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COMMON RUNNING MUSCULOSKELETAL INJURIES AMONG RECREATIONAL RUNNERS IN GONDAR TOWN, NORTH WEST ETHIOPIA

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ABSTRACT

Running is one of the most popular physical activities enjoyed by people around the world. The consequence of the growing running popularity is the increase of musculoskeletal injuries. To determine the prevalence of volleyball injuries sustained among recreational runners, to identify the sites, nature and cause of injuries sustained among recreational runners and to identify the intrinsic and extrinsic factors associated with the injuries sustained among recreational runners. A quantitative research, retrospective study design was used for this study. The subjects of the study were recreational runners of Gondar town. A total of 300 (132 female & 168 male) runners participated and completed the questionnaire. A total of 106 injuries occurred during the study period. Of these, 58.5% injuries were happened during competition, 33.96% during training and, 7.55% of the injuries were during the execution of warming up. Knee, foot and ankle were the most affected anatomical sites. Frequently sustained types of injuries were Tendonitis, muscle strain and abrasion. The prevalence of musculoskeletal running-related injuries over the last 6 months was 35.33%. High running experience was associated with the absence of musculoskeletal running-related injuries. 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.
Keywords: *Injuries occurrence; prevalence, athletics, recreational running.*

1. INTRODUCTION

Running is one of the most popular physical activities enjoyed by people around the world (van Middelkoop, Kolkman, van Ochten, Bierma-Zeinstra, & Koes, 2008) and the number of runners has grown substantially over the past decades.

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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, Ryan, Clement, McKenzie, Lloyd-Smith, & Zumbo, 2003). 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. The sport was limited to these parts of society only because others did not have access to equipment used for competitions or was not organized in a manner that motivated progress. More importantly, running has many beneficial effects including a reduction of risk factors for cardiovascular diseases (Zemper & Pieter, 1989). Despite these health benefits, running injuries are common, with incidence rates ranging between 18.2% and 92.4%, (van Mechelen, 1995; Starkey & Brown, 2001; van Middelkoop *et al.*, 2008) or 6.8-59 injuries per 1000 hours of exposure to running. (Bovens, Janssen, Vermeer, Hoeberigs, Janssen, & Verstappen, 1989; Buist, Bredeweg, Bessem, van Mechelen, Lemmink, & Diercks, 2010; Lun, Meeuwisse, Stergiou, & Stefanyshyn, 2004; Lysholm & Wiklander, 1987; Williams, 1997; Rauh, Koepsell, Rivara, Margherita, & Rice, 2006).

Because of the expected positive health effects of physical exercise, more and more people are becoming stimulated to increase their physical activity. Running is one of the most accessible sports and, probably for this reason, is practiced by many persons all over the world. In Ethiopia running is a day to day activity of all individuals for recreational, physical fitness and competitive purposes. Globally, the Ethiopian Athletics Federation is one of the leading member federations of IAAF especially in long and middle distances. Continentally, in recent times the Ethiopian athletes are appearing in short distances and field events with medals.

However, besides the positive health, recreation and competitive effects of running there are some concerns about the high incidence of running injuries, especially to the lower extremities. Various studies have reported annual rates of lower extremity injuries of runners (Bennell, Malcolm, Thomas, Wark, & Brukner, 1996; Jakobsen, Krøner, Schmidt, & Jensen, 1989; Lun *et al.*, 2004; Macera, Pate, Powell, Jackson, Kendrick, & Craven, 1989; Maughan & Miller, 1983; Taunton *et al.*, 2003; Wen, Puffer, & Schmalzried, 1998) and a substantial number of these running injuries occur in preparation for or during a long-distance running event such as a marathon run (Jakobsen *et al.*, 1989; Kretsch, Grogan, Duras, Allen, Sumner, & Gillam, 1984; Maughan & Miller, 1983; van Tiggelen, Wickes, Stevens, Roosen, & Witvrouw, 2008).

2. METHODS AND MATERIALS

2.1 Subjects

The study was conducted on Gondar Town recreational runners from 1 January 2016 to 15 June 2016. The season estimated to last 24 weeks. A total of 350 recreational runners were invited to participate, but in the current study 300 (132 female & 168 male) runners participated and completed the questionnaire, which yielded a response rate of 85.7%. The response rate among the males was higher at 88.4% (168/190) compared to 82.5% (132/160) among the female runners. Of the participants, 44% (n=132) were females and 56% (n=168) were male runners. A quantitative research, retrospective study design was used for this study.

2.2 Procedure

For the purpose of this study, an injury was defined as, any mishap that occurs during training, warm up and/or competition that requires medical attention (van Middelkoop *et al.*, 2008) and/or cause the player to be absent from sport participation either in a training or competition (Bahr & Reeser, 2003).

A structured interviewer-administered questionnaire was prepared by the investigators by reviewing different literatures and was used as a data collection instrument. The injury prevalence, the characteristics of the injuries (severity, diagnosis) and the anatomical location of the musculoskeletal injuries that occurred during training and competition in the study period were recorded retrospectively.

2.3 Statistical Analysis

The collected data from the participants were ethically secured. Data was checked, entered and cleaned using Epi-info version 17 statistical software and then transferred to SPSS (Statistical Package for Social Science) version 16 for further analysis. Frequencies and cross tabulation was used to summarize descriptive statistics of the data and table and graphs were used for data presentation. Odds ratio (OR), and relative risk (RR) with 95% confidence interval and p-value < 0.05 was used to show association between explanatory variables and dependent variable. Variables having p-value of less than 0.05 has been considered as significantly associated with the dependent variable.

3. RESULTS

A total of 106 injuries occurred during the period from January, 2016 to June, 2016, giving an injury prevalence of 0.35 per player. Of these the prevalence of

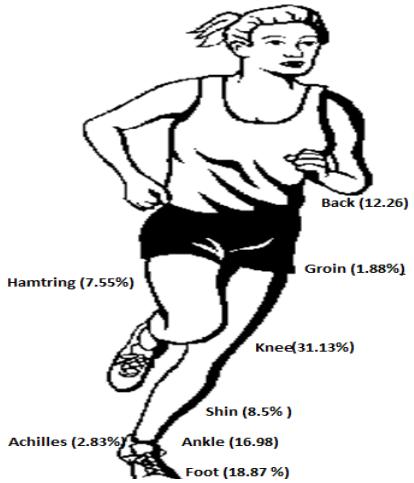
injuries on females was 0.34 and on males the prevalence was 0.36. In the present study 35.33% recreational runners sustained an injury during the season on both competition and training. Of those who sustained injuries, 42.45% were females and 57.55% were males. 194 runners (64.67%) did not sustain any injuries. The odds ratio (OR) of male injuries comparison female was 1.10 (95% Cl: 0.68 to 1.77) p=0.67>0.05, the rate of injuries on males seemed more, but there is no significant difference between male and females.

Table 1: Socio-demographic characteristics of runners (n=300)

Variables	Females (N=132)	Males (N=168)
Age (Years), Mean(±SD)	21.96 (±6.95)	25.08 (±9.9)
Stature of the participant (cm), Mean (±SD)	160.68 (±4.8)	169.6 (±7.37)
Weight of the participant (kg), Mean (±SD)	63.07 (±9.88)	69.33 (±7.97)
BMI (kg/m2), Mean(±SD)	21.95 (±3.19)	22.16 (±3.21)
Running experience of the participant	3.31 (±2.12)	4.95 (±4.45)
Right leg Q-angle (°), mean (±SD)	7.66 (±2.7)	7.23 (±3.31)
Left leg Q-angle (°), mean (±SD)	8.03 (±2.56)	7.42 (±3.22)
Right side hip flexion (°), mean (±SD)	8.83 (±3.67)	8.96 (±3.66)
Left side hip flexion (°), mean (±SD)	8.68 (±3.7)	8.81 (±3.78)

Q-angle = Quadriceps Angle

Figure 1: The rate of injuries in terms of body part



Injuries according to body parts (calculated from the total number of injuries) occurred; knee, foot and ankle was at the highest rate 31.13%, 18.87% and 16.98% respectively followed by injuries in the back 12.23%, shin 8.5% and hamstring 7.55% (See Figure 1).

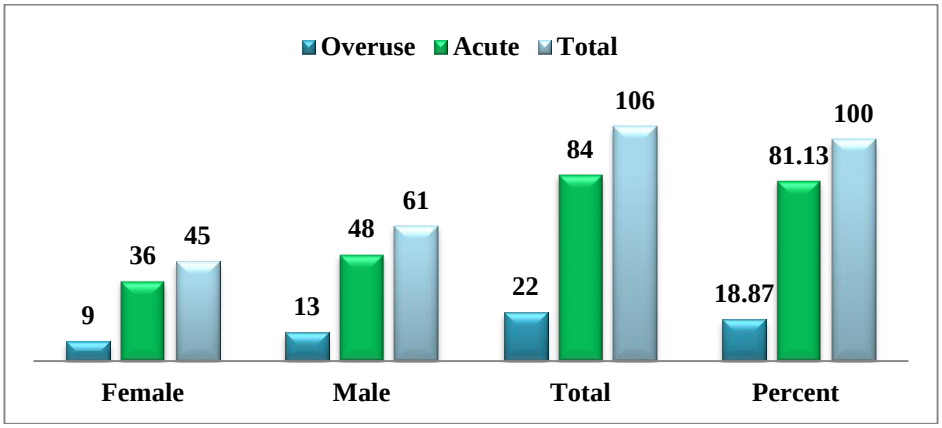
Table 2: Rate and diagnose of injury related to sex

Variables	Females	Percent	Males	Percent	Total	Percent
Tendonitis	10	22.23	9	14.76	19	17.92
Strain/rupture	5	11.12	21	34.43	26	24.53
Sprain	5	11.12	9	14.75	14	13.2
Blister	6	13.14	8	13.11	14	13.2
Shin splint	6	13.14	3	4.92	9	8.5
Abrasion	7	15.56	8	13.11	15	14.15
Dislocation	6	13.14	3	4.92	9	8.5
Total	**45**	**100**	**61**	**100**	**106**	**100**

Regarding the type of injuries diagnosed, 24.53% (n=26) injuries were strain/ rupture followed by tendonitis, 17.92% (n=19) and abrasion 14.15% (n=15). In comparison with the rate and type of injuries, female players were exposed more for tendonitis (n=10, 22.22%) and males (n=21, 34.43%) by strain. (see Table 2)

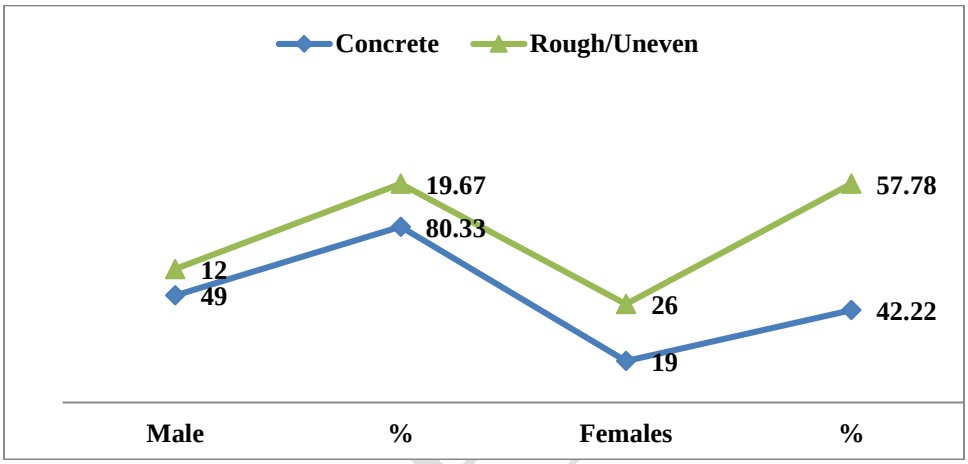
From the total injuries sustained in the season (n=106), 81.13% were acute. Of these, 33.96% were on females and 47.17% were on male runners. On the other hand, 18.87% injuries were overuse, 8.5% on female and 10.38% on males. The odds ratio (OR) of males acute injuries versus females is 0.54 (95% Cl, 0.22 to 1.32) p=0.18>0.05, no significance difference observed. The probability of males for acute injuries was 57.14%, and 42.86% for females, with a relative risk of 1.33 (95% Cl, 0.89 to 1.99) p=0.16>0.05, no significance difference between the two sexes.

Figure 2: Injury classification in terms of sex



From the injured male participants, n=49 (80.33%) of them were injured on concrete or asphalt and n=12 (19.67%) were injured on rough/uneven running surfaces. On the other hand, from 45 injured female recreational runners, n=26 (57.78%) injured on rough or uneven running surface while n=19 (42.22%) of male participants were exposed for injury on concrete or asphalt surfaces.

Figure 3. Injury occurrence on the type of field related to sex



From the total of blister injuries on foot recorded (n=14) in the season, 9/14 (64.29%) of participants used acrylic fiber made socks and the remaining 5/14 (35.71%) were used socks made from cotton fiber.

Odds ratio of blister injuries due to acrylic fiber made socks and cotton fiber made socks was 3.24 (95% Cl: 0.69 to 15.20) p=0.13>0.05, statistically not significant. On the other hand, 38.68% (n=41) from the total number of injuries recorded participants were not wear comfortable running shoes at the time of injury, the rest 61.32% were used comfortable sport shoes.

The odds ratio of female injured players who used comfortable running shoes at the time of injury versus male counterparts was 3.51 (95% Cl, 1.54 to 7.97), p=0.00<0.05, statistically significant association was observed.

The probability of females injuries due to uncomfortable running shoes was 55.56%, and 26.23% for males, with a relative risk of 2.11 (95% Cl, 1.29 to 3.47) p=0.00<0.05, significance difference between the two sexes was observed. Moreover, females were two times more likely to be injured than male because of uncomfortable running shoes.

Table 3: Running components related to sex

	Male		Female	
Training Components	**Injured**	**Non-injured**	**Injured**	**Non-injured**
Running Experience (year), mean (SD)	4.85 (±4.29)	5.15 (±4.75)	3.23 (±1.72)	3.49 (±2.77)
Frequency of running per week (session), mean (SD)	3.34 (±0.77)	3.42 (±0.88)	3.84 (±0.53)	3.73 (±0.58)
Weekly mileage (km), mean (SD)	11.39 (±0.82)	11.35 (±0.72)	13.63 (±0.86)	12.68 (±0.81)

Runners addressed specific components of their running conditioning on set weekdays, thereby prescribing a rigid weekly training schedule and enabling me to monitor their training habits (Tables 3). In addition to the prerequisite running training, participants were required to report whether they performed any cross-training. The female runners ran 24 weeks per a half season including 3.32 sessions per week (SD ±2.13), same as females the male runners ran 24 weeks per a half season including 3.4 sessions per week (SD ±0.84). Regarding cross-training activities, 28 female runners engaged in resistance strength training, while 88 male runners engaged in resistance strength training, aerobics (n=30). Male and female runners who cross-trained were not sustained running injuries.

In relation to the mean weekly mileage, non-injured male runners (n=107) was 11.35km (±0.77), and the injured (n=61) runners was 11.39 km (±0.76) on the other hand the injured females (n=45) weekly mileage was 13.63 km (±0.86) and the non-injured (n=87) was 12.68 km (±0.81). The odds ratio of male weekly mileage versus females was 0.92 (95%Cl: 0.30 to 2.86), p=0.89>0.05. There is no statistically significant difference.

4. DISCUSSION

The total response rate in the study was 85.7% from a sample of 300 players. 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, Sykes, Walker, & Jackson, 2010; Jacobs & Berson, 1986; Hespanhol, Costa, Carvalho, & Lopes, 2012; Satyendra, Morris, & van Heerden, 2013).

Male participation was higher (56%) than in the case of females (44%). This was similar to the study conducted by various studies (Bennell *et al.*, 1996; Brunet, Cook, Brinker, & Dickinson, 1990; Larkins, 1990; Jacobs & Berson, 1986), 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 (Hespanhol *et al.*, 2012). The second objective of the current study is to identify the sites, nature and cause of injuries sustained among recreational runners of Gondar Town.

Among the injured players, knee and foot/toe injuries showed the highest prevalence in the present study which correlate well with studies conducted by Ellapen *et al.* (2013) other study conducted by Hespanhol *et al.* (2012) reported that knee (patellar tendinopathy) and ankle dorsi-flexion tendinopathy was the highest prevalent injuries.

In the present study 35.33% (106/300) recreational runners sustained an injury during the season on both competition and training. Of those who sustained injuries, 42.45% (45/106) were females and 57.55% (61/106) were males 194 runners (64.67%) did not sustain any injuries. This result is lower than that of the results conducted by (Bennell, *et al.*, 1996; Jacobs *et al.*, 1986; Hespanhol *et al.*, 2012). And higher than the result reported by (Buist *et al.*, 2010; Lysholm & Wiklander, 1987).

In the current study, younger age in both male and female participants was high risk of sustaining an RRI. This finding is supported by other studies that conclude that increasing age was significantly related with lower incidences of RRI (Buist *et al.*, 2010; Marti, Vader, Minder, & Abelin, 1988; Mechelen, 1995). A reason for this phenomenon could be ‘‘the healthy runner effect’’, whereby only those runners who stay injury-free continue to run (Buist *et al.*, 2010). Other studies conclude that increasing age is a statistically significant risk factor for sustaining an RRI (Bovens *et al.*, 1989; Mechelen, 1992; Taunton *et al.*, 2003).

In this study higher BMI is associated with sustaining an RRI in male participants. This result is similar with the study conducted by Macera *et al.*, (1989). Macera *et al.*, (1989) added that, heavier persons may have a higher risk of RRI because of the added physical stress of extra weight. Different associations between BMI and RRIs are found in the literature: (Marti *et al.*, 1988) found that lower BMI (<19.5) and higher BMI (>27) were risk factors for development of RRI.

A positive correlation between the incidence of injury and the distance run, has been the most consistently observed result in studies. In a cohort study of 1680 runners followed over a 12 month period, (Walter, Hart, McIntosh, & Sutton, 1989) found that injury risk was higher if individuals ran more than 40 km per week, ran more miles per day on running days, ran longer runs, ran more days per week and ran all year round.

In the current study the mean weekly mileage of the injured (n=61) runners was 11.39 km (±0.76) on the other hand the injured females (n=45) weekly mileage was 13.63 km (±0.86). The finding of this study is not statistically significant and different from the results of other studies.

Supporting Walter *et al.* (1989) finding are the results of a study of 451 runners involved in the 10,000 meter National Championships in New York (Jacobs *et al.*, 1986). Based on the information the runners gave in a self-report questionnaire there was a significantly greater proportion of injured runners than non-injured runners who ran more than 30 miles per week (48% versus 67%, $p<0.001$).

Running surfaces can vary from sand to concrete. As the impact forces from the gait cycle can be two to three times body weight, it is generally believed that running on hard surfaces increases mechanical shock thereby overloading joints and tendons. In the current study more male recreational runners were injured on asphalt or concrete running surfaces (49/61) on the contrary more females were injured on uneven or gravel surfaces (26/45).

In this study there no correlation between running surface and running injury was seen. This is similar with studies conducted by (Brunet *et al.*, 1990; Jakobsen *et al.*, 1989).

5. CONCLUSIONS

The prevalence of musculoskeletal running-related injuries over the last 6 months was 35.33%. The most frequent injuries reported by the runners of this study 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 Gondar).

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