International Journal of Health Sciences and Research
[Indexed, Peer-Reviewed Journal]
Volume 15; Issue: 9; September 2025
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

Prevalence of Upper Limb Musculoskeletal Pain Among Volleyball Players in Gujarat: A Cross-Sectional Study

Khushi Patel[1], Dr. Ragbi Patel[2], Rutika Tamboli[3], Dr. Heena Patel[4], Dr. Shivani Patel[5]

[1,3]Intern, [2,4]Assistant Professor (PT), [5]Tutor,
Nootan College of Physiotherapy, Sankalchand Patel University, Visnagar, Gujarat, India.

Corresponding Author: Dr. Ragbi Patel

DOI: https://doi.org/10.52403/ijhsr.20250936

ABSTRACT

Volleyball is a dynamic, high-intensity sport that demands frequent and repetitive upper limb movements such as spiking, serving, setting, and blocking. These actions place considerable biomechanical stress on the shoulder, elbow, wrist, and hand, increasing the risk of musculoskeletal pain and related functional impairments. Despite rising awareness about sports injuries, there is limited evidence on the prevalence and impact of such conditions among volleyball players in Gujarat. To address this gap, a cross-sectional study was conducted over three months among 200 volleyball players aged 18–35 years, selected through convenient sampling. Both recreational (65%) and competitive (35%) players participated. Data collection involved a Google Form-based questionnaire incorporating the Disabilities of the Arm, Shoulder, and Hand (DASH) scale to assess symptoms, functional limitations, and the impact on quality of life. Ethical consent was obtained from all participants prior to data collection. Findings revealed that shoulder pain was the most prevalent complaint (72%), followed by wrist pain (55%), elbow pain (38%), and thumb pain (23%). More than half of the players (54%) reported functional limitations, and (44%) experienced associated symptoms such as stiffness or tingling. Pain-related sleep disturbances were reported by 28% of players, while 41% acknowledged an overall decline in quality of life. The study concludes that upper limb musculoskeletal pain is highly prevalent among volleyball players in Gujarat, significantly affecting performance, daily function, and emotional well-being. Early preventive measures, targeted physiotherapy, and injury awareness programs are crucial to protect athletes' health and career longevity.

Keywords: Volleyball, Upper limb pain, Musculoskeletal disorders, DASH questionnaire

INTRODUCTION

Volleyball, invented in 1895 by William G. Morgan, is a dynamic team sport requiring technical skill, tactical awareness, and athletic conditioning [1]. Elite players demonstrate high levels of agility, explosive power, and coordination, with specific performance demands varying by position [2]. Governed internationally by the Fédération Internationale de Volleyball (FIVB), the sport features six players per side, with rally scoring and specialized roles [3].

The biomechanics of volleyball involve frequent jumping, landing, overhead hitting, and rapid directional changes [4]. Performance depends on the integration of kinetic chains, from lower-limb power generation to upper-limb force transmission during serves and spikes [5]. Anatomically, the shoulder complex plays a central role, with the glenohumeral joint providing mobility while relying on static and dynamic stabilizers to maintain joint integrity [6]. Excessive or repetitive overhead actions can contribute to subacromial impingement and rotator cuff pathology [7].

Upper limb demands in volleyball are comparable to those in tennis and baseball, but involve unique spiking mechanics characterized by a high approach velocity, rapid shoulder external rotation, and maximal internal rotation acceleration [8,9]. These actions require optimal scapulothoracic rhythm and rotator cuff activation to prevent injury [10]. Players must also withstand repetitive hand, wrist, and forearm loading during ball contact, blocking, and setting [11].

From a physiological perspective, volleyball performance depends on both anaerobic and aerobic systems [12]. The sport involves short bursts of maximal effort interspersed with recovery periods, requiring phosphocreatine resynthesis, lactate clearance, and neuromuscular recovery [13]. Hormonal responses to high-intensity training, including testosterone and growth hormone release, support muscle hypertrophy and repair [14]. Hydration and electrolyte balance are critical to sustaining neuromuscular function, particularly in hot environments [15]. Energy metabolism during play is fueled primarily by carbohydrate oxidation, with protein turnover influencing muscle recovery [16–19].

Intense training and competition can produce oxidative stress, potentially impairing muscle contractility and increasing fatigue [20]. Overuse injuries, particularly to the shoulder, are prevalent among elite players [21]. The high-velocity arm swing during spiking and serving subjects the glenohumeral joint to extreme rotational torques, predisposing athletes to labral tears, internal impingement, and rotator cuff tendinopathy [22–24]. Cumulative microtrauma from training volume and intensity increases injury risk [25].

Epidemiological data indicate that shoulder injuries in volleyball are most often overuse-related rather than acute trauma [26–28]. Risk factors include poor scapular control, glenohumeral internal rotation deficit (GIRD), and muscular imbalances [29]. Preventive strategies focus on rotator cuff and scapular stabilizer strengthening, flexibility training, and workload management [30–32].

Injury prevention models emphasize understanding sport-specific mechanisms and modifiable risk factors [33]. In volleyball, preventive programs must address kinetic chain efficiency, technique optimization, and gradual load progression [34,35]. Education on pain mechanisms, early symptom recognition, and self-management is equally important [36]. Ultimately, volleyball shoulder injury prevention requires a multifactorial approach integrating biomechanics, physiology, epidemiology, and clinical science [37].

This study aims to assess the prevalence of upper limb musculoskeletal pain among volleyball players in Gujarat. The objectives include observing the occurrence of such pain in both recreational and competitive players, specifically focusing on the shoulder, wrist, elbow, and thumb. It also seeks to identify any functional limitations experienced by the players and evaluate how upper limb musculoskeletal pain impacts their overall quality of life.

MATERIALS & METHODS

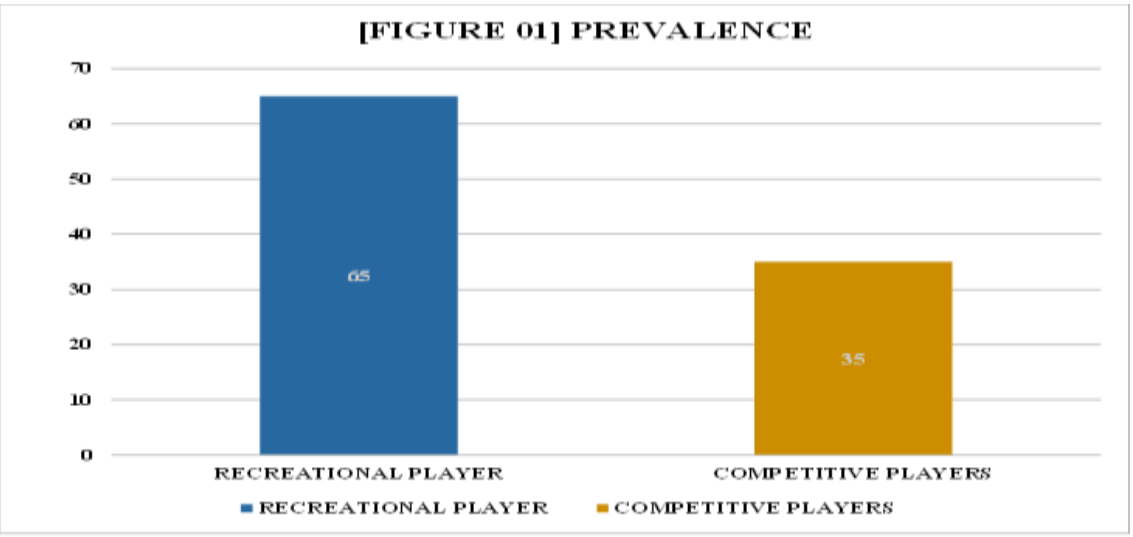
The present cross-sectional study will be conducted among volleyball players in Gujarat over a period of three months, from May 2025 to July 2025, with the objectives to observing the occurrence of such pain in both recreational and competitive players using a convenient sampling method.

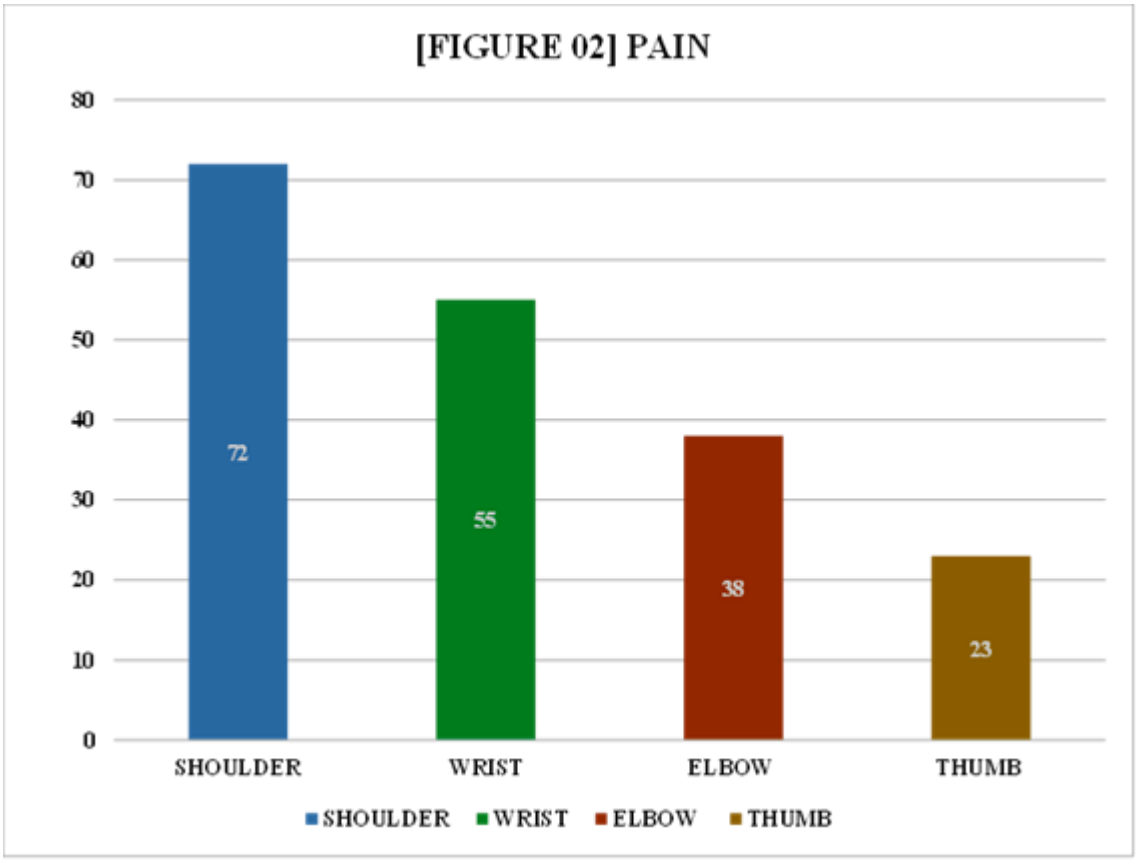
A total of 200 participants will be included, with data collected through a consent form and a structured questionnaire or Google Form, accessed via a smartphone or laptop. The study will focus on players aged 18 to 35 years who are willing to participate and can read, write, and understand English. Individuals with recent surgeries such as ligament reconstruction or tendon interposition, recent injuries within the past six months, or pre-existing medical conditions like rheumatoid arthritis or osteoarthritis will be excluded to ensure accurate assessment of upper limb musculoskeletal pain without confounding factors.

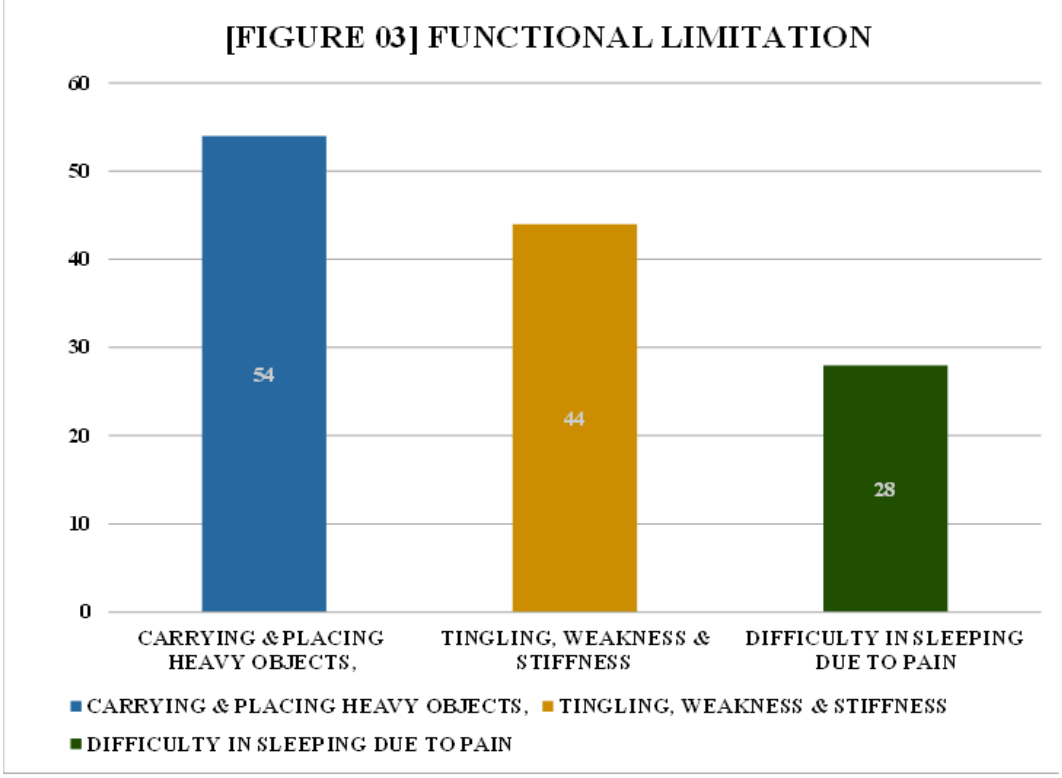
The study will include 200 active volleyball players aged 18–35 years from different regions of Gujarat, selected through purposive sampling based on defined inclusion and exclusion criteria. Data will be gathered via an online Google Form, which will include digital consent and sections on demographics, pain location and characteristics, associated factors, and the DASH questionnaire to assess functional impact. The form will be distributed through volleyball-related online platforms and associations. Data will be collected anonymously, screened for completeness, and used to assess prevalence, severity, and contributing factors of upper limb musculoskeletal pain to inform physiotherapy interventions and preventive strategies.

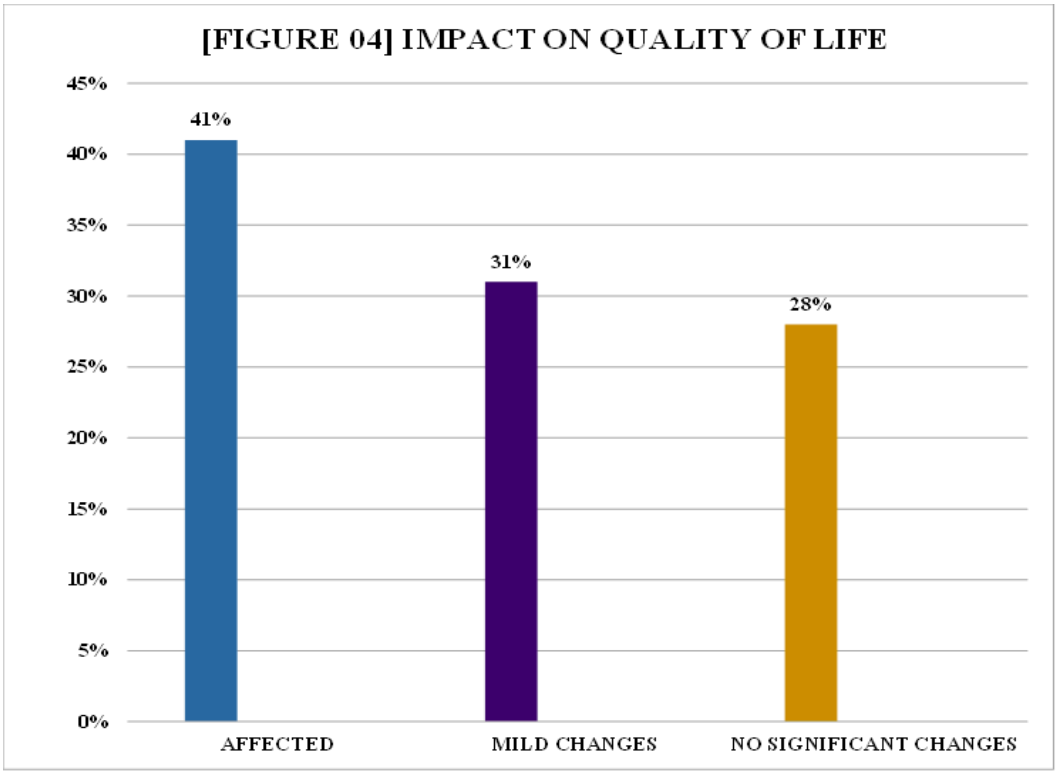
RESULT

A total of 235 volleyball players were approached for this study, out of which 35 did not meet the inclusion criteria. The final analysis was conducted on 200 eligible participants who completed the Google Form questionnaire. Among them, 65% were recreational players and 35% were competitive athletes [Figure 01]. Shoulder pain emerged as the most prevalent complaint, affecting 72% of players, followed by wrist pain in 55%, elbow pain in 38%, and thumb pain in 23%. These findings suggest that repetitive overhead movements and frequent ball impact during play contribute significantly to upper limb discomfort, particularly in the shoulder and wrist [Figure 02]. Functional limitations were reported by 54%, including difficulty lifting heavy objects, placing items overhead, and performing force-intensive actions like smashing or blocking. Additionally, 44% experienced symptoms such as tingling, stiffness, or weakness, and 28% reported pain-related sleep disturbances more common among competitive players [Figure 03]. Quality of life assessments revealed that 82 players (41%) experienced a noticeable decline due to pain and functional restrictions. Of the remaining 118 players, 62 (31%) reported occasional discomfort or reduced gameplay confidence, while 56 (28%) continued their sports and daily routines without major disruption [Figure 04].




[FIGURE 02] PAIN
80
70
60
50
40
30
20
10
0
72
55
38
23
SHOULDER
WRIST
ELBOW
THUMB
SHOULDER
WRIST
ELBOW
THUMB


[FIGURE 03] FUNCTIONAL LIMITATION
60
50
40
30
20
10
0
54
44
28
CARRYING & PLACING HEAVY OBJECTS,
TINGLING, WEAKNESS & STIFFNESS
DIFFICULTY IN SLEEPING DUE TO PAIN
CARRYING & PLACING HEAVY OBJECTS,
TINGLING, WEAKNESS & STIFFNESS
DIFFICULTY IN SLEEPING DUE TO PAIN



DISCUSSION

The present study explored the prevalence and patterns of upper limb musculoskeletal pain among volleyball players aged 18 to 35 years in Gujarat. With responses from 200 player spanning both recreational and competitive categories, the findings bring attention to the often-overlooked burden of repetitive strain and upper limb dysfunction in non-elite volleyball populations. Volleyball, while dynamic and engaging, places considerable biomechanical stress on the upper extremities. The outcomes of this study not only quantify the prevalence but also bring to light the psychological and functional implications of such pain, emphasizing the need for preventive care and structured intervention. A key finding in this research is that 73% of participants reported shoulder pain, consistent with the demands of volleyball particularly due to frequent overhead movements involved in spiking, serving, and blocking.

The current study's findings of high upper-limb pain prevalence among volleyball players in Gujarat add to existing literature on volleyball-related injury patterns. Bahr and Reeser (2003) reported that injuries among world-class professional beach volleyball players were frequent, with the shoulder and knee being the most affected regions. However, their cohort largely consisted of elite athletes under structured training, medical supervision, and advanced preventive strategies. In contrast, the present study observed similar or higher pain prevalence in a non-elite population, particularly for shoulder (72%) and wrist (55%) complaints, despite the lower playing intensity. This difference underscores the influence of inadequate injury prevention measures, limited physiotherapy access, and suboptimal biomechanics at grassroots levels, where players often lack professional support systems [3].

From a broader performance perspective, Morgan's (1896) foundational work on volleyball and Sheppard et al.'s (2009) analysis of positional demands highlight the sport's unique combination of explosive movements, overhead hitting, and rapid directional changes. These physical demands inherently load the upper limb structures, especially in spiking and blocking. While Sheppard et al. emphasized that position-specific roles dictate varied

physiological stresses, the current study suggests that, in community-level play, injury risk remains widespread across all positions — likely due to uniform exposure to high-impact movements without adequate role-specific conditioning [1,2].

Taken together, these comparisons suggest that while the biomechanical demands of volleyball are universal, the prevalence and severity of upper limb pain are heavily influenced by training quality, preventive care, and access to rehabilitation. The gap between elite and non-elite injury outcomes highlights the urgent need for community-level injury prevention programs, targeted education, and structured physiotherapy integration to bridge this disparity. Therefore, this study emphasizes the urgent need for community-level sports physiotherapy programs, injury screening camps, and education in biomechanics and recovery techniques. This study also encountered certain limitations such as Geographical restriction to specific areas, insufficient sample size.

CONCLUSION

The present study clearly reveals that upper limb musculoskeletal pain is a widespread concern among volleyball players aged 18 to 35 in Gujarat. Among all joints affected, the shoulder was the most commonly reported site of pain, followed closely by the wrist, elbow, and thumb. These issues were not limited to discomfort during gameplay but extended into daily life, affecting physical tasks, emotional stability, and overall quality of life. Players experienced not just pain but also functional limitations, disturbed sleep, frustration, and a noticeable drop in confidence while performing volleyball-specific actions. These findings underline the importance of early identification and management of pain, regular physiotherapy checkups, and athlete education. Simple interventions like proper warm-up routines, strengthening programs, and correct playing techniques can go a long way in preventing long-term injury. This study hopes to act as a stepping stone for coaches, physiotherapists, and sports trainers to design injury prevention protocols that don't just protect physical health but also support the emotional well-being of players, ultimately helping them enjoy a longer, healthier sporting career. There is a need for a gender-wise and playing position-wise analysis is recommended to identify specific risk factors based on the role and physical demands in volleyball.

Declaration by Authors

Ethical Approval: Approved by Institutional Ethics Committee

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Morgan WG. The origin of volleyball. Springfield: YMCA Physical Education; 1896.
2. Sheppard JM, Gabbett TJ, Stanganelli LC. An analysis of playing positions in elite men's volleyball: considerations for competition demands and physiologic characteristics. J Strength Cond Res. 2009;23(6):1858–66. Available from: https://doi.org/10.1519/JSC.0b013e3181b45c6a
3. Fédération Internationale de Volleyball. Official Volleyball Rules 2025. Lausanne: FIVB; 2025. Available from: https://www.fivb.com/en/volleyball/thegame_glossary/officialvolleyballrules
4. Bahr R, Reeser JC. Injuries among world-class professional beach volleyball players. Am J Sports Med. 2003;31(1):119–25. Available from: https://doi.org/10.1177/03635465030310010401
5. Zetou E, Moustakidis A, Tsigilis N, Komninakidou A. Does effectiveness of skill in volleyball depend on playing position? Int J Perform Anal Sport. 2007;7(2):1–7. Available from: https://doi.org/10.1080/24748668.2007.11868393b
6. Standring S. Gray's anatomy: the anatomical basis of clinical practice. 42nd ed. Edinburgh: Elsevier; 2020.

7. Bigliani LU, Levine WN. Subacromial impingement syndrome. J Bone Joint Surg Am. 1997;79(12):1854–68. Available from: https://doi.org/10.2106/00004623-199712000-00014
8. Ciccotti MG, Lombardo SJ, Nonweiler B, Pink M. Nonoperative treatment of lateral epicondylitis in tennis players. Am J Sports Med. 1989;17(3):354–8. Available from: https://doi.org/10.1177/036354658901700307
9. Rettig AC. Athletic injuries of the wrist and hand. Am J Sports Med. 2003;31(6):1038–48. Available from: https://doi.org/10.1177/03635465030310062501
10. Ludewig PM, Reynolds JF. The association of scapular kinematics and glenohumeral joint pathologies. J Orthop Sports Phys Ther. 2009;39(2):90–104. Available from: https://doi.org/10.2519/jospt.2009.2808
11. Ziv G, Lidor R. Physical characteristics, physiological attributes, and on-court performances of handball players: a review. Eur J Sport Sci. 2009;9(6):375–86. Available from: https://doi.org/10.1080/17461390903042580
12. Fry AC, Kraemer WJ. Resistance exercise overtraining and overreaching. Sports Med. 1997;23(2):106–29. Available from: https://doi.org/10.2165/00007256-199723020-00004
13. Enoka RM. Neuromechanics of human movement. 5th ed. Champaign: Human Kinetics; 2015.
14. Kraemer WJ, Ratamess NA. Hormonal responses and adaptations to resistance exercise and training. Sports Med. 2005;35(4):339–61. Available from: https://doi.org/10.2165/00007256-200535040-00004
15. Sawka MN, Cheuvront SN, Carter R. Human water needs. Nutr Rev. 2005;63(6 Pt 2):S30–9. Available from: https://doi.org/10.1111/j.1753-4887.2005.tb00153.x
16. Hargreaves M. Exercise metabolism. 2nd ed. Champaign: Human Kinetics; 2006.
17. Berchtold MW, Brinkmeier H, Muntener M. Calcium ion in skeletal muscle: its crucial role for muscle function, plasticity, and disease. Physiol Rev. 2000;80(3):1215–65. Available from: https://doi.org/10.1152/physrev.2000.80.3.1215
18. Robergs RA, Ghiasvand F, Parker D. Biochemistry of exercise-induced metabolic acidosis. Am J Physiol Regul Integr Comp Physiol. 2004;287(3):R502–16. Available from: https://doi.org/10.1152/ajpregu.00114.2004
19. Tipton KD, Wolfe RR. Exercise, protein metabolism, and muscle growth. Int J Sport Nutr Exerc Metab. 2001;11(1):109–32. Available from: https://doi.org/10.1123/ijsnem.11.1.109
20. Powers SK, Jackson MJ. Exercise-induced oxidative stress: cellular mechanisms and impact on muscle force production. Physiol Rev. 2008;88(4):1243–76. Available from: https://doi.org/10.1152/physrev.00031.2007
21. Wang HK, Cochrane T. A descriptive epidemiological study of shoulder injury in top level English male volleyball players. Int J Sports Med. 2001;22(2):159–63. Available from: https://doi.org/10.1055/s-2001-11338
22. Reeser JC, Fleisig GS, Bolt B, Ruan M. Upper limb biomechanics during the volleyball serve and spike. Sports Health. 2010;2(5):368–74. Available from: https://doi.org/10.1177/1941738110374627
23. Cools AM, Cambier D, Witvrouw EE. Screening the athlete's shoulder for impingement symptoms: a clinical reasoning algorithm for early detection of shoulder pathology. Br J Sports Med. 2008;42(8):628–35. Available from: https://doi.org/10.1136/bjsm.2008.048280
24. Gabbett TJ. Influence of training and match intensity on injuries in rugby league. J Sports Sci. 2004;22(5):409–17. Available from: https://doi.org/10.1080/02640410410001675311
25. Wilk KE, Arrigo C, Andrews JR. Preventive and rehabilitative exercises for the shoulder and elbow. Clin Sports Med. 1997;16(4):819–38. Available from: https://doi.org/10.1016/S0278-5919(05)70059-4
26. Bahr R, Krosshaug T. Understanding injury mechanisms: a key component of preventing injuries in sport. Br J Sports Med. 2005;39(6):324–9. Available from: https://doi.org/10.1136/bjsm.2005.018341
27. Aagaard H, Jorgensen U. Injuries in elite volleyball. Scand J Med Sci Sports.

1996;6(4):228–32. Available from: https://doi.org/10.1111/j.1600-0838.1996.tb00098.x
28. Myklebust G, Bahr R. Return to play guidelines after anterior cruciate ligament surgery. Br J Sports Med. 2005;39(3):127–31. Available from: https://doi.org/10.1136/bjsm.2004.010900
29. Verhagen E, van Mechelen W. Sport for all, injury prevention for all. Br J Sports Med. 2010;44(3):158–9. Available from: https://doi.org/10.1136/bjsm.2009.068395
30. Reeser JC, Verhagen E, Briner WW, Askeland TI, Bahr R. Strategies for the prevention of volleyball related injuries. Br J Sports Med. 2006;40(7):594–600. Available from: https://doi.org/10.1136/bjsm.2005.018234
31. Woolf CJ. What is this thing called pain? J Clin Invest. 2010;120(11):3742–4. Available from: https://doi.org/10.1172/JCI45178
32. Berenbaum F. Signaling transduction: target in osteoarthritis. Curr Opin Rheumatol. 2004;16(5):616–22. Available from: https://doi.org/10.1097/01.bor.0000130538.13145.41
33. Michener LA, McClure PW, Karduna AR. Anatomical and biomechanical mechanisms of subacromial impingement syndrome. Clin Biomech. 2003;18(5):369–79. Available from: https://doi.org/10.1016/S0268-0033(03)00047-0
34. Antoniadis G, Richter HP, Rath S, Braun V, Moese G. Suprascapular nerve entrapment: experience with 28 cases. J Neurosurg. 1996;85(6):1020–5. Available from: https://doi.org/10.3171/jns.1996.85.6.1020
35. Woolf CJ. Central sensitization: implications for the diagnosis and treatment of pain. Pain. 2011;152(3 Suppl):S2–15. Available from: https://doi.org/10.1016/j.pain.2010.09.030
36. Bleakley CM, Glasgow P, MacAuley DC. PRICE needs updating, should we call the POLICE? Br J Sports Med. 2012;46(4):220–1. Available from: https://doi.org/10.1136/bjsports-2011-090297
37. Littlewood C, Malliaras P, Mawson S, May S, Walters SJ. Self-managed loaded exercise versus usual physiotherapy treatment for rotator cuff tendinopathy: a randomized controlled trial. Clin Rehabil. 2014;28(1):20–30. Available from: https://doi.org/10.1177/0269215512466989

How to cite this article: Khushi Patel, Ragbi Patel, Rutika Tamboli, Heena Patel, Shivani Patel. Prevalence of upper limb musculoskeletal pain among volleyball players in Gujarat: a cross-sectional study. *Int J Health Sci Res.* 2025; 15(9):343-350. DOI: *https://doi.org/10.52403/ijhsr.20250936*

******