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Evaluation of SPADI and VAS in stroke patients with hemiplegic shoulder pain: A comparative study

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ABSTRACT

Background: This study aims to evaluate the effectiveness of SPADI and VAS as measurement tools in assessing shoulder pain in stroke patients with hemiplegia. Given the impact of accurate pain assessment on rehabilitation outcomes, the study is designed to compare these tools to determine their reliability and usefulness in clinical settings for managing hemiplegic shoulder pain.

Methodology & Results: This 12-month experimental study at Pacific Medical University enrolled 60 stroke patients (≥40 years) with hemiplegic shoulder pain and subluxation. Approved by the Institutional Ethics Committee, it utilized VAS and SPADI to assess pain and shoulder function. Exclusions included vulnerable diseases, tape allergy, and shoulder fractures. Informed consent was obtained, and patient confidentiality was ensured. The analysis revealed that SPADI effectively measured both pain and disability in stroke patients with hemiplegic shoulder pain (HSP), Comparative assessment showed consistent patterns between SPADI and VAS scores. Spearman's correlation analysis demonstrated a significant positive correlation between SPADI and VAS scores

Conclusion: SPADI assesses pain and disability; VAS measures pain intensity quickly. This indicating strong association in pain evaluation.

Keywords: *VAS, Disability, stroke, SPADI*

1. INTRODUCTION

Stroke is a clinical disorder characterized by the sudden onset of a persistent localized neurological impairment caused by a vascular injury[1]. Stroke is the primary cause of significant impairment in the elderly populations of affluent countries[2]. Stroke is a cerebrovascular disease caused by a brain hemorrhage or infarction. Due to the various types and degrees of impairment that many stroke survivors experience, as well as the risk of passing away too soon after adjusting to their new years of life, 102.2 million people are incapacitated[3,4.] Over 70% of stroke victims have impairment in their upper extremities; 5% of these individuals recover normally, and 20% or so regain some function in their upper extremities[5].

Hemiplegic shoulder discomfort is one of the most common post-stroke side symptoms. The prevalence of hemiplegic shoulder discomfort in stroke patients is between 17% to 37% for acute stroke patients and 47% for chronic stroke patients, according to epidemiological surveys[6,7].

Pain and associated psychological suffering limit a patient's capacity to engage in the rehabilitation process. Hemiplegic shoulder pain (HSP) is widely prevalent and is strongly correlated with prolonged hospital admissions[8]. Stroke patients, especially hemiplegics, frequently have shoulder pain, scapular dyskinesia, poor postural control, muscular weakness or imbalance, muscle stiffness, poor voluntary control, and body malalignment[9,10]. One popular tool for measuring pain that may be applied in a variety of contexts is the visual analogue scale (VAS). Its incapacity to convey the complexity of pain has prompted questions about its use with stroke victims. The visual analogue scale is rarely used alone to quantify pain; instead, it is used in conjunction with other forms of assessment[11]. A decline in upper extremity muscle strength, particularly in the shoulder muscles, is intimately linked to the occurrence of HSP. Chronic diseases will cause a reduction in shoulder range of motion (ROM) in addition to a decrease in muscular strength. Data analysis of pain levels (SPADI), motor abilities (Fugl Meyr Assessment Upper Extremity), stroke trigger variables, and time of onset are necessary to fully comprehend HSP[12,13]. In view of above fact, the present study has designed to assess SPADI and VAS measurement in stroke patients with hemiplegic shoulder pain.

2. METHODOLOGY

The experimental type of study was conducted in the Department of Neurology, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan in the duration of 12 months. The present study was approved by Institutional Ethical Committee, Pacific Medical University (PMU/PMCH/IEC/2024/293). The present study has enrolled total of 60 patients of stroke with hemiplegic shoulder pain (Experimental group). The present study has used VAS for the generalised shoulder pain and measurement of SPADI score for the shoulder pain during the movement and measurement of functional disability of the shoulder. A total of 60 patients with age group of ≥40 years of age of either gender with more than 6 months of unilateral ischemic or hemorrhagic stroke attack diagnosed with HSP accompanied by shoulder subluxation were included in this study. Subjects with any type of vulnerable diseases, and have history of shoulder fracture were excluded from this study. Written and verbal consent were taken prior to enrolment. Patient confidentiality was maintained.

3. RESULT

Table-1: Baseline descriptive analysis of variables

Group	**Test value (Mean ± SD)**
Study Subjects (N)	60
Age (years)	55.62 ± 11.85
Gender	Female: 24 (40%)
	Male: 36 (60%)

Table-2: Comparative assessment of values for pain Based on VAS

Variables	**(Mean ± SD)**
Pain	6.62 ± 1.08

Table-:3 Comparative assessment values for Stroke with HSP (Pain & Disability) Based on SPADI

Variables	**(Mean ± SD)**
Pain Scale	76.75 ± 4.93
Disability Scale	80.82 ± 3.61

Table-4: Analysis SPADI (pain & Disability) and VAS in Stroke patient with Hemiplegic shoulder pain.

Variable	Phase	(Mean ± SD)
SPADI (Pain) *vs* VAS	SPADI (Pain	76.75 ± 4.93
	VAS	6.62 ± 1.08
SPADI (Disability) *vs* VAS	SPADI (Disability)	80.82 ± 3.61
	VAS	-

Table-5: Spearman's Correlation analysis SPADI (pain & Disability) and VAS in Stroke patient with Hemiplegic shoulder pain.

Variable	Phase	r value	P Value	REMARKS
SPADI (Pain) *vs* VAS	VALUE	0.819	<0.001	Significant Positive Correlation
SPADI (Disability) *vs* VAS	VALUE	-0.219	0.092	No Significant Correlation

There is significant positive correlation between SPADI(Pain) & Visual analogic scale (VAS). (P value < 0.05). whereas, there is no significant correlation between SPADI(Disability) & Visual Analogic scale (VAS). (P value > 0.05).

4. DISCUSSION

The present study has enrolled 60 patients of both genders, comprising 36 males and 24 females, with a mean age of 55.62 ± 11.85 years (Table 1). A Visual Analogue Scale (VAS) score of 4 is commonly used as a threshold to diagnose Hemiplegic Shoulder Pain (HSP) in stroke patients. The VAS is a self-reported measure of pain intensity, where individuals rate their pain on a 0 to 100 mm scale 0 representing no pain and 100 indicating the worst imaginable pain.[14]

In the present study, pain intensity was measured using the Visual Analogue Scale (VAS), a widely used and validated tool for assessing subjective pain levels. The VAS score was 6.62 ± 1.08, (Table-2).

The **Shoulder Pain and Disability Index (SPADI)** is a widely used tool for assessing shoulder-related pain and functional disability in individuals with **Hemiplegic Shoulder Pain (HSP)** following a stroke. It consists of two subscales: the **Pain subscale**, which evaluates the intensity of shoulder pain, and the **Disability subscale**, which assesses the level of difficulty experienced during daily activities involving shoulder use. Each item is rated on a **0–10 numeric scale**, with higher scores indicating greater pain or disability. The total SPADI score is expressed as a percentage, where **0% represents no pain or disability** and **100% represents maximum pain or disability.**[15]

SPADI (Shoulder Pain and Disability Index) score for shoulder pain are **80.82 ± 3.61** (Table-3). SPADI is specifically designed to measure both **pain** and **disability** associated with shoulder function.

The present study also evaluated the relationship between the **Shoulder Pain and Disability** indicating that higher reported pain levels on the VAS were strongly associated with higher SPADI pain scores. That suggest that perceived pain intensity did not directly correspond to the level of functional disability reported by the participants. In contrast with our study MacDermid et al have conducted a study on total of 129 subject with shoulder pain and have shown **moderate positive correlation** between SPADI-Pain and VAS scores, with **Pearson's r = 0.587 (p <0.01),** indicating that higher shoulder pain reported on VAS corresponds well with SPADI pain scores.[16]

With the observance of **significant positive correlation** ($p < 0.001$) between **SPADI (Pain)** and **VAS** is consistent with these established findings, reinforcing that SPADI-Pain accurately reflects perceived pain intensity. However, we are lack of a significant correlation between **SPADI (Disability)** and **VAS** is understandable because the disability part of SPADI measures how pain affects a person's ability to do daily activities. This doesn't always match up exactly with how much pain a person feels.

5. CONCLUSION

SPADI provides a broader assessment by evaluating both pain and disability components, while VAS offers a quick and simple measure of pain intensity.

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