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EFFECTIVENESS OF COMPREHENSIVE SOCIAL SUPPORT INTERVENTIONS AMONG PATIENTS WITH MULTI-DRUG RESISTANCE TUBERCULOSIS IN NORTHERN TAMIL NADU

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Abstract

Introduction: Multi-drug resistant tuberculosis (MDR-TB) poses a significant challenge due to high treatment dropout rates and psychological distress. This study evaluates the impact of comprehensive social support interventions, including Morita therapy, on improving social support, depression status, and treatment adherence among MDR-TB patients in Northern Tamil Nadu.

Methods: A randomized, open-labeled, parallel-group trial was conducted over 24 months (February 2021–February 2023) among 132 newly diagnosed drug-resistant pulmonary TB patients enrolled in the National Tuberculosis Elimination Program (NTEP). Participants were randomly assigned to either the intervention group (receiving Morita therapy, psychoeducation, and health education) or the control group (receiving only health education). Social support levels were assessed using the Social Support Rating Scale (SSRS), while depression severity was measured using the Patient Health Questionnaire-9 (PHQ-9). Data were analyzed using t-tests and repeated measures ANOVA.

Results: The intervention group showed a significant increase in SSRS scores from a baseline mean of 1.109 to 4.012 post-intervention (p<0.001). Significant improvements were noted in all SSRS dimensions—objective support, subjective support, and support utilization. Depression levels (PHQ-9 scores) decreased substantially from 8.377±5.92 to 5.836±4.34 post-intervention (p<0.001), demonstrating a reduction in psychological distress. Additionally, treatment adherence was markedly higher in the intervention group, with 78.8% of patients achieving successful treatment outcomes compared to 70.5% in the control group. Loss to follow-up and mortality rates were lower in the intervention group, indicating a positive impact of psychosocial support on patient retention.

Conclusion: Comprehensive social support interventions significantly enhance treatment adherence, improve social support, and reduce depression among MDR-TB patients. Integrating psychosocial care into TB management is crucial for achieving better treatment outcomes.

Keywords: MDR-TB, social support, Morita therapy, tuberculosis treatment adherence, psychological intervention

INTRODUCTION

Tuberculosis (TB) is one among the highly contagious disease in India with increased mortality and morbidity. It poses a significant public health challenge in India, with highest global TB burden, accounting for about 26% of worldwide cases [1]. Globally, TB was responsible for approximately 1.25 million deaths and about 10.8 million people were affected in 2023, with a resurgence in cases following disruptions due to the COVID-19 pandemic [2]. Government of India (GOI) has launched ambitious initiatives to tackle TB and aims to eliminate it by 2025, five years ahead of the global goal set by the World Health Organization (WHO) [3]. In 2024, TB report highlight advancements in early detection, improved treatment access, and declining TB incidence and mortality. Over 25.5 lakh TB cases were notified, showing a substantial increase from 2022, with around 67% of cases reported through the public sector and 33% from private providers. [2] These advancements have been supported by enhanced case-finding efforts and the expanded use of molecular diagnostics, especially in decentralized health centres across India. Tamil Nadu has pioneered several innovative approaches, particularly focusing on high-risk populations and increasing the speed and accuracy of diagnosis. Through initiatives like TN-KET (Tamil Nadu Kasanoi Erappila Thittam) and the Chennai TB-Free Project, the state is reducing TB mortality rates, expanding diagnostic access, and strengthening community engagement in TB care [4,5].

Recent WHO reports also praise India's efforts, showing a 16% decline in TB incidence and an 18% reduction in mortality since 2015 [6]. Despite this progress, challenges persist, especially with drug-resistant TB (DR-TB), which continues to present lower treatment success rates, estimated at around 65% for multi-drug-resistant TB in 2023. These forms of TB are more difficult to treat and require longer and more expensive treatment regimens.

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MDR- TB is an emerging global threat due to increased transmission of drug-resistant strains and the treatment rates are on the lower side due to high rates of lost to follow up.

Usually, TB affects the most vulnerable group of people such as immunocompromised, malnourished, poor and low socioeconomic class people and present with HIV infection which contributes to double burden of HIV-TB [7,8]. Although there have been many new interventions implemented for TB treatment, the cure rates are on the lower side due to lack of social support, stigma related to treatment and loss to follow up. Effective management of MDR-TB is crucial to prevent its spread within communities and reduce the overall burden of drug-resistant TB. Notable recent advances include the development of the BPaLM treatment regimen, which offers a shortened, highly effective, all-oral course for multidrug-resistant TB (MDR-TB) [9,10].

As increasing trends of MDR-TB in recent era it's not only the medical care that is sufficient, patient also needs social support as it plays vital role in treatment completion and encourages patient to adhere with the treatment regimen. Comprehensive social support interventions have shown promising results by addressing the multifaceted barriers that patients encounter. These barriers include financial strain, social stigma, and psychological stress, which often hinder patients' ability to adhere to lengthy and complex treatment regimens. Comprehensive social support interventions provide various forms of assistance to patients, including counselling, education, and psychosocial support. These interventions help patients understand the importance of treatment adherence, address barriers to adherence, and provide motivation and encouragement throughout the treatment journey, which would result in better treatment outcomes and reduced risk of treatment failure or relapse. A randomized parallel group trial was conducted to find out the effects of the comprehensive interventions in the form of Morita therapy on the improvement of social support of MDR-TB patients.

METHODOLOGY:

A randomized, open labelled, parallel group trial was conducted to find out the effects of the comprehensive interventions in the form of Morita therapy on the improvement of social support of MDR-TB patients. The study was conducted in Northern Tamil Nadu (Tiruvallur, Kanchipuram) for a period of 24 months (February 2021 to February 2023). All newly diagnosed drug-resistant Pulmonary Tuberculosis patients registered for treatment under National Tuberculosis Elimination Program (NTEP) were included in the study. The patients aged more than 18 years, diagnosed with Drug Resistant TB, registered in National Tuberculosis Elimination Program (NTEP), under Intensive Phase of treatment after initial assessment following their written consent are included in the study. Pregnant and lactating mothers, the patients who are difficult to contact, those with history of severe complications, and migrants are excluded.

The sample size was calculated by keeping the power as 80%, alpha error 5% two-sided, smallest detected meaningful difference is 5, SD is 10 and the attrition rate of 10% attrition rate, total sample obtained was 132. There was a total of 28 Tuberculosis Units (TUs) was chosen from the study area, in which 14TUs in each was randomly selected in Tiruvallur district and Kanchipuram district respectively. About 5-6 study participants were selected from each TU using simple random sampling method, in order to avoid contamination among the subjects. Following which web-based block randomization (block size of 4) was done for randomly allocating study participants into both intervention and control group. Ethical clearance was obtained from Institutional Ethical Committee and the study was registered with CTRI – India [CTRI/2021/02/031196].

A pre-tested semi structured questionnaire was used to collect basic socio-demographic details, complete medical history of the DR- TB patients in both control and intervention groups. Multidimensional Social Support Rating Scale (Objective support, Subjective Support & Support Utilization), is a 10-item questionnaire for measuring social support, including objective social support (3 items), subjective social support (4 items), and utilization of social support (3 items) was used. Patient Health Questionnaire – 9 (PHQ-9) was used to monitor the severity of depression and response to the treatment among the participants in intervention group.

The study participants were randomly allocated to intervention and control group followed by collection of basic demographic details, disease characteristics by the principal investigator before the start of the study. Intervention group received psychotherapy, family and community interventions along with health education, whereas the control group received health education as for a period of 6 months. Intervention was given in once in two-month frequency. All interventions which was given to the infected individuals, except for the psycho-educational sessions in family and community support, were carried out in individual sessions (one to one sessions), rather than group settings to prevent the risk of cross-infection among patients. Health education on epidemiology of Tuberculosis, Diet modifications with low salt, high protein and Lifestyle modifications such as cessation of smoking and alcohol with regular physical exercises was given and the session lasted approximately for 30 minutes. Following the session the hand-outs were given to them.

Morita therapy which is a holistic approach aiming to improve the everyday functioning was delivered to patients at their home by Psychologist. Morita therapy seeks to re-orientate patients in the natural world and potentiate their natural healing capacity [11], inorder to for evaluate the psychological intervention every patient was asked to complete a diary provided during the study. Each session lasted for a period of half an hour for each patient.

Home visits, psychoeducational workshops and peer support was included as a part of family and community support mechanism. Home visits was conducted by community health workers and community administrator to create a relationship with the patient. Family members and friends of the patient attended psychoeducational workshop to receive knowledge about TB and to support the patients. Intervention was given for both the group for a period of 6 months and all the participants were followed up and the outcome was analysed with the help of SSRS reporting. The study protocol was elaborated in table 1 and table 2 for intervention and control group respectively.

Table 1: Study procedure and materials followed for intervention group:

	Intervention	Frequency	Trainers	Area	Participants
Intervention Group	Professional Training using guidelines (Health Education, Psychotherapy, SSRS* Reporting, Morita Therapy)	1 month (weekly twice)	Principal and Co-Investigators	Institutional	Medico-social workers Field workers RNTCP field workers
	Health Education on TB (30 minutes)	2 times	Medico- social workers & All Field workers	Home based	Patient, Caretaker and other family members
	Psycho-educational workshops to family members	2 times	Trained Field worker (1 male & 1 Female)	Home based	Family Members
	Scheduled home visits	10 times (Monthly Once)	All Field workers	Home based	Patient, Caretaker and other family members
	SSRS* Reporting	4 times	All Field workers	Home based	Patient, Caretaker and other family members
	Peer's Feedback Session	2 times	Cured MDR/DR individuals and Field Worker	Home Based	Patient, Caretaker and other family members
	Morita Therapy	8 sessions (30 mins /psychologi cal session)	Trained Field Worker (1 male and 1 female)	Home based	Patient only

Table 2: Study procedure and materials followed for Control group:

	Intervention	Frequency	Trainers	Area	Participants
Control Group	Health education on TB (at baseline)	1 time (30 minute)	Trained Field Worker	Facility Based	Patient Only

	SSRS Reporting	1 time	All Field workers	Home based	Patient, Caretaker and other family members

The outcome assessed was the level of social support, which was measured using the Social Support Rating Scale (SSRS). This comprehensive scale evaluates three aspects of support: objective support, subjective support, and support utilization. The SSRS produces a total score ranging from 12 to 66, where higher scores reflect greater availability of social support. Data entry was done in MS Excel and analysis done using Statistical Package of Social Sciences (SPSS) version 26 software. The normality of the data was tested by the Kolmogorov-Smirnov test. The categorical variables were represented as frequencies and percentage, and the continuous variables by Mean ± Standard Deviation. Factors influencing the effect of intervention were analysed by using t test and repeated measures of analysis of variance test (p value less than 0.05 was considered as statistically significant).

RESULTS

Randomized parallel control trial was conducted among MDR TB patients to assess the effect of Morita therapy on the improvement of social support. Basic demographic details of the study participants in both control and intervention group are elaborated in Table 3. The mean age was 46.7 ($\pm$ 3.9) years. Majority (51.5%) belongs to age more than 45 years and (48.5%) belongs to less than 45 years. Nearly two third of the study participants (70.5%, 71.2 %) were males and one third (29.5%, 28.8 %) were females in both the groups. Majority of the study participants belonged to Middle class (54.1 %, 42.4 %), followed by Lower middle (24.6%, 33.3%), Lower (11.5%, 15.2%) and Upper middle (9.8%, (9.1%) respectively, according to Modified BG prasad socio-economic classification (2024).

Table 3: Basic Demographic Characteristics of the Study Participants in Both Control and Intervention Group (N=132)

Variables	Control Group n (%)	Intervention Group n (%)
Gender Female Male	18 (29.5 %) 43 (70.5 %)	19 (28.8 %) 48 (71.2%)
Socio-Economic Class* Lower Class Lower Middle Class Middle Class Upper Middle Class	7 (11.5 %) 15 (24.6 %) 33 (54.1 %) 6 (9.8 %)	10 (15.2 %) 22 (33.3 %) 28 (42.4 %) 6 (9.1 %)
* Modified BG Prasad Classification (2024)		

Disease characteristics presented by the study participants in both control and intervention group were given in Table 4. About (93.4 %, 97%) of the participants were of Pulmonary Tuberculosis patients followed by Extra-pulmonary Tuberculosis (6.6 %, 3%). Majority of the participants (98.4%, 97%) showed non-reactive to HIV status and rest were found to be reactive (1.6%, 3%). About the regimen type, most of the participants in both the groups are under H mono/poly regimen (68.9 %, 43.9%), followed by MDR/RR (18%, 43.9%) and Oral longer MDR (13.1%, 12.2%) respectively. Regarding the diabetic status, nearly two third of the participants (70.5%, 81.8%) were non diabetic and others (29.5%, 18.2%) were diabetic. Most (78.7%) of the study participants in both the groups were cured after the start of the therapy followed by death (6.6%, 10.6%), treatment completed (8.2%, 6.1%), regimen changed (4.9%, 3%) and loss to follow up (1.6%, 1.5%) respectively.

Table 4: Disease Characteristics presented by the Study Participants (N=132)

Variables	Control Group n (%)	Intervention Group n (%)

| **Site of Disease**		
Extra Pulmonary	4 (6.6 %)	2 (3 %)
Pulmonary	57 (93.4 %)	64 (97 %)
HIV Status		
Non-Reactive	60 (98.4 %)	64 (97 %)
Positive	1 (1.6 %)	2 (3 %)
Regimen Type		
Oral (Longer MDR)	8 (13.1 %)	8 (12.2 %)
H mono/poly	42 (68.9 %)	29 (43.9 %)
MDR/RR – TB	11 (18 %)	29 (43.9 %)
Diabetic Status		
Diabetic	18 (29.5 %)	12 (18.2 %)
Non-diabetic	43 (70.5 %)	54 (81.8 %)
Outcome		
Cured	48 (78.7 %)	52 (78.8 %)
Died	4 (6.6 %)	7 (10.6 %)
Loss to follow up	1 (1.6 %)	1 (1.5 %)
Treatment completed	5 (8.2 %)	4 (6.1 %)
Treatment regimen changed	3 (4.9 %)	2 (3)
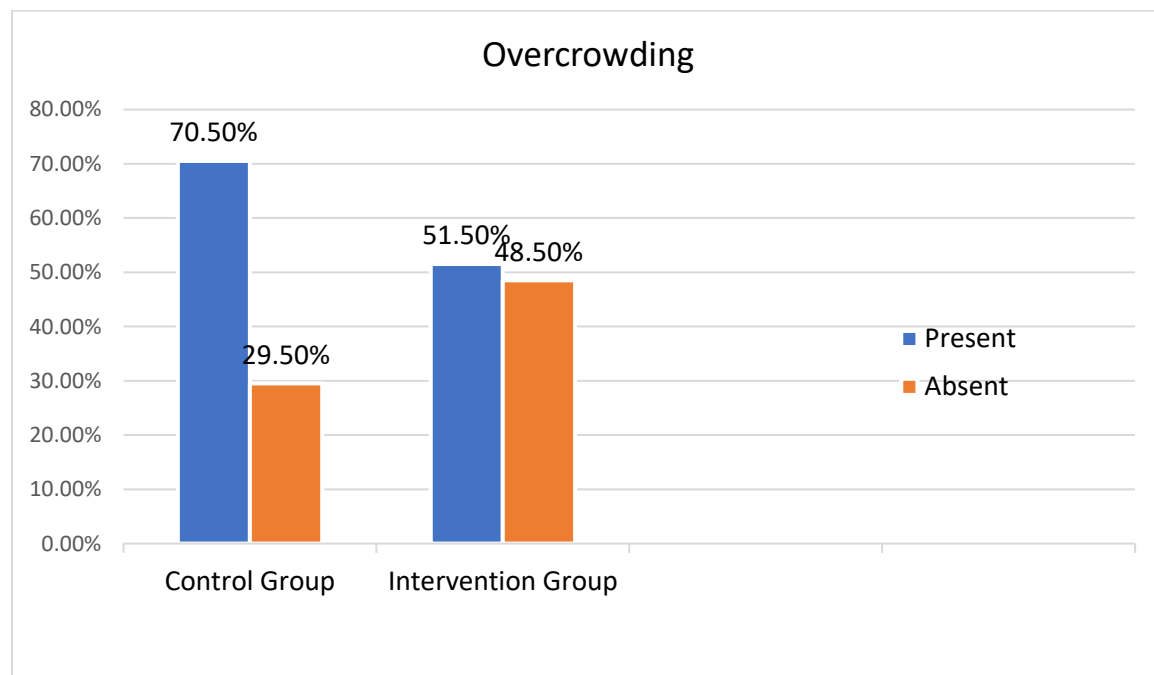
Figure 1 – Diagrammatic representation of overcrowding among control and intervention group (N =132)

Representation of history of overcrowding among the control and intervention group is elicited in figure 1. Nearly two-third of the participants (70.5%) in control group had history of overcrowding, while in intervention group half of them (51.5%) had similar history.

Table 5: Association between treatment outcome, BMI and Total Score (N = 132)
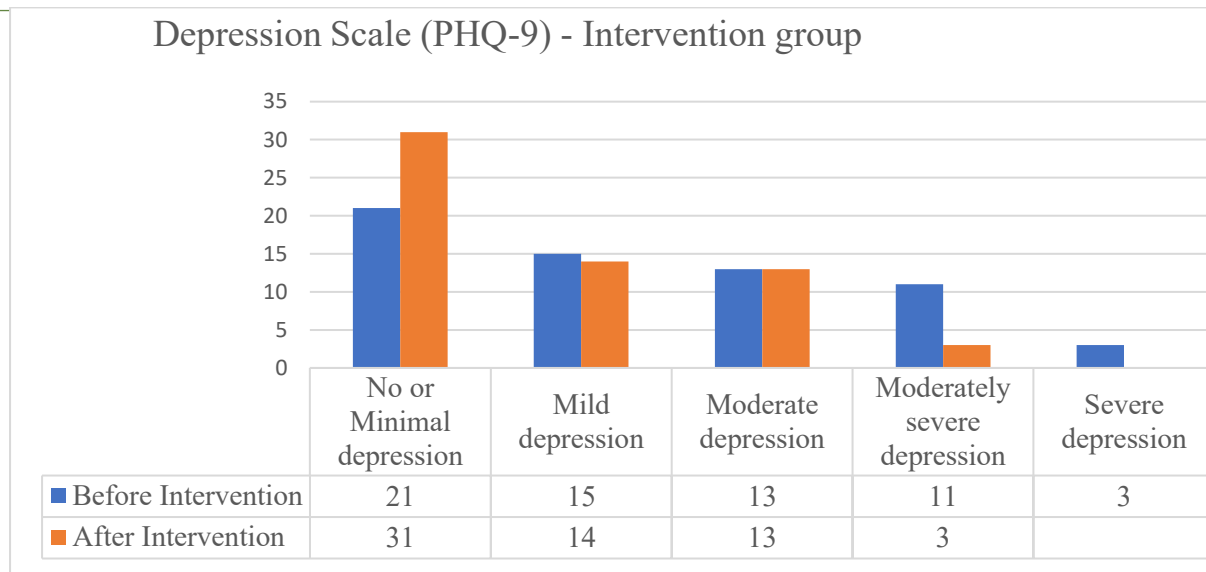
Figure 2 – Diagrammatic representation of status of depression among intervention group using PHQ 9 questionnaire (N =132)

Representation of status of depression among the intervention group is shown in figure 2. Nearly one - third of the participants (21) had no or minimal depression at the start of the study followed by mild (15), moderate (13), moderately severe (11) and severe depression (3) respectively. After intervention such as psychotherapy, health education, counselling sessions for the friends and family members of the Tuberculosis affected patients there is a huge positive shift of depression status. Nearly half of them (31) were free from depression and the severity of depression was reduced with most falling under mild (14), moderate (13) and very less under severe depression (3).

Table 6: Effects of Intervention on depression status among the study participants

Depression score (PHQ 9)	Mean±S.D	95% CI		T Value	p value
		Lower	Upper		
Before intervention	8.377±5.92	1.5764	3.5056	5.269	**0.000** **(p 0.05 is significant)**
After intervention	5.836±4.34				

Table 6 shows a decrease in mean depression score from 8.377±5.92 before intervention to 5.836±4.34 after intervention. The 95% CI ranged from 1.5764 to 3.5056, with a t-value of 5.269 and a p-value of <0.001, demonstrating a statistically significant reduction in depression scores.

Table 7: Effect of intervention by comparing SSRS in both control and intervention group

Variables	Mean±S.D	95% ci		T	p value
		Lower	upper		
Tot1(con)	1.192±0.27	-0.1308	-0.0152	-2.526	**0.014***
Tot2(con)	1.265±0.27				
Total 1(in)	1.109±0.16	-3.2298	-2.5771	-17.786	**0.000**
Total 4(in)	4.012±1.28				
Total 2(con)	1.265±0.27	-3.0734	-2.4208	-16.662	**0.000**

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Total 4(in)	4.012±1.28	-3.0761	-2.4181		
* *p < 0.05 – significant					

The effect of intervention on total SSRS scores between control and intervention group is given in table 7. The total SSRS score and scores of its three dimensions (objective support, subjective support and support utilisation) all showed an increasing trend in two groups during the intervention, but this trend was more obvious in the intervention group. The participants among the control groups were interviewed twice during the study period, at the baseline and at the end of the intervention. The minimal changes among the control group participants are documented, whereas in interventional group there was an increasing pattern. The baseline mean score of 1.109, during the first visit the mean score of 1.915, by the end of second and third visits the mean score of 3.200 and 4.012 respectively. Mauchly's test of Sphericity is about .000 which suggest that the assumption is met for the study that implies that the interventions play and vital role in changing the objective support, subjective support and the support utilization in improving the quality of life among Tuberculosis patients. Reducing the stigma and also creating awareness about the disease is mandatory for the family members and friends of the patients for better social support to the TB infected patients.

DISCUSSION

Basic demographic details
The current study was done among the MDR TB patients to assess the effect of Morita therapy on the improvement of social support. Among 132 study participants, nearly two-third were males (70.2%) followed by females (29.5%). Similar findings were seen in the study conducted by Yin J, Wang et al in China, this could be because of the increased exposure and prevalence of infection among males compared to females, may be aggravated by other factors like smoking, alcohol and other substance usage [12]. Mean age of the study participants was 46.7 ± 3.9 years which is in contrast with the findings reported by V Balaji et al was 37.3 ±14.2, could be due to influencing factors like lifestyle habits, immune condition and exposure rates [13]. In the current study, regarding socio-economic status, nearly half of them belonged to middle class (54.1%, 42.4 %) in contrast with the study conducted by Tiwari R et al in Gujarat showed around 61.1 % people were belonging to below poverty line (BPL) which explains that tuberculosis is most of the cases linked with lower socioeconomic status this could be due to lack of awareness, poor housing standards, overcrowding among the people belonging to BPL [14].

BMI of the study participants
BMI is one of the vital predictors of TB and nutrition. In the study nearly half of the subjects (58%) were found to have normal BMI, followed by overweight (18%), underweight (15%) and obese (8%) respectively. In comparison to the study conducted by Hyun- Oh Park et al in Korea reported that around 24.3% were belonging to low BMI[15,16]. The reason might be due to the effect of chronic disease which affects the body as a whole and results in increased loss of appetite and weight loss among the affected individuals.

HIV status among the study participants
HIV-TB coinfection poses a major challenge in management of cases, leading to increased mortality and morbidity among the affected individuals. In the current study, majority of the study participants were non-reactive (97.7%), whereas 2.27% had positive status, in comparison with the study conducted by Sethi S et al in Northern India reported that 20.1 % were seropositive for HIV[16]. Similar to the study findings the study conducted by Mondal T et al, in Northern West Bengal showed that prevalence of HIV-TB coinfection is 3.91% among MTB positive cases [17]. HIV-TB co infection is more lethal than the disease occurring alone, the progress of adverse effects is huge and is more challenging for their improvement following treatment and survival[17].

Diabetic status among the study participants
Diabetes and Tuberculosis are most likely linked with each other as both of them causes immunosuppression, weight loss, insomnia and mental illness. Knowing diabetic status among Tuberculosis helps to plan the treatment accordingly and also to view the treatment outcome of the patient. In the present study majority of the participants (74%) were non-diabetic and (26%) were diabetic. Similar findings with the present study reported by HS Subhash et al at South India showed around 26% of the participants those who are resistant to first line of ATB were diabetic[18].

Depression status assessment among the intervention group participants
PHQ-9 questionnaire has been used among the study participants belonging to intervention group (61), In which there is a dramatic positive shift of status of Depression among the participants following intervention. Before intervention the study participants among 61 majority (32.7%) were belonging to no depression and 17 among them (29%) belonged to moderately depressed, 11 among them (18%) were classified as moderately severe depression followed by mild depression and severely depressed about (16.3%) and (5.0%) respectively. A study conducted in Pakistan by Javaid A et al revealed that 43.9% of patients with MDR-TB were diagnosed with

depression upon their initial registration [19]. Following the intervention most of the depressed individuals were free from their symptoms and majority were categorized under mild and no depression. The severity of depression was reduced following the intervention therapy.

Changes in SSRS among the control group and intervention group

At baseline, the average scores of SSRS, objective support, subjective support and support utilisation of 61(control) participants were 1.192 and 1.265 respectively. Both the overall SSRS score and the scores for its three components—objective support, subjective support, and support utilization—exhibited an upward trend during the intervention, with the intervention group indicating a significant rise. All four of these scores were higher in the intervention group than in the control group at the end of intervention. The participants among the control groups were interviewed twice during the study period, at the baseline and at the end of the intervention. The minimal changes among the control group participants were due to lack of awareness about the disease also the inability to overcome the burden caused by the disease. But in intervention group this trend follows an increasing pattern due to various interventions given. Similar results was seen in the study conducted by Li X et al in elderly people affected with TB in China reported there was improvement in the scores in both groups, but seems to be higher among those in intervention group compared to those in control group [20,21].

CONCLUSION

MDR-TB treatment can be physically and emotionally challenging for patients. The social and psychological support provided through comprehensive interventions, such as individual or group counselling, peer support, and mental health services, can significantly improve patients' psychological well-being. Addressing mental health issues, reducing stigma, and enhancing coping mechanisms can positively impact patients' overall quality of life during the treatment process. Morita therapy, also known as Morita Naikan therapy is a form of psychotherapy that emphasizes accepting and normalizing the natural fluctuations of emotions that individuals experience. Instead of trying to eliminate or control emotions, the therapy encourages individuals to accept their emotions as a part of the human experience. Morita therapy supports individuals with TB in managing the psychological and emotional aspects of their illness. This therapy can assist individuals in coping with their emotions, managing stress, improving treatment adherence, and enhancing overall well-being.

Strengthens and Limitations

However, the study has some limitations. The relatively small sample size (n=132) may restrict the generalizability of the findings to a larger population. The open-label design, where participants and investigators were aware of the intervention, may have led to observer bias. Despite these limitations, the study provides valuable insights into the role of comprehensive combining Morita therapy, psychotherapy, social support mechanisms, and health education which provides a holistic approach in improving the treatment adherence and mental well-being among MDR-TB patients.

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