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PREVALENCE OF GLENOHUMERAL JOINT INSTABILITY AMONG MANUAL WHEELCHAIR USERS AFTER SPINAL CORD INJURY AT PARAPLEGIC CENTER, PESHAWAR: A CROSS-SECTIONAL SURVEY

Dr. Muhammad Shahab Aurangzeb[1], Dr Muhammad Barkat Ullah[2], Dr Hareem Shoukat[3], Dr Muqaddas Zubair[4], Dr Rukhma Shahzadi[5], Murad Ali Khan[6], Dr Aizaz Ullah Khan[*7]

[1]Clinical Physiotherapist in APRC Physiotherapy Center and Rehabilitation Peshawar.
[2]Rehab House Officer at MTI, Mardan Medical Complex Mardan.
[3]Rehab House Officer at Physiotherapy Clinic of WILRS Abbottabad
[4,5] Rehab House Officer at CMH Abbottabad
[6]Registered Nurse RMI Hospital Peshawar
*[*7]Rehab House Officer at Hayatabad Medical Complex Peshawar*

[1]afridishahab859@gmail.com, [2]itsbarkat723@gmail.com, [3]malik.dpt3510@gmail.com, [4]muqaddaszubair634@gmail.com, [5]rukhmashahzadi514@gmail.com, [6]muradalishaheen@gmail.com
[*7]aizazullah2001@gmail.com

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Corresponding Author: *
Dr Aizaz Ullah Khan

Abstract

Background: *Spinal cord injury is one of the devastating events of a person's life. Below the injury level, the body becomes paralyzed and patient is dependent on assistive devices mostly for ambulation. Among different assistive devices, one is manual wheelchair. Upper extremities are used for ambulation in manual wheelchair users so they are more prone to glenohumeral joint instability. Many studies have been done worldwide about upper extremities pain and disability among manual wheelchair users but very few studies could be found in Pakistan, also there is limited studies on shoulder instability among manual wheelchair users after spinal cord injury.*

INTRODUCTION

Glenohumeral joint (GH joint) is one of the most complex and mobile joint of the human body, designed to provide a wide range of motion (ROM) for the upper extremity. Recent research continues to explain its complex biomechanics, the interconnection and synergy of its components, and the factors that contribute to dysfunction and pain(1-3). The shoulder girdle is a system of four articular surface that work in

coordination to provide movement. It's often characterized as a "compromise between mobility and stability," where its high degree of mobility makes it open to injury. This dynamic stability is managed firstly by muscle forces, with a secondary

role for passive structures like ligaments and the joint capsule(4-6). The four articulations are:

Glenohumeral Joint
A true ball-and-socket joint that connect the humerus and scapula. It has the wide range of movements of any joint in the body, which also makes it most susceptible to dislocation. Acromioclavicular (AC) Joint: A plane synovial joint that enables the scapula to rotate on the clavicle, allows a greater range of motion for the arm.

Sternoclavicular (SC) Joint
A saddle joint that is the single bony joint of the upper limbs to the axial skeleton.

Scapulothoracic (ST) Joint
A "functional joint" or articulation, not a true joint, where the scapula glides over the rib cage. The synchronized movement of this joint with the glenohumeral joint is known as the scapulohumeral rhythm(7, 8). Recent research concentrated on the modeling and interconnectedness of these joints. A review by Rijal (2024), for example, highlighting the vital role of the scapula in providing a stable base for shoulder joint movement. The periscapular muscles are important for this synchronization, and their weakness or dysfunction can lead the way to change scapular mechanics and GH joint dysfunction. Another study focuses on the importance of precise kinematic models for the shoulder complex in the evolution of rehabilitation robots, highlighting the complex, closed-loop nature of the shoulder complex(1, 3, 4). Shoulder instability is a common condition where the humeral head, or "ball" of the upper arm bone, becomes unfastened or dislocated from the glenoid, the "socket" of the shoulder blade. This can take place partially (subluxation) or completely (dislocation). The high degree mobility of the shoulder joint makes it inherently less stable, depending on a complex system of static and dynamic stabilizers, including the joint capsule, labrum, ligaments, and surrounding muscles, especially the rotator cuff(9, 10).
The types of instability include,

Anterior Instability
The most common type, considered for over 95% of cases. The humeral head translates forward and inferiorly.

Posterior Instability
This is rare type of instability and can be caused by seizure or a fall on a forward-flexed arm. It may be linked with a "reverse" Bankart or "reverse" Hill-Sachs lesion.

Multidirectional Instability (MDI)
This includes instability in two or more directions, generally anterior, inferior, and/or posterior. It is often atraumatic in nature and linked to generalized ligamentous laxity (11) Shoulder instability, mostly dislocation, is the frequently occurring joint dislocation in the human body, with a remarkable prevalence in a defined population. The overall prevalence of glenohumeral dislocation is described to be as high as 23.9 per 100,000 person-years in the United States, with a lifetime prevalence of 1% to 2% in the general population(12-14). Almost 50% of significant joint dislocations occur at the GH joint, making it the most common big joint dislocation site in UK emergency rooms (15, 16).
Spinal cord injury (SCI) is a remarkable and life-changing condition occurring from injury to the spinal cord. It leads to a loss of sensory, motor, or autonomic function in areas below the level of the injury. For people with SCI, a manual wheelchair becomes a primary source of mobility. While an important device for self-support, extended manual wheelchair use is correlated with a high prevalence of secondary health conditions, especially in the upper extremities (17, 18). Paraplegia is a specified form of paralysis defined as the lesion or loss of sensory and/or motor function in the thoracic, lumbar, or sacral parts of the spinal cord, bring about functional loss in the lower half of the body. This usually affects the legs, trunk, and pelvic organs (bladder, bowel, and sexual function). Recent GBD data from 2019 evaluate the global annual prevalence of SCI with a lesion below the neck (primarily resulting in paraplegia) to be round about 5 per 100,000 people (19).

SCI is a complex condition with altered degrees of severity, ranged by the level of the neurological lesion and whether it is "complete" (no motor or sensory function below the injury level) or "incomplete" (some function is preserved). Traumatic SCI is often caused by motor vehicle accidents, falls, or violence. Non-traumatic SCI can be caused by conditions like tumors or diseases. Globally, the incidence of SCI ranges from 1 to 5 per 100,000 people (20). The dependency on a wheelchair for mobility also makes individuals in risk to the consequences of instrument failure. A study of individuals with SCI in the United States found that over 50% reported required wheelchair repairs, with 42% have experience of unfavorable outcomes, such as being helpless or missing appointments. These failures can lead to injuries and restricts involvement in daily life (21). The most common cause of pain for people with SCI who use manual wheelchairs (MWC) is GH joint discomfort, which can significantly hinder a person's functioning abilities. Because wheelchair propulsion and other daily activities like transferring and weight-loss labor produce frequent loading, manual wheelchair use results in strain on the upper extremities, particularly the shoulder (22, 23). For individuals who depend on a manual wheelchair for mobility, the correlation between the shoulder's design and its functional demands go through basic and pathological change. The human shoulder was not created to be a weight-bearing joint; its developmental motive is to provide the ability needed for manipulation and reaching. However, in the absence of lower extremity function, the shoulder of a manual wheelchair user (MWU) becomes the primary center for movement, transfers, and activities of daily living (ADLs). This intense move forces a joint engineered for mobility to serve a new, primary role of stability and weight-bearing. This inherent dispute creates a biomechanical susceptibility that is the main cause of the chronic overuse injuries and instability that bother this population, setting the stage for a cascade of progressive degenerative pathologies (18, 24)

The adaptation to manual wheelchair mobility places a novel set of biomechanical demands on the upper extremity. Prolonged manual wheelchair use is specify by repetitive, unidirectional pushing motions that primarily engage the muscles of the anterior upper body, such as the anterior deltoid and pectoralis major. Over time, this can lead the way to muscular imbalance, where the anterior muscles become overdeveloped and tight while the opposing posterior muscle groups, including the latissimus dorsi and posterior deltoid, become weakened and strained (5). This muscular imbalance, combined with the high forces needed for propulsion, transfers, and weight-relief tasks, imposes chronic and subtle strain on the shoulder joint. This repetitive microtrauma initiates a cascade of degenerative changes, including rotator cuff tendinopathy and tears, bursitis, and shoulder impingement syndrome. These structural pathologies, in turn, compromise the joint's inherent stability by weakening the dynamic stabilizing system, thereby increasing the risk of subluxation and following pain. This creates a self-perpetuating cycle of pain and dysfunction (25, 26)

The biomechanical reality of manual wheelchair propulsion presents a fundamental trade-off. The wheelchair itself is an assistive device designed to restore a degree of independence and function to individuals with SCI. However, the very activities required to operate the device namely, repeated, forceful upper-extremity movements are the primary drivers of the chronic musculoskeletal conditions that ultimately diminish that very independence. This contradictory relationship initiates a biomechanical difficulty. a solution for one major functional deficit (loss of mobility) unintentionally creates a new, chronic, and often weakening medical problem. The resultant pain and dysfunction directly disrupt the user's ability to perform required activities of daily living, including wheelchair propulsion and transfers, thereby generate a feedback loop where the solution to the initial problem becomes the source of a new, progressive, and independence-limiting illness.(26, 27).

METHODOLOGY

Study Design

This was a cross-sectional survey about glenohumeral joint instability among manual wheelchair users after spinal cord injury.

Study Settings

Paraplegic Centre Peshawar.

Study Duration

Study was conducted from 1st July to 1st October 2025 (4months).

Sample Size

Sample size was calculated from a population of 133 people with the help of online software **Rao soft** calculator with 95% confidence level and 5% margin of error. The sample size for this study turned out to be 99.

Sampling Technique

Non-probability convenience sampling

Inclusion Criteria:

- Male and female patients aged 18 and above
- T2 level or below spinal cord injury (complete or incomplete)
- Independent manual wheelchair users
- Diagnosed with traumatic spinal cord injury

Exclusion Criteria

- Dependent on others for wheelchair propulsion or transfers
- Using power wheelchairs
- Recent shoulder trauma (dislocation, fracture etc) after SCI
- Cognitive or mental inability to complete the questionnaire assessed through **Montreal Cognitive Assessment (MoCA)** scale (a 30-point test for cognitive impairment)

Data Collection Procedure

By using non-probability convenience sampling for data collection. All participants were screened for inclusion and exclusion criteria. Eligible participants were provided with detailed information about the study and written informed consent form was taken before participation. Participants were assessed for GHJ instability using physical tests and participants were provided to complete the given OSIS questionnaire.

Data Analysis Procedure:

Data was processed using Statistical package of Social Science (SPSS) version 25. Descriptive analysis for socio-demographic variables was employed. Standard deviation and mean were employed for numerical variables like age, duration of MWCs use and OSIS score. For categorical variables such as gender, level of injury and the presence or absence of instability; frequencies and percentages were used in their analyses.

Ethical Consideration:

This study was approved by the Graduate Committee of Institute of Physical Medicine and Rehabilitation (KMU) Peshawar and Paraplegic Centre Peshawar for data collection. Informed consent was taken from all included participants.

RESULTS

Demographic and Clinical Characteristics of Participants

After completing the questionnaire and meeting our inclusion criteria, seventy-one (71) MWCUs with spinal cord injuries were added to the study. The mean age of the participants in our study was 35.94 years, with a standard deviation of ± 10.56. The participants ranged in age from 18 to 60 years, with 52 males and 19 females, resulting in 73.2percent and 26.8percent of the sample, respectively. Of the manual wheelchair users, 57, or 80.3%, were right-handed, while 14, or 19.7% were left-handed. In 19(26.8%) patients, neither shoulder was affected.57.7% (41) had a right shoulder problem,15.5% (11) had a left shoulder problem. At the time of the survey, the mean durations for the injury and manual wheelchair usage were reported to be 3.17 years (SD ± 3.08 years) and 2.79 years (SD ± 2.92 years), respectively. In the current study, the level of injury was classified into four categories and

transformed into coded variables for statistical analysis. Of the SCI patients, 49.3% had paraplegia at the T7-T12 level, whereas those with paraplegia at the T2, T3-T6, and below L1 levels comprised 8.5%, 25.4%, and 16.9%, respectively. The majority of the injuries were located at T7-T12, with 35 cases (49.3%), T3-T6 with 18 cases (25.4%), and injuries below L1 with 12 cases (16.9%).

The clinical and demographic information of the participants is displayed in Table.1.

TABLE .1

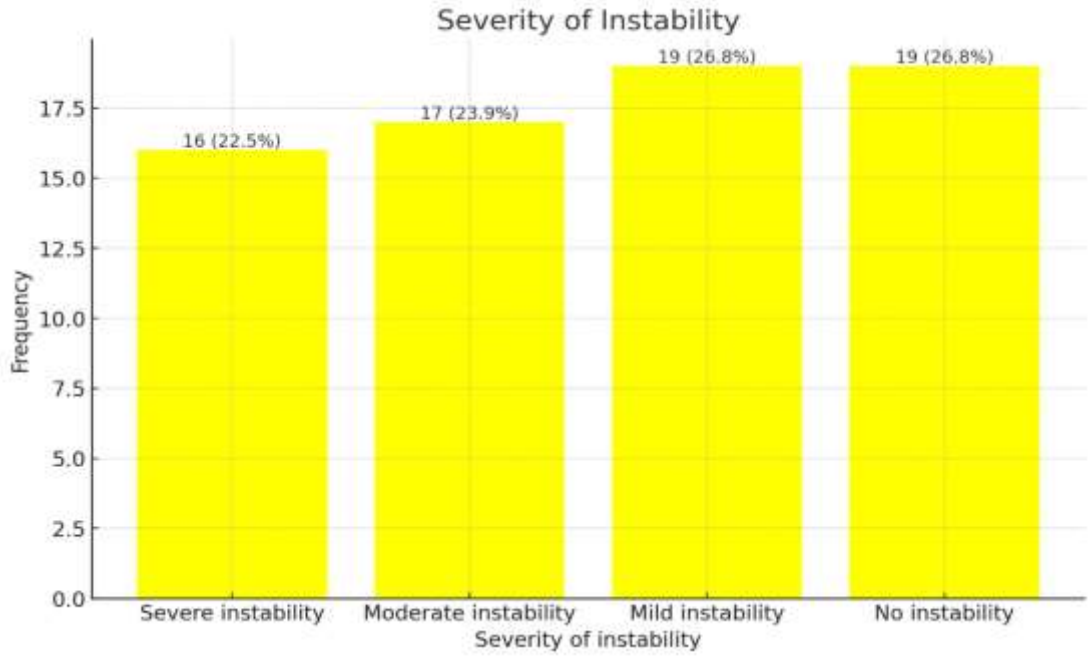
Participants' Clinical and Demographic Details (n = 71):

Variable	Categories	Frequency(n)	Percentage (%)	Mean ± SD
Age(years)				35.94± 10.56
Gender	Male	52	73.2%	
	Female	19	26.8%	
Duration of injury				3.17±3.08 years
Duration of manual wheelchair use				2.79±2.92 years
Hand Dominance when using a manual wheelchair	Right	57	80.3%	
	Left	14	19.7%	
Side of affected shoulder	None	19	26.8%	
	Right	41	57.7%	
	Left	11	15.5%	
Level of Spinal Cord Injury	T2	9	8.5%	
	T3-T6	18	25.4%	
	T7-T12	35	49.3%	
	L1 and below	12	16.9%	

Frequency distribution of severity of shoulder instability (n =71)

The severity of shoulder instability was treated as ordered categorical data. The participants were asked to answer the OSIS questionnaire, and their responses were recorded and analyzed to produce the final average results.22.5%(n=16) of the participants reported severe instability, whereas participants with moderate instability, mild instability, and no instability comprised 23.9%(n=17), 26.8%(n=19), and 26.8%(n=19), respectively. Of the total participants (n=71), only 34(47.8%) were reported to have clinically significant shoulder instability.

FIGURE .1



A bar chart illustrating the frequency distribution of shoulder instability severity(n=71) is presented in Figure 1.

Frequency of shoulder instability according to age:

The occurrence of shoulder instability was also measured among various age groups. Within the 18 to 30-year-old age range, there were 26 participants, with 3 individuals experiencing severe instability, 5 having moderate instability, and 10 reporting mild instability. Meanwhile, 8 participants (11.3%) did not report any shoulder instability. In the 31 - 40-year-old age group, out of 20 participants, 7 reported shoulder instability, with 7 experiencing severe, 5 moderate, and 4 mild instabilities, while 4 participants did not report any issues. Among the 41-50 age group, 16 participants were identified, 5 of whom had instability: 5 severe, 3 moderate, and 3 mild, and 5 did not have any instability. In the 51-60 age group, out of 9 participants, 1 had severe instability, 4 had moderate instability, and 2 had mild, with 2 having no reported instability at all.

Frequency of shoulder instability according to gender

Among the 71 individuals, the percentage of males was 73.2 (n = 52) of whom 11 individuals had shoulder instability. Of these, 15.5% had severe instability (n=11), 21.1% had moderate instability (n=15), and 21.1% had mild instability (n=15), while 15.5% (n=11) reported no instability.

The percentage of females was 26.8% (n = 19) of whom 5 individuals had shoulder instability. Among them, 7.0% had severe instability (n = 5), 2.8% had moderate instability (n = 2), and 5.6% had mild instability (n = 4), while 11.3% (n = 8) did not report any shoulder instability.

Relation of shoulder instability with time period of wheelchair usage:

The group using manual wheelchairs for 6 months to 2 years included 47 participants, of whom 9 had shoulder instability and 38 did not report any instability. Of the 15 participants who had been using manual wheelchairs for 2–5 years, six reported shoulder instability; and nine did not report any instability. Of the five participants who had been using manual wheelchairs for 5-10 years, one reported shoulder instability. Of the four

participants who had used a manual wheelchair for 10–15 years, none had any shoulder instability.

Relation of shoulder instability with level of spinal cord injury:

In the group of 6 Participants with T2 level spinal cord injury (SCI), only one had experienced shoulder instability, while the remaining five did not. In the group of 18 participants with T3-T6 level SCI, four reported shoulder instability, whereas 14 did not. Out of the 35 participants with T7-T12 level SCI, eight experienced shoulder instability, and 27 did not. Of the SCI patients, 12 had paraplegia below L1 level, three reported shoulder instability, while nine did not.

Table .2

Occurrence of shoulder instability categorized by age groups, gender, duration of MWC use, and spinal cord injury severity:

		Categories of Shoulder Instability Severity				
		Severe instability	moderate instability	Mild instability	No instability	Total
Age Group (years)	18-30	3	5	10	8	26
	31-40	7	5	4	4	20
	41-50	5	3	3	5	16
	51-60	1	4	2	2	9
Gender	Male	11	15	15	11	52
	Female	5	2	4	8	19
time period of MWC usage	6 months-2 years	9	12	12	14	47
	2-5 years	6	2	5	2	15
	5-10 years	1	1	1	2	5
	10-15 years	0	2	1	1	4
Level of SCI	T2	1	1	3	1	6
	T3-T6	4	4	3	7	18
	T7-T12	8	12	9	6	35
	L1 and below	3	0	4	5	12

Descriptive Statistics of Oxford Shoulder Instability Score (OSIS):

Seventy-one individuals were evaluated using the 12-item OSIS questionnaire to obtain descriptive statistics. All participants completed the questionnaire, and their responses were recorded. The results showed OSIS scores ranging from 3 to 45, with an average of 28.70 and a standard deviation of 12.88. Based on score classification, 26.8% of participants had mild instability, 23.9% moderate instability, and 22.5% had severe instability. All 71 participants provided valid responses for this measure.

Table .3
Descriptive Statistics of Oxford Shoulder Instability Score (OSIS) among Participants(n=71):

Oxford Shoulder Instability Score (OSIS)					
	Sample	Minimum score	Maximum score	Mean	Std. Deviation
Total_OSIS	71	3.00	45.00	28.7042	± 12.8834

Prevalence of Glenohumeral Joint Instability:
Of the 71 participants with SCI, 34(47.8%) reported symptoms of shoulder instability based on the 12-item Oxford Shoulder Instability Questionnaire or positive clinical signs (apprehension, relocation, or sulcus test), whereas 37(52.2%) did not report instability. Considering a cut-off score of ≤ 30, the prevalence of glenohumeral joint instability in our study was 47.8%(n=34) among spinal cord injury patients using manual wheelchairs.

Table .4
Prevalence of Glenohumeral Instability among SCI Manual Wheelchair Users:

Shoulder Instability	Frequency (n)	Percentage (%)
Present	34	47.8%
Absent	37	52.2%
Total	**71**	**100.0%**

Table .5
Association Between Gender and Shoulder Instability

Variable	Category	Shoulder Instability		P-value	χ^2
		Present	Absent		
Gender of participant	Male	27	25	0.464	0.537
	Female	8	11		
Total_71		35	36		

Table .5 presents the results of the chi-square analysis conducted to determine the association between gender and the prevalence of glenohumeral joint instability among spinal cord injury patients using manual wheelchairs.
The result (χ^2 = 0.537, p = 0.464) indicates no statistically significant association between gender and shoulder instability, as the p-value is greater than 0.05

Discussion
A cross-sectional study was conducted on 71 individuals with spinal cord injury (SCI) to assess the prevalence of glenohumeral joint instability among manual wheelchair users (MWCUs) using the 12-item Oxford Shoulder Instability Score (OSIS). We found a general prevalence of shoulder instability of 47.8% in 71 patients. This is significantly less than recent regional data on Pakistan, where Muhammad et al. (2022) found that the rates of shoulder pain (78.7%) and shoulder disability (69.3%) among MWCs after SCI were significantly higher, indicating the burden of upper limb musculoskeletal issues on this population (28). The difference is likely that the focus on the Oxford Shoulder Instability Score (OSIS) was measured, rather than general measurements of shoulder pain and disability employed in other research, such as the SPADI and WUSPI, which reflect a broader spectrum of shoulder conditions, including pain not necessarily linked to instability. The prevalence of shoulder pain among MWCUs after SCI is unclear, but it is reported to be a widespread issue

in the population, ranging between 20 and 60% depending on the assessment techniques and the nature of the injuries (39, 40). A 47.8 percent shoulder instability in the present study is a clinically relevant subset of more general issues. Glenohumeral joint instability was one of the most prevalent disorders related to shoulder conditions in MWCUs (31, 41).

Spinal Cord Injury (SCI) resulting in paraplegia is a remarkable health problem, with an incidence rate of approximately 23 cases per million per year, according to a regional study conducted in Khyber Pakhtunkhwa (2020) (42). Patients with SCI experience many problems in their lives related to functional, socioeconomic, and psychological factors (43). Mobility is a crucial aspect of social involvement, which is likely to be considerably impaired in SCI patients (44). These patients are often highly dependent on MWCs (45). The lower limbs paralysis and the utilization of MWCs among the people with SCI causes overuse by the upper limbs, which consequently increases the frequency of pain and degeneration in these regions (46). We found that the incidence of shoulder instability was high in MWCUs after SCI. One likely reason contributing to this is the inappropriate methods and corrective measures adopted by the patients when using MWCs.

The most frequently described painful joint above the injury level in individuals with paralysis is the shoulder joint (46). The prevalence of shoulder instability in MWCs in the post-SCI period is determined in our study. This cross-sectional study suggests a general prevalence of shoulder instability of 47.8% in 71 patients. According to Akbar et al., the shoulder is the most common site of injury in MWCUs, with a prevalence of shoulder pain ranging from 31 to 73%. Our study results fall within this range (47). In another similar study, Karal K. Wessels et al. discovered that forty-seven percent of study participants reported shoulder discomfort, which is within the normal range (48). Another cross-sectional survey conducted in the same environment in Peshawar found the prevalence of shoulder pain was 34.7%. Even though the inclusion and exclusion criteria were identical in both studies, the prevalence differences remained evident, probably because of the time differences, which were post-two weeks in their research and post-six months in the current study (36).

In the current study, 22.5% of the participants experienced severe instability, 23.9% experienced moderate instability, and 26.8% experienced mild instability as determined by the Oxford Shoulder Instability Score (OSIS). Our study findings were consistent with those who concluded that musculoskeletal pain during wheelchair use is quite common, affecting approximately one-half of wheelchair users (95% Confidence Interval: 33-67%). Shoulder pain occurs as the most common of these, with a pooled prevalence of 44% (95% CI: 36-52%) (28). In another study the prevalence of shoulder pain among chronic paraplegic patients was estimated to be 60 percent, which is high in comparison to the results of our study, the explanation could be in the differences in sample size used in their research and inclusion criteria may as well have helped in creating the low prevalence recorded in our population (49).

On average, the participants were 35.94 years old. 73.2% of them were males. Most of the injuries are associated with the T7-T12 spinal level. The mean time of injury and wheelchair use was three years and less than three years, respectively. These findings are valuable information about demographic and clinical features of this group and the effect of shoulder instability.

The OSIS is a validated tool for patients to report and quantify the severity of shoulder instability. In this study, the average score was 28.7, which means a moderate level of instability. Because the OSIS is widely used and reliable, our results can be compared with other similar studies (50).

Age and sex comparison has been demonstrated that young age groups (18-30) exhibited moderate and mild instability with an increasing trend in the instability severity in the older age groups, which could be due to survivor bias or varying patterns of wheelchair users with time. Males were found to have had more instability than females, which was in tandem with the higher number of male respondents but also possibly with differences in activity level, injury, or wheelchair propulsion mode, as reported by Tsunoda et al., that male wheelchair users tend to have more shoulder

instability than females because of the low shoulder flexibility (51). The duration of wheelchair use was related to the frequency of shoulder instability, with those using wheelchairs for 6 months to 2 years showing a relatively higher number of instability cases than those using wheelchairs for longer period. A possible explanation for these findings may be the sudden instability of the shoulders after trauma and the loads placed on the shoulders during wheelchair use, which warrants early preventative interventions, as recommended in research focusing on wheelchair setup and biomechanics to reduce shoulder loads (39).

The level of spinal cord injury affected shoulder instability, with mid-thoracic level SCI (T7-T12) having the highest number of individuals reporting instability. In contrast to our study participants, who had 12 lumbar SCI and 59 thoracic SCI, a study with a sample of 51 participants found that 20 participants had lumbar injuries and 28 had thoracic injuries, indicating that the thoracic region is the most vulnerable to paraplegic SCI (52). This could be associated with changes in biomechanics and compensation methods in the group of injury. Prior literature indicates that the biomechanics of the shoulder and muscle activation pattern depend on the neurological level and determine the susceptibility to instability and pain (17).

The study will add to the literature because it will have more current and situation-specific information on shoulder instability among manual wheelchair users with SCI. To summarize, the current research establishes that the issue of shoulder instability is a significant challenge in the population of MWCUs after SCI living in the region of Pakistan and is in line with the evidence presented globally. The OSIS is a good diagnosis and severity rating tool. The findings contributed to the importance of early assessment and specific intervention programs to minimize the complications of shoulders, enhance well-being, and increase the quality of life in the group. The results were verified using a combination of clinical testing (sulcus, relocation, and apprehension tests) because self-reported questionnaire data is susceptible to recall bias.

Association Between Gender and Shoulder Instability

The current study found that shoulder instability was present in both male and female spinal cord injury patients using manual wheelchairs; however, statistical analysis showed no significant association between gender and the prevalence of glenohumeral joint instability ($\chi^2 = 0.537$, $p = 0.464$). Although more males were affected, this was likely due to their higher representation in the sample rather than a true gender-related difference.

These findings are consistent with regional and international literature, which also report that gender is not an independent predictor of shoulder instability. Boninger et al. (2005) found no significant gender differences in shoulder joint abnormalities among wheelchair users, emphasizing that repetitive loading patterns and propulsion biomechanics are the primary contributors to shoulder dysfunction (53).

Similarly, one study reported comparable rates of shoulder impairment in male and female wheelchair users when exposure to wheelchair-related activities was taken into account (29). In a Pakistani cohort study of paraplegic patients, observed a higher absolute number of males with shoulder pain; however, gender was not identified as a statistically significant factor influencing shoulder pathology. These findings support the results of the present study and highlight that shoulder instability is a widespread issue across genders within the SCI population (49).

CONCLUSION

People who use manual wheelchairs after spinal cord injury, glenohumeral joint instability is the common and serious problem of concern. The prevalence was computed at 47.8% justified by Oxford Shoulder Instability Score (OSIS) which resulted in a moderate average of and affirm clinical examinations. The findings of our study mainly consist of young adult males with mid-thoracic level injuries and several years of wheelchair use. Analysis verified relation between instability and age, sex, duration of wheelchair use and neurological injury level, in accordance with existing literature. The high prevalence and

significant effect of musculoskeletal shoulder disorders in this patient population are confirmed by the collective data.

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