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Expert Opinion Article

"Impact Of Mobility On Participation Restriction In Individuals With Spinal Cord Injury"

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ABSTRACT

Background And Objective: Traumatic Spinal Cord Injury is considered as a major disability and also life threatening condition that carries a high risk of morbidity and mortality also face challenge in the in social participation once they enter the community due to which quality of life of an individual with SCI is affected. It is essential to understand how people with SCI live with the overall physical, social and attitudinal environment in which they experience their day-to-day lives and many factors acts either as barrier or facilitator to the person with SCI. Mobility whether independent or supported by assistive devices is a vital aspect of functional autonomy and plays a key role in enabling individuals to participate in society. (1) Therefore, this study aimed to identify the factors influencing mobility related participation restrictions in individuals with spinal cord injury.

Study Design: A cross sectional study.

Materials and Methods: Details of patients with traumatic spinal cord injury were collected from KLE Hubli co-operative hospital, Rehab centers in and around Hubballi, Karnataka and a total of 30 individuals were interviewed face-to-face using the CHART-SF questionnaire, administered in the local vernacular language. Responses were recorded and scored according to the CHART-SF manual guidelines.

Results: Descriptive analysis was used for finding mean, median an standard deviation and the median scores for the CHART-SF Mobility domain was **14 severe handicap**, All statistics were done with SPSS version 26.0. A probability value of $p \leq 0.05$ was considered to indicate a significant difference.

Conclusion: Thus, there is a strong need to focus on planning the better rehabilitation and awareness programs for the betterment of quality of life of people with SCI highlighting on major aspects/factors affected under domain mobility, in and around Huballi.

Keywords: Traumatic Spinal cord injury, Mobility, Participation, Barriers, QOL

Introduction and Need for the study:

A traumatic spinal cord injury is a devastating event with negative physiological, psychological and social consequences for an individual and also an economic burden on society. In addition to neurological effects on motor, sensory and autonomic functions, spinal cord injury affected individuals are at higher risk of developing complications which is influenced by presence of impairment directly or indirectly.(2) In In the Indian context, the incidence rate of spinal cord injury (SCI) ranges from 9.2 to 56.1 per million population, with around 20,000 new cases reported annually. Studies indicate that the mean age of male patients is approximately 34.81 years, while for females it is around 38.60 years. This highlights a higher incidence among the younger, more active, and economically productive segment of the population. (3)

WHO defines participation as "involvement in a life situation" and regards it as an essential aspect of health and well being. Through participation we learn about the expectations of society, learn to communicate, and get successful in the community needs. (4)

Social interaction and a high quality of life depend on Mobility. Traumatic spinal cord injury patients have enough residual motor control in their lower extremities to walk. Enhancing walking function involves training and practice, as well as the use of assistive technology or stimulation to improve balance and function. For at least some of their mobility demands, the majority of people with spinal cord injuries rely on wheelchairs and also mobility is affected by environmental barriers defined as physical impediments that prevent individuals from functioning optimally in their surroundings and include safety hazards, access problems and home and work place design difficulties. Encountering environmental barriers (physical structures, assistance, discrimination) and inadequate social participation (difficulty in participating at home, work, school or reestablishing relationships) have been reported in higher extent in the spinal cord injury population. Spinal cord injury can result in limitation of activity, decreased community participation, all of which will negatively affect the quality of life. (5)

As one of the principle of ICF says that the environmental influence and social factors plays an

important role in people's functioning , thus eliminating or minimizing the barriers is essential to maintain the health and well being, preventing the acute and chronic co-morbidity and maximizing quality of life. (6)

As a community based rehabilitation therapist, our role is to promote health and wellness in public. CBR personnel gives education regarding the condition, identify the risk factors involved, prescribe exercise, promote physical activity and plan the interventions in the community setup and using available resources, which is consistent with a biopsychosocial paradigms. (7) The physical rehabilitation planned by the CBR personnel includes, high incidence of serious but preventable complications following SCI, that the suitable intervention could yield large health and social benefits at relatively less cost. This type of holistic approaches are important and should be provided to patients following discharge, as these patients are vulnerable to complications. Hence to change patients perception regarding their own health and prevention of complication, physiotherapists must take active participation in health education programs.

The Craig Handicap Assessment and Reporting Technique (CHART) was developed to assess the WHO dimensions of handicap is used to identify the participation restriction.(8) Craig Handicap Assessment and Reporting Technique - Short Form (CHART-SF) is the commonly used measurement instrument for studies in SCI by many authors, observed factors affecting social participation for individuals with spinal cord injury. Conceptual and methodological issues concerning the measurement of environmental factors and participation in people with disability is still under debate. These instruments were designed to provide a simple, objective measure of the degree to which impairments and disabilities result in handicaps in the years after initial rehabilitation.

In Indian scenario various factors such as physical barriers, economic challenges, and limited transportation infrastructure restrict mobility, which in turn impacts the social participation of individuals with spinal cord injuries. (9)

Here by, the need and purpose arise to identify the impact of mobility on participation limitations among the spinal cord injured population in our community as they work to reintegrate and to explore additional avenues for promoting their full community participation.

Materials and Methods

Source of Data: KLE Hubli co-operative hospital, Rehab centers in and around Hubballi, Karnataka

Study Design: Cross sectional study

Study Period: **1** month from the institution Ethics Committee Approval.

Sample Size: A series of 30 consecutive SCI participants aged 18 years to 65 years will be enrolled in this study.

Sampling technique: Convenience sample

Inclusion Criteria: One year post traumatic spinal cord injury patients belonging to age group of 18 years – 65 years, either of the genders are included with ASIA (American Spinal Injury Association) score from A-D. (1)

Exclusion Criteria: Patient not willing to participate are excluded.

Study protocol:

Objective: To identify the impact of mobility on participation restriction in the patients with traumatic spinal cord injury using CHART-SF.

Method of the study: The the ethics approval from the Institution Ethics Committee (JGMMMCIEC - F-066/2025) was obtained on 22nd February 2025. Written informed consent was taken from the study participants. The data collected was kept confidential and was delinked from the personal identifiers.

Data collection procedure: In this cross sectional study design the demographic data of participants Age, Gender, Location, Occupation, Economic status, Education, Onset of disease, Treatment history was collected, ASIA scoring was obtained for each participant. Participant were interviewed face to face, by the primary investigator. The CHART-SF questionnaire, which encompasses six domains, included the mobility component as one of the key areas of assessment was used and socioeconomic status is assessed using B G Prasad scale which is a reliable and valid scale for North Karnataka population. Responses were scored in 100 point scale for mobility domain respectively using the formulas and calculation as per the questionnaire. The CHART-SF scoring Interpretation was based on scoring ranges, where a score of 0–25 indicated a severe handicap, 26–50 a moderate handicap, 51–75 a mild handicap, and scores above 75 were considered to reflect no handicap (with 75 as the cutoff score). Percentile scores for each domain were then calculated manually using the prescribed guidelines. The data obtained is analyzed by using the SPSS version 26.0

Results:

The analysis of mobility scores in relation to demographic variables reveals critical insights into the functional capacity of the respondents. Among all variables considered, location and economic status showed statistically significant differences in

mobility scores, while others displayed interesting but non-significant trends.

Location emerged as a key determinant (p = 0.043), with rural respondents having a substantially higher mean mobility score (19.07) compared to their urban counterparts (7.40). This difference may reflect the physical demands of rural life, which often necessitate more activity and movement. In contrast, urban dwellers might rely more on assistive aids, infrastructure, or may experience greater environmental barriers to mobility, such as crowded or inaccessible spaces.

Economic status also showed a statistically significant association with mobility (p = 0.009). Class 4 individuals had the highest mean score (24.50), while Class 1 had the lowest (7.80). This gradient likely indicates that better economic conditions afford greater access to rehabilitation services, assistive devices and overall better health management. Lower-income groups may lack such support, contributing to poorer mobility outcomes.

Though gender did not reach the conventional threshold for significance (p = 0.052), females had a higher mean mobility score (21.50) than males (16.60). This could suggest that women in this cohort may have maintained better mobility, possibly due to continued engagement in household tasks and care giving roles, which inherently require movement.

Age groups showed no significant difference (p = 0.994), and the mean scores were relatively uniform across all age brackets. This suggests that age alone might not be a strong predictor of mobility limitations in this group, especially if other supportive factors such as economic resources or physical activity levels are present.

Education level also did not show significant associations with mobility scores (p = 0.239), though there was a downward trend in mean scores among graduates (12.20) compared to those with primary education (20.82). This inverse relationship may be contextual and reflect occupational roles, lifestyle factors, or reduced physical exertion in more educated individuals.

Similarly, onset of disease and ASIA scale did not show statistically significant differences, but individuals with SCI more than 3 years of disease and those with less severe ASIA classifications tended to have slightly better mobility scores.

In conclusion, this analysis underscores the critical role of socioeconomic and environmental contexts particularly economic class and rural/urban setting in influencing mobility among individuals. These findings highlight the need for targeted interventions focusing on resource-poor and urban populations to improve mobility outcomes.

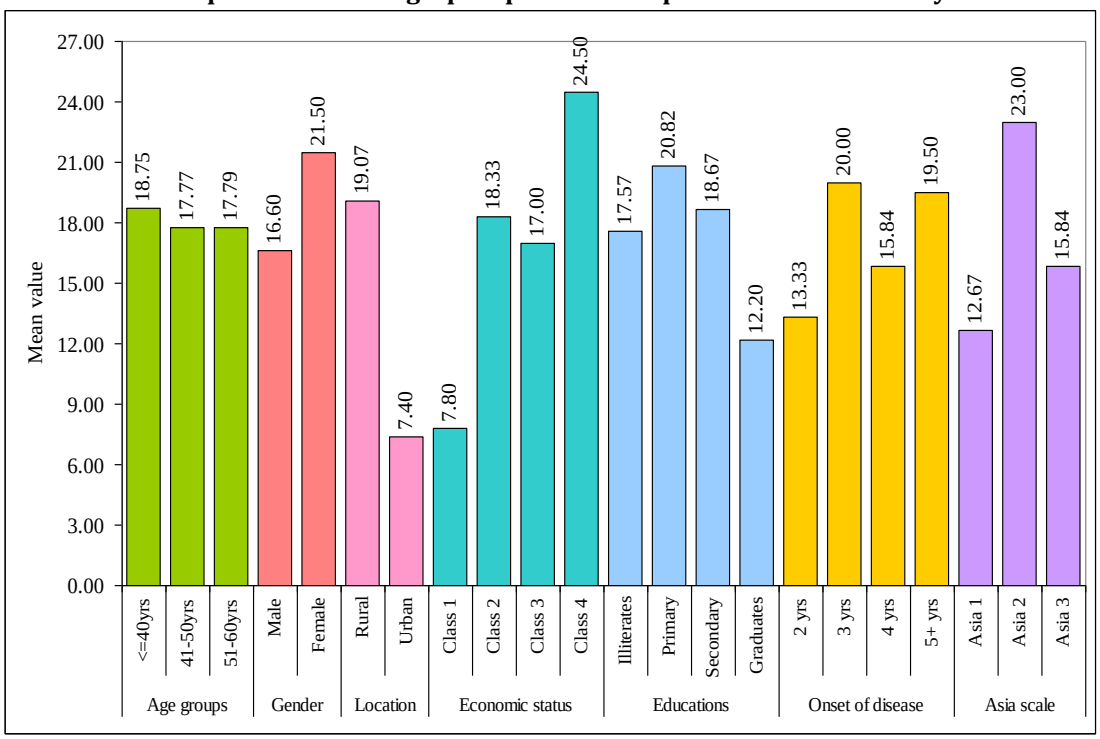
Table: Comparison of demographic profile of respondents with Mobility scores by Kruskal Wallis ANOVA and Mann-Whitney U test

Profile	Mean	Median	SD	H/Z-value	p-value
Age groups					
<=40yrs	18.75	16.50	10.78	0.0110	0.9940
41-50yrs	17.77	17.00	9.23		
51-60yrs	17.79	14.50	8.79		
Gender					
Male	16.60	13.00	9.78	-1.9410	0.0520
Female	21.50	21.00	4.57		
Location					
Rural	19.07	16.00	8.41	-2.0240	0.0430*
Urban	7.40	9.00	6.55		
Economic status					
Class 1	7.80	9.00	5.41	11.5970	0.0090*
Class 2	18.33	21.00	4.62		
Class 3	17.00	13.00	8.68		
Class 4	24.50	24.50	6.95		
Educations					
Illiterates	17.57	13.00	8.02	4.2220	0.2390
Primary	20.82	16.00	8.18		
Secondary	18.67	12.50	11.18		
Graduates	12.20	11.00	8.00		
Onset of disease					
2 yrs	13.33	12.50	4.03	2.6690	0.4460
3 yrs	20.00	16.00	9.44		

4 yrs	15.84	16.00	12.37		
5+ yrs	19.50	18.50	6.56		
Asia scale					
Asia 1	12.67	13.00	0.58	3.3740	0.1850
Asia 2	23.00	24.50	9.40		
Asia 3	15.84	13.00	8.22		
Total	17.91	14.50	8.90		

*p<0.05

Table: Comparison of demographic profile of respondents with Mobility scores



Discussion:

Spinal cord injury (SCI) is a life-altering event with profound physical, psychological, and socioeconomic consequences. Among the most significant impairments following SCI is the loss or limitation of mobility, which directly impacts an individual's independence, social participation, and quality of life. (10)

The findings from the present study, assessed using the CHART-SF mobility component, highlight the influence of several demographic variables on mobility among individuals with SCI. Notably, **location** (rural vs. urban) and **economic status** emerged as statistically significant factors. Rural participants demonstrated higher mobility scores than their urban counterparts, which may reflect environmental conditioning rural individuals often engage in more physically demanding tasks and may retain greater functional movement due to lifestyle needs. Conversely, urban individuals may face more structural and social barriers such as inaccessible buildings, lack of inclusive transport, and limited community-based rehabilitation services.

Economic status also showed a strong association with mobility. Individuals from higher socio-economic classes had significantly better mobility scores, likely due to access to quality healthcare, rehabilitation services, assistive technologies, and a supportive environment. Literature supports this observation. According to Scivoletto et al. ,2008 (11), socio-economic factors greatly influence rehabilitation outcomes. Individuals with better financial resources can afford comprehensive rehabilitation, home modifications, and mobility aids that significantly improve function and independence.

The Indian healthcare landscape further underscores these disparities. As reported by Chhabra et al. 2015 (12), there is a lack of specialized SCI care in rural and economically disadvantaged areas. This lack of infrastructure, combined with economic constraints, hampers recovery and contributes to long-term immobility and dependence.

Although gender did not show a statistically significant difference in this study (p = 0.052), the trend toward higher mobility scores among females warrants attention. In the Indian context, traditional gender roles may lead to women being more active in household activities, contributing to better retained or recovered mobility. A study by Singh and Prabhakar 2020 (13), emphasized that gender-based differences in outcomes must be interpreted carefully within socio-cultural frameworks, as expectations, access to care, and caregiver support can vary significantly.

Age, education, onset of disease, and ASIA impairment scale did not show significant impacts on mobility in this dataset. However, global literature indicates that early intervention and consistent therapy can mediate the effects of age and severity of injury. For example, Kirshblum et al. 2011 (14), assert that neurological level and completeness of injury are key predictors of mobility, but rehabilitation efforts, assistive technology, and patient motivation also play critical roles.

The broader impact of mobility in SCI goes beyond the physical realm. Studies by Post and van Leeuwen 2012 (15) and Widerström-Noga and Craig 2016 (16), have shown that reduced mobility leads to decreased social participation, higher rates of depression, and poorer quality of life. Individuals with greater mobility are more likely to be employed, socially active, and psychologically resilient. In contrast, immobility fosters isolation, dependency, and a decline in overall well-being.

Emerging technologies are also reshaping the rehabilitation landscape. Innovations such as powered exoskeletons, functional electrical stimulation (FES), and advanced wheelchairs offer new hope for improving mobility. However, access to such technologies remains limited in low- and middle-income countries due to cost and lack of awareness. A study by van Middendorp et al. 2016 (17), emphasized the importance of policy-level interventions to ensure equitable access to assistive technologies and mobility-focused rehabilitation programs.

In conclusion, mobility is a cornerstone of functional recovery and quality of life for individuals with SCI. The current study reinforces the importance of socio-economic and environmental factors in influencing mobility outcomes. While injury severity and clinical interventions are crucial, they must be supported by accessible healthcare, inclusive environments, and socio-economic empowerment. Addressing disparities in rehabilitation access, especially in urban poor and economically disadvantaged communities, is essential. Policymakers and healthcare providers must prioritize investment in mobility-enhancing services, assistive technologies, and inclusive infrastructure to promote independence and reintegration of individuals with SCI into society.

Conclusion:

The CHART-SF (Craig handicap assessment and reporting technique - short form) consist domains Mobility, mostly used in patients with SCI used to assess the level of handicap which determines the participation restriction in the community. Thus, this study helped to determine the major factors affecting mobility in the individuals with SCI in and around our region that is Hubballi and Dharwad.

Thus, there is a strong need to focus on planning the better rehabilitation and awareness programs for the betterment of quality of life of people with SCI highlighting on major aspects/factors affected mobility.

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