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PREVALENCE AND ASSOCIATED RISK FACTORS OF ANKLE SPRAIN AMONG VOLLEYBALL PLAYERS IN PESHAWAR SPORT COMPLEXES AND TECHNICAL COLLEGE PESHAWAR: A CROSS SECTIONAL SURVEY

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ABSTRACT

Background: *Ankle sprain is a tear of ligaments of the ankle that hold the ankle in place and connect it with other bones in leg and foot. It occurs when foot suddenly rolls or twists, forcing the ankle joint out of its normal position. Swelling and bruising can occur due to tear in ligaments. Walking, running, jumping or even wearing improper footwear can cause this type of injury.*

Objective: *The aim of the study was to find the prevalence and associated risk factors of ankle sprain among volleyball players in Peshawar sports complexes and technical college Peshawar.*

Methods: *A cross-sectional survey was carried out in Peshawar Sports Complex, Qayyum Sports Complex and Technical college Peshawar. A total of 210 participants were added to the study. Ankle Sprain were checked by FADI and FADI Sports. Significance and association were calculated by using SPSS 25.0. The demographic statistics were calculated, and frequency tables were made.*

Results*: Our survey aimed to assess the prevalence and associated risk factors of ankle sprain among volleyball players. The age (P=0.000), BMI (P=0.000), footwear(P=0.000), jumping(P=0.000), landing(P=0.000) were found to be significantly associated with FADI and FADI sports.*

Conclusion: *This study confirms that ankle sprain significantly affects the performance of volleyball players.*

Keywords: *Ankle sprain,Volleyball,Musculoskeletal injuries,Sports injuries,FADI*

INTRODUCTION

Ankle joint is hinged synovial joint formed by articulation of tibia,fibula and talus.It is stabilized by strong collateral ligaments medially and laterally,on medial side there is medial collateral ligament(deltoid) and the other ligament is lateral collateral ligament(1). (1).Main stabilizing ligament on medial side is deltoid ligament and laterally ankle is stabilized by three ligaments,the anterior and posterior talofibular ligament and the calcaneofibular ligament.The talofibular ligament is the weakest and most frequently injured ligament of the three lateral ligaments(2).Ankle joint is complex joint formed by osseous and soft tissue

structures which provide balance between structure and function,during weight bearing it allows transmission of forces through ankle(3).

It was second most commonly injured body site after the knee.Ankle sprain is a tear of ligaments of the ankle that hold the ankle in place and connect it with other bones in leg and foot(4) .It occurs when foot suddenly rolls or twists,forcing the ankle joint out of its normal position.Swelling and bruising can occur due to tear in ligaments.It can happen to anyone at any age.Participating in sports,walking,running,jumping or even wearing improper footwear can cause this type of injury(5).

Foot and ankle injuries are most prevalent in sports such as basketball,volleyball and gymnastics(6).It can be complicated with instability, re-occurrence and post traumatic osteoarthritis of ankle(7).It was minor accidental injury and quickly resolvable,but these injuries often lead to high rates of re-occurrence and sensorimotor deficient may persist for months or even years after the old injury(8).

In studies disability rate of ankle sprains have been reported in 30-70% of patients for about 6-7 months after injury.It affects their participation in sports, work and activities of daily life because of constant hospital visit(9). In minor injuries like fatigue and muscle stiffness does not require any treatment and participant will recover by itself after a rest. In moderate injuries ,the level of tissue damage is more obvious and causes inflammation as well as torn muscles and torn ligaments. In major injuries the tissue damage is severe which results in complete ligaments tear or fracture characterized by severe pain,swelling,damaged blood vessels and local inflammation(10). Acute ankle sprain is one of most common MSK injuries and have high incidence and re-occurrence rate which is associated with the development of chronic ankle instability(11).

Volleyball is a team-oriented athletic activity represented by six participants positioned on opposite side of net.Each team attempts to accumulate points by placing a ball on opposing team's court.It is one of the most popular,competitive,successful and recreational sports occupying second place after football(12). It is one of the five major international sports,and with 220 national federations,the International Volleyball Federation is largest international sports federation in the world.It was invented in 1895 by American William Morgan and is most commonly played game from top five international sports in the world among male and female players.(13,14).

In volleyball individuals must have agility,coordination,strength,endurance,balance and hand-eye coordination(15). More than half of musculoskeletal injuries occurred during training.The study found that blockers were at highest risk of injury and specialized training require to minimize their risk of injuries (16).

Sports injuries are mostly caused by use of excessive force(17). .Most injuries occur in shoulder, knee, fingers and ankle(18). Ankle sprains are the predominant acute injuries in volleyball athletes, accounting for 41% of sports related injuries. Acute injuries mostly affects fingers and ankles, on the other hand chronic injuries occur in knee and shoulder(19).Acute ankle sprain develop mechanical and functional ankle instability which results in residual symptoms referred as chronic ankle instability(20).AS rate is higher in young children and adolescents than in adults(21).

In volleyball, there is a lot of energy required from musculoskeletal system for rapid action and fast movement like jumping,twisting,spiking,turning movements and blocking in game which can lead to musculoskeletal injuries (22). Lateral ankle sprain which is common and have a high re-occurrence rate of upto 47%(23). Effective skills like balanced stance and effective postural control place great demand on ankle function(24).

Volleyball has much less risk of acute injuries in comparison to the other sports like soccer,basketball or ice hockey.It is non contact game because players from two teams are separated by a net so the risk of injuries are assumed to be low(25).Mostly risk of injury is higher during competition than training in non contact game while contact injuries account for one fourth of all competition injuries(26-27). The arch of foot and mobility are risk factors for ankle sprain among volleyball and other sports players.(28).

Sports related injuries are caused by both internal and external risk factors.Internal factors are related to athlete himself such as age,weight,height,warm ups,inadequate nutritional intake,history of injury,physique and excessive training.On the other hand,external factors that come from outside such as training conditions,field condition,weather,techniques and equipments used in game(29).By working on coordination

abilities from early age in volleyball players is a major key for mastering good techniques which in turn helps in preventing injuries(30).

OBJECTIVE: To Determine The Prevalence And Associated Risk Factors Of Ankle Sprain Among Volleyball Players in Peshawar Sports Complexes And Technical College Peshawar.

METHODS AND MATERIALS:

Study design was cross sectional study, it was conducted at Peshawar Sports Complex, Qayyum Sports Complex and Technical College Peshawar.The sample size was 210 participants with confidence interval at 95%. The sample size was calculated using sample size calculator i.e Raosoft . Sample size was Non-probability convenient sampling. The study was completed within six months after approval of proposal by research committee of PIHMS..

The inclusion criteria for this study were as follows: participants who have been active in sports. The age range of eligible participants was between 13 and 35 years, only male players were included. Additionally, participants of any level of play or professional and non professional volleyball players were included in the study, ensuring that the sample represents individuals with any level of play were studied.

The exclusion criteria for this study included participants with ankle fracture and ankle surgery. Additionally, participants who were diagnosed with any systemic diseases like History of septic ankle arthritis ,previous severe injuries, ankle dislocation that might interfere with the study's objectives were excluded.

RESULTS:

DEMOGRAPHIC CHARACTERISTICS:

It includes age,BMI(weight/height),position of player,side of injury,time of injury,footwear and previous injury.(Table-1)

Table 1:Demographic characteristics

Variables	Catagories	Frequency	Percentage
Age	13 to 18	70	33.3
	19 to 24	89	42.4
	25 to 35	51	24.3
BMI	<18.4	40	19
	18.5 to 24.9	151	71
	25 to 39	19	9
	>40	0	0
Position of player	Setter	15	7.1
	Side hitter	43	20.5
	Blocker	53	25.2
	Libero	35	16.7
	Other	64	30.5
Side of injury	Right	74	35.2
	Left	58	27.6
	No injury	78	37.1
Time of injury	1week to 1 month	87	41.4
	2 to 3 month	41	19.5
	4 to 5 month	3	1.4
	More than 6 month	27	12.9
	No injury	52	24.8
Footwear	Yes	58	27.6
	No	152	72.4
Previous injury	Yes	53	25.2

	No	157	74.8

AGE-Categories Vs FADI Association:

This analysis of age group and FADI showed that total number of participants who are aged from 13 to 18 years was 70 in which 48 had mild disability ,20 had moderate disability and 2 had severe disability .In 19 to 24 years age group the total number of participants is 89 in which 60 had mild disability ,23 had moderate disability and 6 had severe disability .In 25 to 35 years age group the total number is 51 in which 20 had mild disability ,7 had moderate disability and 24 had mild disability .A statistical significant association between age and FADI is P=0.000.(Table-3)

Table 3: AGE categories Vs FADI

Age	FADI			Total	P value
	Mild >68	Moderate <68	Severe <34		
13 to 18years	48	20	2	70	.000
19 to 24years	60	23	6	89	
25 to35years	20	7	27	51	
Total	128	30	32	210	

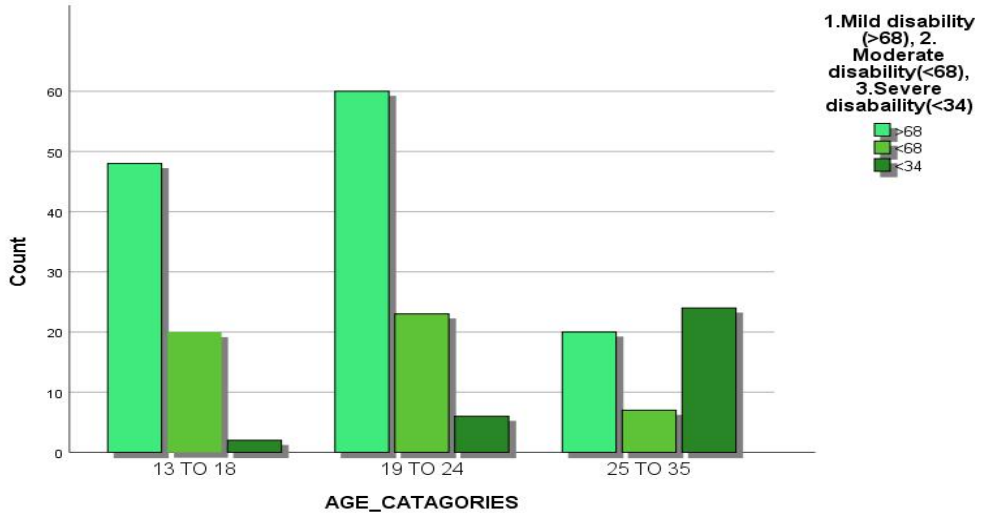

Figure 6.Age categories Vs FADI

BMI Categories Vs FADI Association:

The analysis of BMI across FADI showed that the total number of participants who are less than 18.4(underweight) are 40 in which 35 had mild disability,5 had moderate disability and 0 had severe disability .In 18.4-24.9(normal) BMI group the total is 151 in which 87 had mild disability , 41 had moderate disability and 23 had severe disability .In 25-35(overweight)the total is 19 in which 6 had mild disability , 4 had moderate disability and 9 had severe disability .This analysis showed the statistical significance value of p=0.000.(Table-4)

Table 4:BMI Catagories Vs FADI

BMI Categories	FADI			Total	P value
	Mild >68	Moderate <68	Severe <34		
<18.4(underweight)	35	5	0	40	0.000
18.4-24.9 (normal)	87	41	23	151	

25-35 (overweight)	6	4	9	19	
Total	128	50	32	210	

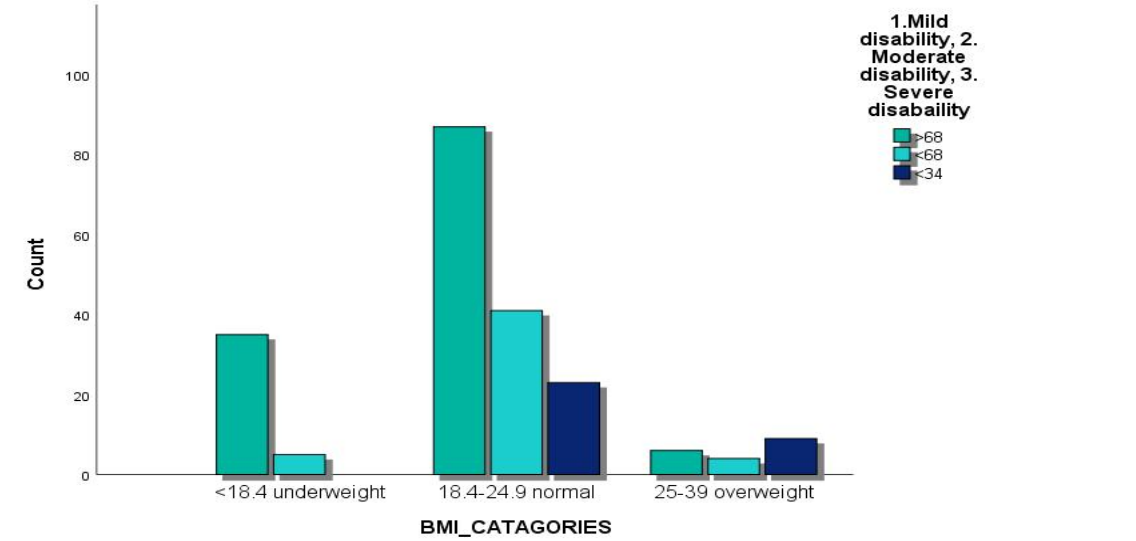

Figure7.BMIcategories Vs FADI

Position of player Vs FADI Association:

The analysis of position of players and FADI showed that the total number of participants who are setter is 15 in which 13 had mild disability,2 had moderate disability and 0 had severe disability.The total percentage of sidehitters is 43 in which 36 had mild disability,6 had moderate disability and 1 had severe disability.The total percentage of blockers is 53 in which 22 had mild disability,15 had mderate disability and 16 had severe disability.The total number of libero is 35 in which 32 had mild disability,3 had moderate disability and 0 had severe disability.The total number of other position of players is 64 in which 25 had mild disability,24 had moderate disability and 15 had severe disability.This analysis showed the statistical significance value of p=0.000.(Table-5)

Table 5:Position of players Vs FADI

Position of players	FADI			Total	P value
	Mild >68	Moderate <68	Severe <34		
Setter	13	2	0	15	0.000
Sidehitter	36	6	1	43	
Blocker	22	15	16	53	
Libero	32	3	0	35	
Other	25	24	15	64	
Total	128	50	32	210	

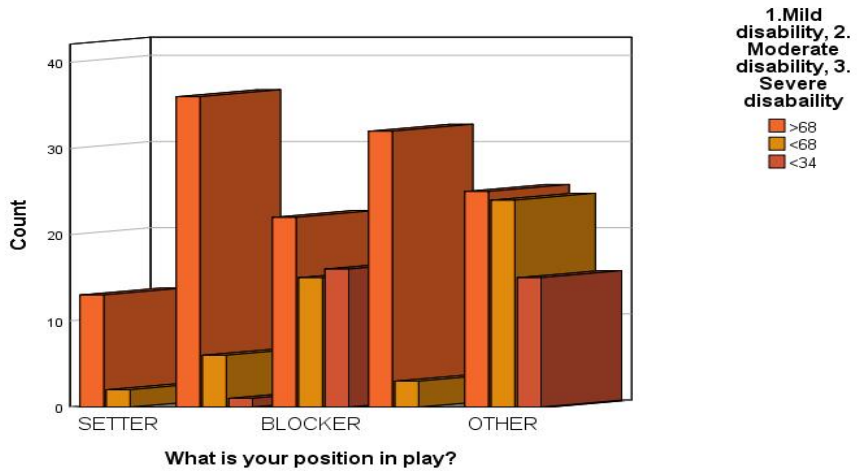

Figure 8.Position of player VS FADI

Footwear Vs FADI Association:

The analysis of footwear and FADI showed that the total number of those participants who are using footwear is 58 in which 20 had mild disability,20 had moderate disability and 18 had severe disability.The total number of those who are not using footwear is 152 in which 108 had mild disability, 30 had moderate disability and 14 had no disability. This analysis showed the statistical significance value of p=0.000.(Table- 6)

Table 6:Footwear Vs FADI

Footwear	FADI			Total	P value
	Mild >68	Moderate <68	Severe <34		
With footwear	20	20	18	58	0.000
Without footwear	108	30	14	152	
Total	128	52	32	210	

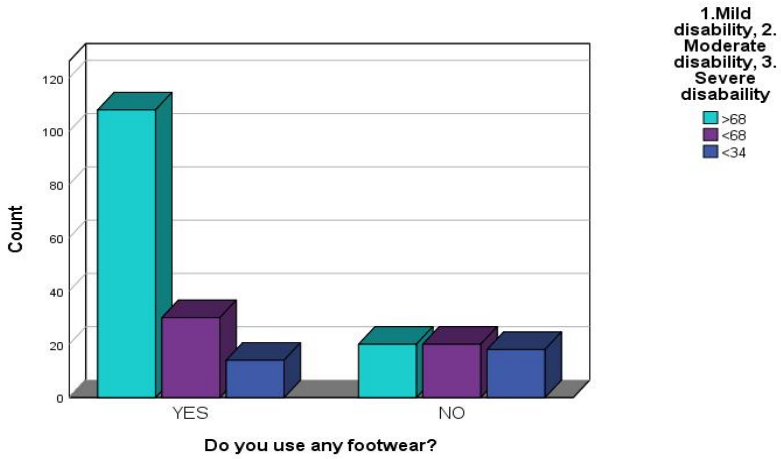

Figure 9. Footwear Vs FADI

Jumping Vs FADI SPORTS Association:

The analysis of jumping Vs FADI sports showed that the total number of participants who had extreme disability to perform jumping according to FADI sports is 33 in which 0 had mild disability,3 had moderate and 30 had severe disability.The total number of those who had moderate disability is 52 in which 4 had mild disability, 46 had moderate and 0 had severe disability.The total number of those who had mild disability is 37 in which 28 had mild disability, 2 had moderate and 0 had severe disability.The total number of those who had no disability is 97.The statistical significance value is P=0.000.(Table-7)

Table 7:.Jumping Vs FADI Sports

Jumping	FADI Sports			Total	P value
	Mild	Moderate	Severe		
Extreme disability	0	3	30	33	0.000
Moderate disability	4	46	0	52	
Mild disability	28	2	0	37	
No disability	97	0	0	97	
Total	129	51	30	210	

Landing Vs FADI SPORTS Association:

The analysis of landing vs FADI sports showed that the total number of those who had extreme disability in landing according to FADI sports is 34 in which 0 had mild,4 had moderate and 30 had severe disability.The total number of those who had moderate disability in landing is 49 in which 4 had mild, 45 had moderate and 0 had severe disability in FADI sports score.The total number of those who had mild disability in landing is 29 in which 27 had mild, 2 had moderate and 0 had severe disability.The total number of those who had no disability in landing is 98.The statistical significance value is P=0.000(Table-8)

Table 8:Landing Vs FADI Sports

Landing	FADI Sports			Total	P value
	Mild	Moderate	Severe		
Extreme disability	0	4	30	34	0.000
Moderate disability	4	45	0	49	
Mild disability	27	2	0	29	
No disability	98	0	0	98	
Total	129	51	30	210	

DISCUSSION:

This study aimed to assess the prevalence and associated risk factors of ankle sprain among volleyball players. A total of 210 male volleyball players aged 13-35 years participated in the survey, with a mean age of 21.93 ± 5.885. The results showed that ankle sprains were common among the participants, with 41.4% experiencing acute injuries and 33.8% experiencing chronic injuries and 24.8 had no injury. The risk factors associated with ankle sprains included playing volleyball, playing on uneven surfaces, running, jumping, and improper footwear. The study also found that the severity of ankle sprain injuries varied across different age groups and body mass index (BMI) categories. Specifically, younger players (13-24years) tended to have severe disabilities, while older players (25-35 years) had milder disabilities. Similarly, underweight players were found to have milder disabilities, while overweight players had more severe disabilities

Proper footwear was found to play a crucial role in preventing ankle sprains. Among the participants, 27.6% reported using proper footwear, while 72.4% did not. This highlights the importance of wearing suitable footwear during volleyball games and practices to reduce the risk of ankle sprains.

The resemblance was found with the prevalence study by Ahmad et al. that (59.4%) players were having MSK injuries. The most injured anatomical sites of volleyball players were ankle (21.8%)(10).but A cross-sectional study conducted in Bangladesh by Delowar Hossain Chowdhury (2018) examined that most

common injured anatomical site in volleyball player's were knee (27.4%), ankle (22.6%), shoulder (16.1%), and and lower back (14.5%) (35).it is investigated by Azuma et al. in Japan ,that The ankle joint was the most common injury site among volleyball player's (34).systematic review by migiliorini et al. results showed that the lower limb was the most affected area, with the ankle being the most commonly injured area within this region.Joint injuries, primarily sprains and ligament damages were the most frequent type.Spiking and blocking were identified as high-risk circumstances for injuries with acute onset lesions being more common than overuse injuries.highlighting the importance of injury prevention and management strategies in volleyball (33)

Our study identified several risk factors associated with ankle sprains,including playing on uneven surfaces,running,jumping,improper landing and improper footwear.In order to prevent these type of injuries these risk factors would be helpful for prevention and treatment strategies. Future study should aim to build on our findings and address the limitation of our study.

CONCLUSION:

This study revels that there is the effect of ankle sprain on volleyball players.There is association between age and disability,participants aged < 24 years showed 75.7% disability.There is association between BMI and disability, participants with BMI <24(normal) showed 71.9% disability.There is association between injury and FADI, which showed 62.8% had injury.There is association between footwear and disability, showed 72.4% disability.

LIMITATIONS

This study focused on only few complexes so sample size is small, large sample size should be better. Many players were not cooperative and females players were not included.

RECOMMENDATIONS

This study should be conducted on provincial level and longitudinal study should be performed for good inter and intra rater reliability. Population and sample size should be larger. This study revealed that there is a lack of awareness regarding the use of proper footwear before playing game so it is recommended to use proper footwear and do practice the techniques of game.There is need to do more RCT so we can treat athletes accordingly.

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