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Comparing the Anthropometric Characteristics of Injured and Non-Injured Girl Student Athletes Participating in the Sport Olympiads Held by the Ministry of Health and Medical Education in the Summer of 2009 in the City of Yazd

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History and objective

Participation in sport competitions such as Olympiads may be associated with sport injuries Many factors including the anthropometric conditions may lead to the incidence of injury. The purpose of this research was to examine the association between the body mass index and the incident of sport injuries among the girl students participating in the sport Olympiads held in 2009 in the city of Yazd.

Material and methods

In this research, the BMI of the injured and non injured girl athletes were compared. The data was collected using the injury recording form. Weight and height of the athletes as well as data related to the incidence of the injury were recorded. Statistical analysis was performed on data using the SPSS: pc version 16.

Results

The results of the analysis showed that 37 injuries occurred. The result of the analysis showed that there was a significant difference between the BMI of the injured and non-injured athletes ($p<0.05$). in addition, the injured athletes had significantly higher mean value than the non-injured athletes (21.9 versus 19.5).

Conclusion and discussion

The results of this study showed that anthropometric characteristics of the girl athletes such as bmi were a contributing factor for the incidence of injury. It was concluded that change in BMI by reducing weight to the desirable level may reduce the chance of injury in future competitions. More research and control over other variables are needed to reduce the chance of injuries further.

Key words: Athlete, Olympiad, Injury, BMI.

Sport Olympiads are special sport events held by the ministry of health and medical education on regular bases every two year. In these competitions, like any other sport competitions, the risk for sport-related injury exists. Sport injuries are undesirable consequences of participation in sport activities. Identifying the causes and conditions in which the injuries occur may help the practitioners in the sport completion to decrease

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the rates of injury or alleviate some of the factors that contribute to the incidence of most of the injuries.

The significance of the subject has brought the matter into the focus of research in the area of sport injuries. Many different factors may contribute to the incidence of sport-related injuries. Several studies have observed an association between injury incidence and risk factors, such as type of sport, gender, and history of injury in both high school populations[1-4] and other athletic populations[5-7]. In addition, low physical fitness has been identified as a risk factor in other physically active populations, such as the military[8,9]. Numerous investigations have been conducted by different researchers to identify the risk factors for the athlete's injuries during the competitions or training sessions[10-19]. The risk of injury exists for both sexes, that is, female athletes are at similar risk of injuries like their male counterparts. Lowly and associates (2007) conducted a research to examine the relationship between the physical activity –related injury and BMI in high school students. The author concluded that there was no significant association between the BMI and sport-related injuries[20]. Despite the findings of this author and due to the fact that in certain competitions such as those held for high school students, the condition of competitions may not be as intense as those in college and university sports. In addition, due to the fact that the changes in some anthropometric measures such as the weight and height of college students may be different than those of high school students, the contribution of these factors assessed as the body mass index in the incidence of injury is less clear.

The purpose of this research was to examine the differences in body mass index of injured versus the non-injured athletes during the sport Olympiad during the summer of 2009 in the city of Yazd.

MATERIAL AND METHODS

In this cross-sectional research, the BMI of 37 injured girl athletes was compared with that of 133 none-injured girl athletes. The injury as well as other demographic data was collected using the injury recording form employed earlier. The data were collected at the competition areas by employing a Seca scale model at the competition site. An injury was defined as any incident during the game that prevented the athlete from continuing the competition. The characteristics of the non-injured as well as the injured athletes were recorded prior to the start of the competition in the beginning of the matches.

RESULTS

Overall, 169 students were examined. Descriptive statistics including mean and standard deviation of weight, height and age of the subjects are presented in Table 1. Independent t-test was used to compare the BMI, weight and height of the injured athletes with the non-injured athletes. Body Mass Index was calculated by dividing the weight of subjects into the squared of height in meter. In table 1, descriptive statistics of the injured and non-injured student athletes are presented

The results of independent t-test showed that there was a significant difference between the body mass indexes of the injured and non-injured

Table 1. Statistical description of injured and non-injured athletes

Condition	Stat. indexes	Bmi(kgm²)	Ht(cm)	Wt(kg)	Age (year)
injured	Mean	21.9	164.7	59.6	20.28
	Std. Deviation	2.3	6.83	7.14	1.5
	Minimum	18.21	155	45	18
	Maximum	28.72	179	75	27
Not-injured	Mean	19.5	163.4	52.3	21.2
	Std. Deviation	1.9	6.09	6.06	1.43
	Minimum	15.06	150	40	18
	Maximum	24.91	184.	71	28

Table 2. The results of independent t-test for comparing BMI, height and weight and of injured and non-injured student athletes

variables	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Body Mass Index	.934	.335	6.330	167	.000	2.41915
height	1.812	.180	1.085	167	.279	1.27485
weight	2.179	.142	6.201	167	.000	7.34862

Table 3. Frequency distribution of injuries according to the limb

Limbs	Frequency	Percent
lower	16	44.4
upper	14	38.9
Face and head	4	11.1
trunk	2	5.6
Total	36	100

student athletes (21.9 versus 19.5). The non-injured athletes showed significantly lower BMI than that in the injured athletes. Further analysis was performed to compare the weight and height of the injured and non-injured student. The results of analysis showed that there was a significant difference between the weight of injured and non-injured student athletes (p=0.0001); the injured athletes were significantly heavier than the non-injured student athletes (59.6 versus 52.3). These results are presented in Table 2.

Further analysis was performed to identify the location of injuries in the injured athletes. These results are presented in table 3. as it can be seen, the most frequent injuries occurred in the lower extremities.

DISCUSSION

Body mass index is a concept used to examine one of the components of physical fitness. Yard and associate (2011)[1] reported that there was a relationship between the weight and sport injury in high school competitions. The main objective of this study was to compare the BMI of the injured and non-injured college girl student athletes participating in sport Olympiad of the ministry of health and medical education in the summer of 2009 in the city of Yazd. Body mass index calculated as the ratio of height and weight is amenable to alteration by specifically changing the weight through various measures including more intensive training. Therefore, under circumstances where there is a relationship between the sport injury incidence in competitions and bmi, the change in BMI may change the frequency of the injury incidence. The results of this study indicated that there was a significant difference between the BMI of the injured and non-injured girl student athletes. When comparing the weight and height of these athletes, a significant difference was found between the weights of injured and non-injured athletes but not for their height. The investigation of various factors contributing to the incidence of injury in athletes at different level has been the subject on many studies. Lee and associates (1997) examined the relationship between the players' physique and injury rate in rugby football and reported that the BMI for players who were injured in a match was 25.4 compared with 24.6 for players who were not injured in a match ($P < 0.0001$)[21]. Waterman and associates (2011) conducted a research in which the anthropometric characteristics of the athletes with ankle sprain were compared with those of the non-injured ones[23]. The results of this study revealed that the athletes with ankle sprains had higher mean height, weight, and BMI than uninjured men ($P <.001$). The findings of the present research are in agreement with the findings of this research in regard to BMI and weight, however, in the present, no statistically significance difference was found when the height of the subjects was compared. Such discrepancy may be due to the types of sports being investigated. Malliaras and associates (2007) also conducted a research to determine the risk factors associated with the patellar injuries in athletes. They examined the anthropometric risk factors such as height, weight, body mass index (BMI), waist girth, hip girth and WHR in a cohort of 113 competitive volleyball players (73 men, 40

women). They concluded that players with a waist girth greater than 83 cm seem to be at greater risk of developing patellar tendon pathology[24].

Knowles and associates (2006) conducted a research to examine the factors contributing to the incidence of sport injury in 12 different sports from 1996 to 1999 in high school competitions. The authors concluded that body mass index was not a strong predictor of injury incidence in this population. The difference of these results findings with the result of the present research may be due to the fact that the two populations were relatively different from the age and level of competitions prospect. University students are older than the high school student athletes. In addition, the competition at the Olympiad level is more intense and athletes participate in these events more vigorously.

According to the finding of this research, BMI and weight are two important factors that are distinguishable among the injured and uninjured girl student athletes. In regard to the variable of weight, it seems obvious that having heavier weight requires higher energy to move in the sport arena in the entire game and may expose the athlete to premature fatigue state. This condition in turn may act as a risk factor for sport injury. In addition, heavier weight puts extra pressure on tendons, ligaments, and muscles during the activities that require frequent jumping. Such condition can contribute to the incidence of injury controlling for all other factors. It is fortunate that weight is a variable that can be modified. By special training and certain diet program, it is possible to lower the weight and as a consequence lower the BMI. However, in sports that require certain weight like martial arts such intervention is not feasible.

In regard to the location of injury in this study, it was found that the majority of the injuries occurred in the lower extremities. These results were similar to what was reported by Hootman and associates (2007) who observed that 50 percent of all injuries in sport competitions occurred in the lower extremities.

In this research, a reportable injury was one that resulted from participation in an Olympiad sport competition and either limited the student's full participation in the sport at the time of competition or required medical attention by a medical professional.

The strength of this study was the cross-sectional design used to examine the frequency of injury incidents across a variety of games. Other studies aimed at examining the incidence of injuries in sport events targeted at single sport[21-24] or used method assessing the incidence of injury through athletes reported[25].

A limitation of this cross sectional study was that the anthropometric factors identified as being associated with injury were limited to the height and weight and the exclusion of the boy athletes. Further research is needed to examine the same condition in men completions.

CONCLUSION

Anthropometric characteristics of the athlete such as weight and BMI are attributes that may play a significant role in the incidence of sport injuries and therefore need to be taken into consideration when preparing for sport events. Players with higher BMI may be at risk of injury during the sport Olympiads.

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