Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 7 (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Impact Of Physical Independence On Participation Restriction In Individuals With Spinal Cord Injury

Dr. Navami Mahaveer[1], Dr. Komal K B[*1], Dr. Alisha Fernandes[2], Mr. Mahaveer Jain[3]

[1]Assistant Professor, KLE college of Physiotherapy, Hubballi.

Email ID: navamimvkcpt@gmail.com

[*1]Assistant Professor, KLE college of Physiotherapy, Hubballi.

Email ID: e-mail-drkomalkbkcpt@gmail.com

[2]Associate Professor, Acharya NR Institute of Physiotherapy, Bangaluru.

Email ID: e-mail-alishafdes@gmail.com

[3]Assistant Engineer, Department of Biomedical Engineering, SDM Hospital of Medical Science, Dharwad.

Email ID: Mahaveer2612@gmail.com

Cite this paper as: Dr. Navami Mahaveer, Dr. Komal K B, Dr. Alisha Fernandes, Mr. Mahaveer Jain, (2025) Impact Of Physical Independence On Participation Restriction In Individuals With Spinal Cord Injury. *Journal of Neonatal Surgery*, 14 (7), 786-791.

ABSTRACT

Traumatic Spinal Cord Injury (SCI) is a critical condition that significantly impacts an individual's physical functioning, social participation, and overall quality of life. Individuals with SCI often encounter numerous challenges in reintegrating into the community, primarily due to participation restrictions stemming from reduced physical independence. Understanding the barriers and facilitators that influence physical independence is essential for enhancing rehabilitation outcomes and community involvement. This cross-sectional study aimed to explore factors influencing physical independence-related participation restrictions among individuals with SCI. Data were collected from 30 individuals with traumatic SCI through face- to-face interviews using the CHART-SF questionnaire, administered in the local vernacular language, across KLE Hubli Co-operative Hospital and nearby rehabilitation centers in Hubballi, Karnataka. The responses were scored following CHART-SF guidelines, and descriptive statistics, including mean, median, and standard deviation, were calculated using SPSS version 26.0. The median score in the Physical Independence domain indicated a severe handicap (score of 14), with a significance level set at $p \leq 0.05$. The findings underscore the pressing need for targeted rehabilitation and awareness programs, focusing on improving physical independence and thereby enhancing the quality of life for individuals with SCI in and around the Hubballi region.

Keywords: *Traumatic SpinSl cord injury, Physical Independence, Social Participation, Barriers, QOL.*

1. INTRODUCTION

Spinal cord injury (SCI) is a life-altering condition that disrupts the physical and psychological well-being of individuals, leading to long-term challenges in daily functioning (1). One of the most significant consequences of SCI is the impact it has on an individual's physical independence, which plays a crucial role in their ability to participate in various life activities. Participation in societal roles—such as work, education, social interactions, and recreational activities is fundamental to the overall quality of life (2). However, physical disability due to SCI often results in participation restrictions that hinder individuals from fully engaging in these aspects of life (3). This study seeks to explore the relationship between physical independence and participation restriction in individuals with SCI, focusing on how the ability to perform activities of daily living (ADLs) influences their participation in broader social contexts.

Physical independence in individuals with SCI typically refers to the capacity to perform ADLs, such as dressing, bathing, and mobility, with or without assistive devices. It is well- established that physical independence correlates with greater autonomy, better psychological well-being, and improved overall life satisfaction (4). In contrast, participation restriction refers to the limitation's individuals experience when trying to engage in activities or roles within society due to physical, environmental, or societal barriers (5). Research has shown that individuals with SCI often report lower levels of participation in work, education, and leisure activities due to physical barriers, stigma, and accessibility issues (6).

Studies have shown that physical independence is a critical factor in mitigating participation restrictions. For example, individuals with higher levels of independence in performing ADLs report less restriction in their participation in community activities and employment (7). The use of assistive technologies, such as wheelchairs, prosthetics, and modified vehicles, has been associated with increased independence and greater participation (8). However, even with physical independence, factors such as societal attitudes, accessibility, and support systems remain influential in determining the extent to which individuals with SCI can fully participate in society (9).

The International Classification of Functioning, Disability, and Health (ICF) framework by the World Health Organization provides a comprehensive model for understanding the relationship between physical function and participation. According to the ICF, both individual factors (such as body functions and activities) and environmental factors (such as societal attitudes and physical accessibility) jointly determine participation outcomes (10). Thus, while physical independence is an important predictor of participation, it does not act in isolation; environmental and social factors must also be taken into consideration (11).

As community-based rehabilitation (CBR) therapists, our primary role is to promote health and wellness within the community. CBR professionals provide education about various conditions, identify associated risk factors, prescribe exercises, encourage physical activity, and plan interventions that utilize available resources in the community. This approach aligns with the biopsychosocial model, which considers biological, psychological, and social factors in health.

In the context of spinal cord injury (SCI), CBR professionals address the high incidence of serious but preventable complications that can arise after injury. Effective interventions can lead to significant health and social benefits at relatively low costs. Such holistic approaches are particularly vital for patients after discharge, as they remain vulnerable to complications. To alter patients' perceptions about their health and prevent complications, physiotherapists must actively engage in health education programs (12).

The Craig Handicap Assessment and Reporting Technique (CHART), developed to assess the World Health Organization (WHO) dimensions of handicap, is a tool used to identify participation restrictions in individuals with SCI. The CHART Short Form (CHART-SF) is commonly used in SCI research to examine factors that affect social participation. Despite its widespread use, conceptual and methodological challenges remain in measuring environmental factors and participation restrictions among people with disabilities (13). These instruments were designed to offer a straightforward, objective measure of the extent to which impairments and disabilities lead to handicaps in the years following initial rehabilitation. A growing body of literature emphasizes the need to address participation restrictions holistically by focusing not only on improving physical independence but also on eliminating environmental barriers and improving societal attitudes towards individuals with disabilities. Studies suggest that interventions targeting both functional independence and social inclusion can lead to improved participation outcomes for individuals with SCI (14). Despite these advances, there remains a gap in understanding the specific impact of physical independence on participation restriction among individuals with SCI, particularly in different cultural and social contexts.

This study aims to bridge this gap by examining the relationship between physical independence and participation restriction in individuals with SCI. Understanding this relationship can inform the development of targeted rehabilitation strategies and policy interventions aimed at improving both physical independence and societal participation for individuals with SCI.

2. 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 months 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 Physical Independence on participation restriction in the patients with traumatic spinal cord injury using CHART-SF.

Method of the study: The ethics approval from the Institution Ethics Committee (JGMMMCIEC - F-067/2025) was obtained on 28th 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 Physical independence 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 Physical Independence 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 cut-off score). Percentile scores for domain was then calculated manually using the prescribed guidelines. The data obtained is analysed by using the SPSS version 26.0

3. RESULTS

The analysis in Table evaluates the relationship between various demographic factors and physical independence scores using the Kruskal-Wallis ANOVA and Mann-Whitney U tests. Among the variables, **location**, **economic status**, and **education level** showed statistically significant differences ($p < 0.05$) in physical independence scores.

Respondents from **rural areas** had significantly higher physical independence scores (mean = 39.85) compared to their **urban** counterparts (mean = 12.10), indicating better physical independence in rural residents. Similarly, economic status significantly affected scores. Participants in **lower economic classes** (Class 3 and 4) had higher mean scores (41.07 and 45.50, respectively), while those in **higher classes** (Class 1) scored lower (mean = 13.08), suggesting greater dependence among the economically better-off groups.

Educational background also influenced physical independence. **Illiterates** scored the highest (mean = 46.00), while **graduates** had the lowest (mean = 18.72), indicating that individuals with less formal education were more physically independent. Other variables like age, gender, disease duration, and Asia scale classification did not show statistically significant differences, suggesting these factors did not substantially affect physical independence in the sample studied.

Overall, the findings highlight socioeconomic and educational disparities in physical independence among respondents.

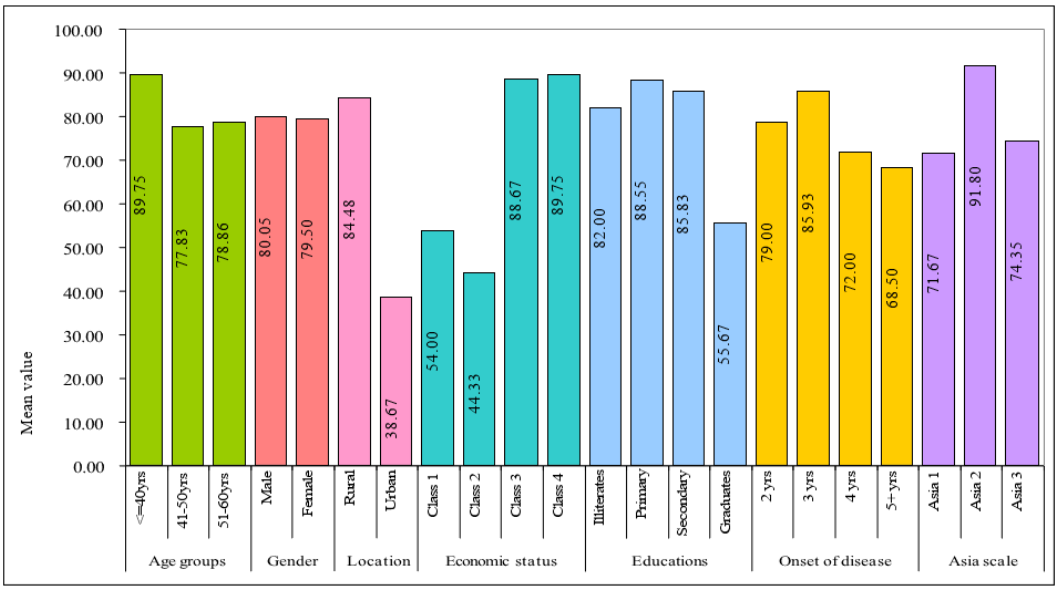
Table: Comparison of demographic profile of respondents with Physical independence scores by Kruskal Wallis ANOVA and Mann-Whitney U test

Profile	Mean	Median	SD	H/Z-value	p-value
Age groups					
<=40yrs	33.50	35.00	13.80	1.3050	0.5210
41-50yrs	45.36	40.00	28.60		
51-60yrs	31.00	32.00	11.22		
Gender					
Male	34.92	36.00	20.19	-0.4730	0.6360
Female	43.00	31.00	22.85		
Location					
Rural	39.85	32.00	19.91	-2.4060	0.0160*
Urban	12.10	16.00	10.41		
Economic status					
Class 1	13.08	16.00	8.72	10.4990	0.0150*
Class 2	26.67	30.00	5.77		
Class 3	41.07	40.00	19.97		
Class 4	45.50	36.00	21.67		
Educations					

Illiterates	46.00	48.00	26.31	8.3470	0.0390*
Primary	42.36	32.00	19.90		
Secondary	35.33	40.00	13.95		
Graduates	18.72	18.00	11.05		
Onset of disease					
2 yrs	32.33	31.00	13.53	2.8810	0.4100
3 yrs	42.53	40.00	22.38		
4 yrs	23.66	30.00	15.66		
5+ yrs	40.50	31.00	26.85		
Asia scale					
Asia 1	33.33	32.00	14.05	2.5840	0.2750
Asia 2	45.20	40.00	20.64		
Asia 3	32.96	30.00	21.48		
Total	37.08	32.00	20.84		

*p<0.05

Figure: Comparison of demographic profile of respondents with Physical independence scores



4. 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 in Physical Independence, which directly impacts an individual's social participation, and quality of life. (15)The present study explored the relationship between demographic factors and physical independence among individuals with spinal cord injuries, revealing significant associations with location, economic status, and educational level, while age, gender, disease onset, and ASIA classification did not show statistically significant effects. These findings offer both confirmations and contrasts when compared to earlier research.Location was found to significantly impact physical independence, with rural residents scoring higher than urban counterparts. This may seem counterintuitive given the typically better healthcare access in urban areas. However, a study

by **Singh et al. 2019** (16) reported similar findings, suggesting that individuals in rural areas often become more self- reliant due to limited access to healthcare services, thus developing adaptive strategies that enhance physical independence. In contrast, urban residents may rely more on professional assistance, potentially reducing self-initiated physical activity.Economic status also played a significant role. Participants from lower economic classes (Class 3 and 4) demonstrated higher physical independence compared to those from higher economic classes. While **Kawu et al. 2011** (17) found that better economic conditions typically improve rehabilitation outcomes, the current results may reflect a socioeconomic paradox. Individuals in lower classes may be compelled to function independently due to lack of caregiving resources or financial means to access assistive technologies, thereby fostering greater self-dependence. These findings highlight that necessity can sometimes drive functionality, challenging the assumption that financial resources alone guarantee better recovery outcomesEducation level presented another significant factor, with illiterate participants showing higher physical independence than those with higher education, including graduates. This contrasts with findings by **Post and van Leeuwen 2012** (2), who observed that higher education enhances understanding of health practices and adherence to rehabilitation protocols, generally leading to better functional outcomes. The current findings could suggest that less educated individuals are more accustomed to physically demanding tasks and environments, making them better equipped to adapt to physical limitations through experience rather than formal knowledge.On the other hand, age and gender did not significantly affect physical independence, aligning with the study by **McKinley et al. 2002** (18), which concluded that these variables had minimal influence on functional outcomes when injury severity and rehabilitation access were controlled. This supports the view that intrinsic motivation and environmental support may be more critical determinants of physical recovery than demographic factors like age or sex.Likewise, disease onset and ASIA classification did not show significant differences, which contrasts somewhat with **Scivoletto et al. 2008** (19), who found that earlier intervention and less severe injuries predicted higher independence. The lack of significance in the present study could be due to the homogeneity of the sample in terms of injury severity or variability in access to follow-up care.

In summary, the findings suggest that environmental pressures and life circumstances such as rural living, low socioeconomic status, and limited formal education can lead to increased physical independence. These outcomes stress the importance of considering contextual and psychosocial factors in rehabilitation programs. Tailored approaches that leverage individuals' life experiences and environments may be more effective than one-size-fits-all models rooted solely in clinical measures or socioeconomic advantage.

5. CONCLUSION

The present study highlights that physical independence among individuals with spinal cord injuries is significantly influenced by contextual factors such as location, economic status, and educational level, rather than demographic variables like age, gender, disease onset, or ASIA classification. Participants from rural areas, lower economic classes, and those with less formal education demonstrated higher levels of physical independence. These findings challenge traditional assumptions that greater resources and education necessarily lead to better functional outcomes. Instead, they suggest that necessity-driven independence, environmental adaptation, and cultural norms may play a pivotal role in shaping rehabilitation outcomes. Comparisons with existing literature underscore the need for more culturally and contextually tailored rehabilitation strategies. Overall, the study emphasizes the importance of viewing physical independence not only through a clinical lens but also by considering the social, economic, and environmental realities of the affected individuals. Future interventions should integrate these broader determinants to enhance the effectiveness and equity of rehabilitation programs.

REFERENCES

[1] World Health Organization, International Spinal Cord Society. International perspectives on spinal cord injury. World Health Organization; 2013.

[2] Post MW, van Leeuwen CM. Psychosocial issues in spinal cord injury: a review. Spinal cord. 2012 May;50(5):382-9.

[3] Manns PJ, Chad KE. Components of quality of life for persons with a quadriplegic and paraplegic spinal cord injury. Qualitative health research. 2001 Nov;11(6):795-811.

[4] Ginis KA, Jörgensen S, Stapleton J. Exercise and sport for persons with spinal cord injury. Pm&r. 2012 Nov 1;4(11):894-900.

[5] Üstün TB, Chatterji S, Bickenbach J, Kostanjsek N, Schneider M. The International Classification of Functioning, Disability and Health: a new tool for understanding disability and health. Disability and rehabilitation. 2003 Jan 1;25(11-12):565-71.

[6] Frisbie JH. Breathing pattern in tetraplegic patients. Spinal Cord. 2002 Aug;40(8):424- 5.

[7] Bach JR, Kim H, Zimbelman J. Physical independence and employment of individuals with high-level spinal cord injury. Am J Phys Med Rehabil. 2011;90(11):877–884.

[8] Coster W, Bedell G, Law M, Khetani MA, Teplicky R, Liljenquist K, Gleason K, KAO YC. Psychometric

evaluation of the Participation and Environment Measure for Children and Youth. Developmental Medicine & Child Neurology. 2011 Nov;53(11):1030-7.

[9] Craig, A., Nicholson, Perry, K. N., Guest, R., & Middleton, J. W. (2004). Adjusting to spinal cord injury: Role of self-efficacy, coping, and social support. *Disability and Rehabilitation*, 26(10), 701–708.

[10] World Health Organization. International Classification of Functioning, Disability and Health (ICF). Geneva: World Health Organization; 2001.

[11] Whiteneck G, Dijkers MP. Difficult to measure constructs: conceptual and methodological issues concerning participation and environmental factors. Archives of physical medicine and rehabilitation. 2009 Nov 1;90(11):S22-35.

[12] Mulla S, Upadhyaya N, Shetkar S, Sanap A. Factors affecting social participation restriction in individuals with spinal cord injury. Journal of medical pharmaceutical and allied sciences. 1882 May;11(3).

[13] Mahaveer N, Komal KB, Jain M. Impact of Mobility On Participation Restriction In Individuals With Spinal Cord Injury. American Journal of Psychiatric Rehabilitation. 2025 May 8;28(5):25-30.

[14] Friedrich M, Jacobsen F, Müller R. Social participation in persons with spinal cord injury: The role of social support and environmental barriers. Disabil Rehabil. 2011;33(5):450–6.

[15] Craig A, Tran Y, Middleton J. Psychological impact of spinal cord injury: A review. Spinal Cord. 2009;47(2):110–6.

[16] Bensley KM, Fortney J, Chan G, Dombrowski JC, Ornelas I, Rubinsky AD, Lapham GT, Glass JE, Williams EC. Differences in receipt of alcohol-related care across rurality among va patients living with HIV with unhealthy alcohol use. The Journal of Rural Health. 2019 Jun;35(3):341-53.

[17] Saunders LL, Krause JS. Psychological factors affecting alcohol use after spinal cord injury. Spinal Cord. 2011 May;49(5):637-42.

[18] McKinley WO, Seel RT, Lammertse DP. The effects of age and gender on functional outcomes following spinal cord injury. Arch Phys Med Rehabil. 2002;83(9):1205-9.

[19] Scivoletto G, Tamburella F, Laurenza L, Di Donna V, Molinari M. The impact of the severity of spinal cord injury on functional recovery and complications. Spinal Cord. 2008;46(8):547-52.