

**ORIGINAL RESEARCH****Prevalence and Its Associated Factors of Musculoskeletal Injuries: In Case of South Gondar Zone Project and Club Volleyball Players, Amhara Regional State, Ethiopia**Million Agegn¹, Ephrem Tamrat^{1*}¹Department of Sport Science, College of Natural and Computational Sciences, University of Gondar, Ethiopia.^{1*}Corresponding Email: ephrem123@gmail.com

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ABSTRACT

In recent years in Ethiopia, there is an increment of the number of participants in volleyball sport under clubs, projects and recreational programs. However, athletes are highly vulnerable for injuries because of a lack of protective equipment, suitable playing areas, medical facilities, efficient injury surveillance systems and skilled manpower. The aim of this study was to investigate the prevalence and its associated factors of musculoskeletal injuries: in case of South Gondar zone project and club volleyball players, Amhara regional state, Ethiopia, 2021/22. The injury prevalence rate, severity, diagnosis and anatomical location of injuries that occurred during Match and training were recorded retrospectively. A total of 360 volleyball players (195 project players and 165 club players) from South Gondar clubs and projects were participated in the study. In the current study, the overall mean age of the players was 18.54 ± 3.27 years. in terms of team type, the age of project players was 15.42 ± 1.92 years and for club players it was 20.34 ± 2.78 years. During the period of the study the total sample ($n = 360$) reported 62 injuries. In terms of the rate of injuries 45.16 % (28/62) were projects and 54.84 % (34/62) were clubs. 298 players (82.78) did not sustain any injuries. The Adjusted odds ratio (AOR) of club injuries comparison project was 1.548 (95% CI: 0.8931 to 2.6831) $p = 0.1194$, the rate of injuries on clubs seemed more, but there is no significant difference between project and clubs. The overall risk of injuries was higher for match play than for training. The probability of injury during match was 12.78% and training 4.44% with a relative risk of 2.875 (95% CI: 1.6591 to 4.9821) $p = 0.0002$. Significant difference was seen, and players during match was 2.9 times more likely to be injured than training. According to the physician diagnosis, the most common injury parts were ankles and fingers 56.45% (35/62) and 22.58% (14/62) respectively, and followed by injuries in the shoulder 8.06% (5/62), thumb 6.54% (4/62) and knee and Achilles tendon 3.23% (2/62) each. In conclusion, the frequency of injury was high during the study period.

Keywords/phrases: Causes, Injuries, Prevalence, Trainees, Volleyball,

Introduction

Volleyball is one of the big five international sports being played today, relying on 220 affiliated national federation with an estimate of 800 million players who play volleyball at least once a week (Gouttebarga, 2017). Moreover, it is the only ball game which is involved in both modern Olympic and Paralympics sport competitions: six players on each team are used in an indoor version, and a two players per volleyball outdoor game typically played on sand known as beach volleyball (Desalegn et al., 2016).

Due to its worldwide popularity, volleyball is one of the well-known most exhilarating, fast, and dynamic sports on the globe (Desalegn et al., 2016). While being undoubtedly beneficial to physical, mental and social well-being was people muck in this sport. Volleyball, like other sports, is also associated with a risk for musculoskeletal injuries.

Studies investigate in different countries suggest that musculoskeletal injury prevalence in volleyball are repetitive in different weight, height, sex and age group. For instance, Gouttebarga (2017), reported that the incidence of musculoskeletal injuries among Volleyball players range from 1.7 to 10.7 injuries per 1000 playing hours, occurring more often during matches and among male players.

In case of volleyball characteristics the game, which needs repetitive overhead motions, such as spiking and blocking, players are prone to overuse injuries of the shoulder and in other movements (Bere et al., 2015).

According to Desalegn et al. (2016) in recent year Ethiopia, there is an increment of the number of participants in volleyball sport under clubs, projects and recreational purposes. Likewise, athletes are highly vulnerable for injuries because lack of protective equipment, comfortable playground, medical facilities, efficient surveillance systems of injuries, and skilled

man power (coaches so given vulnerability of athletes regarding sport injuries, it is clearly understood that more studies are needed on volleyball players, which may give better control over the occurrence of these injuries. Therefore, our county stakeholder like coach and sport commission experts need to be aware of the risk factor and preventive mechanism associated with the musculoskeletal injuries in order to contributes best follow up and management.

Therefore this study was conducted on the prevalence, type, severity, body location, cause, preventive mechanism of musculoskeletal injury and the injured player court position, of injuries in South Gondar zone male volleyball projects and Woreda clubs.

Materials and Methods

A quantitative research, Retrospective study design was used on cohort volleyball players. The source of the study population was zone of South Gondar, Administrative Cities and Woredas volleyball projects and clubs.

According to the second quarter of 2022 report of South Gondar Zone, there are forty-eight volleyball projects in all age categories and both sexes (i.e. U-13, U-15 and U-17). Moreover, this Zone has 17 volleyball clubs.

Data Collection Instrument, Procedure and Definition

To conduct this study, a structured interviewer-administered questionnaire and exposure forms were prepared by the investigators by reviewing different literatures and was used as a data collection instrument. The questionnaire comprises two parts; part one includes data relating to demographic profile. Part two includes injury profile subsections in which the runners were asked to report each of their injuries. The data that has been collected include whether the injury occurred during training or a competition.

The questionnaire was prepared in English and Amharic or local language since the participants are different in academic status.

For the purpose of this study, an injury was defined as, any incident that occurs during warm up or competition that requires medical attention (Zemper & Piter, 1989) and cause the player to be out from sport participation either in training or match session (McKay et al.,2001). A pre-existing before the tournament and not fully rehabilitated injury was not reported or registered.

Statistical Methods

Descriptive information of the injuries was based on the information gathered through interviewer-administered questionnaire. Incidence tables were used to describe categorical data, while means and SD were used to describe continuous data.

Injury prevalence was calculated as the number of injuries reported per leisure time runners. Adjusted Odds ratio (AOR), relative

risk (RR) with 95% confidence interval and p-value < 0.05 was used to show association between explanatory variables and dependent variable.

Results

Participants

A total of 374 volleyball players were expected to participate in the study. A total 360 (170 club & 204project) players participated and completed the questionnaires, which yielded a response rate of 96.3%.The response rate among the clubs was higher at 97.1% (165/170) compared to 95.6% (195/204) among the project volleyball players. In the current study, as shown in figure 4.1, among the participants, 45.8 % (n=165) were clubs and 54.2 %(n=195) were project volleyball players

Table 1: Socio-Demographic Characteristics of the Participants

Variable	Team of the Participant		
	Club	Project	Total
	Mean ± SD*	Mean ± SD	Mean ± SD
Body mass	67.04±4.53	53.15±6.51	56.42±3.27
Stature (cm)	180.77±4.24	167.15±6.23	169.44±7.8
Age (years)	20.34±2.78	15.42±1.92	18.54±2.81
playing experience (years)	4.38±2.38	1.91±0.77	2.33±1.51
Training hours per week (hours)	10.75±3.32	7.68±1.41	8.73±2.83
Frequency of training per week (Sessions)	4.0±0	3.0±0	3.5±0

*SD-Standard Deviation

The overall mean age of the players was 18.54±3.27 years. In terms of team type, the age of project players was 15.42±1.92 years and club players were 20.34±2.78 years. The mean weight of the players was 56.42±8.27kg and in relation to team type for club players 67.04±4.53kg and 53.15±6.51kg for project counterparts. The mean height of the all players was 169.44±7.8cm and 167.15±6.23cm for project players and 180.77±4.24cm for club players, in

that order.

The mean and standard deviation of playing experience and training hours for project players was 1.91±0.77years and 7.68±1.41 hours respectively, for club players 4.38±2.38 and 10.75±3.32hours correspondingly. Regarding frequency of training per week for project players was 3.0±0 sessions and for club players it was 4.0±0 sessions.

Prevalence of Injuries in the Season

A total of 62 injuries occurred during the period of October 2021 to February, 2022, giving an injury prevalence of 0.17 per player. In the current study 17.22 % (62/360), volleyball players sustained an injury during the season on both competition and match. Of those who sustained injuries, 45.16 % (28/62) were projects and 54.84 % (34/62) were clubs.298 players (82.78) did not sustain any injuries.

The odd ratio (AOR) of club injuries comparison project was 1.548(95%CI: 0.893 to 2.683) $p=0.119 > 0.05$, the rate of injuries on clubs seemed more, but there is no significant difference between project and clubs.

On the other hand, the probability of clubs for injury was 20.6 % (34/165), for projects 14.36 % (28/195) with a relative risk (RR) of 1.435, (95%CI, 0.910 to 2.262) $p = 0.12 > 0.05$, no significant difference observed. But, club players are 1.4 times more likely to be injured than project players.

Injury Occurrences in Relation to Team Type

Based on the total reported injuries (n=62), the occurrence of injuries on the players, 46 (74.19%) were during match and, 16 (25.81%) of the injuries were occur during team training. The odd ratio of injuries during match within 18 weeks versus injuries during team training was 3.1497 (95%CI, 1.748 to 5.677) $p = 0.0001 < 0.05$. The overall risk of injuries was higher for match play than for training. The probability of injury during match was 12.78% and training 4.44% with a relative risk of 2.875 (95%CI: 1.659 to 4.982) $p = 0.0002 < 0.05$.Significant difference was seen, and players during match was 2.9 times more likely to be injured than training.

Table 2: The Rate of Injuries in Terms of Body Part

Body Part	Injury Exposure	
	Frequency	Percentage
Knee	2	3.23
Ankle	35	56.45
Thumb	4	6.54
Achilles Tendon	2	3.23
Finger	14	22.58
Shoulder	5	8.06
Total	62	100

Based on the overall number of injuries, the following body parts were the most common sites of injury: fingers and ankles, with rates of 56.45% (35/62) and 22.58% (14/62) respectively; shoulder, thumb, and knee and Achilles tendon, with rates of 8.06% (5/62), 6.54% (4/62), and 3.23% (2/62) in that order.

The Injured Anatomical Site

In the current study, the majority of injured players sustained injuries were in the lower extremities 62.9%(39/62), followed by upper limbs 37.1%(23/62).The adjusted odds ratio (AOR) of injuries in the lower extremities in the season versus upper extremities was 2.88 (95%CI, 1.387 to 5.9588) $p = 0.0045 < 0.05$, significant difference was observed, the rate of injuries in the lower extremity are more than upper extremity, due to this significant difference was observed between them.

Table 3: Rate and Diagnose of Injury Related to Team Type

Type of Injuries Diagnosed	Club	%	Project	%	Total	%
Bursitis	1	1.61	0	0	1	1.61
Muscle Cramp	3	4.84	0	0	3	4.84
Tendonitis	0	0	2	3.22	2	3.22
Sprain	1	1.61	0	0	1	1.61
Strain	13	20.97	16	25.81	29	46.78
Total	34	55.84	28	45.16	62	100

According to the above data, 46.78% (n=29) of the injuries were strains, which were followed by dislocations of the ankle, finger, and knee. Tendonitis and muscular cramps accounted for 3.22% (n=2) and 4.84 percent (n=26) of the injuries, respectively. The rates of sprains and bursitis were 1.61% (n=1) each.

Club players were more exposed to dislocation (n = 16, 47.06%) and projects (n = 10, 35.71%) by strain, but projects were more exposed (n = 16, 57.14) and clubs (n = 13, 38.23%) compared to the rate and type of injuries.

The Type of Injuries Diagnosed in Terms of Body Part

In terms of the kind of injuries to the body parts, the most common injuries were strain and dislocation (46.8% and 41.9%), respectively, followed by tendinitis and muscular cramps (4.8% and 3.2%), in that order. Ankle dislocation and strain were high in relation to body type (33.9% and 22.6%, respectively). Fingers were more likely than ankles to sustain the same kind of damage (3.2% and 19.3%, respectively). Knees (3.2%) were another area where these issues were noted for each. Similarly, 3.2% of injuries involved tendinitis in the Achilles tendon and the same percentage had hamstring cramps.

Injury Related to situation of Playing

In the current study, blocking resulted in injuries for 52.94 % (18/34) of the injured club and 50% (14/28) of the project players. Setting increased the risk of injury for 39.29% (11/28) of injured project players and 20.59% (7/34) of club players. Moreover, 7.14% (2/28) and 17.65% (6/34) of the club players sustained injuries during spiking. The remaining 8.82% (3/34) club and 3.57% (1/28) project players sustained injuries as a result of sprawling and serve receiving.

The probability of front line players to be injured during setting, blocking and spiking was 93.5% and the probability of injuries on other court position is 6.5%, with a relative risk (RR) of 5.0 (95%CI, 1.7436 to 14.3379) $p=0.0027$, showed that volleyball players in the attacking zone position were significantly more likely to be injured than the back court players. Players in the left and right front row were significantly more prone to be injured during blocking ($p=0.006$).

Table 4: Factors of Injury In terms Team Type

Injury Factor	Team Type					
	Club			Project		
	Freq	%		Freq	%	Total
Step on other's foot	14	22.58		8	12.9	22
Ball Contact	7	11.29		5	8.06	12
Wrong Technique	13	20.97		15	24.19	28
Total	34	54.84		28	45.15	62
Freq: Frequency; %: Percentage						

Table 4, demonstrates that over half of the injuries on project (53.57%/15/28) and 38.24%(13/34) on club players were due to incorrect technique execution; steps on another person's foot caused injuries to 41.17% (14/34) of club and 28.57% (8/28) of project players; ball contact exposed the remaining 20.59% (7/34) of clubs and 17.86% (5/28) of projects.

Injury Classification

From the total injuries sustained in the season (n=62), 91.93 % (57/62) were acute.

Of these, 50 % (31/62) were on clubs and 41.93 % (26/62) were on project players. On the other hand, 8.07 % (5/62) injuries were overuse, 4.84 % (3/62) on club and 3.23 % (2/62) on projects. The odds ratio (AOR) of clubs acute injuries versus projects is 1.3846 (95CI, 0.6816 to 2.8127) p=0.3681, no significance difference observed.

The probability of clubs for acute injuries was 18.79 % for projects 14.36% with a relative risk of 1.4091(95%CI, 0.8735 to 2.2731) p=0.1599, even if the prevalence of acute injuries on clubs seemed more but significance difference was not seen between the two teams.

Injuries in Terms of Players Court Position

In the current study 62 injuries were registered during volleyball practice and competition period in the season. Of these, 47.06% (n=16) of the club and 35.71% (n=10) of the project injured players were front row players on the left and right; 26.47 (9/34) of the club and 25% (7/28) of the project injured players were center players; 17.65% (6/34) of the club and 32.14% (9/28) of the project players were setters; the remaining 8.82% (3/34) of the club and 7.14% (2/28) of the project injured players were in the back line or row of the playing court.

Discussion

Age, height, weight, playing experience, and weekly training hours were all lower in the current study than in a related study by Beneka et al. (2007). The participants' age, weight, and height were higher than those in the current study in another study on the national and local divisions of Greece (Zetou et al., 2006). In addition, Tsigganos et al. (2007) discovered higher mean height, weight, and age than the current investigation.

In this study, there were 17.22% of the volleyball players' sustained injuries during the season. This result was more than that of a prior study conducted by Schafle et al. (1990) and almost identical to the conclusion of Augustsson et al. (2006), which showed that only 17.22% of the players had injuries.

Over the course of the season, 17.22 injuries occurred. In contrast to the higher study by Schafle (1990) that found a prevalence of 10% and the earlier study by Bahr & Reeser (2003) that found a prevalence of 43%, the injury prevalence in the current investigation was lower.

Ankle and finger injuries were more common among the injured players in this study, which is consistent with research by Beneka et al. (2009), Augustsson et al. (2005), Verhagen et al. (2004), and Bahr (1997).

The majority of injuries sustained during training and games were minor ones. This is in good agreement with the results of the Aagaard and Jorgenson (1996) study, which indicated that the majority of major/severe injuries happen during a game.

The significance of the games and, consequently, the players' increased intensity and overexertion are blamed for the overuse injuries that occur during games (Agele et al., 2007; Augustsson et al., 2006). Verhagen et al. (2004) linked the longer exposure times to an increased risk of injury during training.

In this study, the rates of injuries that occurred during matches were higher than those during training sessions (74.19%). While the study by Bahr & Bahr (1997) indicated a rise in injuries during matches, the study by Augustsson et al. (2006) showed a high injury prevalence during training.

Most injuries related to training and game periods happened to the ankle, which was consistent with Augustsson et al.'s (2006) findings. This is corroborated by additional research showing that the most frequent acute injury sustained in volleyball is an ankle sprain (Reeser et al., 2006; Augustsson et al., 2005; Verhagen et al., 2004; Nelson et al., 2007).

According to this study, 8.1% of players experienced injuries that developed gradually and for which they were unable

to provide a time frame during a practice, a game, or a warm-up. This is less than the study by Augustsson et al. (2006) found that 41% of injuries happened gradually.

This has a good correlation with other research. Augustsson et al. (2006) found that a number of studies revealed a progressive rise in injuries, which they attribute to an increase in training hours. The amount of training hours in this study was less than in the Augustsson et al. (2006) study.

Most of the injuries that happened in this study weren't brought on by players colliding with one another. This is comparable to a study by Briner & Kamcar (1997), which discovered that the majority of volleyball injuries were linked to no touch with other players.

Agel et al. (2007) state that contact is the primary cause of most ankle injuries. In this study, 45.16 percent of ankle injuries resulted from steps on another person's foot in the conflict zone or centerline (28/62).

CONCLUSION

The overall injuries prevalence among the South Gondar project and club volleyball players is high as 17.22% of the players were injured. The injury prevalence and the risk to be injured are higher among the clubs players.

Ankle and finger injuries are the most common type of injuries. Most of ankle injuries occur due to contact with the other players at the center line during blocking and spiking. The shoulder injuries, which occur due to overuse, are relatively low. Players in left and right front row are more prone to be injured during blocking in the conflict zone.

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