



Assessment of shoulder pain and disability in recreational swimmers using the Shoulder Pain and Disability Index (SPADI)

Dr. Tooba Mohd Furqan Shaikh, Dr. Pranjal Grover*

Department of Physiotherapy, Lokmanya Tilak College of Physiotherapy, Mumbai, Maharashtra, India

Corresponding Author: Dr. Pranjal Grover

DOI: <https://doi.org/10.66856/ijyppe.2026.11.3.11077>

Abstract

Background: Swimming involves repetitive movements of the shoulder, which may contribute to shoulder pain and functional limitations. Shoulder problems can occur in swimmers due to repeated upper limb movements during swimming. However, limited studies have focused on shoulder pain and disability among recreational swimmers using a standardized assessment tool such as the Shoulder Pain and Disability Index (SPADI).

Objective: To study shoulder pain and disability among recreational swimmers using the Shoulder Pain and Disability Index (SPADI).

Methodology: A cross-sectional study was conducted on 51 recreational swimmers aged 18–40 years. Participants were selected using convenience sampling. Data were collected using a structured case record form, Visual Analogue Scale (VAS), and Shoulder Pain and Disability Index (SPADI). The dominant shoulder was assessed for all participants. The SPADI questionnaire was administered through an interview method. Data were analyzed using descriptive statistics.

Results: The mean age of the participants was 27.43 ± 7.13 years and the mean VAS score was 3.33 ± 2.25 . The mean SPADI pain score was $17.29 \pm 12.62\%$, the mean SPADI disability score was $10.98 \pm 8.16\%$, and the mean total SPADI score was $13.40 \pm 9.46\%$. SPADI assessment showed that 64.71% of participants had minimal pain, 33.33% had mild pain, and 1.96% had moderate pain. For disability, 84.31% had minimal disability and 15.69% had mild disability.

Conclusion: The majority of recreational swimmers demonstrated minimal shoulder pain and disability. Although some participants reported mild pain and disability, the overall level of shoulder-related symptoms and functional limitation was low in the studied group.

Keywords: Shoulder pain, Recreational swimmers, SPADI, Shoulder disability, VAS, Physiotherapy

Introduction

Swimming is a physically demanding activity that involves repetitive and coordinated movements of the upper and lower limbs to produce propulsion through water. Although recreational swimming is generally considered a beneficial form of physical activity, repeated swimming movements place considerable demands on the musculoskeletal system, particularly the shoulder. These repetitive movements may contribute to the development of shoulder pain and overuse injuries. Nearly 90% of swimmer complaints involve the shoulder, with “swimmer’s shoulder” being one of the most commonly reported conditions. It has been associated with faulty freestyle technique, muscle imbalance, and repetitive stress, which may contribute to tendon inflammation, impingement, and anterior capsule laxity [1]. A study conducted in Pune reported that 81% of recreational swimmers experienced musculoskeletal injuries, with the shoulder being the most commonly affected region, particularly among females [1].

Previous research has also reported that 37% of injuries among swimmers occurred in the shoulder, followed by 28% in the knee and 19% in the foot/ankle [2]. Swimming involves repetitive upper-limb movements, particularly at the shoulder, and the different swimming strokes require repeated elevation, rotation, and movement of the upper limb. These repetitive movements and loading may contribute to the development of shoulder symptoms [1,2]. Kulkarni *et al.* (2023) [3] reported a high prevalence of shoulder injuries and disability among competitive

swimmers, highlighting the shoulder as an important region affected by swimming-related musculoskeletal problems [3]. Several risk factors for shoulder pain and disability have been identified among swimmers. Youth swimmers with pain, disability, and dissatisfaction were reported to have a greater history of shoulder trauma, more years of competitive swimming, and less participation in other sports compared with swimmers with fewer symptoms [4]. Paramanidis *et al.* (2023) [4] reported negative correlations between SPADI scores and trunk muscle endurance in young competitive swimmers, with stronger associations observed among female swimmers [4]. These findings suggest that individual physical characteristics and muscular endurance may be associated with shoulder function in swimmers. Greater swimming experience and a previous history of shoulder problems have also been associated with increased shoulder pain and disability [2,4].

Musculoskeletal problems have also been reported among recreational swimmers, with the shoulder being one of the commonly affected areas [1]. However, much of the available research has focused on competitive or highly trained swimmers and has examined shoulder pain, injuries, or disability in these populations [2, 3, 5, 6]. Comparatively, less attention has been given to assessing both shoulder pain and functional disability specifically among recreational swimmers. Therefore, evaluating shoulder-related symptoms in recreational swimmers may provide useful information regarding their shoulder health and functional status.

The Shoulder Pain and Disability Index (SPADI) is a self-reported questionnaire developed to assess shoulder pain and disability. It consists of separate pain and disability components, allowing both the severity of pain and difficulties with functional activities to be evaluated [7]. Research has demonstrated the validity of the SPADI for assessing shoulder pain and disability, supporting its use in clinical and research settings [8]. Assessing both pain and disability can provide a broader understanding of shoulder-related problems than assessing pain alone. This is particularly relevant when evaluating swimmers, as shoulder symptoms may involve both pain and limitations in functional activities. Therefore, the use of a standardized measure such as the SPADI can help quantify these aspects of shoulder health [7,8].

Although previous studies have reported shoulder pain, disability, and musculoskeletal problems among swimmers, comparatively limited attention has been given to recreational swimmers. Therefore, the present study was undertaken to assess shoulder pain and disability in recreational swimmers using the Shoulder Pain and Disability Index (SPADI), a standardized measure of shoulder pain and functional disability.

Methodology

This study adopted a cross-sectional study design and was conducted at Bombay YMCA Club. A convenience sampling method was used to recruit participants. A total sample of 51 recreational swimmers was selected for the study.

Participants aged between 18 and 40 years, who had been swimming for a minimum of six months, were currently active in swimming for at least three sessions per week, and were willing to participate in the study were included. The dominant shoulder was assessed for all participants. Swimmers who were unwilling to participate, had an acute traumatic shoulder injury, had undergone shoulder surgery within the previous six months, had a neurological condition affecting the upper limb, or were pregnant were excluded from the study.

Ethical approval was obtained from the Institutional Ethics Committee prior to commencement of data collection. Prior to participation, informed consent was obtained from all participants. Demographic details were collected using a structured case record form. Shoulder pain intensity was assessed using the Visual Analogue Scale (VAS). Shoulder pain and disability were assessed using the Shoulder Pain and Disability Index (SPADI), which was administered through an interview method.

The SPADI questionnaire was administered to the participants and their responses were recorded. The pain and disability scores were calculated separately, followed by calculation of the total SPADI score. All collected data were recorded systematically and analyzed using descriptive statistics. Frequency and percentage were used for categorical variables, while mean and standard deviation were used for continuous variables and SPADI scores.

Statistical analysis

Descriptive statistics were used for data analysis. Frequency and percentage were used for categorical variables, while mean and standard deviation were used for continuous variables and SPADI scores.

Data analysis and results

The objective of the present study was to assess shoulder pain and disability among recreational swimmers aged 18–40 years using the Shoulder Pain and Disability Index (SPADI). A total of 51 recreational swimmers participated in the study. The participants were between 18 and 40 years of age, with a mean age of 27.43 ± 7.13 years. Among the total participants, 34 (66.67%) were female and 17 (33.33%) were male.

Table 1: Frequency of gender of participants

Gender	Frequency (n=51)	PERCENTAGE (%)
Male	17	33.33
Female	34	66.67

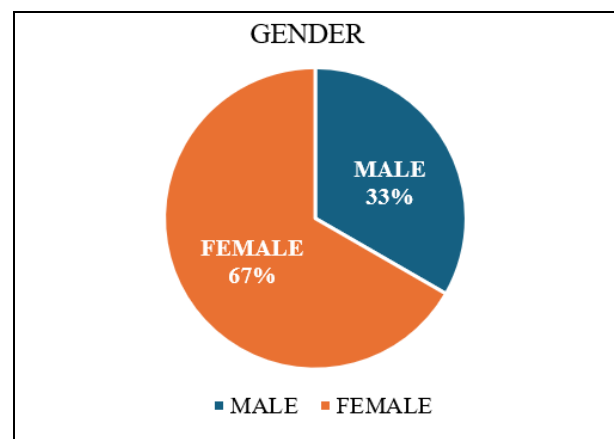


Fig 1: Frequency percentage of gender of participants

Interpretation

The study population demonstrated a higher proportion of female participants (66.67%) compared to male participants (33.33%).

Table 2: Frequency and percentage of age of participants

Age Ranges (in years)	Frequency (%) (n=51)
18 – 24	21 (41.18%)
25 – 30	15 (29.41%)
31 – 35	6 (11.76%)
36 – 40	9 (17.65%)

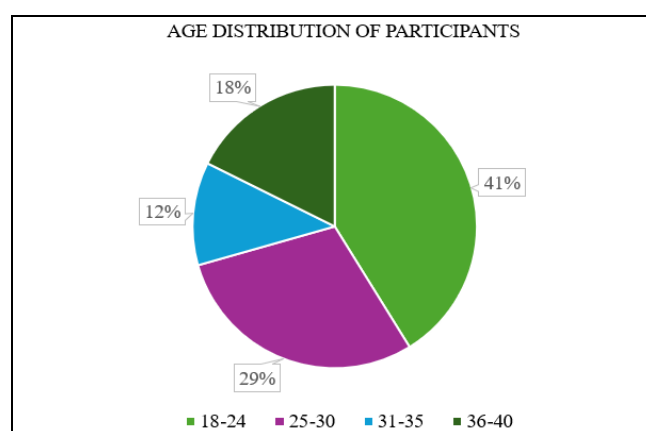


Fig 2: Frequency percentage of age of participants

Interpretation: The study population consisted predominantly young adults, with the highest proportion of participants (41.18%) belonging to the 18–24 years age group. The 31–35 years age group represented the smallest

proportion of participants (11.76%). The mean age of the study population was 27.43 ± 7.13 years.

Table 3: Distribution of total pain score among the participants

Total pain score	Number of participants
Minimal (0-20)	33
Mild (21-40)	17
Moderate (41-60)	1
Severe (61-80)	0
Extreme (81-100)	0

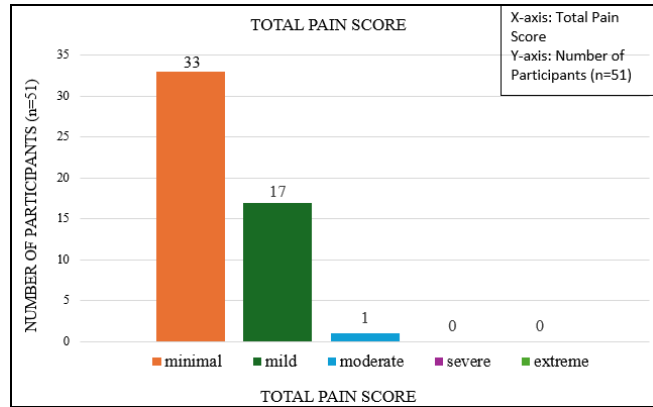


Fig 3: Distribution of total pain score among the participants

Interpretation: Based on the SPADI pain score, 33 participants (64.71%) were classified as having minimal pain, 17 participants (33.33%) as having mild pain, and 1 participant (1.96%) as having moderate pain. No participants were classified in the severe or extreme categories.

Table 4: Distribution of total disability score among the participants (n=51)

Total disability score	Number of participants	Percentage (%)
Minimal (0-20)	43	84.31
Mild (21-40)	8	15.69
Moderate (41-60)	0	0
Severe (61-80)	0	0
Extreme (81-100)	0	0

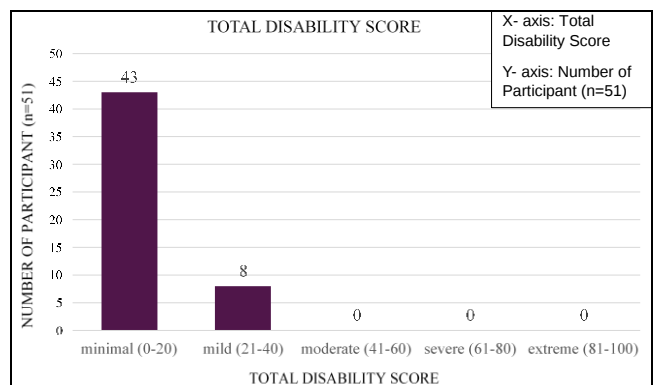


Fig 4: Distribution of total disability score among the participants

X- axis: Total Disability Score
Y- axis: Number of Participant (n=51)

Interpretation: The SPADI disability score showed that 43 participants (84.31%) were classified as having minimal disability, while 8 participants (15.69%) were classified as

having mild disability. No participants were classified in the moderate, severe, or extreme categories.

Table 5: Distribution of total spadi score among the participants (n=51)

Total spadi score	Number of participants	Percentage (%)
Minimal (0-20)	39	76.47
Mild (21-40)	12	23.53
Moderate (41-60)	0	0
Severe (61-80)	0	0
Extreme (81-100)	0	0

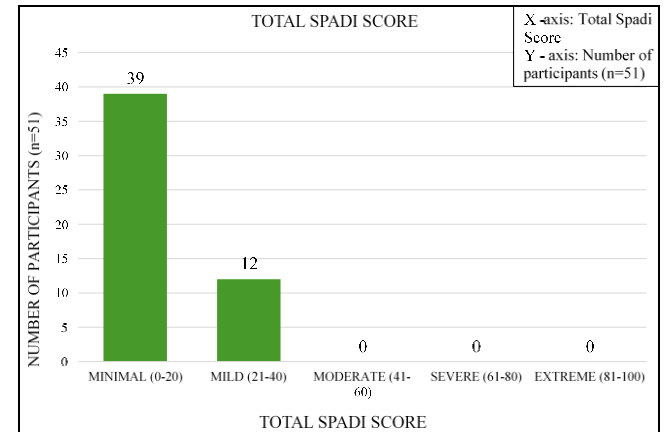


Fig 5: Distribution of total spadi score among the participants (n=51)

Interpretation: Based on the total SPADI score, 39 participants (76.47%) were classified in the minimal category, while 12 participants (23.53%) were classified in the mild category. No participants were classified in the moderate, severe, or extreme categories.

Table 6: Mean pain score and disability score

Outcome measure	Mean value
Pain score	17.29
Disability score	10.98

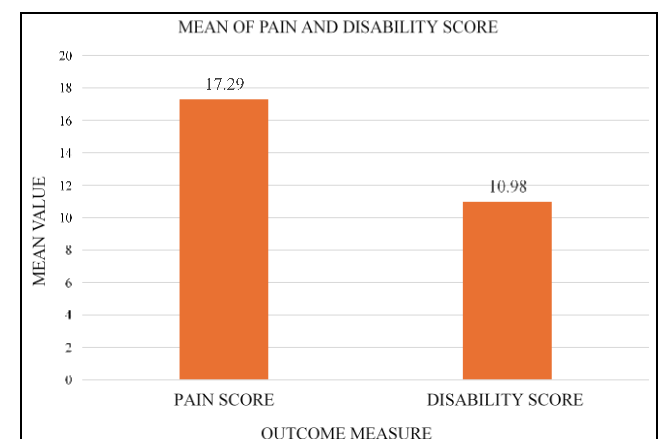


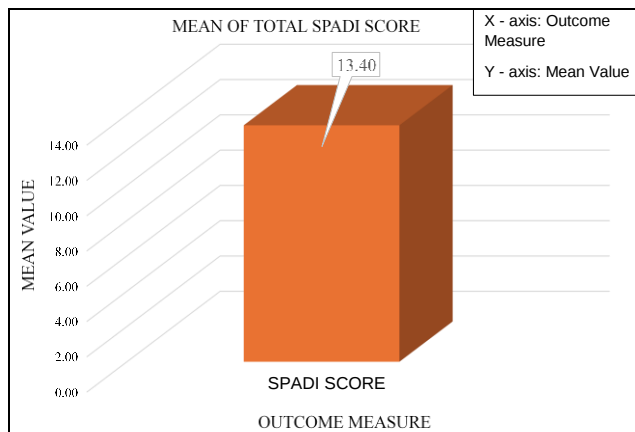
Fig 6: Mean pain score and disability score

X - axis: Outcome Measure
Y - axis: Mean Value

Interpretation: According to the data obtained, The mean SPADI pain score was 17.29 ± 12.62 , while the mean SPADI disability score was 10.98 ± 8.16 .

Table 7: Mean of the total spadi score

Outcome measures	Mean value
Spadi score	13.40

**Fig 7:** Mean of the total spadi score

X - axis: Outcome Measure
Y - axis: Mean Value
SPADI SCORE

Interpretation: The mean of the total SPADI score among the participants was 13.40%, indicating an overall minimal level of shoulder pain and disability in the study population.

Table 8: Mean and standard deviation of study variables

Study variables	Mean	Standard deviation
Age (years)	27.43	7.13
Vas score	3.33	2.25
Spadi pain score %	17.29	12.62
Spadi disability score %	10.98	8.16
Total spadi score %	13.40	9.46

Interpretation: The mean age of the participants was 27.43 ± 7.13 years. The mean VAS score was 3.33 ± 2.25 . The mean SPADI pain score was $17.29 \pm 12.62\%$, while the mean SPADI disability score was $10.98 \pm 8.16\%$. The mean total SPADI score was $13.40 \pm 9.46\%$. These findings indicate that the participants generally demonstrated minimal shoulder pain and disability.

Discussion

The present study was conducted to assess shoulder pain and disability among recreational swimmers aged 18–40 years using the Shoulder Pain and Disability Index (SPADI). A total of 51 recreational swimmers participated in the study. The mean age of the participants was 27.43 ± 7.13 years. Female participants constituted the majority of the sample, with 34 females (66.67%) and 17 males (33.33%). The largest proportion of participants belonged to the 18–24 years age group, followed by the 25–30 years, 36–40 years, and 31–35 years groups. The majority of participants were right-side dominant, with 47 participants (92.16%) having right shoulder dominance and 4 participants (7.84%) having left shoulder dominance. These demographic findings describe the characteristics of the study population and were not used to determine any association with shoulder pain or disability.

The mean VAS score among the participants was 3.33 ± 2.25 out of 10, indicating a relatively low level of perceived

shoulder pain. The VAS findings were consistent with the SPADI pain findings observed in the study. The mean SPADI pain score was $17.29 \pm 12.62\%$, while the mean SPADI disability score was $10.98 \pm 8.16\%$. The higher mean pain score compared with the disability score suggests that participants reported more pain-related symptoms than functional difficulty. However, both scores remained within the minimal severity range.

The SPADI pain score showed that 33 participants (64.71%) had minimal pain, 17 participants (33.33%) had mild pain, and only 1 participant (1.96%) had moderate pain. None of the participants had severe or extreme pain. Therefore, although shoulder pain was present in the study population, higher levels of pain were uncommon. The SPADI disability score showed an even greater predominance of minimal impairment. Forty-three participants (84.31%) had minimal disability and 8 participants (15.69%) had mild disability, while none had moderate, severe, or extreme disability. This indicates that the shoulder symptoms reported by the participants were generally associated with limited functional difficulty.

The total SPADI score further supported these findings. Thirty-nine participants (76.47%) were classified in the minimal category and 12 participants (23.53%) in the mild category. No participant demonstrated a moderate, severe, or extreme total SPADI score.

The mean total SPADI score was $13.40 \pm 9.46\%$, indicating an overall minimal level of shoulder pain and disability in the study population. Overall, the findings suggest that most recreational swimmers in the present study had minimal shoulder symptoms and relatively little functional limitation. The findings of the present study can be compared with previous research conducted among swimmers. Aghav *et al.* (2024) ^[1] reported a high prevalence of musculoskeletal pain among recreational swimmers, with the shoulder being the most commonly affected region ^[1]. Similarly, studies by Stirling *et al.* (2024) ^[2] and Kulkarni *et al.* (2023) ^[3] reported a high occurrence of shoulder pain among competitive swimmers ^[2,3]. These studies suggest that shoulder symptoms can be common in swimming populations, particularly in relation to repetitive movements, training volume, and swimming technique. However, the present study found predominantly minimal shoulder pain and disability among recreational swimmers. One possible reason for this difference may be the nature of the population studied, as the previous studies included competitive or more intensively training swimmers, whereas the present study focused on recreational swimmers. The present study, however, did not evaluate training intensity, swimming technique, or training load in detail, so these factors cannot be considered as explanations based on the present data.

Adiele and Morgan (2018) ^[6] also reported that shoulder pain was the most common musculoskeletal problem among school-level swimmers, with a higher prevalence reported in females ^[6]. Similarly, Paramanidis *et al.* (2023) ^[4] reported shoulder pain in swimmers with low trunk muscle endurance and suggested that poor core stability may contribute to shoulder symptoms ^[4]. These findings highlight that shoulder problems may occur in different swimming populations. In contrast, the present study showed mainly minimal pain and disability. This difference may be related to differences in age, swimming level, training characteristics, or other participant factors, although

these factors were not specifically investigated in the present study.

An important finding of the present study was that the pain component of SPADI showed slightly greater impairment than the disability component. This suggests that the participants who reported shoulder pain did not necessarily experience the same degree of difficulty in functional activities. In other words, some participants may have experienced shoulder discomfort while

still being able to perform their usual activities. This finding is relevant because it shows the importance of assessing both pain and disability rather than considering pain alone. The SPADI was developed to assess these two aspects of shoulder problems, and previous research has supported its usefulness and validity for assessing shoulder pain and functional disability^[7,8].

The present findings therefore indicate that recreational swimmers in the studied population generally had minimal shoulder pain and disability. Although a smaller proportion of participants reported mild symptoms and one participant reported moderate pain, no participants demonstrated moderate or greater disability or total SPADI severity. The findings suggest that shoulder symptoms were present but were generally associated with limited functional impact in this group. Further studies with larger samples and assessment of factors such as swimming technique, training intensity, duration, previous shoulder problems, and training load may provide a better understanding of shoulder symptoms among recreational swimmers.

Limitations

1. The study was conducted on a relatively small sample of 51 recreational swimmers, which may limit the generalizability of the findings.
2. Convenience sampling was used, and the study was conducted at a single swimming club, which may not represent all recreational swimmers.
3. Factors such as swimming technique, training intensity, duration of swimming, previous shoulder problems, and training load were not evaluated in detail.
4. The cross-sectional design provides information about shoulder pain and disability at one point in time and does not allow assessment of changes over time or causal relationships.
5. SPADI is a self-reported measure and responses may be influenced by individual perception of pain and disability.
6. Objective physical examination findings such as range of motion, muscle strength, flexibility, scapular control, or swimming technique were not assessed.

Conclusion

The present study assessed shoulder pain and disability among 51 recreational swimmers aged 18–40 years using the Shoulder Pain and Disability Index (SPADI). The findings demonstrated that the majority of participants had minimal shoulder pain and disability.

The majority of participants (64.71%) demonstrated minimal pain, while 33.33% had mild pain and only 1.96% had moderate pain. No participant demonstrated severe or extreme pain. Similarly, 84.31% of participants demonstrated minimal disability and 15.69% demonstrated mild disability, with no participants demonstrating moderate, severe, or extreme disability. The mean SPADI

pain score was $17.29 \pm 12.62\%$, the mean disability score was $10.98 \pm 8.16\%$, and the mean total SPADI score was $13.40 \pm 9.46\%$, all falling within the minimal severity range. Therefore, the recreational swimmers assessed in the present study predominantly demonstrated minimal levels of shoulder pain and disability, with relatively limited functional impact despite the presence of shoulder symptoms in some participants.

List of abbreviations

SPADI – Shoulder Pain and Disability Index

VAS – Visual Analogue Scale

SD – Standard Deviation

YMCA – Young Men's Christian Association

TMV – Tilak Maharashtra Vidyapeeth

MUHS – Maharashtra University of Health Sciences

IEC – Institutional Ethics Committee

BPTTh – Bachelor of Physiotherapy

References

1. Aghav OA, Shinde SJ, Parab S. Prevalence of musculoskeletal injuries in recreational swimmers. *DPU's Journal of Ayurved, Homeopathy and Allied Health Sciences*. 2024;3(1):1-5.
2. Stirling BD, Sum JC, Baek L, Michener LA, Barrack AJ, Tate AR. Shoulder pain in competitive swimmers: a multi-site survey study. *International Journal of Sports Physical Therapy*. 2024;19(8):965.
3. Kulkarni M, Ghugare N, Pawar P. Prevalence of shoulder injuries and disability in competitive swimmers. *Sports Journal*. 2023;8(3):20-23.
4. Paramanidis N, Kabasakalis A, Koutlianos N, Tsalis G, Kouidi E. Shoulder pain and trunk muscles endurance in young male and female swimmers. *Healthcare*. 2023;11(15):2145.
5. Deshpande S, Kulkarni CA, Wadhokar OC, Naqvi WM, Phansopkar P, Arora SP. Land based exercises versus pool-based exercises for swimmer's shoulder in competitive swimmers: randomized clinical trial. *Journal of Medical Pharmaceutical and Allied Sciences*. 2021;10(4):3296-3299.
6. Adiele D, Morgan GP. Prevalence of musculoskeletal injuries in males and females practicing swimming from higher school of Zimbabwe. *American Journal of Sports Science*. 2018;6(1):8-11.
7. Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. *Arthritis Care and Research*. 1991;4(4):143-149.
8. Hill CL, Lester S, Taylor AW, Shanahan ME, Gill TK. *Factor structure* and validity of the Shoulder Pain and Disability Index in a population-based study of people with shoulder symptoms. *BMC Musculoskeletal Disorders*. 2011;12:8.