Original Article

The Effectiveness of Cognitive Behavioral Therapy (CBT) and Recreational Activities on Psychological Morbidities and Quality of Life (QOL) in Traumatic Spinal Cord Injury: A Pilot Study an Original Research Article

[1]Lakshita Jaya, [2]Rama Kumar Sahu

[1]MOT (Neuro Rehabilitation) -Occupational Therapist, Department of Physical Medicine and Rehabilitation, JLN Medical College and Hospital, Ajmer, Rajasthan, [2] Senior Occupational Therapist CUM Junior Lecturer, Department of Occupational Therapy, Svnirtar, Cuttack, Odisha

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Abstract

Background: Spinal Cord Injury (SCI) presents with life changing consequences altering the physical, social, vocational aspects of a person at the same time leading to multiple psychological morbidities. Depression, anxiety, and Post Traumatic Stress are the three most common psychological issues seen in SCI population. Alterations to basic physiologic functions, intense emotions, disruption of social relationships, and barriers to participating in their usual activities – leads to a compromise in their Quality of Life (QoL). Cognitive Behavioral Therapy(CBT) administered along with recreational activities could prove to an effective mode of intervention for better mental health and QoL of traumatic SCI patients.

Objectives: To evaluate, as a pilot feasibility study, the preliminary effects of CBT combined with recreational activities on stress, anxiety, depression, and QoL in patients with traumatic SCI.

Study Design: Pilot pre–post feasibility study

Methods: A total of 30 subjects were taken for the study as per the inclusion criteria, outcome measures used were DASS-21 and WHOQOL-BREF. Total duration of therapy was 6 weeks. 1 session for 2 hours per week was taken for initial 3 weeks. In the last 3 weeks 2 sessions per week for 2 hours duration was administered. Each session was followed by 15 minutes of recreational activities. Therapy was administered in a group mode.

Results: Wilcoxon signed rank test revealed that there was preliminary improvement in DASS scores post intervention ($Z = -4.183$, $p = <0.001$). Similarly, a statistically significant increase in QoL was seen post intervention ($Z = -4.375$, $p = <0.001$).

Conclusions: Administration of CBT along with recreational activities to subjects with Depression, Anxiety and Stress and reduced QoL post traumatic SCI appears feasible and shows promise as an intervention; results are preliminary and will inform a larger definitive trial.

Key Words: Spinal Cord Injury, Post Traumatic Stress Disorder, Cognitive Behavioral Therapy, Quality of Life.

Corresponding Author: Lakshita Jaya, 31, Gaurav Enclave, Harvilas Sharda Marg, Civil Lines, Ajmer, Rajasthan-305001

E-mail: lakshitajaya3@gmail.com

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Introduction

Traumatic SCI is a sudden and life-altering occurrence that profoundly affects an individual's health, capabilities, involvement in society, and overall well-being. Typically deemed as a permanent condition, any potential recovery of function is largely constrained to the initial two years after the injury. Beyond this timeframe, significant improvements in functional abilities are rare, leading to mostly minor changes, but there can be enduring effects on one's quality of life and mental health.[1] SCI involves not only severe physical, social, but also psychological consequences.[2] SCI population has higher incidences of psychological morbidities when compared with the general population.[3] The prevalence of depression is notably higher, nearly twice as much, within the population of individuals with SCI when compared to the general population.[4] While this heightened incidence has traditionally been attributed to the psychological, economic, and social challenges inherent to SCI. More than half of the considerable number of individuals undergoing rehabilitation after experiencing a SCI encountered difficulties related to anxiety and somatization, which involves physical symptoms arising from psychological distress.[5] Post-Traumatic Stress Disorder (PTSD) represents another commonly observed health issue among individuals with SCI, with its occurrence ranging in prevalence from 7% to 44%.[6] Thus, Depression, anxiety, and PTSD have become the three most common psychological morbidities in the SCI population.[7] QoL is a term used to evaluate individuals' wellbeing in a wide range of contexts. For patients with SCI, achieving a satisfactory QoL is a primary goal of treatment and rehabilitation.[8] Individuals who sustain SCI must adjust immediately to a new way of life that is often characterized by significant physical limitations, alterations to basic physiologic functions, intense emotions, disruption of social relationships, and barriers to participating in their usual activities – essentially, every possible area compromising quality of life (QoL).[9] CBT is a structured, short termed, present oriented psychotherapy directed toward solving current problems and modifying dysfunctional (inaccurate and/or unhelpful) thinking and behaviour[10] Individuals who experience high levels of anxiety and depression can benefit significantly from therapies such as CBT. In fact, research suggests that individuals with SCI can be `immunized' against anxiety and depression if CBT is provided early on in their rehabilitation following injury. Levels of recreational activities significantly decreases post injury; multiple studies have been carried out to see whether there exists any correlation between recreational activity indulgence and QoL in SCI patients. Given the exploratory nature of this research, the present work was conceived as a pilot study to assess feasibility, acceptability, and to generate preliminary effect-size estimates for planning a larger, adequately powered trail.

Rationale

Psychological morbidities are common after SCI. A meta-analysis reported the point prevalence of diagnosed depression to be approximately 22% (95% CI 18.7–26.3).[11] Clinically significant anxiety symptoms have also been documented in SCI cohorts, with some studies reporting rates as high as 40–45%.[12] Given this high burden, psychological interventions are an important component of SCI care. Evidence-based reviews indicate that CBT is a promising approach for improving depression, anxiety, adjustment and coping after SCI,[13,14] with group and individualized CBT trials reporting improvements in mood and psychosocial functioning.[15] In recognition of these findings, recent psychosocial care standards and regional SCI guidelines recommend routine psychological assessment and the provision of evidence-based treatments, including CBT, as part of the multidisciplinary rehabilitation pathway.[16] Combining CBT with structured recreational activities may therefore address both symptom reduction and broader QoLr outcomes, and testing that combination in SCI patients could support a validated treatment protocol for psychological morbidities in this population.

Methodology

STUDY DESIGN: Pilot pre–post feasibility study

STUDY POPULATION: Spinal Cord Injury Patients (Traumatic onset with all levels of lesions)

STUDY PLACE: Occupational Therapy Department, Swami Vivekanand National Institute of Rehabilitation Training and research (SVNIRTAR), Olatpur, Cuttack.

SAMPLE SIZE: 30

SAMPLING METHOD: Random Sampling

DURATION OF THE STUDY: From Oct 2021 to June 2023.

Inclusion Criteria

1. Traumatic SCI patients (ASIA- A to D)
2. Age: 18 to 60 years
3. Both male and female.
4. Subjects having Mild to severe depression, anxiety and stress on

   Depression, Anxiety, and Stress Scale–21 (DASS 21)
5. Subjects able to read and write in at least one Indian language.

Exclusion Criteria

1. Non- Traumatic Spinal Cord injury
2. Subjects having DASS 21 score for Depression less than 9, Anxiety less than 7, Stress less than 14.
3. Currently under any other psychotherapeutic treatment.
4. Taking antidepressants/mood stabilizers in the last 2 months prior to inclusion in the study
5. Acute suicidal ideations

Screening Tools

1. Medical Records and History taking
2. ASIA Impairment Scale
3. Depression, Anxiety, and Stress Scale–21

Outcome Measures

1. Depression, Anxiety, and Stress Scale–21
2. World Health Organization Quality of Life – BREF Scale

Data Collection

SCI patients were identified, and the ASIA Scale was used to confirm their diagnosis. All levels of injury and all grades on the ASIA Scale were considered for inclusion in the study. Prior consent was obtained from the patients. Subjects meeting the predefined inclusion criteria were enrolled. The study's objectives and procedures were explained to the patients, demographic data and basic medical history were recorded.

The DASS-21 (Depression, Anxiety, and Stress Scale - 21 items) was administered to the patients. Those scoring within the criteria for mild to extremely severe depression, anxiety, stress, or a combination of these conditions were included in the study. Additionally, the WHOQOL-BREF scale was used to assess the participants' quality of life. Data was collected using these scales before and after the intervention.

The intervention utilized the FEAR Model of CBT (Stephen Lenz) Permission was obtained from the author, and A permission was taken from Texas A&M University, United States, to access and utilize the original manual for the intervention.

A total of 30 subjects were taken for the study and were administered with the CBT protocol for a period of 6 weeks. 1 session for 2 hours per week for initial 3 weeks. In the last 3 weeks 2 sessions per week for 2 hours duration was administered. Every CBT session was followed by 15 minutes of recreation-based activities.

CBT Protocol

Time	Technique/ Protocol
Week 1	Introduction to relationships between Situations, feelings and thoughts. Building a Therapeutic Relationship
Week 2	Identifying venerable thoughts and associated feelings. Working on the cognitive model- identifying Automatic thoughts and beliefs of the client.
Week 3	Identifying negative automatic thoughts and using coping self-talks. Challenging Automatic Thoughts
Week 4	Introducing problem solving strategies and informed decision making as attitudes and actions for self-help
Week 5	Incorporating CBT techniques into daily routine and lifestyle. Deep Breathing Progressive Relaxation Meditation techniques
Week 6	Termination of treatment, evaluating treatment gains and developing future skills

Patients were engaged in board games like carom board, story narration, ball catch and throw (those with required physical capabilities) and charades as a form of recreation-based intervention activities.

Results

A total of 30 patients participated in the study, 23 Males and 7 females. The age range of the patients was 34.60 $\pm$ 4.6. 10 patients were ASIA D, 11 patients were ASIA C, 4 patients were ASIA B and 5 patients were ASIA A.

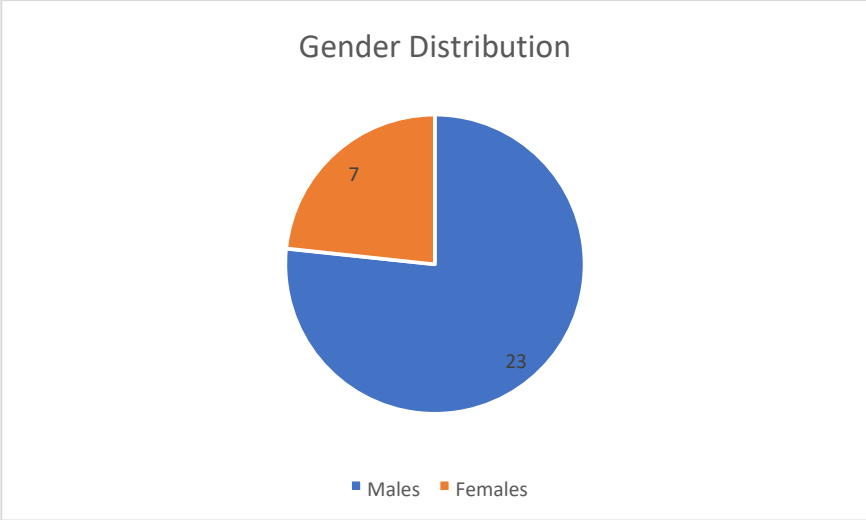

Figure 1: Shows the gender distribution of the SCI population.

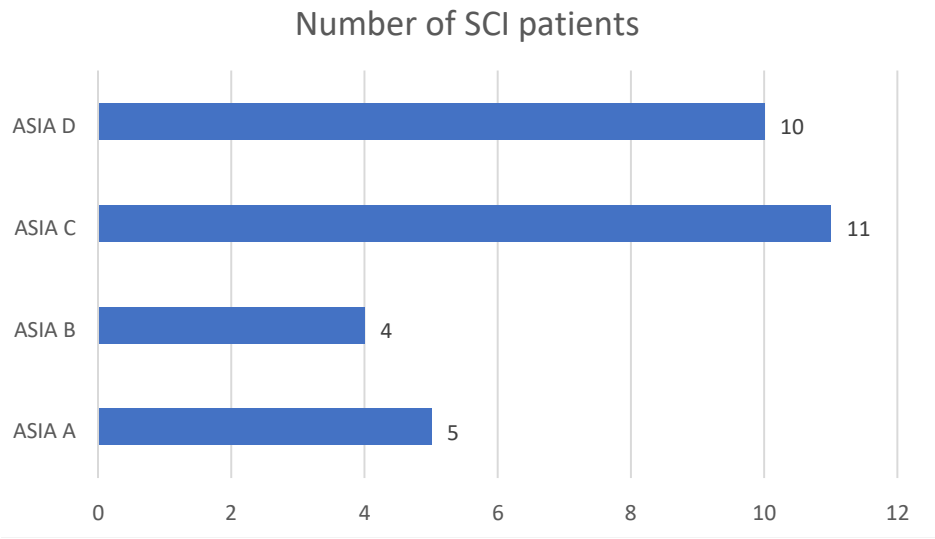

Figure: 2 depicts the distribution of SCI patients according to the ASIA Scale.

A Wilcoxon signed rank test was administered which revealed that the scores of the DASS-21 scale were significantly lower after the intervention (Md= 58.5 N=30) as compared to before the intervention (Md = 65 N=30), Z= -4.183, p< 0.001 and with a large effect size of r = 0.55.

Analysis for improvement in DASS-21 Scores			
PRE-TEST MEAN	**POST-TEST MEAN**	**Asymptotic Sig. (p)**	**Test statistic (Z)**
62.1 ± 17.35	58.96 ± 17.27	<0.001	-4.183

Figure 3: Shows the pretest- posttest analysis. It is observed that there is a statistically significant improvement in the DASS-21 scores post intervention.

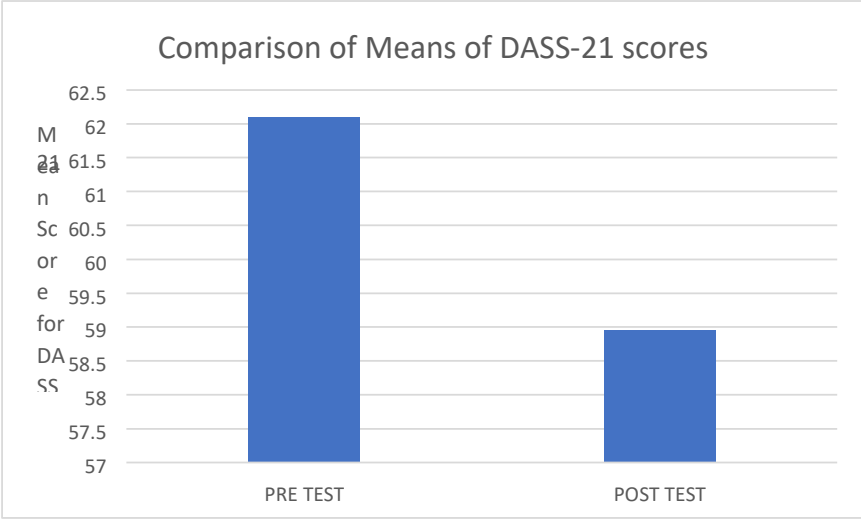

Figure: 4 depicts the graphical representation of pre and post test mean DASS-21 scores. There is a decrease in the mean score post intervention.

Wilcoxon test was further administered to evaluate whether there were any changes post CBT in the Quality of life of SCI patients. The tests revealed a statistically significant increase in QoL post intervention Z= -4.375 p< 0.001 and with a large effect size of r = 0.56.

Analysis for improvement in QoL Scores			
PRE-TEST MEAN	**POST-TEST MEAN**	**Asymptotic Sig. (p)**	**Test statistic (Z)**
40.81 ± 10.62	48.95 ± 11.25	<0.001	-4.375

Figure: 5 shows the pretest- posttest analysis. It is observed that there is a statistically significant improvement in the QoL scores post intervention.

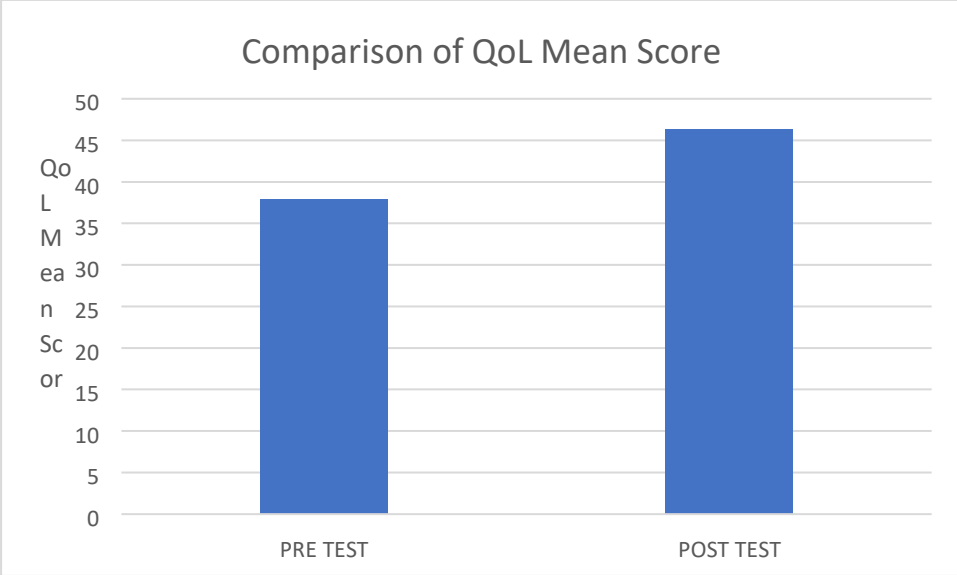

Figure: 6 the graphical representation of pre and post-test mean QoL scores. There is an increase in the mean score post intervention

Given the pilot nature of the study, analyses emphasize effect sizes and confidence intervals alongside descriptive statistics, with hypothesis testing interpreted cautiously.

Discussion

A longitudinal cohort study conducted in the United States reported that psychological morbidities were present in **59.1% of adults with spinal cord injury**, compared to **30.9% among matched controls without SCI,** indicating a substantially higher burden of mental health disorders—including anxiety, depression, post-traumatic stress disorder, and mood disturbances—within the SCI population.[17] There is a requirement for clinical initiatives aimed at enhancing mental health assessments and implementing specific interventions to lower the likelihood of psychological health problems emerging among those with traumatic SCIs[18] While factors like the level of spinal cord lesion, age, age at the time of injury, sex, time since injury, and completeness of the lesion have shown inconsistent links to lower QoL) among individuals with spinal cord injuries (SCI), certain negative psychological states and the intensity of pain have demonstrated a consistent impact on QoL.[19] The CBT model proposes that psychopathology is the product of faulty information processing that manifests itself in distorted and dysfunctional

thinking, which directly leads to negative emotions and maladaptive behaviours. Thus, the CBT therapist works with the patient to identify evaluate and then modify distorted cognitions to produce more realistic and adaptive evaluations.According to a recent scoping review by Shu-Hua Yang et al CBT is the most commonly used psychological intervention in SCI and may be effective in improving symptoms of depression, coping and adjustment in adults following SCI. However, it mentioned that more elaborate and multifaceted cognitive behaviour interventions, especially to strengthen self-identity and to inspire patients' hope, is a requirement for the future.[20] The present study incorporates recreation-based activities and CBT protocol together as recreational activities are known to be associated with enhancing QoL in normal population.[21] The use of recreational activities for promoting mental health especially in neurological conditions has not been widely studied in the past thus paving way for further scope of research with isolated intervention. The results indicated that there was statistically significant improvement in Depression, Anxiety and Stress Scores post intervention, similar results were seen for Quality of life of SCI patients. The mean domain score of the four domains of WHOQoL were calculated and it was seen that the Physical domain of WHOQoL showed the most improvement post intervention followed by the Social Relationship domain, psychological domain and Environmental domain. For DASS-21 the mean improvement in scores was the most for the Depression subset followed by the Anxiety Subset and Stress Subset. Psychotherapies such as interpersonal therapy, problem-solving therapy, Mindfulness Based Cognitive Therapy, Mindfulness Based Stress Reduction, Dialectical Behavioral Therapy, Acceptance and Commitment Therapy and Yoga are widely in use for multiple psychological morbidities post neurological conditions, however the effectiveness of each of these in isolation or in combination on specific subsets of psychological conditions would be an interesting topic of exploration for the future.

Conclusion

The present study suggests that CBT combined with recreational activities is feasible and shows promise in reducing psychological morbidities and improving QoL in SCI patients. These findings are preliminary and support the need for a larger, adequately powered randomized trial. A deeper understanding of the mechanisms of these psychotherapeutic interventions would help occupational therapists to build a better understanding of specific interventional strategies in patients of Traumatic Spinal Cord Injury with psychological morbidities and decreased QoL.

Limitations & Future Recomendations

1. **Small sample size:** The limited number of participants is consistent with the pilot design; hence, the study was not powered to draw definitive conclusions about efficacy.
2. **Single-center study:** Conducted at one rehabilitation institute, which may restrict generalizability of results to other settings or populations.
3. **Short intervention and follow-up period:** The six-week duration did not allow assessment of long-term effects or sustainability of improvements.
4. **No control group:** Absence of a comparison group makes it difficult to rule out natural recovery or placebo effects.
5. **Heterogeneity of participants:** Variations in injury level, completeness, and duration since injury were not controlled and may have influenced outcomes.
6. **Future direction:** Larger, multi-centre randomized controlled trials with longer follow-up are recommended to validate and extend these preliminary findings.

Ethical Considerations

The study was conducted in accordance with the **Declaration of Helsinki**. Although formal approval from an Institutional Ethics Committee (IEC) could not be obtained due to the absence of an external or university-level IEC at the **National Institute for Rehabilitation Training and Research (NIRTAR), Odisha**, the research was reviewed and approved by the **Internal Scientific Committee** (Approval dated **4 January 2024**, Ref. No. [MOT/08/2021].

All participants provided **written informed consent**, and confidentiality was maintained throughout. The **CBT intervention** was administered by the first author, **Lakshita Jaya**, **Occupational Therapist**, JLN Medical College and Hospital, Ajmer, who holds a **Master's in Occupational Therapy (Neurological Rehabilitation)** with formal training in **CBT and Cognitive Rehabilitation**, including a **15-hour certified course on Essentials of CBT**.

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Conflicts of Interest Statement: No conflict of interest involved**.**

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