



Investigation of jeopardy aspects of injuries among volleyball male and female players

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Abstract

The aim of this study is to investigate the injuries among volleyball male and female players. The study was conducted on 61 female and 60 male volleyball players that were participating in the Inter college volleyball championship finals in 2016 in Chitwan. These players completed a questionnaire which included information on personal characteristics, on prophylaxis and on characteristics of injuries. The majority of injuries were very serious. The most common types of injuries were sprains and muscle strains for male in lower limbs (knee, ankle) and sprains in upper limbs (shoulder, elbow) for female. Contact injuries were more common than noncontact injuries for both players. The chi-square test found that there is statistical significant difference among the gender and the place where an injury occurred ($p=0.045$). Kendall's tau-b test found that there is statistical significant correlation among the variable use of technical training and incidence of injuries in men ($p=0.046$). Conclusively in this sport although the incidence is small, the severity, in many cases is very serious. Sometimes there is a difference in risk aspects among players.

Keywords: jeopardy, volleyball, sports, incidence rate

1. Introduction

Volleyball is the oldest member of the Handball family. It had, very fast, developed its own unique identity, as a sport. In the winter of 1895, in Holyoke, Massachusetts (United States), William G. Morgan, a YMCA physical education director, created a new game called *Mintonette*, a name derived from the game of badminton, as a pastime to be played (preferably) indoors and by any number of players. The game took some of its characteristics from other sports such as tennis and handball. Another indoor sport, basketball, was catching on in the area, having been invented just ten miles (sixteen kilometers) away in the city of Springfield, Massachusetts, only four years before. *Mintonette* was designed to be an indoor sport, less rough than basketball, for older members of the YMCA, while still requiring a bit of athletic effort.

As Inklaar (1994) [5], reported, causes and versions of injuries in every sport can be different among different subgroups of athletes. In the future, in order to reduce the rate of injuries in every sport it's useful to determine athletes in high jeopardy, and to develop necessary preventive measures and means in the future. This study aims to investigate the injuries among players in volleyball. More specifically to record the frequency and the seriousness of injuries and also to correlate them with the jeopardy aspects of this sport.

2. Materials and Methods

2.1 Participants

This study was conducted on 121 volleyball players (61 females and 60 males), that were participating in the Inter College Volleyball Championship Finals, that took place in Narayangarh, Chitwan, Nepal on the 20th to the 22nd of May 2016. All the participants received complete information about this study from the Organizing Committee at the technical meeting.

2.2 Measurements and Procedures

A questionnaire that included information on personal and demographic characteristics of each player. More specifically namely, sex, age, weight, height, athletic background, education level, profession, accommodation during tournament etc. In the questionnaire was also included various useful information such as previous injuries that the players have suffered in the last 2 years and additionally if there are any precaution equipment or specific training as a part of everyday practice. According to Hatzimanouil, Oxizoglou, Kanioglou, Manavis, &Stefas (2008) [2], as injury is defined "an accident sustained during practice or competition, which led to a medical problem and prevented participation for at least one day beyond the day of occurrence". Mechanisms and types of injuries and also severity, frequency and localization, in practice or in a game, were mentioned in the questionnaire as well. Every player completed its own questionnaire, voluntary, in the presence of the researchers, who were ready to answer any question that the athletes might have had about the research, at the venue of the games. In total, from the 200 players that participated in the tournament, 121 have completed the questionnaire that makes 60.5% of the players.

2.3 Statistics

The statistical analysis of the data was made with the SPSS 21 (IBM, USA) and included the calculation of the mean and the frequency of each variable. Also the chi-square test was used to investigate the relation among the incidence and the severity of an injury with any other variable and the Kendal's tau-b test was used to investigate the relationship among two ordinal variables. Level of significance was determined at 0.05.

3. Results

Table 1 shows the personal data of the participants in the

study, regarding age, height, weight, body mass index (BMI), and years of training in respectively. In terms of education 36.7% men had attended +2 education, 43.3% bachelor education and 20% Master's Degree studies. The largest percentage (50%) was studied in the private sector, while the lowest percentage was studied in the public sector (6.7%). Moreover, a percentage of 6.7% was studied. It was remarkable that 16.7% said they were trying to be a professional player. The highest percentage of 95% of male athletes stayed during this tournament, in hotels in the area. The mean of the months that practiced team were 8.08 ± 2.66 and 4.78 ± 4 months respectively. The mean of weekly training sessions in team were 4.2 ± 2.06 and 2.62 ± 1.24 trainings respectively. A 70% of male athletes stated that they are participating in this tournament as key players with their teams. Most (75%) said they were following a physical condition program during preparation for volleyball. Almost all said that during exercise they use stretching exercises (90%). Most of them, 71.7%, said that these stretching exercises used them during warm-up.

Table 1: Personal data of study population.

Parameter	Male (n=60)	Female(n=61)
Age (yrs)	26.65 ± 5.65	26.31 ± 5.43
Body Height (m)	1.87 ± 0.07	1.70 ± 0.05
Body Mass (kg)	86.18 ± 12.12	65.60 ± 5.17
BMI ($\text{kg}\cdot\text{m}^{-2}$)	24.44 ± 2.92	22.49 ± 1.85
Playing Experience Beach Handball(yrs)	7.52 ± 4.80	6.31 ± 3.16
Playing Experience Team Handball (yrs)	14.4 ± 5.60	16.13 ± 5.74

For education, 44.7% of female had completed +2 education, 43.8% bachelor education and 11.5% Master's Degree studies. The largest percentage (39.3%) was studied in the private sector, while the lowest percentage was studied as professional volleyball players (8.2%). Additionally, 6.6% were studied. The largest percentage of female athletes 78.7% stayed during this particular tournament in hotels in the area.

The mean of the months that practiced team volleyball were 9.47 ± 1.52 and 4.05 ± 1.59 months respectively. The mean of weekly training sessions in team's volleyball were 3.64 ± 1.51 and 2.94 ± 1.22 trainings respectively. An 86.7% of female players said they are participating in this tournament as key players with their teams. Most (85%) said they were following a physical condition program during preparation for volleyball. Nearly all said that during exercise they use stretching exercises (93.4%). The majority (82%) stated that the stretching exercises were used during warm-up.

Table 2 includes information for both genders on the prophylactic use of equipment, and technique exercises, the injury incidence rate, and treatment. In total 17 of the 60 men athletes reported a total of 23 injuries and 15 of the 61 of female athletes reported a total of 20 injuries during the last 24 months. The injury incidence rate for male volleyball athletes in my results was 8.04 / 1000 hours during games, and 3.06 / 1000 hours of training. The injury rate for female athletes was 7.9 / 1000 hours during games, and 2.75 / 1000 hours of training. Injuries occurred more frequent during trainings for male (62.5% of total injuries) while for female athlete's injuries occurred more frequent during games (73.3% of total injuries). The most common type of injury was sprains and

muscle strains for male and sprains for female players (Table 3). In male players the majority of injuries affected the lower limbs whereas in female players the majority of injuries affected the upper limbs (Table 4). More specifically, in male players the knee and the ankle were the body parts more commonly injured whereas the shoulder and the elbow were the regions more commonly affected by injuries in female players. Contact injuries were more common than non-contact injuries for both genders (Table 5a). In particular, contact with the opponent player was the most common mechanism of injury (Table 5b). Statistical analysis from the chi-square test found that there is statistical significance difference among the gender and the place where an injury occurred ($p=.045$). More specifically male players presented more injuries during trainings while female players presented more injuries during games. Statistical analysis of injuries found no statistical significance difference among the incidence of injuries and all the variables for the male players. Similarly, there wasn't any statistical significance difference among the severity of injuries and all the variables for male athletes whereas from Kendall's tau-b test was found that there is statistical significant correlation among the variable use of technical training and the incidence of injuries in male players ($p=.046$). In female beach handball players, there was also no statistical significance difference found among the incidence of injuries or the injury severity and all the variables.

4. Discussion

From my results it seems that at the same player training age has a significant difference. More specifically players have a bigger volleyball background. This happens because volleyball is an old sport in comparison with indoor ball games.

Demographic data shows that most players are educated, in private sector (44.65%) and only a small percentage plays professionally handball (12.45%). Most of the players (86.85%) stayed in hotels during tournament.

Most of the players (80%) participated in physical preparation of their teams before entering the tournament.

91.7% of the participants use stretching exercises during training in beach handball. More specifically a percentage of 76.85% use these exercises during warm up.

From the results of my study it is found that male beach handball players use prophylactic equipment more often (50%) in comparison to indoor handball players (38.9%) which was found by Hatzimanouil *et al.* (2008) [2]. At the same time female volleyball players (33.3%) use prophylactic equipment less frequently. The lack of prophylactic equipment in female indoor volleyball players it is shown that lead to an increase in injuries (Rasuli, Jafari, Moghaddam & Shotorbani, 2012) [10]. Prophylactic equipment is a preventive mean from injuries but in my study although male players use them more often and female less often, was not found any relation with incidence and severity of injuries.

From my results using Kendall's tau-b test was found that there is a statistical significant correlation among the two variables, the use of technical exercises during training sessions and the incidence of injuries in male players ($p=.046$). Henke, Luig & Schulz (2014) [4], reported that lack of technical training can lead to an increased possibility for

chronic and acute injuries in volleyball.

Moreover my results revealed that there was a decrease of the percentage of total injuries for both genders in comparison to the results of ICVC (2014) which showed 68% in male and 62.5% in female players. Similarly, in my study there was a decrease in injury incidence rate during games for male and female respectively (8.04/1000 hours and 7.9/1000 hours) in regard to ICVC (2014).

It is remarkable that in injury incidence rate during trainings for male there was an increase while in female there was a decrease in comparison with the results of ICVC in 2014 (3.06/1000 hours for male to 1.8/1000 hours and 2.75/1000 hours for female to 4/1000 hours) (Hatzimanouil *et al.*, 2017) [1]. One possible reason for the above increase in men is competitiveness in trainings due to the constant enhancement of the level of the players involved.

Furthermore, Myklebust, Skjolberg & Bahr (2013) [7] and Moller, Attermann, Myklebust & Wedderkopp (2012) [6], stated that recurring injuries appear to be more frequent when there were previous injuries particularly to lower extremities. In my study I found high percentage in injury recurrence (58.8% for male and 40% for female). These findings are more increased in regard to ICVC (2014), in which tournament had been found a percentage of 13.2% for male and 13.6% for female players. One possible cause is the constant increase of intension in trainings and games because of the up growth of the game in general.

From my results it is showed that most of the players in both genders were more prone to one injury during the last 24 months. Thus few players in both genders reported more than one injury during the last 2 years. This news are good if we take into consideration that in ICVC 2014 the percentage of the players who had more than one injury was bigger (Hatzimanouil *et al.*, 2017) [1].

Another remarkable result of my study was that there is statistical significance difference among the gender and the place where an injury occurred (p=.045). It seems that male players presented more injuries during trainings while female players presented more injuries during games (Table 2). One possible reason is that trainings in male players have more intensity than trainings in female players.

As it regards the treatment it seems that most players of both genders followed conservative treatment. Consequently, few injuries in both genders need surgical medical care.

Sprains and muscle strains are the most common type of injuries in men while in female players sprains are the injury with the biggest percentage (Table 3). It is remarkable that none of women reported muscle strain, fracture and meniscus injury as a type of an injury that had sustained during the last 24 months. Olsen, Myklebust, Engebretsen, Holme & Bahr (2003) [8] and Olsen, Myklebust, Engebretsen & Bahr (2004) [9], reported that muscle strains are the most common injury in volleyball. Another interesting finding of my study was that except sprains, 35.7% of female players reported subluxation / dislocation as a type of injury. Although Henke *et al.* (2014) [4] and Moller *et al.* (2012) [6], claimed that lower limbs are the most common site of injury in volleyball, my results revealed that in this specific tournament, in contrast with men, female athletes reported that upper limbs (60%) were the most common site of injury. Men players reported that knee and

ankle were the body parts more commonly injured while female players claimed that shoulder and elbow were the body parts frequently affected from an injury (Table 4).

Hatzimanouil *et al.* (2017) [1], reported that injuries most commonly occur in contact situations. My results are similar with the above authors as we can see that for both genders (66.6% for men and 66.7% for women) contact situations was the main mechanism of an injury (Table 5a). Henke *et al.* (2014) [4], reported that contact situation is the main mechanism of an injury also in volleyball. In my study collision with an opponent was the most frequent mechanism of injury for men and women although female players presented a bigger percentage (60%) (Table 5b).

The time of absence from training determined the severity of injuries in my study. From the results showed that in male athletes the severity was very serious and moderate while in female athletes was small and very serious. These results present the severity of injury for a big percentage of both genders very serious (Table 6). Also we must take into consideration as we mentioned before first that most of the times most of the players in both genders were more prone to one injury during the last 24 months and second that most of the times the treatment was conservative. From this finding we can say that although a lot of players reported one injury, this injury a lot of times was very serious and although it was very serious most of the times the treatment was conservative. In my study the sample although 60.5% (121 players) answered the questionnaire it must be taken under consideration that the sample was small. Furthermore, the study was based on a self-reported anonymous questionnaire and we must consider about the reliability of the survey.

In the literature a lot of times I can find contradictory results about sports injuries and that is because of using tools with low reliability (Salman, 2014) [11]. Moreover, my sample was college volleyball athletes thus some of the results might not refer to professional players. Consequently, the above considerations should be taken into account while Investigate the results of my study and specifically in this tournament.

Table 2: Gender differences in relation to prophylaxis and characteristics of injuries

Parameter	Male (%)	Female (%)	p-value
Use of protective equipment	50.0	33.3	0.06
Technical training	90.0	95.0	0.29
Incidence of injuries	28.3	24.6	0.12
Past injuries*	58.8	40.0	0.28
More than one injury	10.0	4.90	0.28
Injury during game	37.5	73.3	0.05
Treatment (conservative)	76.0	92.9	0.21

* > 24 months on the same site as the one reported on this survey

Table 3: Gender differences in relation to the type of injuries.

Parameter	Male (%)	Female (%)	p-value
Sprain	26.7	42.9	0.35
Muscle contusion	6.7	21.4	0.24
Muscle Strain	26.7	0.0	0.03
Fracture	13.3	0.0	0.15
Subluxation/ Dislocation	13.3	35.7	0.15
Meniscus injury	13.3	0.0	0.15

Table 4: Site of injury.

Body part injured	Male (%)	Female (%)
Upper limb	20.0	60.0
Shoulder	7.14	10.71
Elbow	0.0	3.57
Torso	20.0	13.3
Head	7.14	0.0
Back	0.0	7.14
Lower limb	60.0	26.7
Knee	19.04	0.0
Ankle	2.38	16.67
Sole	0.0	4.75
Toe	0.0	14.28

Table 5a: Rate of contact and non-contact injuries. Gender Differences

Mechanism of injury	Male (%)	Female (%)	p-value
Contact	66.6	66.7	0.34
Non-contact	33.4	33.3	0.34

Table 5b: Injuries based on mechanism of injury. Gender differences

Mechanism of injury	Male (%)	Female (%)	p-value
Collision with opponent	43.8	60.0	0.36
Collision with teammate	6.3	6.7	0.96
Collision with object	0.0	6.7	0.29
With the ball	6.3	20.0	0.25
Alone without ball	6.3	0.0	0.32
Other	37.5	6.7	0.04

Table 6: Severity of injury. Gender differences

Absence from training (weeks)	Male (%)	Female (%)	p-value
Small (0-1)	6.7	46.7	0.01
Moderate (1-2)	33.3	13.3	0.19
Serious (2-4)	13.3	6.7	0.54
Very serious (>4)	46.7	33.3	0.45

5. Conclusion

Generally, in this sport although the incidence is small, the severity, in many cases is very serious. Jeopardy aspects in volleyball are similar to other ball games while in some cases there is a difference in genders (among male and female players). More studies must provide more results, information and data about volleyball and its jeopardy aspects for injuries to help volleyball players to prevent their injuries.

6. References

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