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Prevalence of Dorsal Wrist Impingement Syndrome with Scaphoid Instability among Gym Goers

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KEYWORDS

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DECLARATIONS

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ABSTRACT

Background: Gym goers are at increased risk of developing musculoskeletal disorders due to poor posture, repetitive hand movements, extended workout duration, and inadequate ergonomics. The dorsal wrist impingement syndrome is associated with wrist hyperextension and scaphoid bone instability. **Objective:** To investigate the prevalence of dorsal wrist impingement syndrome with scaphoid instability among gym goers. **Methodology:** This observational study was conducted over six months following synopsis approval from the University of Lahore, targeting gym goers in Sargodha city, with 147 participants recruited using a non-probability purposive sampling technique. Participants aged 16 to 45 years, both genders, experiencing wrist pain or difficulty in wrist hyperextension were included, while those with wrist fractures, dislocations, neurological problems, recent trauma, or deformities were excluded. Data collection involved standardized diagnostic tools, including the scaphoid shift test to assess scaphoid instability, the finger extension test to confirm dorsal wrist impingement syndrome, the numerical pain rating scale to measure pain intensity, and the patient-rated wrist evaluation questionnaire to evaluate wrist function and disability. Spearman's rank correlation test was applied to examine relationships between variables, and results were expressed using percentages and frequencies for quantitative variables. **Results:** Out of 147 participants, 75 male participants had more right-handed wrist pain than 72 female participants. The age range of participants was between 16 and 45 years, and the highest frequency was between the ages of 31 and 35 years. 94 participants had positive results for the scaphoid shift test, while 53 participants had negative results. In the ratio of the finger extension test, 111 participants had positive results, and 36 participants had negative results. **Conclusion:** This study concludes that dorsal wrist impingement syndrome with scaphoid instability is indeed prevalent among gymgoers. This condition is closely linked to wrist hyperextension during heavy lifting, making it a prominent risk factor. Additionally, the research suggests that right-handed individuals are more prone to experiencing wrist pain in comparison to their left hand.

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INTRODUCTION

In gym goers, the wrist serves as a crucial weight-bearing joint, imparting a unique biomechanical dimension to sports and exercise-related activities.[1] Unlike many other athletic populations, gym goers often subject their wrists to continuous loading, compression, and extreme ranges of motion during strength training, calisthenics, gymnastics-inspired movements, and weightlifting exercises. These repetitive and demanding tasks place the wrist at risk of developing overuse injuries and mechanical stress disorders.[2] Gym goers commonly begin rigorous training and participation in high-intensity workouts before achieving full skeletal maturity, thereby exposing their wrists to stress during a vulnerable developmental stage. Such conditions make the wrist particularly susceptible to specific categories of ailments.[3]

One notable condition, referred to as "gymnast wrist," arises from repetitive micro trauma and chronic stress applied to an immature distal radius. This condition often results in inflammation of the distal radius physis and, if not addressed promptly, can progress to long-term complications, such as ulnar impaction syndrome caused by ulnar overgrowth and premature growth arrest of the radius.[4] Moreover, persistent dorsal wrist discomfort is frequently reported among gym goers, and this is largely associated with repetitive overextension movements, dorsal capsular impingement, and irritation of the posterior interosseous nerve. In addition, the improper use of equipment, such as poorly fitting dowel grips, may trigger short-term problems like "grip lock," which can sometimes escalate into acute injuries such as forearm fractures.[5]

Dorsal wrist syndrome is broadly defined as a condition characterized by chronic dorsal wrist pain, most commonly aggravated during hyperextension activities.[6] Clinically, it manifests as localized dorso-radial radiocarpal joint pain, often associated with inflammation, synovitis, arthritis, swelling, and reduced grip strength, with symptoms worsening under repetitive workload or excessive training intensity.[7] The repetitive nature of gym exercises, which involve continuous hand and wrist movements, predisposes individuals to overuse syndromes and repetitive strain injuries affecting the musculature, nerves, and tendinous structures of the wrist.[8] Scapholunate ligament injuries and scaphoid bone instability are common contributors to dorsal impingement syndrome, with many cases linked to acute wrist sprains or a prior history of repetitive wrist injuries.[8]

A commonly observed diagnostic feature is the "clamp sign," where the patient instinctively grips both the dorsal and volar aspects of the scaphoid to relieve discomfort or instability.[9] Given the structural complexity of the wrist joint, which consists of intrinsic and extrinsic ligaments working to maintain the balance between physiological forces and bony articulations, it is highly vulnerable to instability under conditions of excessive or abnormal loading. When this equilibrium is disrupted by repetitive mechanical stress, gym goers experience functional limitations, evaluating wrist dysfunction and its impact on daily life activities, which is particularly significant.[5]

Dorsal wrist impingement syndrome (DWIS) specifically occurs due to the entrapment of dorsal capsular tissue during axial compression combined with repetitive dorsiflexion, conditions that are frequently observed in gym goers performing push-ups, bench presses, and handstands.[10] Chronic exposure to these stresses can lead to dorsal capsular thickening, synovitis, and, in some cases, the development of dorsal ganglion cysts.[11] Although clinical examination remains a primary diagnostic method, imaging modalities such as MRI play an essential role in ruling out other potential causes of scapholunate discomfort, including partial ligament tears and cystic lesions.[12] Importantly, partial injuries to the dorsal scapholunate band and the presence of dorsal ganglion cysts may also involve associated midcarpal or extrinsic ligaments, such as the dorsal capsular and scapholunate septum (DCSS), further complicating diagnosis and management.[13]

Biomechanically, the wrist is primarily composed of articular cartilage and is highly dependent on the capitate's neck as the pivotal center of motion. During wrist extension, the proximal carpal row glides forward on its articulations while simultaneously rotating around the distal radius, whereas the reverse mechanics occur during wrist flexion.[14] Clinical signs such as tenderness, fullness, and swelling in the dorsal scapholunate region can be indicative of scapholunate ligament injury, occult ganglion formation, or dorsal wrist syndrome. Such patients often present with dorsal scapholunate synovitis, pain, soreness, or

discomfort during routine activities, and positive responses on specialized clinical assessments such as the finger extension test and scaphoid shift test.[15] Typical symptoms may also include mechanical sounds like clicks or pops, swelling, tingling sensations, temperature changes, deformities in hyperextension, and progressive grip weakness, especially evident during load-bearing activities like push-ups or weightlifting exercises.[16]

The prevalence of DWIS is notably higher in individuals with hypermobile or flexible wrists, slender muscle build, or those engaged in repetitive heavy lifting and strenuous upper-limb tasks. Epidemiological data also highlight a male-to-female ratio of approximately 9:4 for this syndrome, indicating higher susceptibility among males.[17] From a diagnostic perspective, clinical assessment is crucial. Tests such as Watson's test, which assesses scaphoid instability, involve applying gentle but firm pressure on the scaphoid tuberosity while passively moving the wrist from ulnar to radial deviation.[18]

The elicitation of a painful "click" or "pop" is considered a positive finding, often suggestive of scaphoid instability or scapholunate ligament separation. Similarly, the finger extension test, wherein the examiner resists pressure applied to the middle and ring fingers, serves as an effective tool for detecting scaphoid instability and identifying early symptoms of dorsal wrist syndrome.[19] The study aimed to investigate the prevalence of dorsal wrist impingement syndrome with scaphoid instability among gym goers.

METHODOLOGY

This study was conducted using an observational design over a period of six months following synopsis approval from the University of Lahore, targeting gym goers in Sargodha city who met the defined inclusion criteria. A total sample size of 147 participants was determined through Raosoft software, and participants were recruited using a non-probability purposive sampling technique from different gyms across the city. The inclusion criteria specified individuals aged 16 to 45 years, both male and female, experiencing wrist pain or difficulty in wrist hyperextension, while those with wrist fractures, dislocations, neurological problems, recent trauma, deformities, or outside the age range were excluded. Data collection involved standardized diagnostic tools, including the scaphoid shift test to assess scaphoid instability, the finger extension test to confirm dorsal wrist impingement syndrome, the numerical pain rating scale (NPRS) to measure pain intensity, and the patient-rated wrist evaluation (PRWE) questionnaire to evaluate wrist function and disability.

Informed consent was obtained from all participants, with clear explanations provided regarding study procedures, risks, and rights, ensuring ethical compliance. Diagnostic assessments included controlled application of pressure during the scaphoid shift test and observation of pain or a 'click' sound, while the finger extension test involved monitoring discomfort during resisted finger extension. Data collection further integrated participant-reported outcomes via the PRWE questionnaire, capturing pain, functional limitations, and wrist-specific difficulties.

Statistical analysis was performed using SPSS version 26, where normality of data was assessed through the Kolmogorov-Smirnov test, which revealed a non-normal distribution. Consequently, Spearman's rank correlation test was applied to examine relationships between variables, and results were expressed using percentages and frequencies for quantitative variables, supported by tabular and graphical presentations for clarity and interpretation. This rigorous methodology ensured reliability, ethical integrity, and comprehensive assessment of DWIS with scaphoid instability among gym goers.

RESULTS

Table 1 depicts the frequency and percentage of age. Results showed different age groups with different frequencies and percentages as 16-20 (10.2%), 21-25 (15.6%), 26-30 (15.0%), 31-35 (30.6%), 36-40 (17.7%), and 41-45 (10.9%). Table 2 shows the frequency and percentage of pain at rest. Results showed different intensities of pain with different frequencies and percentages. 47 (32.0%) participants suffered from mild pain, 64 (43.5%) from moderate pain, and 36 (24.5%) participants suffered from severe pain. It shows the results of different times of workout with different frequencies and percentages: 57 (38.8%) when the time of workout is 15-30 mins, 59 (40.1%) when the time of workout is 30-45 mins, and 31 (21.1%) when the workout is 45 mins-1 hour. This explains the frequency and percentage of pain and

tenderness around the wrist. Results showed that different groups, with 77 (52.4%) participants, responded yes, and 69 (46.9%) responded no, about pain and tenderness around the wrist.

Table 1 shows the results of different groups with different frequencies and percentages, as 111 participants had positive results and 36 participants had negative results. It explains the frequency and percentage of the scaphoid shift test for scaphoid instability. Results showed different groups with different frequencies and percentages. About 94 participants had positive results for the scaphoid shift test, while 53 participants had negative results. This depicts the frequency and percentage of the NPRS. Results showed different groups with different frequencies and percentages, as 17 participants have no pain, 39 participants have pain in a range of 1-3 (mild pain), 60 participants have pain in a range of 4-6 (moderate pain), and 31 participants have pain in the range of 7-10 (severe pain). Table 8 shows a correlation coefficient (r) of 0.18 with a p-value of 0.02 for the 2-tailed test. There is a statistically significant weak positive correlation between age and PWRE score.

DISCUSSION

Dorsal wrist impingement syndrome with scaphoid instability is a multifaceted condition that can significantly affect individuals engaged in activities such as gym goers and weight-bearing exercises. In this study, we aimed to investigate the prevalence of this syndrome among gym goers. The findings of our study offer important new understandings regarding the prevalence of this illness and its possible effects on persons engaged in these activities. The null hypothesis proposed that there is no prevalence of dorsal wrist impingement syndrome with scaphoid instability in gym users, in contrast to our research hypothesis. Our results validate the research premise and show that people who engage in gym activities are more likely to have this illness.

The scaphoid shift test and the finger extension test were two essential diagnostic techniques in our investigation. In the scaphoid shift test, pressure is applied to the scaphoid bone as the wrist is deviated radially. A “click” or symptomatic pain during the test is an indicator of a good outcome. Similarly, when a patient voluntarily extends their fingers against resistance, the finger extension test assesses the presence of DWIS, confirmed by the inability to maintain wrist extension due to pain. We were able to recognize and confirm the existence of DWIS with scaphoid instability in our study participants by using these diagnostic procedures.[1]

Our results are consistent with earlier studies that have highlighted the importance of dorsal wrist impingement syndrome in those who engage in activities that subject the wrist and associated structures to repetitive stress. Earlier research has shown that there is a noticeable strength difference between the dominant and non-dominant hands in right-handed individuals, but this difference is less pronounced in left-handed individuals. Furthermore, differences in power grip strength

Table 1: Frequency and percentage of variables

Variables		Frequency	Percentage
Age	16-20	15	10.2
	21-25	23	15.6
	26-30	22	15.0
	31-35	45	30.6
	36-40	26	17.7
	41-45	16	10.9
Pain at rest	Mild	47	32.0
	Moderate	64	43.5
	Severe	36	24.5
Time	15-30 mins	57	38.8
	30-45 mins	59	40.1
	45 mins-1 hour	31	21.1
Tenderness around wrist	Yes	77	52.4
	No	69	46.9
Finger extension test	Positive	111	75.5
	Negative	36	24.5
Scaphoid shift test	Positive	94	63.9
	Negative	53	36.1
Numeric pain rating scale	None	17	11.6
	1-3	39	26.5
	4-6	60	40.8
	7-10	31	21.1
Total		147	100.0

Table 2: Spearman's rank correlation

Age of patients	PRWE score	Correlation Coefficient (sig 2-tailed)
1.00	0.01	0.02 (0.18)

and pinch strength between the dominant and non-dominant hands has been reported.[20]

In our current study, we found that 82% of male and female participants aged 31- 35 experienced moderate pain and tenderness when lifting heavy objects with their right hand. In contrast to previous studies on Olympic athletes, which reported injury rates of 79.9% for males and 86.4% for females.[21] Our study found that males had a higher ratio of complaints than females. This discrepancy underscores the unique risks associated with gym activities. GS Kim et al. in 2020 examined the effects of weight-bearing wrist movement by applying taping in cases of dorsal wrist.[22] Our study used the finger extension test and the scaphoid shift test to assess dorsal wrist impingement syndrome pain. Both studies indicated that any weight-bearing movement through the hand or wrist could induce pain.

A study conducted by Watson focused on rickshaw drivers who worked over 10 hours a day and found that prolonged overuse of activities and stress on the hand and wrist were the main causes of dorsal wrist syndrome.[23] In our current study, gymgoers engaged in activities that put stress on the wrist, such as squats, even though their time duration of 1.5 to 2 hours was significantly less. This underscores that even shorter durations of intense wrist stress can lead to dorsal wrist impingement syndrome. Our study also revealed a statistically significant correlation between age and PRWE, but a weak positive correlation. This suggests that while there may be an increase in wrist hyperextension pain with age, it is not a substantial increase.

The high frequency of DWIS among exercise enthusiasts emphasizes the importance of early detection and treatment to prevent the onset of symptoms and maintain healthy wrist function. This underscores the need for increased awareness and preventive measures within the gym and sports community. Gym goers and athletes should be educated about the risks of repetitive wrist motions and wrist joint overuse, and the occurrence of dorsal wrist impingement syndrome may be reduced by implementing wrist supports and other preventative measures. Including a small sample size and a concentration on gym users who might not be representative of the general community. To gain a deeper knowledge of the prevalence of dorsal wrist impingement syndrome with scaphoid instability, future research might use a bigger and more varied sample. Long-term follow-up studies can also look into how well prevention strategies and medical therapies work to lessen how this ailment affects people's everyday lives and quality of life.

CONCLUSION

To build upon these findings, future research should be conducted on a larger scale with an increased sample size to enhance the reliability and generalizability of the results. It is also essential to investigate dorsal wrist impingement syndrome in relation to other wrist conditions beyond scaphoid instability. Furthermore, assessing the prevalence of DWIS in both healthy individuals and those with compromised wrist function would provide a more comprehensive understanding of the condition.

This study concludes that DWIS associated with scaphoid instability is notably prevalent among gymgoers. The condition appears to be strongly linked to wrist hyperextension during heavy lifting, identifying it as a significant risk factor. Additionally, the findings suggest that right-handed individuals are more likely to experience wrist pain in their dominant hand compared to the non-dominant one. These insights contribute valuable knowledge regarding the prevalence and risk factors of DWIS within the physically active population.

DECLARATIONS

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