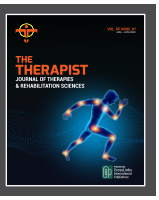
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Relationship between Fear of Pain and Movement among Stroke Patients with Poor Coordination

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ABSTRACT

Stroke is a major cause of long-term disability worldwide, often leading to motor impairments and reduced coordination. Beyond physical limitations, many stroke survivors experience psychological barriers such as fear of pain and movement, which can further hinder rehabilitation progress. **Objectives:** To determine the relationship between fear of pain and movement among stroke patients with poor coordination. **Methods:** This cross-sectional correlational study was conducted over four months at Ganga Ram Hospital, Lahore, involving 189 ischemic stroke patients aged 45–85 years, selected via convenience sampling. The Fear-Avoidance Beliefs Questionnaire (FABQ), Tampa Scale of Kinesiophobia (TSK), and Comprehensive Coordination Scale (CCS) were used (α=0.82 and α=0.79, respectively). Parametric analysis of summed ordinal scores was justified by prior studies and sample size. Pearson's and Spearman's correlation analyses were performed using SPSS version 26.0. **Results:** The study found moderate motor control difficulty among participants, with a mean CCS score of 14.52 ± 3.32. Fear-related avoidance behaviors were significant (FABQ: 37.29 ± 17.32), and fear of movement was moderate to high (TSK: 31.60 ± 11.85). FABQ showed a strong positive correlation with coordination ($r = 0.773$, $p<0.001$), while TSK had a strong negative correlation ($r=-0.667$, $p<0.001$). Interestingly, FABQ and TSK were inversely correlated ($r=-0.787$, $p<0.001$), indicating distinct psychological constructs. **Conclusions:** Higher fear-avoidance beliefs and kinesiophobia were both associated with poorer coordination in stroke patients. Despite overlap, FABQ and TSK reflect distinct aspects of pain avoidance and fear of movement, respectively.

INTRODUCTION

Stroke is a brain condition attributed to impaired blood supply to the brain that is a result of obstruction or rupture of the blood vessels in the brain. This obstruction may form clots, which in turn lead to blockage of the arteries, causing rupture of blood vessels and brain hemorrhage [1]. Sudden bursting of the arteries in a stroke condition deprives brain cells of oxygen, resulting in their immediate death. Stroke is commonly referred to as a disease of rapid onset of focal or global disorders of the brain function, which persists beyond a period of 24 hours or otherwise leads to the death of an individual without an apparent cause other than ascribable to a vascular source [2]. It also encompasses both an intracerebral hemorrhage and cerebral infarction. In the last 25 years, there has been a near doubling of the stroke survivors, and the same is likely to increase in the future, with at least the number of survivors doubling once more in the coming 50 years [3]. Stroke is the number one cause of disability in the world today. Greater than 50 percent of stroke survivors develop some residual motor disability, and a very large percentage of them develop non-paretic arm dysfunction. [4, 5]. The chances of stroke come with age, especially past the age of 55, and are even higher among people having diagnosed illnesses such as high blood pressure or heart disease. About 60% of people who have a stroke history have cases of a transient ischemic attack (TIA). Stroke risk factors can be categorized as modifiable or non-modifiable, with some lifestyle choices contributing to an increased risk of stroke [6-8]. Additionally, abnormal co-activation of muscles, particularly during shoulder abduction and distal limb

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flexion, impairs joint control and limits the ability to perform specific movements [9]. This abnormal co-activation pattern, known as flexion synergy, affects individuals' ability to reach for objects, as movements of the elbow, wrist, and fingers are involuntarily coordinated, limiting independent joint movement [10]. Stroke prevention focuses on modifying risk factors to reduce the incidence of stroke in the population, while stroke management aims to treat the underlying pathophysiology of the condition [11]. Despite extensive research into stroke, no simple, universally effective method for preventing or treating all forms of stroke has been established. Current research is focused on developing new therapies that target factors contributing to both primary and secondary strokes. In New Zealand, stroke is the third leading cause of death and a major contributor to disability in adults. The financial burden of stroke affects not only the individuals but also their families and society as a whole [12]. Recovery from a stroke is often a lifelong process, with upper limb weakness being prevalent in around 75% of stroke survivors. Within the first two weeks after a stroke, only a small percentage of individuals are free from upper extremity motor impairment, and even six months after the event, many survivors still experience severe motor deficits despite undergoing conventional therapy [13-15]. In some cases, neurobiological tasks are employed to address cognitive dysfunction and encourage synaptic plasticity. Task-oriented approaches, such as arm training and walking exercises, are commonly used to help manage physical disabilities, while visual computer-assisted gaming has been shown to enhance neuronal plasticity [16-18]. Stroke patients with poor coordination often experience fear of pain, which may limit their movement and hinder rehabilitation progress.

This study aimed to explore the relationship between fear of pain and movement in stroke patients with poor coordination.

METHODS

This cross-sectional correlational study was conducted from March 2024- August 2024 at Ganga Ram Hospital, Lahore, involving 189 ischemic stroke patients aged 45–85 years, selected via convenience sampling. Participants were recruited from rehabilitation centers and hospitals if they met the inclusion criteria of having a history of stroke and exhibiting poor coordination. Fear of pain was assessed using the Fear-Avoidance Beliefs Questionnaire (FABQ), which evaluates the extent to which individuals avoid movement due to pain-related fear. Additionally, kinesiophobia, or excessive fear of movement, was measured using the Tampa Scale of Kinesiophobia (TSK) to determine its impact on movement patterns. Poor coordination was assessed using the Coordination and Control Function (CCF) test, which evaluates motor control deficits in stroke patients. The Comprehensive Coordination Scale (CCS) was used because it focuses on motor coordination and is convenient to apply in clinical stroke settings. In contrast to broader tools such as the Fugl-Meyer Assessment, CCS is focused on coordination deficit, which coincides with the objectives of the study. Data collection involved administering these questionnaires and assessments during a single session, with assistance provided to patients with cognitive or physical limitations. Data analysis employed both Pearson's and Spearman's correlation methods: Pearson's r for normally distributed variables (confirmed by Shapiro-Wilk tests) and Spearman's ρ for ordinal/non-normal data, as indicated in results tables. Relationships between variables were analyzed using Pearson's correlation, which is robust for continuous or interval-like data. While TSK and FABQ are ordinal scales, their summed scores approximate interval-level data and have been treated parametrically in prior studies. Our large sample size (n=189) further justifies the use of Pearson's correlation, as it reduces bias from non-normality. Sensitivity analyses confirmed comparable effect sizes between Pearson's and Spearman's methods. Participants' responses were collected. Data were collected using demographic questions and analyzed using SPSS version 26.0. Categorical variables were summarized using descriptive statistics, while relationships between variables were assessed using Spearman's correlation.

RESULTS

The average age of the 189 participants was 65.22 ± 12.27 years, ranging from 45 to 85 years (Figure 1).

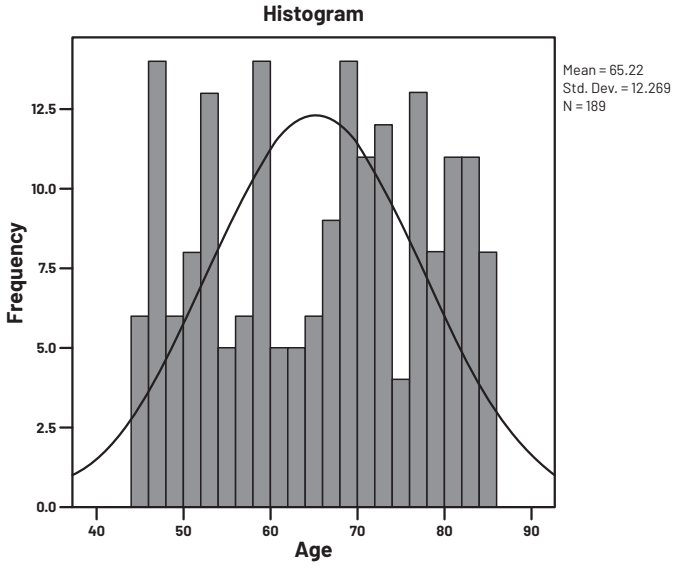


Figure 1: Graphical Representation of Participants' Age (n = 189)

The gender distribution of the 189 participants, with females comprising 53.4% (n=101) and males 46.6% (n=88) of the sample (Table 1).

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Table 1: Gender Distribution of Participants (n=189)

Variables	Frequency (%)
Female	101 (53.4%)
Male	88 (46.6%)
Total	189 (100.0%)

Fear-Avoidance Beliefs Questionnaire (FABQ) results, with a mean score of 37.29 and a standard deviation of ± 17.10 32, ranging from to 72 (Table 2).

Table 2: Descriptive Statistics of FABQ (n=189)

Variable	Minimum	Maximum	Mean ± SD
FABQ Score	10	72	37.29 ± 17.32

The Tampa Scale of Kinesiophobia (TSK) scores had a mean of 31.60 and a standard deviation of ±11.85, with scores ranging from 11 to 56 (Table 3).

Table 3: Descriptive Statistics of Tampa Scale (n=189)

Variable	Minimum	Maximum	Mean ± SD
Tampa Scale Score	11	56	31.60 ± 11.85

The relationship between the Comprehensive Coordination Scale, Fear Avoidance Beliefs Questionnaire (FABQ) and Tampa Scale of Kinesiophobia (TSK). The Comprehensive Coordination Scale and FABQ have a strong positive correlation (r=0.773**, p<0.01), revealing that greater fear-avoidant beliefs are connected to poor coordination. The Comprehensive Coordination Scale is negatively correlated with the Tampa Scale of Kinesiophobia (r=-0.667**, p<0.01), meaning that higher fear of movement is linked to worse coordination. Additionally, the FABQ and TSK also have a strong negative correlation (r=-0.787**, p<0.01), suggesting that as fear-avoidant beliefs increase, kinesiophobia decreases, or vice versa. All correlations are significant at 0.01 level (Table 4).

Table 4: Correlation of Fear of Pain with Movement and Poor Coordination (n=189)

Variable	Comprehensive Coordination Scale	Fear-Avoidance Beliefs Questionnaire	Tampa Scale of Kinesiophobia
Comprehensive Coordination Scale	1	0.773**	-0.667**
Sig. (2-tailed)	—	0.000	0.000
Fear-Avoidance Beliefs Questionnaire	0.773**	1	-0.787**
Sig. (2-tailed)	0.000	—	0.000
Tampa Scale of Kinesiophobia	-0.667**	-0.787**	1
Sig. (2-tailed)	0.000	0.000	—

DISCUSSION

This study aimed to explore the relationship between fear of pain and movement in stroke patients with poor coordination. Results revealed significant associations between psychological factors and motor performance. Notably, fear-avoidant beliefs were strongly correlated with reduced coordination, suggesting that patients fearing pain may limit movement, impairing motor recovery. In line with previous findings [19, 20], factors such as female gender, poor balance, use of walking aids, and history of falls were significantly associated with fear of falling (FoF). The present study found that stroke patients with a history of falls had a higher likelihood of FoF (OR 2.33) compared to those without (OR 1.67). Additionally, reduced balance was significantly linked to increased FoF. The study also observed a complex relationship between kinesiophobia and coordination. While higher fear-avoidance beliefs correlated with poorer coordination, higher TSK scores were unexpectedly associated with better coordination, warranting further investigation. These results align with Oguz et al., who reported a strong negative correlation between balance and fall efficacy (r = –0.808) [21], and with Özden et al., who found that fear of falling positively correlated with reduced mobility (r=0.669) and balance (r=0.545) [22]. Similarly, Akosile et al. noted a negative correlation between physical performance and fall efficacy (r =–0.66), underscoring the interplay between physical limitations and psychological barriers. The findings also complement those of Nakao et al., who identified sex, age, cognitive function, TUG scores, and fall efficacy as predictors of life-space mobility (LSM) [24]. Although ADLs were not assessed in the present study, Tashiro et al., emphasized their significance in LSM, along with walking speed and fear of falling [25]. Finally, a strong negative correlation between FABQ and TSK scores (r =–0.787, p<0.001) suggests these tools assess distinct psychological dimensions, fear-avoidance and kinesiophobia, highlighting the need for targeted psychological interventions in stroke rehabilitation.

CONCLUSIONS

The study concludes that both fear-avoidance beliefs and kinesiophobia are significantly associated with poor motor coordination in stroke patients. Despite some overlap, these constructs reflect distinct psychological barriers, highlighting the need for targeted interventions in stroke rehabilitation.

Authors Contribution

Conceptualization: AM[1], AM[2]
Methodology: AU, AM[1]
Formal analysis: AM[1]
Writing review and editing: ST, AU, TA

All authors have read and agreed to the published version of the manuscript

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Conflicts of Interest

All the authors declare no conflict of interest.

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