

## ORIGINAL ARTICLE

## FREQUENCY OF MUSCULOSKELETAL INJURIES AND ASSOCIATED RISK FACTORS AMONG THE VOLLEYBALL PLAYERS IN PESHAWAR

Sardar Ahmad<sup>1</sup>, Shakir Ullah<sup>2</sup>, Zardad Khan<sup>3</sup>, Alam Zeb<sup>4</sup>

### ABSTRACT

**Introduction:** Volleyball is one of the most commonly played game from the top five international sports in the world amongst male and female due to its ability to play both indoors and outdoors and its minimal equipment requirements. Sports injury is an important public health issue. Sports have many numerous health benefits; however, injury is their potential outcome. Specific tasks of volleyball like jumping, spiking, twisting, diving, turning movements, and blocking the ball require a lot of energy from the MSK system for the fast movements and rapid action in the game which can lead the player towards the risk of MSK injuries. Volleyball represents a higher injury rate than other games for practice. This study aimed to determine the frequency and associated risk factors of MSK injuries among volleyball players.

**Material & Methods:** This cross-sectional study was conducted from August 2019 to February 2020 in the Peshawar sports complex, Hayatabad sports complex, and the University of Peshawar. 170 participants; only males with age ranged from 15-35 years, were recruited while using convenient sampling technique. Data were collected and analyzed through SPSS version 21. A Chi-square test was applied to determine the association of injury.

**Results:** Among 170 players, Participants were having mean age  $27.5 \pm 4.5$  years, weight  $63.02 \pm 4.2$  kg, height  $5.7 \pm 0.3$  feet, and  $20.65 \pm 2.3$  BMI 101 (59.5%) players were having MSK injuries. The most injured anatomical sites of volleyball players were ankle (21.8%) and knee joint (12.9%). The most risky position for getting injured in volleyball on track was spiker (42.9%), followed by a blocker (30%), setter (15.3%), and libero (11.8%) respectively.

**Conclusion:** This study concluded that MSK injuries have a high frequency in volleyball players. Demographics and position of players are the most important risk factors causing MSK injury.

**Key Words:** Body Mass Index, Musculoskeletal Injuries, Overweight, Prevalence, Volleyball

**Authors' Declaration:** The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, question designing, data collection, data analysis and write-up of the article.

### Authors' Affiliation

<sup>1</sup>Physical Therapist, Rafsan Neuro Rehab Center, Peshawar

<sup>2</sup>Assistant Professor, Khyber Medical University IPMR

<sup>3</sup>Lecturer, Northwest Institute of Health Sciences, Peshawar

<sup>4</sup>Assistant Professor, School of Health Sciences Peshawar

### Corresponding Author

Zardad khan

Lecturer, Department of Physical Medicine & Rehabilitation, Northwest Institute of Health Sciences, Peshawar

Email: zardadibrahimi07@gmail.com

**This article may be cited as:** Ahmad S, Ullah S, Khan Z, Zeb A. Frequency of musculoskeletal injuries and associated risk factors among the volleyball players in Peshawar. Rehman J Health Sci. 2024;6(1). 111-115

Submitted: July 26, 2021    Revisions Submitted: Nov 23, 2023    Accepted: Dec 29, 2023

### INTRODUCTION

Volleyball is one of the most commonly played game from the top five international sports in the world amongst male and female due to its ability to play both indoors and outdoors and its

minimal equipment requirements.<sup>1</sup> Over two decades youth athletics participants increased dramatically.<sup>2</sup> In 1895, volleyball was invented by American William Morgan.<sup>3</sup> The Danish

Volleyball Federation had registered 20,819 players of different clubs in 1994.<sup>4</sup> In the sphere of sports medicine, volleyball has received very little interest.<sup>5</sup> It is considered a safe game as compare to other games e.g. football, handball, and basketball.<sup>6</sup> In the US approximately 30 to 45 million school-going children participate in sports.<sup>7</sup> Approximately 800 million people practiced volleyball in the world, while according to the International Federation of Volleyball approximately 500 million people play volleyball world widely.<sup>8,9</sup>

During the tournament or practice, any physical complaint or medical attention comes in the categories of injury.<sup>10</sup> Sports injury is an important public health issue. Sports have many numerous health benefits; however injury is their potential outcome.<sup>11</sup> As volleyball is a non-contact game, players of the teams are separated by the net, so it can be expected that in this game the incidence of injuries is low.<sup>12</sup> American Academy of Orthopedic Surgeons 2008 described that Musculoskeletal (MSK) injuries are the most leading cause of work lost in the industrial state.<sup>13</sup> The MSK injury was categorized into three categories; minor, moderate, and major. The injury which leads to the participants' absence from training almost one or more than one week was defined as "minor". Injury which leads to the participants' absence from training two to 4 weeks was defined as "moderate" while the injury leads to the absence of participants from training more than four weeks was defined as "major".<sup>14</sup>

Work-related MSDs in professionals are very commonly investigated in different occupational settings.<sup>9</sup> Specific tasks of volleyball like jumping, spiking, twisting, diving, turning movements, and blocking the ball require a lot of energy from the MSK system for the fast movements and rapid action in the game which can lead the player towards the risk of MSK injuries.<sup>6</sup> Volleyball represents a higher injury rate than other games for practice, which was different from the rate represented by the other two games i.e. basketball and soccer.<sup>15</sup>

Volleyball is one of the main games played in Peshawar. The majority of the players are vulnerable to musculoskeletal disorders during playing volleyball. Along with the frequency of MSK injuries in Volleyball players. Current study has also enlisted different risk factors responsible for musculoskeletal injuries which may help the players with the precautions and

prevention of different musculoskeletal disorders while playing volleyball.

## MATERIAL AND METHODS

The objectives of this study were to determine the frequency and associated risk factors of MSK injuries among volleyball players. A cross-sectional survey was conducted in which data were collected from Peshawar sports complex, Hayatabad sports complex and University of Peshawar. The sample size was 170, which was calculated with Open Epi, with confidence interval of 95%.

The study duration was 6 months from September 2019 to March 2020. The study was conducted after proposal approval from the Research and Ethical Board of Khyber Medical University. Then further permission was taken from the respective centers for proceeding research i.e. Peshawar sports complex, Hayatabad Sports Complex, University of Peshawar. The questioner has taken from a study done in Sweden<sup>16</sup> and was approved form the research committee. Questionnaires were distributed after proper inform consent was taken. This questionnaire consists of two parts. Part one contains six questions; how long playing volleyball, time of training per week, training in hours per week, perform prevention program or not. Part two consist of nine questions; point of injury, situation of injury, contact or non-contact injury, injured body part, location of the injury, amount of absence from training, and match after injury.

Data were analyzed through SPSS version 21. To calculate the frequencies and percentages of variables i.e. Gender of players, injured players, injured areas, moment of injuries, duration of playing volleyball players, the descriptive statistic was applied. Mean and Standard deviation was analyzed for quantitative variable, i.e. age, body mass (weight), Height and BMI of players. A Chi-square test was applied to find the association of injuries with these variables.

## RESULTS

Among all players, 59.4% were injured during playing volleyball, while 40.60% reported no injuries. Movement of injury was also compared for training including warm-up and practice, and during the match including competition. Most of the injuries were during training (57.4%) as compared to match (42.6%). This survey resulted that most risky position for getting injured in volleyball on track was spiker (42.9%), followed by a blocker

(30%), setter (15.3%), and libero (11.8%) respectively, shown in (Table 1).

All players were male, whose age was between, 15 years to 35 years, with a mean (SD) age of  $27.5 \pm 4.5$  years. Height and weight were varying among the players. Minimum height and weight were 5 feet and 2 inches, and 56 kg respectively, while maximum height and weight were 6 feet 3 inches and 73 kg respectively. Their mean BMI was  $20.6 \pm 2.35$ , which is lying in the normal range of BMI, the detail has shown in (Table 2).

Musculoskeletal injuries were studied for age, weight, height, and BMI of the players. 59.5% of the players reported injury, whose age was above 25 years compare to below 26 years (40.5%), ( $P \leq 0.05$ ). For height comparison with injuries of the players, 30% of them injured, whose height was in the range of 5.9 – 6.3 feet, while 29.2% have injured whose height was 5.2 – 5.8 feet ( $P \leq 0.05$ ). The injuries were also compared for the weight and BMI of the players, whose weight was  $>60$  reported 40.5% injuries, while those who were underweight, 27% injured as compared to 25% in normal weight and 7% in overweight players ( $P \leq 0.05$ ). (Table 2)

The common anatomical sites at risk of injury in playing volleyball are hand/fingers, elbow, shoulder, back knee, and ankle joint. This study reported that most injured anatomical sites of volleyball players were ankle (21.8%) and knee joint (12.9%) followed by back (10%) and elbow (9.4%) joint as shown in (Figure 1).

## DISCUSSION

The current study resulted that about two-third of participants got injuries, while playing volleyball. More than one-third of them were having injuries, whose age was more than 25 years; those whose height was higher were injured more as compared to those whose height was less. Players with a weight greater than 60 kg were having a high incidence of injuries. The ankle was the most common site of injuries in them, the most risky position for getting injured was spike on the track.

This study reported the mean height;  $5.722 \pm 0.38$  feet Inches, mean body weight  $63.02 \pm 4.20$  kg represent the resemblance with study done by Vanderlei et al (2013) which reported mean height  $1.69 \pm 0.11$  m which is equal to 5.5 feet and body weight  $60.88 \pm 12.43$  kg. Another similarity shown by this study with the current study was the mean BMI i.e.  $21.08 \pm 2.81$  kg/m<sup>2</sup> while the current study report mean

BMI  $20.65 \pm 2.35$  kg/m<sup>2</sup>. According to the BMI classification, the BMI value between ranges 18.5-24.9 comes in category of normal BMI, so both studies represent similar mean BMI of volley ball players.<sup>8</sup>

The resemblance was found that with the prevalence study by S.R Augustsson et that 52% of volleyball players have reported injury,<sup>14</sup> but Jadhav et al in 2012 have reported in their survey that the frequency of injury in volleyball players were 84 %.<sup>17</sup> The most common injured area was the ankle joint followed by the knee joint, the same result was observed by author Click et al in a systemic review that most common injured anatomical site in volleyball players was the ankle joint followed by knee joint while playing volleyball.<sup>18</sup> It was reported regarding the most affected (injured) region of the body by Bahr R et al and Jadhav K in their studies.<sup>19</sup>

Players who were heavier in weight reported a high frequency of injuries in those players who were heavier in weight greater than 60 kg, the same was reported by Vanderlei FM Jadhav et al in their studies.<sup>20</sup> Bhat et al (2017) have reported in their study position of the players on track has an effect on injuries of players, the most common position for getting to be injured was spiker followed by blockers, setters, and libero, the same was reported in our study.<sup>21</sup> Jadhav et al also reported that the most common circumstances which lead to injury were spiking (33.7%), blocking (24%), diving (17.41%), and setting (11.23%).<sup>17</sup>

The current study reported that more than half of the players got injured during training as compared to matches or competitions which may be due to no proper protocols. A recent study of 2017 has reported contrast results from the current study, that study reported that most of the players got an injury during competition as compare to the training.<sup>21</sup> Similar results were shown by the previous study that most injuries occurred during training (47%) as compared to the competition and gradual onset (41%).<sup>14</sup> Some interventional studies need to be done, which may help to find the mechanism of prevention of injuries.

## CONCLUSION

This study concluded MSK injuries have a high frequency in volleyball players. It also showed that demographics like age, weight, and position of the players can affect the injuries of the players.

**REFERENCES**

1. James LP, Kelly VG, Beckman EM. Injury risk management plan for volleyball athletes. *Sports medicine*. 2014;44(9):1185-95.
2. Biber R, Gregory A. Overuse injuries in youth sports: is there such a thing as too much sports? *Pediatric annals*. 2010;39(5):286-92.
3. Seminati E, Minetti AE. Overuse in volleyball training/practice: A review on shoulder and spine-related injuries. *European journal of sport science*. 2013;13(6):732-43.
4. Ali S, Drendel AL, Kircher J, Beno S. Pain management of musculoskeletal injuries in children: current state and future directions. *Pediatric emergency care*. 2010;26(7):518-24.
5. Jadhav K, Deshmukh P, Tuppekar R, Sinku S. A survey of injuries prevalence in varsity volleyball players. *Journal of Exercise Science and Physiotherapy*. 2012;6(2):102.
6. Bere T, Kruczynski J, Veintimilla N, Hamu Y, Bahr R. Injury risk is low among world-class volleyball players: 4-year data from the FIVB Injury Surveillance System. *Br J Sports Med*. 2015;49(17):1132-7.
7. Franklin CC, Weiss JM. Stopping sports injuries in kids: an overview of the last year in publications. *Current opinion in pediatrics*. 2012;24(1):64-7.
8. Vanderlei FM, Bastos FN, Tsutsumi GYC, Vanderlei LCM, Júnior JN, Pastre CM. Characteristics and contributing factors related to sports injuries in young volleyball players. *BMC research notes*. 2013;6(1):415.
9. Steinmetz A, Scheffer I, Esmer E, Delank K, Peroz I. Frequency, severity and predictors of playing-related musculoskeletal pain in professional orchestral musicians in Germany. *Clinical rheumatology*. 2015;34(5):965-73.
10. Clarsen B, Myklebust G, Bahr R. Development and validation of a new method for the registration of overuse injuries in sports injury epidemiology: the Oslo Sports Trauma Research Centre (OSTRC) overuse injury questionnaire. *Br J Sports Med*. 2013;47(8):495-502.
11. Knowles SB, Marshall SW, Bowling JM, Loomis D, Millikan R, Yang J, et al. A prospective study of injury incidence among North Carolina high school athletes. *American journal of epidemiology*. 2006;164(12):1209-21.
12. Doherty C, Delahunt E, Caulfield B, Hertel J, Ryan J, Bleakley C. The incidence and prevalence of ankle sprain injury: a systematic review and meta-analysis of prospective epidemiological studies. *Sports medicine*. 2014;44(1):123-40.
13. AAOS. *The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal, and Economic Cost-Executive Summary*. AAOS Rosemont, IL; 2008.9.
14. Augustsson S, Augustsson J, Thomee R, Svantesson U. Injuries and preventive actions in elite Swedish volleyball. *Scandinavian journal of medicine & science in sports*. 2006;16(6):433-40.
15. Foss KDB, Myer GD, Hewett TE. Epidemiology of basketball, soccer, and volleyball injuries in middle-school female athletes. *The Physician and sportsmedicine*. 2014;42(2):146-53.
16. Augustsson S, Augustsson J, Thomeé R, Svantesson U. Injuries and preventive actions in elite Swedish volleyball. *Scandinavian journal of medicine & science in sports*. 2006;16(6):433-40.
17. Jadhav K, Deshmukh P, Tuppekar R, Sinku S. A survey of injuries prevalence in varsity volleyball players. *Journal of Exercise Science and Physiotherapy*. 2012;6(2):102-5.
18. Kilic O, Maas M, Verhagen E, Zwerver J, Gouttebauge V. Incidence, aetiology and prevention of musculoskeletal injuries in volleyball: A systematic review of the literature. *European journal of sport science*. 2017;17(6):765-93.
19. Bahr R, Reeser JC. Injuries among world-class professional beach volleyball players: the Federation Internationale de Volleyball beach volleyball injury study. *The American journal of sports medicine*. 2003;31(1):119-25.
20. Vanderlei FM, Bastos FN, Tsutsumi GYC, Vanderlei LCM, Júnior JN, Pastre CM. Characteristics and contributing factors related to sports injuries in young volleyball players. *BMC research notes*. 2013;6(1):1-7.

21. Bhat N, Balamurugan K. Injuries among Journal of Physical Education, Sports and varsity men volleyball players. International Healthh. 2017;4(3):68-71.

Table 1: Injuries statistics for movement of injury and injury position

Characteristics	N(%)
Injury Statistics	
Yes	101(59.4)
No	69(40.6)
Movement of Injury	
Training	58(57.4)
Match	43(42.6)
Position of Injury	
Spiker	73(42.9)
Blocker	51(3)
Setter	26(15.3)
Libero	20(11.8)

Table 2: Musculoskeletal injuries among Demographics

Risk Factors		Musculoskeletal injury		Total	P-Value
		Presence	Absence		
Age (Years)	15-25	13 (7.6%)	56 (32.9%)	69 (40.5%)	0.000
	26-35	88 (51.7%)	13 (7.6%)	101(59.5%)	
Height (ft. inch)	5.2 – 5.8	50 (29.4%)	54 (32%)	104 (61%)	0.000
	5.9 – 6.3	51 (30%)	15 (9%)	66 (39%)	
Weight (kg)	≤ 60	32 (19%)	40 (34%)	72 (43%)	0.001
	> 60	69 (40.5%)	29 (17%)	98 (57.5%)	
BMI	Underweight	46 (27%)	6 (4%)	52 (31%)	0.000
	Normal	43 (25%)	54 (32%)	97 (57%)	
	Overweight	12 (7%)	9 (5%)	21 (12%)	

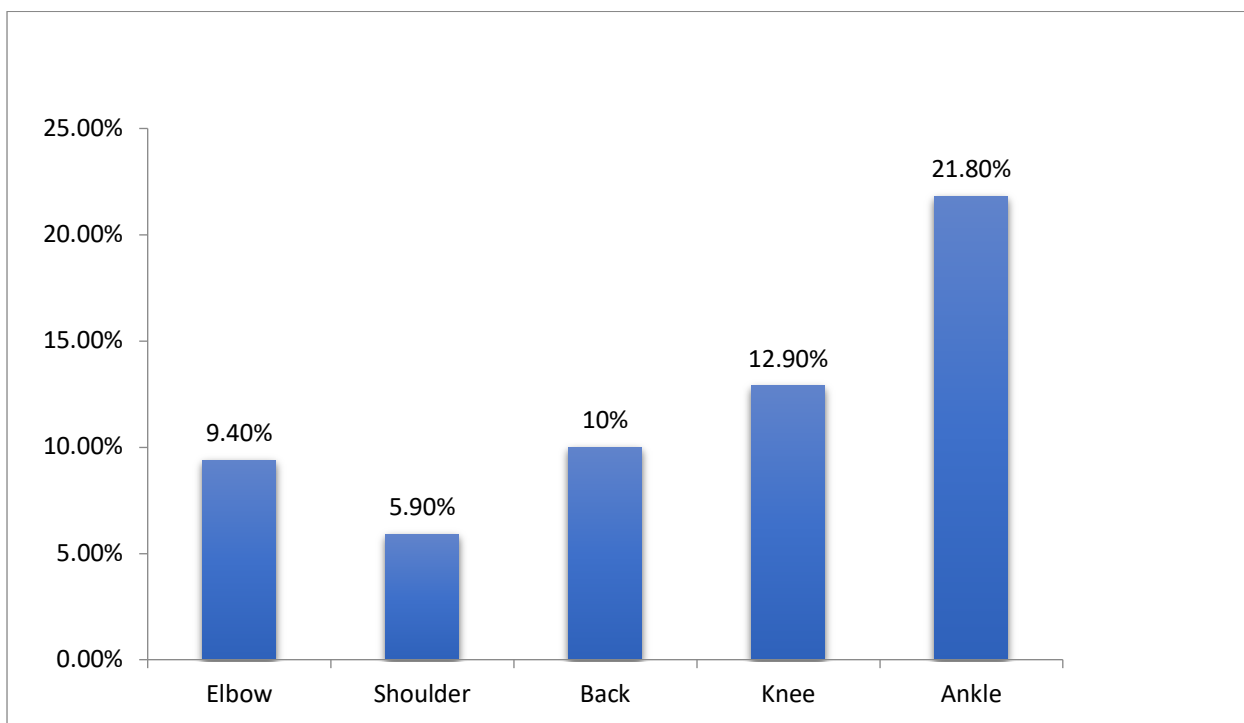


Figure 1: Frequencies of MSK injuries according to anatomical sites