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ORIGINAL RESEARCH

Injuries and its Associated Risk factors among Leisure Time Runners in Debre-Tabor Town, Ethiopia

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ABSTRACT

Running is the most popular physical activities enjoyed by people around the world. People seeking a healthier lifestyle through weight control and improved exercise capacity frequently choosing running, as this has been considered to be of low cost and can be easily implemented. Despite these health benefits, running injuries are common. The purpose of this study is to determine the prevalence of running-related musculoskeletal injuries among leisure time runners over a 6-month period. A cross-sectional study design was used for this study. The participants of the study were leisure time runners of Debre-Tabor Town. From the registered participants (350), 323 (155 female & 168 male) runners were included and completed the questionnaires, which yielded a response rate of 92.28%. In the current study, 188 injuries were occurred during the study period, giving an injury prevalence of 0.58 per leisure time runner. Of these, the prevalence of injuries was 0.58 on females and 0.57 on males. The occurrence of injuries on the runners, 62/106(58.5%) were during competition, 36/106(33.96%) during training and, 8/106 (7.55%) of the injuries were occur during warming up. The rate of injuries on Knee, foot and ankle were 38.3% (72/188), 30.85 %(58/188) and 17.55 %(33/188) respectively. In this retrospective study, the prevalence rate of musculoskeletal running-related injuries during the study period was 58.2%. The most frequent injuries reported by the runners were tendinopathies and muscle strain/rupture followed by abrasion and the knee and foot/toe was the most affected anatomic sites.

Keywords: *Injuries, prevalence, Athletics, Leisure time running*

Introduction

Athletics is one of the exciting, fast, dynamic and most popular sports and enjoyed by people around the world and the number of runners has grown substantially over the past decades (Van Middelkoop *et al*., 2008). Athletics is described as a "track and road sport". This is to mean that it is a sport that does not involve any physical contact between the athletes and their opponents. People seeking a healthier lifestyle through weight control and improved exercise capacity frequently choose running, as this has been considered to be of low cost and can be easily implemented (Taunton *et al*., 2002).Although the exact roots of Athletics in Ethiopian cannot be retraced back accurately, it is widely believed that the sport was widely practiced in schools and military camps before 1897. More importantly, running has many beneficial effects including a reduction of risk factors for cardiovascular disease (Zemper & Pieter, 2009).Despite these health benefits, running injuries are common, Studies conducted in different countries show that injury prevalence pattern in athletics are repetitive ranging between 18.2% and 92.4%,(Van Middelkoop *et al*., 2008; Starke & Ryan, 2001) or 6.8–59 injuries per 1000 hours of exposure to running (Buist *et al*., 2010; Rauh *et al*., 2006; Lun *et al*., 2004).This large variation in incidence rates of running injury may be explained by the difference in the subjects' characteristics, as well as the definitions of running-related musculoskeletal injuries (RRMIs),which differ between studies.

Studies have been conducted to identify what are the most common injuries among runners (Buist *et al*., 2010; Knobloch, and Vogt, 2008; Taunton *et al*., 2003).Moreover, Predisposing factors contributing to musculoskeletal running injuries include poor training habits, inadequate rehabilitation of previous injuries, high weekly mileage, incorrect shoes and muscle imbalances (Noakes, 2001; Van Mechelen, 1992; Taimela and Oesteiman, 1990; Marti *et al*.,1988). Studies have identified the knee as the anatomical site most vulnerable to running-related musculoskeletal injury, followed by the ankle (Noakes, 2001; Van Mechelen, 1992; Taimela and Oesteiman,1990; Marti *et al*.,1988). Intrinsic factors such as deviant quadriceps angles (Q-angles), genu varum, genu valgum, rear foot varus and rear foot valgus have been associated with vulnerability to knee and ankle injuries (Puckree, 2007; Noakes, 2001; Powell, 1986). Despite the fact that numerous research studies have been carried out regarding running related musculoskeletal injuries and associated factors, there is still a paucity of research studies in Africa in general and in Ethiopia in particular. As to the knowledge of the investigator, no study has been conducted in Ethiopia on running musculoskeletal injuries among leisure time runners. Due to these, the study focuses on common running musculoskeletal injuries and its associated risk factors on among leisure time runners in Debre-Tabor Town, North west Ethiopia, 2018.

Materials and Methods

A quantitative research, retrospective study design was used for this study. The source of population was the community of Debre-Tabor Town. The participants of the study were leisure time runners of the town. According to the 2018 second quarter report of Debre-Tabor Town sport office, the number of leisure time running participants in Debre-Tabor Town estimated 1547 (982 male and 565 female). Among the 1547 participants of Debre-Tabor leisure time runners registered at the end of the second quarter of the season, 350 participants have been selected by using Solvin formula ($n = N / (1+Ne^2)$). Of these, 323 (155 female and 168 male) participants were filled the questionnaire, the return rate of the questionnaire was 92.28%. For the present study, 50 participants above 35 years of age and 273 below 35 years age have been taken by using systematic random sampling method at Ajibar and Arada regions leisure time runners.

Data collection instrument, procedure and definition of injury

To conduct this study, a structured interviewer-administered questionnaire and exposure forms were adopted from Augustsson (2006) was used as injury data collection instrument. For the purpose of this study, an injury was defined as any incident that occurs during warm up or competition that requires medical attention (Honkamp, 2016) and cause the player to be absent from sport participation either in a training or competition (Bahr and Reeser, 2003).

Measurements

In addition to information probed by the questionnaire, the following anthropometric measurements were recorded: body mass, stature, Q-angle and hip flexion by using standardized scale, stadiometer, Goniometer and Thomas test, respectively. The objective was to determine whether a significant relationship existed between these intrinsic factors and musculoskeletal injury.

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

Results

Socio-Demographic Characteristics of the participants

A total of 350 leisure time runners were expected to participate in the study. But 323 (155 female & 168 male) runners participated and completed the questionnaires, which yielded a response rate of 92.28%. Among the participants, 48% (n=155) were females and 52% (n=168) were male runners.

Table 1. Demographic characteristics of the participants

Variables	Females (N=155)	Males (N=168)
Age (Years),Mean(±SD)	29.12(±6.19)	27.21(±8.7)
Stature(cm),Mean(±SD)	162.12(±3.8)	168.19 (±5.2)
Weight (kg),Mean(±SD)	61.07 (±8.81)	69.33 ±6.27)
BMI(kg/m2),Mean(±SD)	19.95(±2.19)	18.12 (±2.27)
Running experience	2.11 (±1.11)	4.35 (±3.45)

SD = standard deviation; BMI = body mass index

The mean age of **female runners** was 29.12 (±6.19) and males were 27.21(±8.7). The average height of the leisure time runners was 162.12cm (±3.8) for females and 168.19cm (±5.27) for males.The mean body mass of the participants during the study period was 61.07kg (±8.81) for females and 69.33kg (±6.27) for males. In relation to body mass index the mean BMI of females was 19.95 (±2.19) and for males 18.12(±2.27). Moreover, the mean running experience of the participants was 2.11 years (±1.11) for females and 4.35 years (±3.45) for males.

Injury rate

The rates of injuries by gender and participant type are reflected on the following Table-2 below.

Table 2. Frequency and percentage of injuries sustained by gender and Participants type

		Injury			
Participant Type	Gender	Injury Cases (%)	Injured (%)	Noninsured (%)	X^2
Youth	Female	68(36.17%)	53(40.46%)	91(47.39%)	0.11, p = 0.74
	Male	58(30.85%)	45(34.35%	84(43.75%)	
	Total	126(67.02%)	98(74.81%)	175(91.15%)	
Adult	Female	23(12.23%)	15(11.45%)	9(4.69%)	0.25, p = 0.62
	Male	39(20.75%)	18(13.74%)	8(4.17%)	
	Total	62(32.98%)	33(25.19%)	17(8.86%)	
Youth vs Adult		X^2=15.88,p<0.0001 OR=0.2885,Cl:0.1528-0.5445,p<0.0001 RR=0.5439,Cl:0.4217-0.7014,p<0.0001			

During the period of the study 188 injuries were registered on 131 participants. Of this, 32.98 %(62/188) of injury cases were registered from adult runners and 67.02 % (126/188) cases occurred on young runners. The injury rate in adult runners was statistically different in comparison to the injury rate in the other age groups (young) runners (x^2 = 15.88, p<0.05).

Regarding the frequency of injuries, 86 (65.65%) runners were injured once, of these females were 49(37.40%) and males 37(28.25%), 33 (25.19%) runners were injured twice, females 15(11.45%), males 18(13.74%) and 12(9.16%) runners were injured three times, from these females were 4(33.33%) and males 8(66.67%).The odds ratio of injured female runners in comparison with male counterparts was 0.9930 (95% Cl:0.6366 to 1.5489) p>0.05.The number of female injured runners seemed higher than male, but no significant difference was found.

In order to study the different injury rate in relation to age, the 323 runners were divided into two groups as youth and adult. Of the 188 recorded injuries on runners, 118 injuries were occurred on 91 runners between the age range of 14-16 years (62.77 %), 65 injury cases were happened on 37 runners on the age range of 17-25 years (34.57%) and 3 runners sustained 5 injuries on the age of 26 and above years (2.66%).According to the chi square analysis significant difference was obtained between age and injury occurrences (X^2=5.89, p<0.05).

The rate of injuries in terms of body part

When we consider the whole injuries, knee, foot and ankle occurred at the highest rate 38.3 (72/188), 30.85%(58/188) and 17.55%(33/188) respectively followed by injuries in the back 6.9% (13/188), shin 3.72% (7/188) and hamstring 2.66% (5/188).

Rate and Diagnose of Injury Related to Sex

In relation to the type of injuries diagnosed, 24.53%(n=26) injuries were strain followed by tendonitis,17.92%(n=19) abrasion 14.15% (n=15) sprain and blister were 13.20%(n=14) each. Shin splint and dislocation were relatively small 8.5 %(n=9) each.

In comparison with the rate and type of injuries, female runners were exposed more for

tendonitis (n=10, 22.22%) and males (n=21, 34.43%) by strain, followed by sprain and Tendonitis for male (14.76% for each) and Abrasion for females (15.56%).

Table 3. The Rate of Injuries and Injured Runners Related to participant Type

Participant Type	Number of runners (N=323)	Number of Injury Cases (N=188)	Injured runners (N=131)	Non-Injured runners (N=192)
Youth	273(84.52%)	126(67.02%)	98(74.81%)	175(91.15%)
Adult	50(15.48%)	62(32.98%)	33(25.19%)	17(8.85%)
X^2=15.88,p=0.0001<0.05*				
Young Vs Elite	OR = 0.2885,Cl:0.1528-0.5445,p=0.0001<0.05			
	RR= 0.5439,Cl:0.4217-0.7014,p=0.0001<0.05			

*Statistically significant

Injury exposure in terms of sex on youth and adult runners, in the present study from the total of 98 reported injuries on youth runners, 53(54.08%) injuries presented on females and the remaining 45(45.92%) on male counterparts. On the other hand, from the registered 33 injuries on adult runners during the entire study period, 18(54.55%) of the cases occurred on male and 15 (45.45%) on females.

In comparison the injured youth and adult runners in relation to sex, on female runners statistical difference was found(X^2 = 5.64, p = 0.017). The OR of youth and adult female runners was 0.5889, Cl: 0.4041 to 0.8582, p = 0.0059.Statistically significant. The probability of youth male runners for injury was 36.8 % (53/144) and adult runners was 62.5 %(15/24) with a relative risk 0.3495, 95%Cl: 0.1431to 0.8536, p = 0.021. Likewise, on adult and youth male runners the X^2 analysis shows that, statistical difference was found(X^2 = 10.58, p = 0.0011).

The odds ratio of youth and adult male runners was 0.2381, 95%Cl: 0.096 to 0.5904, p = 0.002<0.05. and the probability of adult runners was 69.23 %(18/26) and the probability of youth males was 34.88 % (45/129) with a relative risk of 0.5889-0.95%Cl: 0.3557 to 0.7138, p = 0.0001.

Injury Type (acute or overuse)

In the present study, the acute injuries were significantly different in comparison to overuse syndromes (X^2 = 90.8, p<0.0001). During the season, a total of 167 (88.83%) acute injuries represented a prevalence rate of 0.51 per 1000 hours. Of the total acute injuries, 81(48.50%) were on females and 86 (51.50%) on males.

The odds ratio of the overall acute versus overuse injuries was 9.2098 (95% CI, 5.498 to 15.4272) p= 0.0001<0.05, and statistically significant difference was observed. The probability of overall acute injury was 88.83%. For overuse the probability was 11.17%, with a relative risk (RR) of 6.2105 (95% CI, 3.9233 to 9.8311) p = 0.0001<0.05 significant difference was also observed between acute and overuse injuries on runners.

Table 4. Comparative analyses of the mean Q-Angle of runners with Knee injuries v. those with Non-Knee injuries (N = 33)

Sex	Q-Angle	Injured	Non injured	t-test	P-Value
Female	Left Q-Angle[^{0}]Mean[SD]	11.22[±3.289]	9.529[±2.426]	2.507	0.0184*
	Right Q-Angle[^{0}]Mean[SD]	10.7[±3.255]	9.058[±3.578]	1.77	0.0911
Male	Left Q-Angle[^{0}]Mean[SD]	6.944[±2.577]	6.826[±3.09]	0.172	0.864
	Right Q-Angle[^{0}]Mean[SD]	7.687[±3.718]	6.815[±3.39]	0.877	0.39

Statistically Significant

In comparison with the left Q-angle of knee injured and non-injured runners of female and male runners, statistical difference was found only on the left leg Q-angle of female runners (*t-test* = -02.507, p = 0.0184). On the contrary, no significant difference was observed on right leg Q-angle of female and both Q-angle of male runners. Even if, statistical difference was not found on Q-angles between the injured and non-injured male runners, in this study have large Q-angle.

Discussion

The total response rate in the study was 92.2% from a sample of 323 runners. The high response rate supports the validity of the study even though the small sample size limits the generalization potential of the study. The high response rate in this study is similar to previous studies (Fields *et al*., 2010; Luiz *et al*., 2012; Ellapen *et al*., 2013).

Male participation was higher (52%) than in the case of females (48%). This was similar to the study conducted by various studies (Bennell *et al*., 1996; Brunet and Cook, 1990). And different from a result studied by Buist *et al*. (2010).In relation to the age and BMI of the participants, the result in this study is lower than that of the study conducted by Luiz Hespanhol Junior *et al*.(1912).

Among the injured runners, knee and foot/toe injuries showed the highest prevalence in the present study which correlate well with studies conducted by Ellapen *et al*.,(2013)and LuizHespanhol Junior *et al*.(2012) other study conducted byAlexandre Dias Lopes, (2012) reported that knee (patellar tendinopaty) and ankle dorsi-flexion tendinopathy was the highest prevalent injuries.The main risk factors found in my study were Q angle, use of uncomfortable socks and running shoes, and absence of preventive exercises. Q-angle was associated as risk factors (Ellapen, 2013).

In the present study 58.2% (188/323) leisure time runners sustained an injury during the season on both road race and training. Of those who sustained injuries, 48.41% (91/188) were on females and 51.59% (97/188) were on males 192 runners (59.44%) did not sustain any injuries. This result is lower than that of the results conducted by Bennell, Crossley (1996) and Jacobs SJ, Berson BL.(1986). And higher than the result reported by Lysholm&Wiklander (1987) and Buist, *et al*.(2010).

Conclusions

In this retrospective study, the prevalence rate of musculoskeletal running-related injuries during the study period was 58.2%. The most frequent injuries reported by the runners were tendinopathies and muscle strain/rupture followed by abrasion and the knee and foot/toe was the most affected anatomic sites. Physical alignment (Large Q-angle), absence of preventive exercise,

lack of warming up and use of uncomfortable running shoe and socks were the intrinsic and extrinsic factors of running related musculoskeletal injuries. High running experience was associated with the absence of musculoskeletal running-related injuries. Majority of injuries occurred during competition (great run at Debre-Tabor).

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