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## Relationship between the incidence of sport injuries in lower limbs and fitness factors in female futsal players

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### ABSTRACT

The main aim of this study was to determine the relationship of sport injuries in lower limbs and fitness factors in women futsal players. Sixty eight athletes between 17-32 year old as players in one of Karaj futsal teams participated in 2010 championship in Karaj competitions, were selected as statistical sample. In this study fitness tests were used to measure the subjects' fitness. A questionnaire was used for the collection of sport injuries. K-square of correlation coefficient was used to examine the relationship between variables. The results showed that there is no significant relationship between the flexibility, abdominal muscle endurance, agility and explosive power and lower extremity injuries in athletes; there is a significant relationship between aerobic power and lower limb injuries ( $p > 0.05$ ).

**Key words:** sport injuries-fitness factors-lower limbs

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### INTRODUCTION

In recent years researchers about the incidence of sport injuries have been increasingly expanded so that enough information are available in the field of different sport pathologies especially for medical, rehabilitation teams as well as coaches and athletes. The importance of this topic can be paid attention in both terms of health and championship; in one hand an athlete needs a healthy body and his/her fitness and in the other hand the atmosphere of competition or championship influences on athletes temperament as well; therefore the role of researchers are important in the field of sport injuries, type and related mechanisms [46]. Today the majority of people have achieved to a correct understanding of sport and physical activity in terms of health, fitness, treatment and prevention of injuries, but the lack of fitness and physical injuries awareness in those one who participated in his/her favorite sport field may cause to unexpected physical losses; this may also label a negative mark in the field of sport; not only the lack of information in terms of sport makes athletes expose to any injuries but also their mental/psychological conditions get into risky setting so that any physical activities disappear from athletes sport life [14]. Fitness factors and sport injuries are dependent completely together influencing each other at the same time; therefore any struggle through athletes physical abilities cause to prevention of an injury is a crucial step to reach to physical training worthwhile goals; as we know football is a favorite sport of Iranian people and the world; based on FIFA statistics about 265 million players exist in all over the world; that is, about four percent of the world population playing football in many different locations (FIFA). Among this futsal is a new-established sport playing by million players in all over the world but a few researches have been achieved in the field of futsal injuries so far; in our country in spite of increasingly number of futsal there is no any comprehensive research in this regard [27]. We should try to keep futsal players from any injuries during the matches because the issue of player injuries has been considered as the most vital problem among coaches and players of futsal sport; therefore in order to prevent any injuries in futsal we should know firstly about the amount and incidence of injury in sport

community and its related factors on individuals fitness rate; because fitness tests are used to evaluate the status of athletes in terms of health and their results play key role in players lifestyle quality. Meanwhile the results of the study can help all coaches, body-building partners, sport psychologists to be able to control any injury related factors and the incidence of injury among athletes. Therefore this research plays a key role in the prevention of sport injuries as well as decreasing the incidence of these injuries; Sanaiee (2009) has reported the causes of injuries in terms of player clashes and collision with an opponent; Zareiee (2008) has also reported the greatest number of injuries in the final 15min of play and the most part of injuries were related to ankle and leg (18%); he took factors such as race, region, field, anatomical area of injury, post of players and host or guest as the famous incidence of injury factors in Iranian premier league. Hasheminaia (2007) has announced that the highest rate of injury in lower limbs (60.7%). The information related to the power of lower limb showed that most of these players were moderate or low in terms of upper and lower limbs; information related to cardiovascular endurance also showed that about 51.2% as the moderate level and 24.4% were in a suitable position; among this their flexibility tests was 22.2%, 26.7% in upper and lower limbs as the most strongest respectively. In 2003 Nasermelli the researcher of gymnastics, wrestling, swimming and taekwando concluded that the rate of backache incidence in footballers (83.87%) stands in the second place in this research; the most important reasons of backache incidence among athletes especially in footballers relate to a direct damage towards back, inappropriate pitch, extra exhaustion and exercise pressures, opponent tackling, and sudden turn during the game [31]; therefore prevention of any severe clashes and aggressive behaviors, readiness of physical skills and a suitable sport setting are suggested strongly as the preventive/protective tools of backache [31]. Safayian (1988) in a comparison of fitness and the incidence of sport injuries concluded that both fitness and injury are dependent together in which some of these injuries such as muscular strain, contusion and inflammation into the muscles can be suspended through increasing the level of fitness. A few injuries such as contusion, fracture, abrasion are a little exposed to the fitness [39]. Elyasi (1988) in description and determination of sport injuries in football concluded that the lower limbs with 64.25% has the highest rate of injury in which the lack of fitness, enough warm-up, players tackles, inappropriate pitch and the shortages of sport facilities have been considered as the sources of injuries [5]. Soltani (1988) in a study of sport injury incidences of male high school has pointed that in injured parts of the body, the most injured parts are lower limbs (44% all injuries). In this research the highest percentage of injury was reported in football (76%) due to the direct clash between players and the inappropriate pitch [43]. Rajabi (1992) in a research by the name of studying the rate and type of injuries in male students in all over the country showed that in football the degree of damages in lower limbs is 41% and the most common damaged areas are in the wrist and toes, knees, fingers and ankles that the most common type of injuries is called sprain; moreover the greatest part of injuries can be happened in the head and face areas especially nose [36]. Barouni et al (2008) in a study related to the review of incidence of sprains in ankle of 128 Brazilian 13-15 year old footballers reported hitting on the ground is the main reason for this kind of injury [34].

Gall and et al (2008) stated that players under 14 years old are more prone to injury during exercise (especially damage to growth plates) but in the tournaments players under 16 years old are injured more than other age groups. It seems that with the increasing age of the young players the incidence of injury will reduce. This issue is happening in young and inexperienced players due to fewer skills and less muscular endurance [8]. Ribero et al (2006) stated that the main reason of injuries is the clashes between players (65.62%) in the study of futsal championship tournaments of Brazilian under 20 year old players. In another research Emry et al (2006) carried out the comparison of injury incidence in football and futsal tournaments; the rate of incidence (4.45%) for injuries per 1000 hr was reported 5.59% for futsal tournaments [6]. Also Giza et al (2005) reported the prevalence rate of 12.63 injuries per 1000hr of competitions for the American national women football league. Despite the lower the incidence of injury in women soccer players than men some types of injuries occur in women; for example the incidence of injury ACL in women has been reported due to hormone effects, the small size of the gap between the condyl of femur and muscle weakness hamstring three to four times more than men [11]. Faud et al (2005) also reported the prevalence of 23.3 injuries per 1000hr between the women's professional soccer in Germany. Jung et al (2004) pointed to 191 injuries per 1000 hr in the championship of futsal in Guatemala in 2000 that this rate of injuries were two times higher than football competitions [21]; but Putkin et al (1996) reported 44.4 injuries per 1000hr competitions in three days futsal tournaments in the US; also these researchers did not observe any significant differences between the rate of injuries in men and women and other different age groups [33]. Linderfield et al (1994) also showed 50.4 of injuries per 1000hr for men and 50.3 for women during the futsal tournaments [26]. Hoff et al (1986) stated that the main cause of these injuries is related to the clashes between players; also they reported that this rate of injury incidences is 6.1 times higher than soccer football. According to the mentioned studies the incidence of injuries in futsal is higher than football that it comes from this sport's fast reactions from players; in other words, all players' movements and the hardness of the field are suitable reasons for any injuries in futsal than football [17]. Sullivan and et al (1980) reported the highest rate of injuries among 17-19 year old girls but the lowest rate of this subject relates to 9-13 year old girls; but this rate in old women has been reported lower than old men [44]. Bergron and Wilson Green (1990) stated in the field of fitness that if an athlete stopped his/her fitness during the sport season he/she would increasingly challenge with injuries; therefore all

athletes need to gain their power recovery, flexibility in both upper and lower limbs and cardiovascular endurance at the end of their vacation [47]. John and Musher (1991) also stated that some researchers have been considered these injuries related to fitness such as power, endurance, agility and exhaustion and in their studies on injured students showed that the lack of fitness is considered as the most common agent of 27% injuries among students [20]. Based on controversial researches it is implied that self-research should be done in the field of women football and their physical fitness factors.

## MATERIALS AND METHODS

This research is a descriptive-correlative method. Information about the prevalence and type of occurred damage in the tournaments after was obtained through questionnaires distributed. 68 athletes between 17-32 years old as the players on the Olympic team in friendly matches of Karaj were selected as the samples. In this study the stopwatch Q & Q made in china CR2032 was used to measure time of the tests. The box of measuring flexibility of lower limbs used for gathering sport injuries that each athlete marks his/her own injuries there .k-square correlation coefficient methods was used to examine the relationship between the research variables. All the calculations have been carried out by computer and SPSS15 software.

## RESULTS

**Table 1. Description of Age, Height and Weight of subjects**

Variable Index	Mean	St. Dev.	Minimum	Maximum	St dev.	Range of Changes
Age	21.6	3.57	17	32	3.57	15
Height	163.5	5.67	147	174	5.67	27
Weight	56.3	7.24	45	79	7.24	34

Table 1 shows the mean age of subjects were between  $21.6 \pm 3.57$ . Also footballers height were  $163.5 \pm 5.67$  and their weights were between  $56.3 \pm 7.24$ .

**Table 2. Description of Fitness tests scores of subjects**

Variable Index	Mean	St Dev.	Minimum	Maximum	Range of Change
VO <sub>2max</sub>	41.2	5.3	29.7	52.3	22.6
Flexibility	31	6.7	12	45	33
Sit-Reach	39.7	10.7	20	65	25
Agility	18.3	1.09	15.8	21.5	5.69
Explosive power	31.6	4.67	23	42	19

Table 2 shows the mean aerobic endurance of the subjects was between  $41.2 \pm 5.3$ . Also, footballer's flexibility record was  $31 \pm 6.52$ cm; the number of squats was  $39.7 \pm 10.7$ . Also the record of agility between footballers was  $18.3 \pm 1.09$  seconds. The mean record of explosive power among Karaj footballers was  $31.6 \pm 4.67$ cm. The heartbeat of footballers was  $119 \pm 34.1$  beat per minute after walking test (1609 m).

**Table 3. Distribution and Percentage of sport injuries in lower limbs**

Limb	Injuries	No injuries
Leg	Distribution	55
	Percentage	80.9
Knee	Distribution	46
	Percentage	67.6
Calf	Distribution	60
	Percentage	88.2
Ankle	Distribution	62
	Percentage	91.2
Sole	Distribution	67
	Percentage	98.5
Toes	Distribution	65
	Percentage	95.6

According to table 3, it is observed that 19.1% of the subjects had injuries in the leg, 32.4% at their knees, 11.8% in their calf, 8.8% in the ankle, 1.5% at their sole and 4.4% in their toes. Totally, the highest rate of injuries relates to lower limbs and the lowest injuries have been found in the sole of players.

**Table 4. Distribution and Percentage of injuries in lower limbs**

Type of injury	Fractures	Stretches and wounds	Contusion	Strain	Bruises	Muscular Stretches	Injuries of meniscus and disks
Distribution	1	14	-	3	24	15	-
Percentage	1.7	24.6	-	5.1	42.1	26.3	-

Table 4 shows that the highest injuries 42.1% is related to bruises. About 26.3% are muscle stretches; 24.6% relates stretches and wounds, 5.1% are strains, 1.7% strain and 1.7% is fractures.

**Table 5. Description of fitness records of subjects**

	Good	Moderate	Weak	
<b>Aerobic power</b>	Distribution	4	37	-
	Percentage	9.8	90.2	-
<b>Flexibility</b>	Distribution	41	-	-
	Percentage	100	-	-
<b>Abdominal muscular endurance</b>	Distribution	11	25	5
	Percentage	23.9	61	12.1
<b>Agility</b>	Distribution	9	32	-
	Percentage	22	78	-
<b>Explosive power</b>	Distribution	-	10	31
		-	24.4	75.6
<b>Total</b>	8.8	83.8	7.4	

Table 5 shows the record of aerobic power among footballers are as follows 83.8% moderate, 8.8% good, and 7.4% weak. The aerobic power in 90.2% is moderate. 9.8% is defined as a high level; all subjects had enough flexibility in this regard; the level of endurance in abdominal muscles was 23.9% good, 61% moderate and 12.1% weak. 22% had a good agility level and 78% agility is defined as moderate level. 24.4% were moderate aerobic endurance and 75.6% were weak.

**Table 6. Coefficient of K-Square to find relation between fitness tests and incident of sport injuries**

Variable	K-Square	Sig
<b>Flexibility</b>	-0.026	0.75
<b>Abdominal Muscular Endurance</b>	0.106	0.948
<b>Agility</b>	0.72	0.396
<b>Explosive Power</b>	1.259	0.262

According to table 6 it can be said that there are no any significant differences between flexibility, abdominal muscles, agility, explosive power and the lower limbs ( $p>0.05$ ). But in the other hand there is a significant difference between aerobic power and lower limbs injuries ( $p>0.05$ ).

## DISCUSSION AND CONCLUSION

The results of the study showed that the most injuries among women footballers relate to contusion, strain and stretch. The results of the study and Dourk and Jangi (2007) are matched together in which the highest rate relates to business and also Grenier (2001) states the business as the common injury in football. Lidfield et al. (1994) reported contusion as the common injury in football. Also Hoy and et al (1992) consider contusion and stretch as the usual injuries in football and futsal; Draver and fooler (2002), Thomas and David (1998) reported contusion and stretch as common injuries. Also the results of the study are matched with Saneii (2009), Hasheminai (2007), and Safaiyan (19898) that all consider contusion and stretch as the most common injuries in football. according to the level of fitness in all footballers as in moderate level, the results of this research are matched with the results of Bergerdon et al (1990), Heiss (1987), Gall et al (2008); besides all these researchers consider the lack of fitness as the most vital factor for any sport injury. The present athletes of the study were in good level of flexibility whereas other factors were in moderate level.

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