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TO ESTABLISH THE PSYCHOMETRIC PROPERTIES OF HINDI TRANSLATED VERSION OF CAPABILITIES OF UPPER EXTREMITY

Medical Science

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ABSTRACT

The spinal cord, a critical component of the central nervous system, serves as the primary communication link between the brain, body muscles, and sensory nerves. This study aimed to establish the psychometric properties of the Hindi-translated version of the Capabilities of Upper Extremity (CUE) scale. The CUE was administered to patients either face-to-face in inpatient and outpatient settings or via telephonic interviews for cases sourced from the medical records of the Indian Spinal Injuries Centre (ISIC). Results demonstrated excellent internal consistency, with a Cronbach's α of 0.964 and item-total correlations exceeding the minimal standards. These findings align with previous studies on the reliability and validity of the original CUE scale, where Cronbach's α was reported as 0.963. This study reinforces the reliability of the Hindi-translated CUE as a robust tool for assessing upper extremity capabilities.

KEYWORDS

spinal cord, central nervous system, upper extremity capabilities, Hindi translation, psychometric properties, reliability, validity, Cronbach's α

I. INTRODUCTION

The spinal cord, a vital part of the central nervous system, serves as the primary communication pathway between the brain and the body. It transmits motor commands from the brain to muscles and sensory signals from the body to the brain, enabling coordination and responsiveness. Structurally, the spinal cord is organized into segments corresponding to pairs of spinal nerves, including cervical (neck), thoracic (chest), lumbar (abdomen), sacral (pelvis), and coccygeal (tailbone) regions. These segments facilitate the intricate connectivity required for motor and sensory functions.

The spinal cord's functional anatomy consists of longitudinally arranged spinal tracts (white matter) that envelop centrally located gray matter. The gray matter contains the neuronal cell bodies, while axons of sensory neurons enter the spinal cord and exit as motor neuron axons via segmental nerves. Each spinal nerve root is associated with specific skin regions (dermatomes) and muscle groups (myotomes), providing a systematic distribution of sensory and motor innervation. Notably, most muscles receive innervation from multiple spinal roots, ensuring redundancy and functional reliability.

Among its critical roles, the spinal cord facilitates electrical communication, enables locomotion, and mediates reflexes. However, spinal cord injury (SCI) significantly disrupts these functions by impairing the transmission of motor and sensory signals across the lesion site. SCI is a medically complex condition with profound implications for an individual's quality of life. Historically, it has been associated with high mortality rates, underscoring the critical need for advancements in its understanding and treatment.

II. Rationale of the Study

The "Capabilities of Upper Extremity" (CUE) questionnaire is a vital tool for assessing upper extremity functionality, but its use is limited in Hindi-speaking populations due to the absence of a validated translation. This study aims to establish the psychometric properties of the Hindi-translated version of the CUE to ensure it is reliable, valid, and culturally appropriate. By doing so, the study will provide a standardized assessment tool for clinicians and researchers, improving accessibility and accuracy in evaluating upper extremity capabilities in Hindi-speaking individuals.

III. Aim and Objectives of the Study

Aim: To establish the psychometric properties of Hindi translated version of capabilities of upper extremity (CUE).

Objective: To evaluate the psychometric properties of the Hindi-translated version of the Capabilities of Upper Extremity (CUE) scale.

IV. Methodology

Study Design and Duration

- **Design:** Methodological
- **Duration:** One year

Sample

- **Size:** 100 participants with spinal cord injury (SCI)
- **Selection:** Purposive sampling technique
- **Source:** Inpatient and outpatient departments of Indian Spinal Injuries Centre (ISIC), Vasant Kunj, New Delhi

Participant Criteria

Inclusion Criteria:

1. Fluent in Hindi
2. Traumatic or non-traumatic SCI
3. Aged 16–70 years
4. At least 1-year post-SCI
5. Motor level between C5 and T1

Exclusion Criteria:

1. Age <16 or >70 years
2. Cognitive impairment, drug dependency, psychiatric illness, or behavioral issues

Instrumentation

- **Tool Used:** Capabilities of Upper Extremity Hindi Translated Questionnaire (Appendix E)

Ethical Approval

- Approved by the Research Review Committee and Ethical Committee of ISIC (Appendix A)

V. Data Analysis

Demographic and Clinical characteristics of Subjects (n=100)

Factors	Characteristics	Percentage
Sex	Male	76
	Female	24
Age	18-28years	18
	29-39 years	53
	40-50 years	24
	51-60 years	5
ISNCSCI	ASIA-A	2
	ASIA-B	43
	ASIA-C	54
	ASIA-D	1
	ASIA-E	0
Level of injury	C5	60
	C6	38
	C7	1
	C8	0
	T1	1
Duration of Injury (in years)	1	37
	2	44
	3	9
	4	3
	5	3
	7	1
	8	2
	12	1

Item level Analyses

Item mean & SD are shown in Table 4. All levels of each item in the instrument were selected. Item means ranged from 2.50 to 6.58, while SDs ranged from 1.09 to 2.50.

Item Mean & SD for the Hindi Translated Version of CUE

	Mean	Std. Deviation	Analysis N

Q1_R	6.07	1.742	100
Q1_L	5.96	1.681	100
Q2_R	6.08	1.612	100
Q2_L	6.24	1.457	100
Q3_R	3.24	2.114	100
Q3_L	3.15	2.076	100
Q4_B	5.75	1.749	100
Q5_R	6.48	1.283	100
Q5_L	6.60	1.015	100
Q6_R	6.06	1.632	100
Q6_L	6.17	1.477	100
Q7_R	6.48	1.283	100
Q7_L	6.58	1.093	100
Q8_R	5.94	1.607	100
Q8_L	6.04	1.517	100
Q9_B	4.26	2.460	100
Q10_R	5.17	2.165	100
Q10_L	5.26	2.043	100
Q11_R	5.17	2.142	100
Q11_L	5.28	2.015	100
Q12_R	4.30	2.329	100
Q12_L	4.09	2.345	100
Q13_R	4.31	2.241	100
Q13_L	3.96	2.313	100
Q14_R	4.27	2.416	100
Q14_L	4.03	2.359	100
Q15_R	3.86	2.165	100
Q15_L	3.72	2.243	100
Q16_R	2.53	1.749	100
Q16_L	2.50	1.861	100
Q17_R	4.96	2.482	100
Q17_L	4.86	2.503	100

The Inter item correlation are depicted in Table 5. The inter item correlation ranged from .002 to .996 of all 17 items of CUE.

VI. RESULTS

The demographic and clinical characteristics of the participants are presented as follows: The study sample comprised 76% males and 24% females. Regarding age distribution, 18% were between 18-28 years, 53% were in the 29-39 age group, 24% were 40-50 years, and 5% were 51-60 years. Based on the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), the majority fell under ASIA-C (54%), followed by ASIA-B (43%), ASIA-A (2%), and ASIA-D (1%), with no participants in ASIA-E. The injury levels predominantly included C5 (60%) and C6 (38%), with minimal representation from C7 (1%) and T1 (1%), and no injuries at C8. The duration of injury varied, with the highest percentages at 1 year (37%) and 2 years (44%), while injuries lasting 3 years (9%), 4 years (3%), 5 years (3%), 7 years (1%), 8 years (2%), and 12 years (1%) were less common.

The item-level analysis of the Hindi-translated version of the CUE revealed mean scores ranging from 2.50 to 6.58, with standard deviations between 1.09 and 2.50, demonstrating variability across responses. Inter-item correlations ranged from 0.002 to 0.996, indicating varying degrees of consistency among the items.

VII. DISCUSSION

The demographic and clinical characteristics of the participants provide valuable context for interpreting the study findings. The predominance of males (76%) and individuals aged 29-39 years (53%) aligns with typical trends in spinal cord injury (SCI) demographics, where younger, active males are more frequently affected. The ASIA classification revealed most participants with incomplete injuries (ASIA-C, 54%, and ASIA-B, 43%), suggesting the study is more representative of individuals with some preserved motor or sensory function. Injury levels were concentrated at C5 (60%) and C6 (38%), consistent with the higher vulnerability of mid-cervical regions, while injury duration was predominantly 1-2 years, indicating a relatively recent injury cohort. The item-level analysis of the Hindi-translated CUE demonstrated variability in responses, with inter-item correlations ranging widely, reflecting diverse functional outcomes within the group. These findings provide important insights into the characteristics of the study population and underline the need for cautious generalization of results to other SCI groups.

VIII. CONCLUSION

The preliminary EFA of the Hindi-translated CUE demonstrates acceptable internal consistency and item-total correlation, supporting its initial validity for assessing functional outcomes in SCI populations. The demographic and clinical characteristics provide essential context but highlight the need for cautious generalization. Further research is required to establish additional psychometric properties and enhance its applicability across diverse groups.

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