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PREVALENCE OF SHOULDER PAIN, DISABILITY AND ITS ASSOCIATION WITH NECK DISABILITY IN TENNIS PLAYERS: A CROSS-SECTIONAL STUDY

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Abstract

Background: *Shoulder pain in a tennis player the joints and soft tissues surrounding the shoulder are the source of shoulder pain. The acromioclavicular, Sternoclavicular, and glenohumeral joints are examples of joints. Neck disability in a tennis player shows to any impairment or limitation in the functioning of the neck that affects their ability to play tennis or perform daily activities.*

Methodology: *It was a cross-sectional study to explore association between shoulder pain, disability and neck disability in tennis players. 80 tennis players were examined for shoulder pain and disability by Shoulder pain and disability index questionnaire and neck disability index questionnaire was filled by tennis players for checking neck disability.*

Results: *Most of the players 50.1% had mild impact of shoulder pain and disability and 41.25% had no impact of shoulder pain. Players were from age 18-30 years having mean age 23.71±3.119, the mean score of shoulder pain and disability was 1.67±0.635 and the mean score of neck disability index was 2.33±0.823, the chi square test showed no association for shoulder pain, disability and age with neck disability as their P-values were 0.294>0.05, 0.493>0.05, There was no association of shoulder pain and disability with neck disability.*

Conclusion: *Shoulder pain in a tennis player the joints and soft tissues surrounding the shoulder are the source of shoulder pain. Neck disability in a tennis player shows to any impairment or limitation in the functioning of the neck that affects their ability to play tennis or perform daily activities.*

In this research study, we associated the age, gender, shoulder pain and disability with neck disability but there was no significant association among these variables. Despite it, there was a significant association among training hours and neck disability.

INTRODUCTION

Shoulder pain in a tennis player the joints and soft tissues surrounding the shoulder are the source of shoulder pain. The acromioclavicular, sternoclavicular, and glenohumeral joints are examples of joints (1). The connective tissue surrounding the shoulder joint is damaged when the repetitive loads produced during physical exercise exceed the joint's physiological limits (2). Tennis players with extensive training and other sportsmen using the overhand stroke were shown to have a depression of the exercised shoulder. The enlargement of the racket-holding extremity and the stretching of the shoulder raising muscles are the causes of this deformity (3). Neck disability in a tennis

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player shows to any impairment or limitation in the functioning of the neck that affects their ability to play tennis or perform daily activities(4, 5). Since the bulk of sports-related injuries in young athletes are caused by repetitive and excessive stress on their developing musculoskeletal system, overuse injuries in youngster athletes are an increasing problem(6). Tennis players commonly complain about shoulder pain. Because of the complexity of the shoulder girdle's anatomy, it can be hard to identify the specific disease causing shoulder pain in tennis players(7).Tennis is an intermittent sport where players must possess a range of physical abilities to operate at high levels, including agility, muscular power, cardiovascular fitness, and linear sprint and change-of-direction speed , Players must use a lot of forceful strokes during practice and competition, especially serves and groundstrokes, the serve, in particular, is crucial to the result of a tennis match since it gives the player the opportunity to win the point with an ace straight away or control the rally from the outset early on in an athlete's career(8). Any neck discomfort that lasts for at least a day is classified as both cervical and upper limb pain, with or without referred pain(9). The limited glenohumeral joint internal rotation (IR) range of motion (ROM), tennis players frequently experience posterior shoulder pain(10). Professional tennis players often develop injuries to their shoulder joints, primarily as a result of the joint's repetitive mechanical overload(11) (12). Tennis players with neck pain were diagnosed in 9.5% of the males and 13.5% of the females, the occurrence of neck discomfort was linked to a history of back, neck, or shoulder injuries as well as physical and psychological stress at work, even after control for age and gender (13) (14). With shoulder injuries in tennis ranging from 1.5% to 27.2%, shoulder pain is a contributing factor in injury reports(15) (16). The prevalence of self-reported weekly neck shoulder pain in 15- to 18-year-old youths to be 17%, and in seven years, the prevalence of weekly neck shoulder pain had increased to 28%. After seven years, the six-month prevalence of occasional or weekly neck shoulder pain was 59% among those asymptomatic at baseline (17) (18). The prevalence of shoulder pain in tennis players major concerns included deficiencies in strength, power, and response speed; only 89.60% of players reported no shoulder problems at all during play(19). The estimates of the prevalence of shoulder discomfort range widely; point prevalence estimates range from 7 to 26%, while lifetime prevalence estimates range from 7 to 67% (20) (21). On the other together, information from multiple other research has revealed that the lower extremities account for 31%–67% of tennis-related injuries, with the upper extremities (20%–49%) and the trunk (3%–21%) coming in last(22).

In overhead sports, shoulder injuries and shoulder pain pose substantial problems for athletes, and several studies have presented a variety of risk factors such as decreased shoulder strength, range of motion deficits, and scapular dyskinesia that increase the risk of these complaints(23). In overhead athletes, a glenohumeral internal rotation deficit (GIRD) between the dominant and non-dominant shoulders is thought to increase the risk of shoulder injury Professional tennis players' dominant shoulders develop modifications, It is used to gain a deeper comprehension of the variables, such disability, that affect health outcomes(24) (25). The study has limitations This analysis of the data is retrospective in nature and does not allow for the evaluation of any risk factors or outcomes. Due to unknowns regarding the number of tennis players and their playing hours, this study is unable to calculate any injury incidence rates(26) (27). Those findings were presented as absolute values rather than in relation to training volume or other extrinsic risk factors specifically for upper limb injuries(28) (29).

Most of the tennis players complain after the game that they feel discomfort in the neck region with shoulder pain. Because, occasionally shoulder pain and disability leads neck disability in tennis players so this study is to find the prevalence of shoulder pain and disability its association with neck disability in tennis players. The literature review was conducted using databases such as Google Scholar and PubMed, focusing on English-language publications with search terms including “shoulder pain and disability,” “neck disability,” “causes of shoulder pain and neck disability,” and “risk factors.” Several studies revealed a connection between musculoskeletal shoulder pain and central nervous system involvement, including generalized mechanical hyperalgesia and allodynia. Overuse and repetitive stress were identified as leading causes of tennis-related injuries, with shoulder pain often resulting from overhead motion and

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diagnosed as impingement syndrome, rotator cuff issues, or biceps tendonitis. One study examined the prevalence of overuse-related shoulder pain in competitive tennis players over a one-week period, while others noted that neck pain significantly affects quality of life and performance. The literature highlights that tennis injuries do not stem from a simple combination of isolated risk factors and that current research often overlooks patient-reported outcomes, which could offer a more comprehensive understanding of disability. Factors such as racquet stiffness, grip size, and stroke technique were also linked to injury risk. Despite the frequent reporting of shoulder pain, limited research has been published specifically on neck pain in tennis players. Additionally, injury rates, mechanisms, and preventive strategies vary widely, with some studies emphasizing the importance of muscle balance, particularly in the non-dominant side, while others call for standardized methods to assess injury severity and time loss. Research has also shown a high incidence of shoulder injuries in overhead athletes, often due to deficits in internal rotation or muscular fatigue. Some studies proposed that interventions like e-health monitoring systems may help prevent such injuries. Overall, the literature emphasizes the multifactorial nature of shoulder and neck pain in tennis players, suggesting that injury prevention requires a comprehensive approach addressing biomechanics, training loads, technique, and modifiable musculoskeletal factors.

MATERIALS & METHODS:

The present study employed a cross-sectional design and was conducted at Hayatabad Sports Complex and Qayyum Stadium in Peshawar over a period of six months following the approval of the research proposal by the AMI research committee. A total of 80 participants were selected using a non-probability convenience sampling technique, with the sample size determined using Raosoft's sample size calculator at a 95% confidence interval and assuming a 50% proportion of the outcome factor in the population. The inclusion criteria comprised male and female tennis players aged between 18 and 30 years, who had been actively playing for at least one year and trained a minimum of 10 hours per week. Players were excluded if they had a history of humerus fracture repair, neck surgery, had been out of practice for 10 weeks, or had traumatic cervical history or shoulder dislocation. After obtaining institutional approval and official permissions from the respective sports complexes, participants were informed about the study objectives and screened based on the inclusion and exclusion criteria. Data were collected using two validated self-report tools: the Shoulder Pain and Disability Index (SPADI) and the Neck Disability Index (NDI) questionnaires. The SPADI assesses shoulder pain and its effect on daily functioning through 13 items scored from 0 to 10, where higher scores indicate more severe disability, and severity levels were categorized from minimal (0–20%) to very severe (81–100%). The NDI measures the impact of neck pain on daily life across 10 sections, each scored from 0 to 5, with a maximum total of 50 points, converted to a percentage; higher scores represent greater disability, categorized from no disability (0–4) to complete disability (above 34). Data were analyzed using SPSS version 28, where means and standard deviations were calculated for categorical data, results were presented in tables and charts, and chi-square tests were used to assess significant associations among variables.

RESULTS

Total 80 players out of them 72 were male players and 8 female players were involved in this study. The mean age of the players was 23.71 ± 3.119 years.

The number of players was, 80 out of which 16.3% i.e. (n=13) were with no disability, followed by 41.3 % i.e. (n=33) were with mild disability, 36.3 % i.e. (n=29) were with moderate disability, 6.3 % i.e. (n=5) were with severe disability.

Showing neck disability categories

Neck disability Categories	Frequency	Percent	Neck disability (%M±S.D)
No disability	13	16.3	2.33±823
Mild disability	33	41.3	
Moderate disability	29	36.3	
Severe disability	05	6.3	

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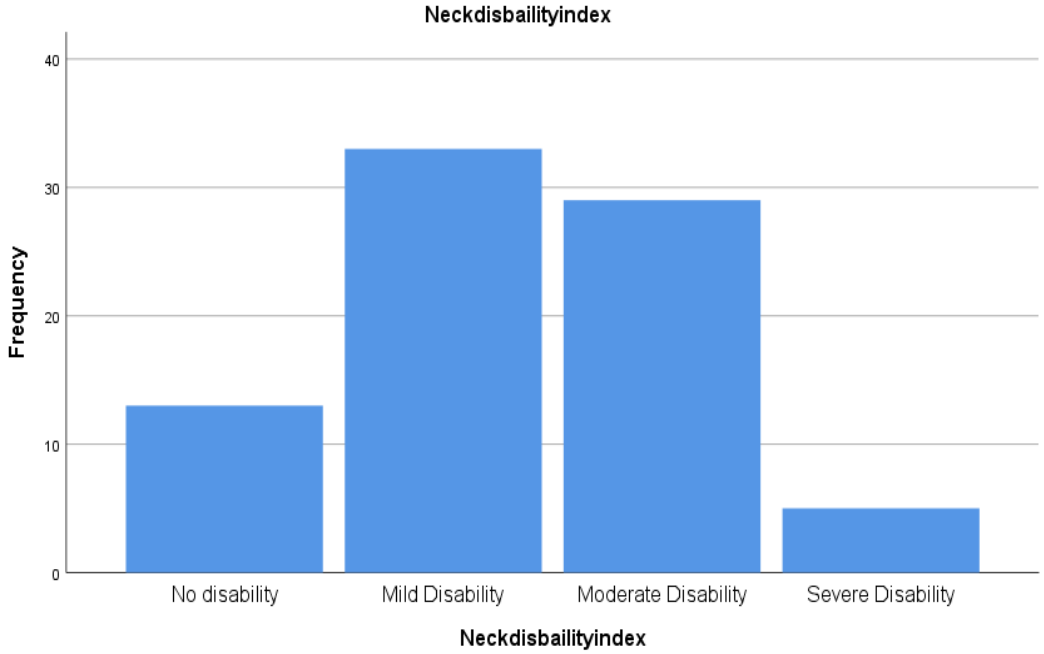
Total	80	100.0	

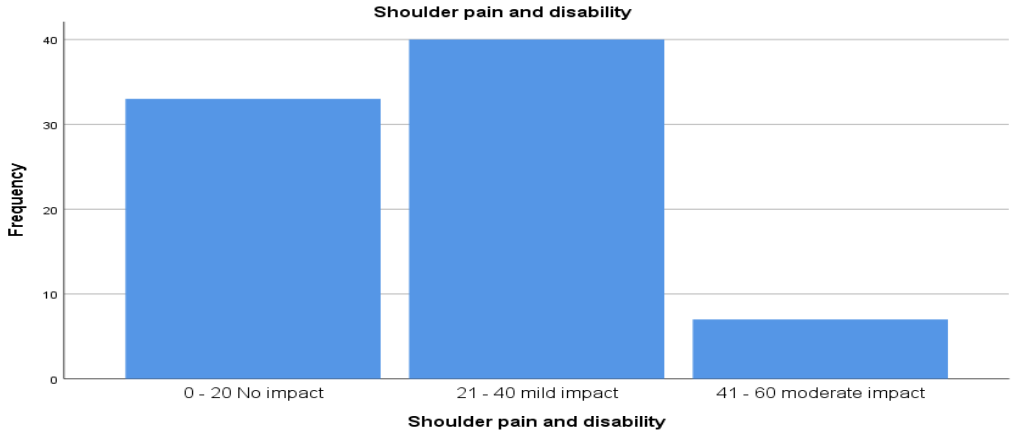


Showing neck disability categories in chart form

Shoulder pain and disability categories: The number of patients was 80, out of which 41.3% i.e. (n=33) were with no impact, followed by 50.1% i.e. (n=40) were with mild impact, 8.9 % i.e. (n=0) were with moderate disability, 0% i.e. (n=0) were with severe impact. 0% i.e. (n=0) were with very severe disability.

Showing shoulder pain and disability Index categories.

Shoulder pain and Disability Index Categories	Frequency	Percent	Shoulder pain and Disability Index (%M±S.D)
No impact	33	41.3	1.67±0.635
Mild impact	40	50.1	
Moderate impact	7	8.9	
Total	80	100.0	



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Showing shoulder pain and disability index categories in chart form.

Association of gender and neck disability index:
The number of players was 80, and out of 80 there is no significant association among gender and neck disability index as the P-value was 0.395, which is greater than 0.05.

Showing association of gender categories with neck disability index categories

Gender categories	No Disability	Mild Disability	Moderate Disability	Severe disability	Total	P-value
Male	13(16.2%)	28(35%)	26(32.5%)	5(6.25%)	72(90%)	0.395*
Female	0(0%)	5(6.5%)	3(3.75%)	0(0%)	8(10%)	
Total	13(16.25%)	33(41.25%)	29(36.25%)	5(6.25%)	80	

*Chi square test was applied.

Association of age and neck disability index:
The number of players was 80, out of 80 there is no significant association among age and neck disability index as the P-value was 0.493, which is greater than 0.05.
Showing association of age categories and neck disability index categories

Age Categories	No Disability	Mild Disability	Moderate Disability	Severe disability	Total	P-value
18	0(0%)	2(2.5%)	1(1.25%)	0(0%)	3(3.75%)	0.493*
19	1(1.25%)	5(6.25%)	2 (2.5%)	1(1.25%)	9(11.25%)	
20	1(1.25%)	1(1.25%)	1(1.25%)	0(0%)	3(3.75%)	
21	2(2.5%)	5(6.25%)	0 (0%)	0(0%)	7(8.75%)	
22	0(0%)	0 (0%)	3(3.75%)	0(0%)	3(3.75%)	
23	0(0%)	6(7.5%)	33.75%)	0(0%)	9(11.25%)	
24	3(3.75%)	2(2.5%)	6(7.5%)	1(1.25%)	12(15%)	
25	1(1.25%)	5(6.25%)	3(3.75%)	1(1.25%)	10(12.5%)	
26	3(3.75%)	2(2.5%)	4(5.1%)	1(1.25%)	10(12.5%)	
27	0(0%)	2(2.5%)	4(5.1%)	0(0%)	6(7.5%)	
28	1(1.25%)	1 (1.25%)	1(1.25%)	0(0%)	3(3.75%)	
29	0(0%)	2(2.5%)	0(0%)	0(0%)	2(2.5%)	
30	1(1.25%)	0(0%)	1(1.25%)	1(1.25%)	3(3.75%)	
Total	13(16.2%)	33(41.25%)	29(36.25%)	05(6.25%)	80(100.0%)	

Association of training hours and neck disability index:

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The number of players was 80, out of 80 there is significant association among training hours and neck disability index as the P-value was 0.041 which is lower than 0.05.

Showing association of training hours categories with neck disability index categories

Training Hours categories	No Disability	Mild Disability	Moderate Disability	Severe disability	Total	P-value
10	0(0%)	0(0%)	3(3.75%)	0(0%)	3(3.75%)	0.041*
11	2(2.5%)	2(2.5%)	1(1.25%)	0(0%)	5(6.25%)	
12	5(6.25%)	7(8.75%)	2(2.5%)	1(1.25%)	15(18.75%)	
13	4(5.1%)	7(8.75%)	11(13.75%)	0(0%)	22(27.5%)	
14	1(1.25%)	9(11.25%)	7(8.75%)	1(1.25%)	18(22.5%)	
15	0(0%)	5(6.25%)	4(5.1%)	3(3.75%)	12(15%)	
16	0(0%)	3(3.75%)	0(0%)	0(0%)	3(3.75%)	
17	0(0%)	0(0%)	1(1.25%)	0(0%)	1(1.25%)	
21	1(1.25%)	0(0%)	0(0%)	0(0%)	1(1.25%)	
Total	13(16.25%)	33(41.25%)	29(36.25%)	5(6.25%)	80(100%)	
*Chi square test was applied.						

Association of shoulder pain, disability index and neck disability index:

The number of players were 80, out of 80 there is no significant association between shoulder pain and disability with neck disability index as the P-value was 0.294, that is greater than 0.05.

Showing association of shoulder pain and disability categories with neck disability index categories.

Spadi Categories	No disability	Mild Disability	Moderate Disability	Severe disability	Total	P-value
No impact	5(6.25%)	10(12.25%)	14(17.5%)	4(5.1%)	33(41.25%)	0.294*
Mild impact	8(10.1%)	19(23.75%)	12(15%)	1(1.25%)	40(50%)	
Moderate impact	0(0%)	4(5.1%)	3(3.75%)	0(0%)	7(8.75%)	
Total	13(16.25%)	33(23.75%)	29(36.25%)	5(6.25%)	80(100%)	

*Chi square test was applied.

DISCUSSION

Numerous studies have reported shoulder pain in tennis players, often linked to excessive lateral rotation and high medial rotation velocities during the acceleration phase of the stroke (30). In this study we checked the physically demanding nature of tennis, characterized by extreme joint motions and repetitive stress, makes the shoulder joint a common site of chronic injury and pain(31). A study was described to determine whether periods of increased external workload, such as intense training or competition, were linked to a higher incidence of shoulder pain in adolescent competitive tennis players (26). The study reported that majority of injuries were acute in nature in sports, primarily affecting the neck muscles. This finding is consistent with previous studies, which have also identified neck muscle strain as a common injury type in tennis players(32). A study described to high prevalence of shoulder problems, even when considering injuries that do not require time-loss, supports the idea that many athletes continue to participate in training and competition despite experiencing shoulder pain and limitations(33). A study described to shoulder injuries constitute the most prevalent type of upper extremity injury in professional tennis players (34). Alrabaa RG et al described the impact of tennis matches on player health is evident in studies showing significant reductions in shoulder range of motion and increased neck pain directly following competition(35). A recent study explored the mechanisms behind increased internal shoulder rotation in tennis players, identifying humeral retroversion and posterior capsule thickening as contributing factors for

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shoulder pain (36). A study reported that the findings of this study support that neck dysfunction may contribute to the development of shoulder injuries in tennis players (31). PD McCann et al described that shoulder pain is a significant problem for tennis players (7) . A study mentioned the shoulder pain is common in upper extremity in amateur tennis players (37) . A study reported to Research has indicated that deficits in shoulder range of motion and shoulder pain can occur acutely following tennis players (35).

Our study is in contrast to other previous studies as our study did not show any association; this is might be due to methodological difference, different population and lower sample size.

In this study we checked neck disability index categories, which are no, mild, moderate, severe and complete disability. Most of among them, the reported category was mild disability. We also checked the association of shoulder pain and neck disability but it did not show a significant association as its P-value is p=0.294 which is greater than 0.05. Additionally, we associated the gender and neck disability which also did not show association having P-value is p=0.395 which is greater than 0.05. We associated the age and neck disability that did not mention the association as its P-value is p=0.493 that is greater than 0.05. We also associated the training hours and neck disability that showed the association as its P-value is p=0.041 that is lower than 0.05. Our results of study do not show any association except the association among training hours and neck disability index.

Conclusion

Shoulder pain in a tennis player the joints and soft tissues surrounding the shoulder are the source of shoulder pain. Neck disability in a tennis player shows to any impairment or limitation in the functioning of the neck that affects their ability to play tennis or perform daily activities. In this research study, we associated the age, gender, shoulder pain and disability with neck disability but there was no significant association among these variables. Despite it, there was a significant association among training hours and neck disability.

This study should be longitudinal study and conducted on provincial level should be done for good inter and intra rater reliability.

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