpatients apropos their one attending (gender matched) family member. Thus the study aims to estimate 1. Incidence and extent of depression in tuberculosis inpatients 2. Estimate and correlate the same in attendants 3. To compare two depression scores in each case (inpatient) and control (attendant).

Ethical consideration

This study was approved by Institute Ethics Committee (clearance letter number: M5N1, Dated 03.02.2026) and was conducted in compliance with the Helsinki Declaration (version 2013) from 16.12.2025 to 31.12.2025, in the inpatients of tuberculosis ward of the civil hospital associated with GMERS Medical College, Morbi (Gujarat), India.

Consent from all the participants (inpatients as well as their corresponding gender matched attendants) was taken in vernacular (Gujarati translation of original

English version from WHO website – back translated to check veracity by the author.1. Though the identity and process authenticity is recorded verifiably and documented accordingly for future statutory purposes, it's masked otherwise.

MATERIALS AND METHODS

All the 19 inpatients of newly diagnosed tuberculosis (on the first line therapy) who, along with one of their gender matched attendants, documented the consent for study, were enrolled. (to avoid gender as an emotive confounder in depression).

On its webpage [21] American Psychological Association (APA) enlisted the “Center for Epidemiologic Studies Depression Scale (CES-D), NIMH” [22, 23] a ‘priceless’ open access measure, scoring 0-60 (20 questions, each scoring 0-3) on an ordinal scale.

As per instructions therein, the positive traits in question point 4, 8, 12 and 16 were scored in reverse. As the original scale was in non-vernacular language (English), it was translated (into Gujarati, and checked by back translation into English to assess the reliability) and applied by the medical investigators.

As another scale, free version of Beck Depression Inventory (BDI) (21 points, again scoring 0-3 for each, >40 indicating extreme depression) was adopted [24]. The non-vernacular original English version was processed as before. Patients and attendants – were separated and interview in isolation (to avoid data contamination) and in quick succession (to avoid posterity effect).

Once the patients and attendants were finally selected by the prime investigator cum study designer, their serial numbers (patient attendant pair as 1.P-1.A, 2.P-2.A and so on, up to 19.P and 19.A) were randomised and the allocation was concealed to the interviewers or supervising psychiatrist. Statistical analyser had access only to the final output dataset.

This triple blinding ensured avoidance of Hawthorne effect (as per consequence). And as each interview was conducted in isolation, John Henry effect (mutually comparative adjusted behaviour) was also ruled out.

RESULTS

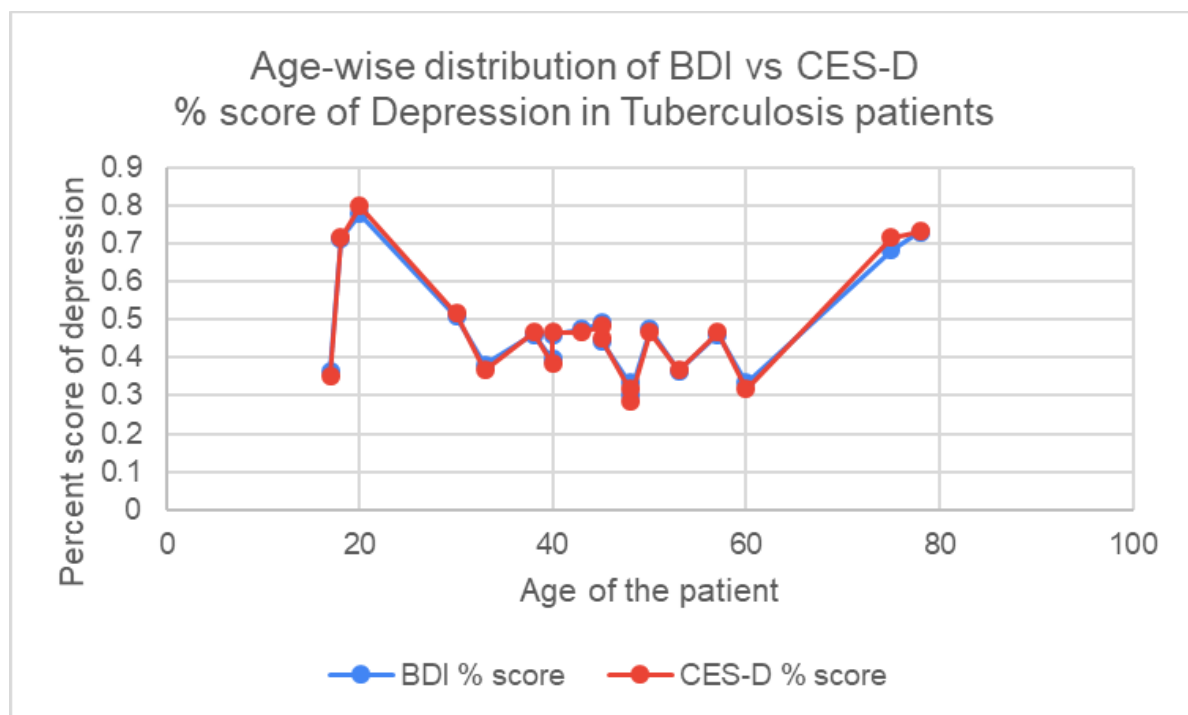
As the BDI scale has maximum score of 63 (21 assessment points) instead of 60 in CES-D scale (20 assessment points), the same patient expectedly and mostly had a higher depression score on the former scale. That's why, the percentage of both scores were considered for mutual comparison.

For example, a score of 21 on BDI was considered equal to 20 on CES-D (both being 33.33% of the maximum) (figure.1). Table.1 entails untransformed data along with age and gender details.



Table.1: Age and gender wise BDI & CES-D depression scores of the Patients

Age	Gender	BDI score-P	CES-D score-P
20	Male	49	48
30	Male	32	31
38	Male	29	28
57	Male	29	28
45	Male	31	29
50	Male	30	28
45	Male	28	27
17	Female	23	21
43	Male	30	28
33	Female	24	22
60	Female	21	19
18	Male	45	43
40	Female	25	23
53	Male	23	22
75	Male	43	43
78	Male	46	44
48	Male	21	19
40	Male	29	28
48	Male	19	17

**Figure 1: Age-wise BDI vs CES-D % score of depression in tuberculosis patients.**

As each person was measured on 2 ordinal scales, non-parametric variant of paired t-test (= Wilcoxon's signed rank test) was used. Two scores of patients (CES-D.P

versus BDI.P) were shown to be statistically similar ($p = 0.3866$, $Z = -0.8657$, which is within the 95% region of acceptance) as shown in figure.2 [25].

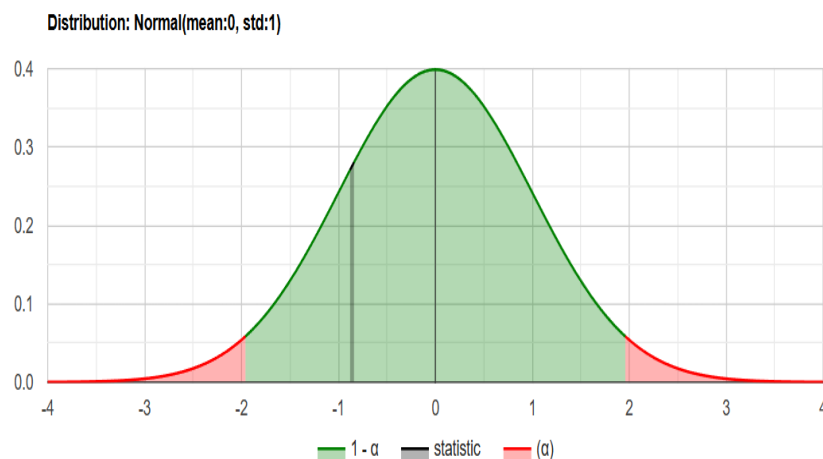


Figure 2: The two depression scores CES-D.P versus BDI.P
[on non-parametric paired (= Wilcoxon's Sign Rank) test]

If the dual depression score is arranged in 19 patient-attendant pairs – viz. CES-D.P, BDI.P, (two depression scores for patients) CES-D.A, BDI.A (two depression

scores for corresponding attendants) – we get a discordant graph as shown in figure.3, and discordance continues even after % transformation.

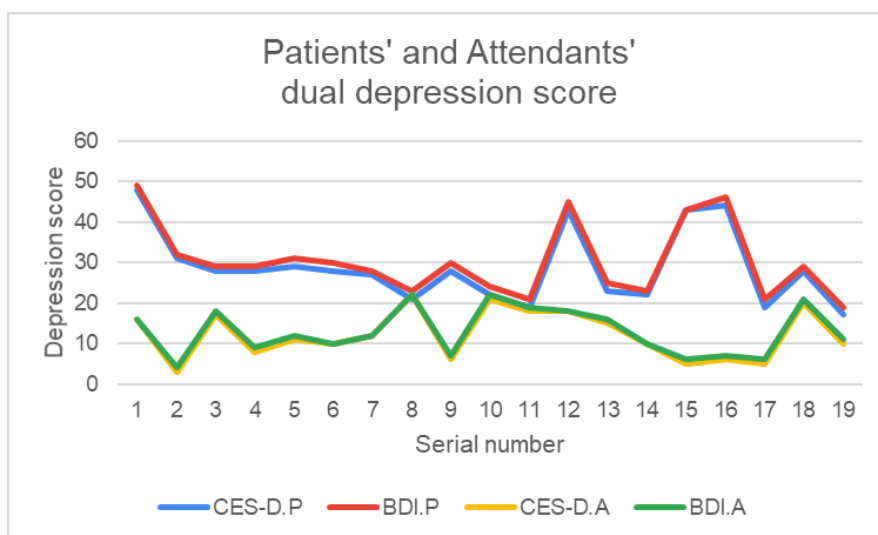


Figure 3: Patients' and Attendants' dual depression score
(CES-D.P and BDI.P for patient and CES-D.A and BDI.A for attendant)

Like transformation of patients' dual depression score in figure.1, even if attendants' dual depression score is again transformed and arranged as per age, a patient like bimodality in figure.1 is not elicited in figure.4 – though congruence of two depression scores continues.

Reassessing congruence of the two depression scores of attendants (CES-D.A versus BDI.A) on the same non-parametric paired (= Wilcoxon's sign rank) test, $p = 0.6318$ and $Z = 0.4792$, which is within the 95% region of acceptance) as shown in figure.5 [25].

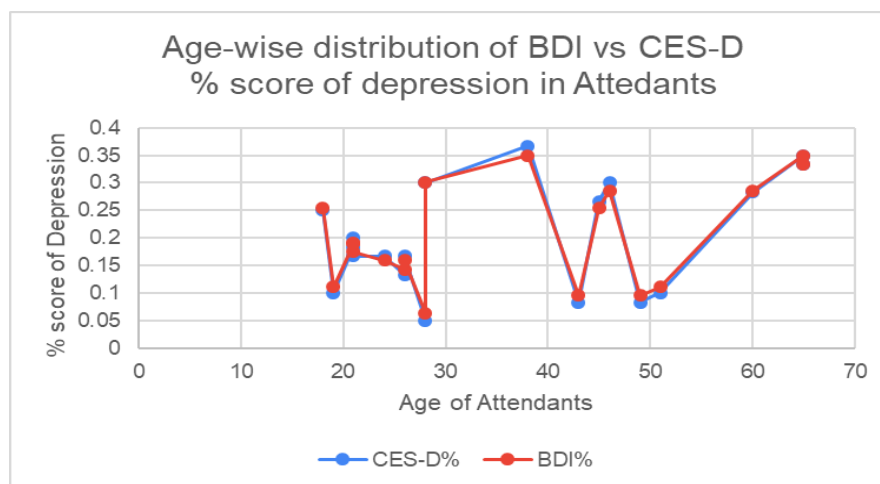


Figure 4: Age-wise BDI vs CES-D % score of depression in Attendants

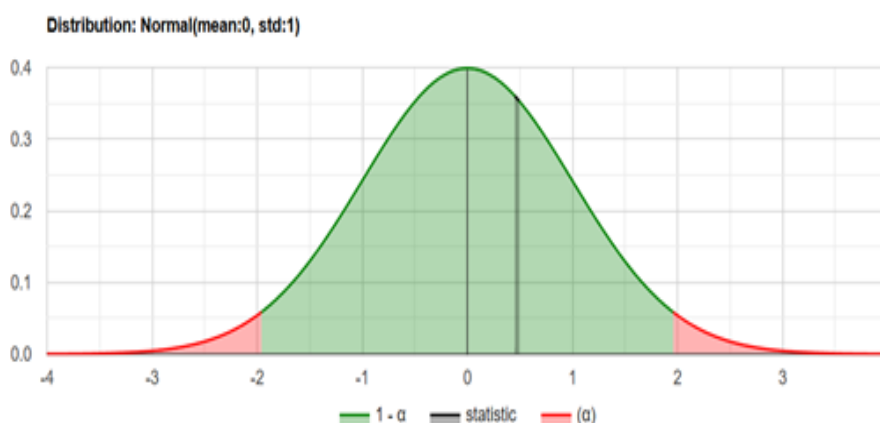


Figure 5: The two depression scores CES-D.A versus BDLA
[On non-parametric paired (Wilcoxon's sank sum) test.]

This indicates that the factors affecting depression score in attendants were different from those of the patients. If the patient-attendant relation (PAR) is arranged as brother-brother (BB), father-son (FS), son father (SF),

mother daughter (MD) and daughter-mother (DM) – but for few exceptions, a rising trend is seen in the dual (shown in blue-red) score as summarised in figure. 6.

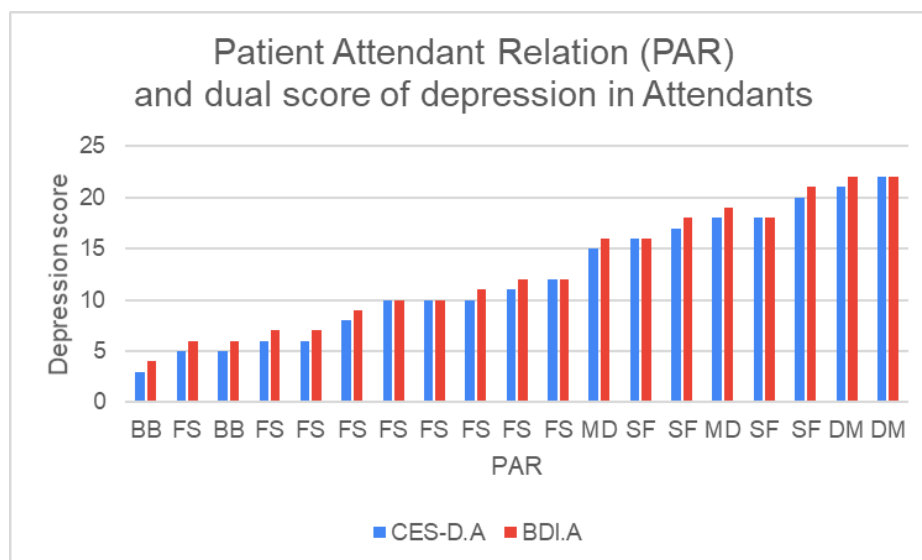


Figure 6: Patient Attendant Relation (PAR) and dual score of depression in attendants



DISCUSSION

Depression is a befitting example of the epidemiological ‘tip of iceberg’ as undiagnosed cases constitute a huge chunk of disease burden [26]. In this study, patients’ depression score was never negligible [25] (which can be normal ups and downs till score 10 or mild mood disturbance till 16).

Just one case was of borderline clinical depression (score 19), while ten cases scored as moderate depression (21-30). There were 4 cases of severe depression and 4 cases of extreme depression – and none of those 8 was diagnosed or treated like that.

Among attendants, 8 persons could be considered for normal ups and downs (score 10 or less). And 5 cases were of mild mood disturbance – which could be expected to resolve spontaneously as the situation improves. But even amongst attendants, 3 cases of mild depression, and 3 of moderate depression, are the real concern. Compared to other studies done in outdoor setting [4-13] this is far more alarming.

Both the investigators participated in the interview of each case and both the scales were applied on each of the participants (patients as well as attendants). Thus the question of inter-rater variability didn’t arise. As we see in the patients apropos attendants (figure.1-5), both depression scales were essentially congruent.

As all the patients and their attendants were gender matched adults of the same family, confounding by different socioeconomic status (and ensuing hygiene/ nutrition/ educational awareness differences) were inherently ruled out. Here gender matching of patient-attendant pair aimed for a clear contradistinction on that count.

As this study included only newly diagnosed inpatients of tuberculosis, the iatrogenic confounders (e.g. different anti-tubercular regimens inducing difference in the vicious cycle of tuberculosis depression syndemic) and severity confounders (different degree of severity of tuberculosis leading to different level of depression) were also not implicated.

Bimodal curve of depression severity (showing peaks at early adolescence and in extreme elderliness) seen in figure.1 could be an expression of social reality. While late teenage and early adulthood is more concerned about career, economy and life partner with least emotional maturity, middle aged people are mostly better off on these counts.

On the other extreme, aged people have many geriatric (physical as well as mental) complications aggravated by an unending feeling of worthlessness and/or helplessness, ultimately leading to a painful death. Thus this bimodality of age-wise distribution of depression (figure.1) is explicable.

Though patients’ depression is evidently not correlated anyhow to that of the attendant (figure.2) – even in

attendants, the two depression scores (CES-D.A versus BDI.A) were mostly mutually congruent (figure.3) – thus the two scoring systems, either in patients or in attendants, could corroborate each other.

As seen in figure 4, brother-brother PAR was least vitiated (i.e. brothers were found to be least depressed by tuberculous patients); followed by father-son PAR (i.e. sons are slightly more affected by fathers’ ailment – wherein, emotive as well as economic dependence could have been instrumental).

Mother-daughter PAR was even more strained (gender factor might have crept in – as daughters, despite being economically independent from mother, are more depressed about their ailing mothers) but son-father PAR is still more strained (parental concern overwon the gender factor; fathers were even more concerned about their sons).

The gender and parentage concern could have been combined in daughter-mother PAR – wherein mothers (female as well as parent) were maximally strained, esp. if the daughter was an unmarried patient. In summary, blood lineage, parentage and gender are successively more affective in syndemic viciousness.

CONCLUSION

1. Bulk of depression tuberculosis syndemic is far more than expected (nearly universal among inpatients). Attendants’ mental health was an additional concern.
2. Depression among tuberculosis patients has a bimodal curve of age-wise severity (patients in early adolescence or in late elderliness were more liable to depression).
3. The syndemic is reaffirmed by both the depression measuring scales (CES-D as well as BDI) unanimously, and both the scales were mostly congruent.
4. In family support – lineage (son was more concerned than brother), parentage (father seems to be more concerned about sons, than sons were about their fathers) and femininity (mothers were more depressed about daughters, than fathers about their sons) were increasingly graver concerns.

This study was limited to a scarcely resourced government hospital and might have covered families of lower socio-economic status with less awareness/ education/ emotional maturity – which might have induced a positive (right sided) skew in the studied sample.

A similar study with larger sample size, and in multi-centric setting, can quantify the effect of parentage versus gender in familial basis of depressive association in the attendants of tuberculosis – which could be extended to other respiratory, or otherwise chronic, diseases. By better diagnosis of the syndemic, prognosis is expected to improve.



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Conflicts of interest: There are no conflicts of interest.

Ethical Approval: This study was approved by Institute Ethics Committee (clearance letter number: M5N1, Dated 03.02.2026) and was conducted in compliance with the Helsinki Declaration (version 2013) from 16.12.2025 to 31.12.2025, in the inpatients of tuberculosis ward of the civil hospital associated with GMERS Medical College, Morbi (Gujarat), India.

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