

Identification of the types, causes, and mechanisms of widespread injuries in handball players according to their positions

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Abstract

This research attempts to identify the types, causes, and mechanisms of injuries in semiprofessional handball players 17-20 years old according to their positions. We have had 103 samples of boy and girl players. The personal and reported injuries data have been gathered by questionnaire. Descriptive and inferential statistics by one sample chi square have been applied between the types, causes, and mechanisms of the injuries in different positions. In the different positions, the joint and muscular injuries have been the most frequent. The most frequent causes of the injuries are continuous overpressure, strikes or sudden pressure, wrong performance of tactics, in order of importance. The most frequent mechanisms of injuries in different positions of girls and boys are direct hits, overuse of one organ, body contact with other player, turning motion, throwing motion and falling. The results of this research indicated that the most types of injuries in goalkeeper position is bone injuries and in center, right wing, and left back positions, joint injuries are the most frequent. In line, left wing, and right back positions, the muscular injuries are the most frequent in the players. The causes of the injuries in goalkeeper position is continuous pressure and in other positions strikes, hits or sudden pressure. The mechanism of the injuries in goalkeeper, and right back and wing positions is direct hits as well as in line and center positions, the mechanism is overuse of one organ. The mechanism is also strike in left back and turning and falling in left wing.

Keywords: handball, game position, sport injuries, 17-20 girl and boy players.

1. Introduction

Handball is a sport of high body contact with very dynamic fast performance. It requires speed and alacrity as well as neural and muscular coordination as a key factor in dominance (1). Due to the performance of the sport, particularly in attack and defense, it is considered as a harsh sport. As the players are not familiar with the accurate performance of the skills and not physically prepared, they may experience serious damages. Injuries in the sport due to high frequencies of

physical body contacts, the hints of ball to the players and the falling of the players on the ground can all threaten the health of the handball players (2). In a study by Radfar (2000), he investigated the widespread sport injuries and their main causes in different positions of handball. He argued that the injuries in upper body members have most injuries so that the positions of back have 45% and wings 43% and the positions of line, goalkeeper, and center have 46%, 38, and 36% of injuries, respectively. It was also found in the study that the muscular injuries were the most widespread in all the positions following the joint and bone injuries (2). Piry et al. (2011) in their study about the injuries to Asian professional handball players indicated that the most injuries were in the left and right back positions (41%). They also found that about 35% of the injuries were by body contact and 65% by not body contact as well as 28% of the injuries was caused by jumping and 22% by plant-and-cut (12). The researches of Olsen et al. (2006) about the injury pattern in young handball team in a comparison of the two prospective registration methods represented that the most of the injuries were occurred in the back and wing positions in attack, plant-and-cut, landing or turning movement. They also indicated that half of the injuries were caused in contact with the opponent. The results of the study also suggested that the injuries in young team are more than that in professional teams (13). Myklebust et al. (1998) in their investigation about the mechanism of ACL injury in knee on the handball players found that the most important mechanism of injury is fast plant-and-cut (14).

Olsen et al. (2006) believed that two mechanisms were very important in tearing of ACL. The first and most important is the plant-and-cut with opened knees in internal and external turning. The second mechanism is often occur in shoot descend of one leg when the quite open knees are with external turning of the knee (15).

Kazemian (2003) in the investigation about the types, frequency rates, and causes of knee joint injuries in elite female players of badminton, handball, and taekwondo reported that the most frequency of injuries in handball is occurred in shooting with movement and the least in fixed dribbling, passing, and shooting (3).

This research attempts to answer the question that what are the widespread types, causes, and mechanisms of injuries in semi-professional male and female handball players from 17 to 20 years old according to their positions in Tehran Province. It is expected that the results provide knowledge about the injury-making performance in the field to prevent the injuries. The results can present influential suggestions to the coaches and sportsmen to reform the injurious techniques and consider the scientific principles of exercises.

2. Methodology

This research is a descriptive semi-experimental study by the post hoc method. The population of the research is all the male and female handball players ranged from 17 to 20 years old in Tehran Province. These players have been at least one year exercising in the handball clubs. The

samples have been randomly selected from the available players. The questionnaires have been filled by up to 103 players. The questionnaire tool has two different parts of personal information and information of injuries. In the first part, some variables have been measured about height, weight, age, and duration of activity and experience in the field of sport. The second part measures the injury area of body, injury type, injury mechanism, injury causes, and the signs of injuries. The questionnaire has been designed by the author based on the Australian injury questionnaire. The validity of the tool has been confirmed by pathology professionals and its reliability is 83% by Cronbach Alfa. We have used descriptive statistics to make a conclusion of the findings. We have initially applied Kolmogorov-Smirnov test for normality of distribution. In descriptive statistics, we used frequency tables, mean, standard deviation, and also one sample chi-square to determine differences in significance of the types, causes, and mechanisms of injuries in two groups of males and females in different positions.

3. Results

In positions of goalkeeper, line, center, and right back, the players experienced greatly joint injuries, in positions of back and left wing they experienced mainly muscular injuries. In positions of right wing, most male samples have joint and muscular injuries. The most percentage of injuries in girls in position of goalkeeper is related to bone injuries, in positions of line, center, left and right back is related to muscular injuries, and in right wing related to joint injuries.

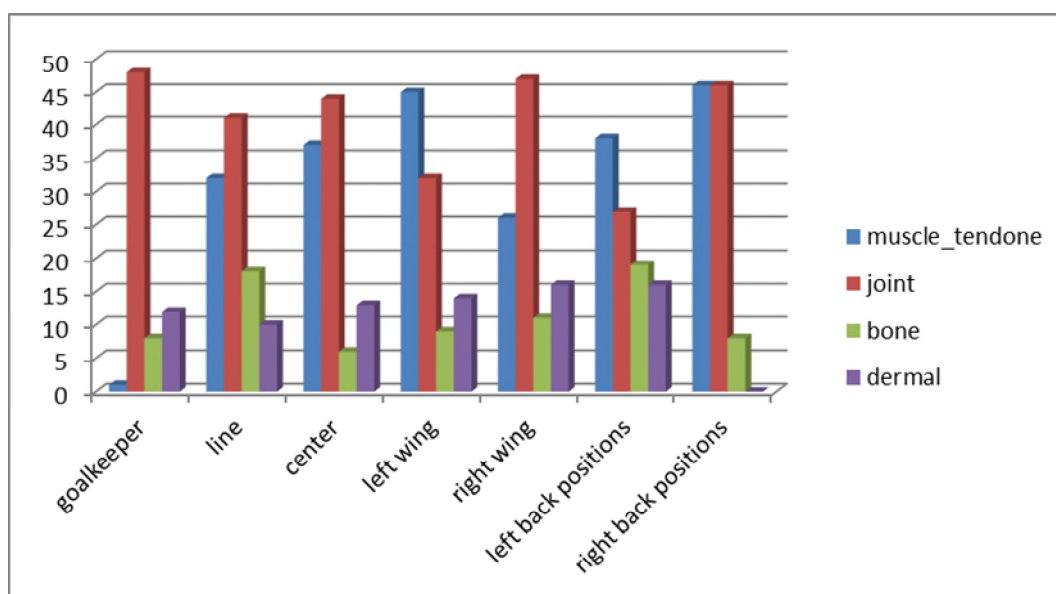


Figure 1: types of injuries in males

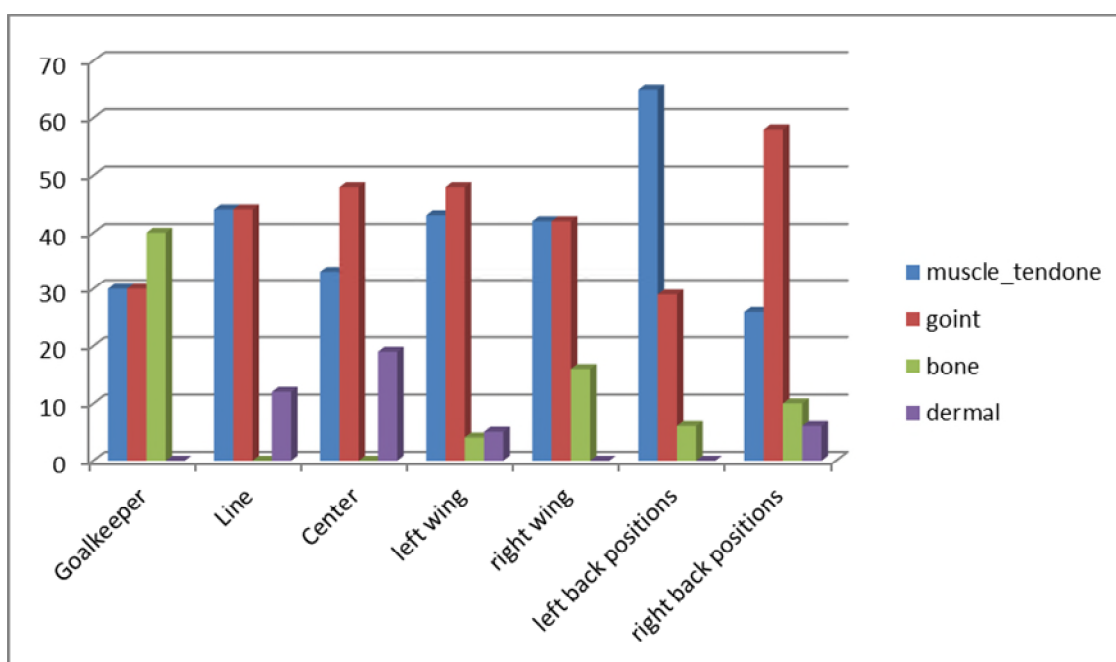


Figure 2: types of injuries in females

The most important causes of the injuries in this research were strikes or sudden pressure, continuous pressure, improper equipment, not warm up, low body preparation, fatigue, and wrong performance of tactics. The most important percentage of causes of injuries for the boys in goalkeeper position were strikes or sudden pressure (62.5%), then continuous overpressure, not warm up, low body preparation, and fatigue (12.5%). The causes in girls were continuous overpressure (28.75) as the most widespread.

The most frequent causes of injuries in line position in male players were sudden pressure, low body preparation, and wrong performance of tactics with frequency of 25%. These injuries in female players were strikes or sudden pressure and wrong performance of tactics with frequency of 33.33%.

The most frequent injuries in the boys in center position were continuous overpressure (42.86%), strikes or sudden pressure and wrong performance of tactics (28.57%) as the most widespread injuries. In the girls these injuries were mainly caused by continuous overpressure (37.5%) and wrong performance of tactics (25%).

In position of left back in boys, the main injuries were caused by strikes or sudden pressure, improper equipment, not warm up (22.22%) and in girls by strikes or sudden pressure, continuous overpressure with 50% and 25%, respectively.

In position of right back, the causes were strikes or sudden pressure (33.33%), improper equipment, not warm up (22.22%). The main causes for the boys were strikes or sudden pressure (42.85%), continuous overpressure and wrong performance of tactics (14.28%).

In left wing position, the main causes for boys were strikes or sudden pressure (80%), continuous overpressure (20%). For girls the main causes in this position were strikes or sudden pressure (42.85%), wrong performance of tactics (28.58%).

In right wing position, the main causes for boys were strikes or sudden pressure (37.5%), wrong performance of tactics (25%). The main causes for girls in this position were strikes or sudden pressure (37%), continuous overpressure and low body preparation (20%).

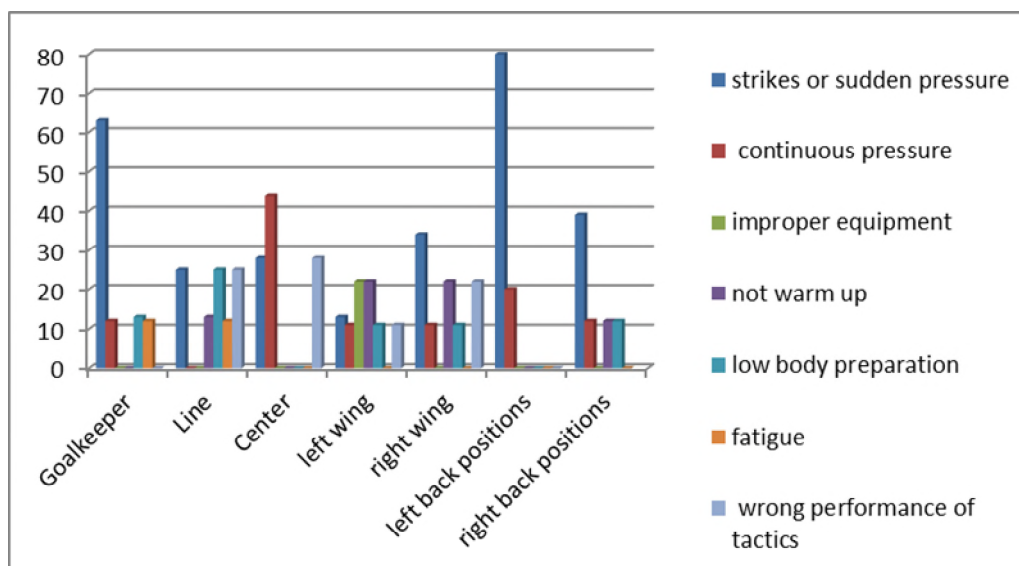


Figure 3: the causes of injuries in male players in different positions

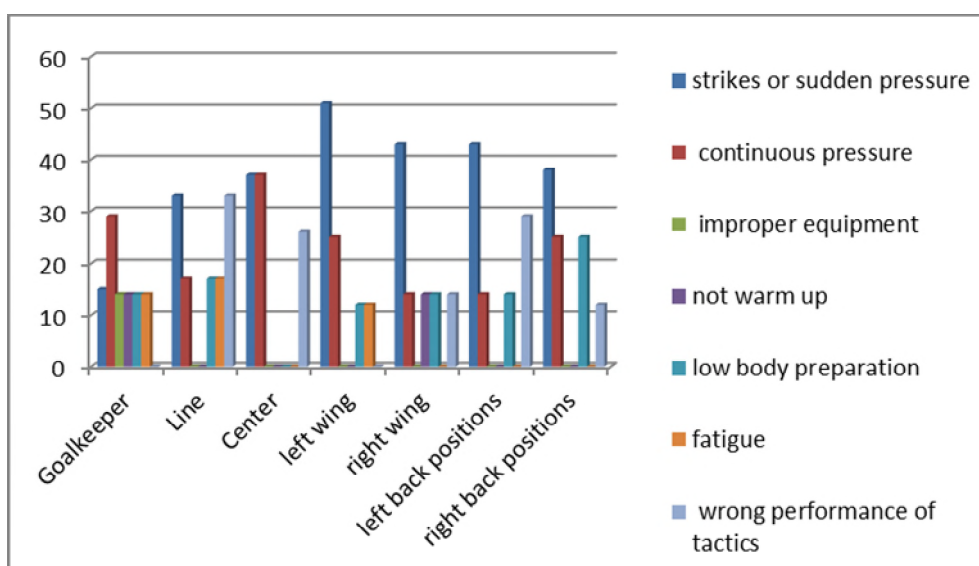


Figure 4: the causes of injuries in female players in different positions

The main mechanism of the injuries were overuse of one organ, throwing motion, turning motion, direct strike, body contact with other players, jumping, and falling.

The results of mechanisms of injuries in goalkeeper position in boys were direct strike (50%), overuse of one organ, throwing motion (25%) and in girls overuse of one organ, throwing motion and jumping (28.57%). In line position the main mechanisms of injuries in boys were overuse of one organ, turning motion, direct strike (25%), and then throwing motion and jumping (12.5%) and in the girls turning motion (50%) and then throwing motion and body contact with other players, jumping (16.66%).

In center position, the main mechanisms were overuse of one organ, body contact with other players, and jumping (28.57%) and falling (14.28%) in boys and overuse of one organ and throwing motion (25%) and then sudden stop in motion, direct strike and jumping (12.5%) in girls.

In left back position, the main mechanisms are falling (33.33%), body contact with other players (22.22%), overuse of one organ, turning motion, direct strike, and jumping (11.11%) in boys and jumping (37.5%), falling and running (25%), and throwing motion (12.5%).

In the right back position, the main mechanisms are direct strike (42.85%), falling (28.57%), jumping and body contact with other players (14.28%) in boys and turning motion and falling (33.33%), and the motion of a member to reach target point (16.66%) in girls.

In the left wing position, turning motion and falling (33.33%) and overuse of one organ and direct strike (16.66%) were also the main mechanisms of injuries in boys and the stretching

motion (28.58%), overuse of one organ, sudden stop in motion, throwing motion, falling and body contact with other players (14.28%) in girls.

In right wing position, throwing motion and direct strike (37.5%), turning motion and jumping (12.5%) were the main mechanism in boys and the throwing motion, direct strike and falling (25%), overuse of one organ and body contact with other players(12.5%) in girls.

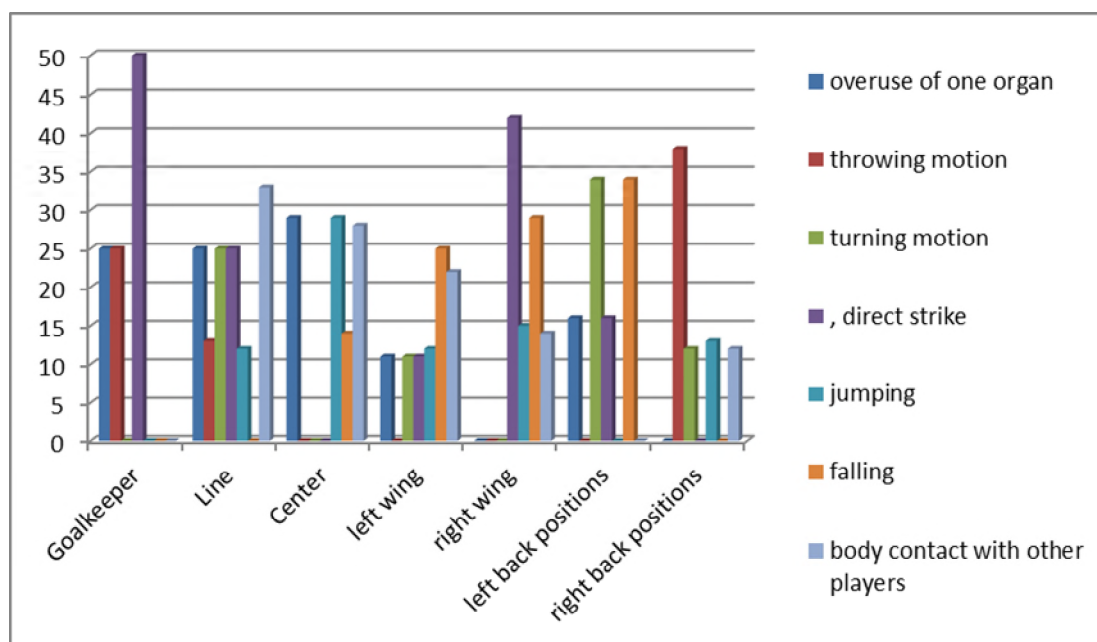


Figure 5: the mechanisms of injuries in male players in different positions

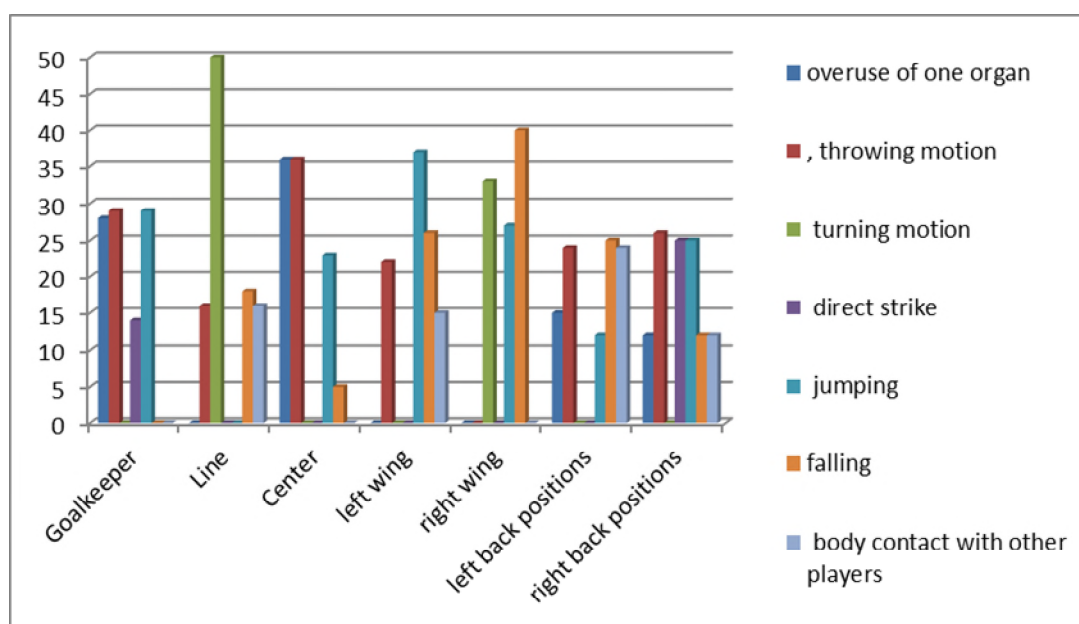


Figure 6: the mechanisms of injuries in female players in different positions

Discussion and conclusion

As the main purpose of this research, the types, causes and mechanisms of the injuries in the handball game play are identified according to the positions in the semi-professional male and female players 17-20 years old in Tehran. The male players in the positions of goalkeeper, line, center, and right back had mainly joint injuries, in left back and wing positions mainly muscular injuries and in right wing position mainly both the joint and muscular injuries. Accordingly, female players in goalkeeper position had bone injuries, in line, center, right and left back positions had joint and muscular injuries, and in right wing mainly joint injuries.

These results are consistent with those of Nejati in the players of handball, badminton, volleyball, tennis, swimming, mini volleyball, and mini basketball; as he also mentioned the joint and muscular injuries as the main types of damage (4). It is likely that the main causes of injuries in wrist in handball can be attributed to fast sudden turning motion in escape of the defenders and imbalanced descents in shooting. The knee joint is very important in stability, balance and weight endurance, dynamics and pivotal motions. However, the knee joint due to low supporting layers such as fat tissues and imbalanced muscular tissues is susceptible to many kinds of injuries.

In goalkeeper position, strikes or sudden pressure in boys and continuous overpressure in girls are the most widespread causes of injuries. Ball hit and continuous abrupt jumps of goalkeeper can explain the causes of injuries in the position. In line position, the most frequent causes of damage are strikes or sudden pressure, low body preparation and wrong performance of tactics in

boys and strikes or sudden pressure and wrong performance of tactics in girls. The line players require high body preparation and right performance of tactics to avoid the injuries. This is due to their especial arrangement against the opponent players, more physical contact, higher turning motions towards the goal, and more falling after shooting. In the boys in center position, continuous overpressure and in girls strikes or sudden pressure and continuous overpressure are considered as the most frequent injuries. The arrangement of this position in the core of the play and most pressure due to its pivotal role can explain the more incidence of these injuries. In left back position, in boys the strikes or sudden pressure, improper equipment and not warm up are the main causes of injuries and in girls the strikes or sudden pressure is the main cause. In left right back and left and right wing positions, the strikes or sudden pressure are the most important and frequent injuries. According to chi square test results, there are two differences between the frequencies of injury causes in boys and girls in all the positions ($P > 0.05$). As the body contact with the opponent players in escape from defenders and frequent descents in shooting can explain the causes of strikes or sudden pressure, this research result is against the results of Piry et al. (2011) who attributed the main causes to not body contact causes (12). But, the results of this research is consistent with the results of Olsen et al. (2006) who attributed the causes to body contacts (15) and also the results of Ramezani (1993) who mentioned the causes of injuries in handball students due to not warm up and low preparation (5) and also with the results of Gharakhanloo (1991) who believe that the main causes of injuries are not warm up and wrong performance of tactics (6). These similar results in these studies can indicate the kinds of motions and body contacts of players. The findings also confirm the results of Dehkordi et al. (2011) who believed that the main causes of injuries in three men performers are due to shifting in running position and inadequate preparation. The shifting in direction and path of movement in both fields can explain the causes. In the studies of Chang et al (11) about the injuries in 103 elite professional tennis players, the most important causes of injuries were wrong performance of tactics and not warm up. This is also in accordance with this research results and the cause of not warm up can be the most important cause for many injuries in this field of sport (11).

In goalkeeper position, direct hits in boys and overuse of one single organ, throwing motion, and jumping in girls are the most frequent mechanisms in the injuries in the handball players. Ball hits and continuous sudden jumps of the goalkeeper to get the ball can explain these mechanisms in this position. In the line position, the mechanisms of overuse of one single organ, throwing motion and direct hits in boys and the throwing motion in girls are the most frequent. The frequent turning of line players for shooting the ball increases the mechanism of turning motion for this position. In the center position, the mechanisms of overuse of one single organ, jumping, and body contact with other players in boys and also the overuse of one single organ and throwing motion in girls are reported as the most frequent. The center player has most of the jumps and rebounds against the defenders. Therefore, jumping and throwing motion are the most frequent mechanisms of injuries in this position. This confirms the results of Piry et al (2011) as they found the jumping as the most mechanisms of the injuries (12). In the left back position, falling in boys and jumping in girls are the most frequent mechanisms. In the right back position,

the most important mechanisms are direct hits in boys and throwing motion and falling in girls. The back position players have to turn themselves a side or jump in order to make the best shooting to goal; these activities can make them vulnerable to these injuries. Therefore, the falling can be mentioned as one of the most important mechanisms of the injuries in back position. This confirms exactly the results of Olsen et al (2006), because they also mentioned the turning and falling as the most frequent mechanisms (13). In the left wing position, the mechanisms of turning and jumping are the most frequent in boys and stretching motion in girls. In right wing position, the direct hits and throwing motion in boys and direct hits, throwing motion and jumping in girls are the most frequent. The results of chi square test indicate that there is not any significant difference between the frequencies of the injury mechanisms in male and female players in all positions ($p>0.05$). The fast turning and abrupt jumps in escaping from defenders, three step jumps, and imbalanced descent after shooting could be the causes of these mechanisms in the injuries of the handball game. These findings are also confirmed by the results of Alipour (2012). He indicated that the main mechanisms of injuries in the park sport equipment are exerting forces against the moving direction of muscle forces (33%), contact of two same forces in different directions (25%), and repeated exertion of forces (10). The findings of this research are also consistent with the results of Myklebust et al. (1998) and also Olsen et al. (2006) about knee injuries. Similar to the results of this research, they found plant-and-cut, descent with straight knee, while it is turning inside or outside, as the major mechanisms of the knee injuries (14, 15). The causes for this consistency in the results of these mechanisms can be sudden shifting of the players in path, body contact with the players in plant-and-cut, descent on the ground, and repeated forces. This is also in accordance with the results of Tadayoni (2009) who found the jumping and descent as the most frequent mechanisms of injuries in volleyball (8). This is because of common motions in the two fields of sport. The results of our research are not consistent with the results of Jafari (2009); as he mentioned load pressure and heavy weights as the most frequent mechanisms of injuries in the body builders of huge sportsmen in Iranian championship. The reason for this inconsistency is the difference in resistance of muscles in the two fields of sport. The research of Chang et al. (2010) believed that the most important causes of injuries in elite tennis players is over exercise. These results are not also consistent with these results. One of the reasons for this inconsistency might be differences in elite and amateur players in the two researches (11).

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