Abstract

The Epidemiology of Musculoskeletal Injuries in 2015-2016 Kuwaiti Track and Field Athletes

Dr. Abdulmajeed M. Almousawi

Objective: To describe the epidemiology of the type and severity of musculoskeletal injuries sustained by Kuwaiti track and field athletes from different sporting clubs during a one-year period from October 2015 to October 2016, and to compare their rates of overuse and acute injuries.

Design*:* Descriptive epidemiology study. *Setting:* All injury data was reported and recorded by Sports Medicine and Health Awareness Center (SMHAC) - Public Authority for Sports in The State of Kuwait.*Participants:* Track and field Kuwaiti male athletes from different sporting clubs during a one-year period from October 2015 to October 2016. A total of 54 Subjects consisted of 19 sprinters and hurdles, 18 middle and long distance, 10 jumpers and 7 throwers.***Main Outcome Measure(s):*** All injury data was obtained and analyzed from The (SMHAC) computer software. ***Results:*** During the study period a total of 334 musculoskeletal injuries from different sports were diagnosed and recorded by physiotherapists in (SMHAC). A total of 54 injuries were reported from male track and field athletes, which accounted for 16.2% of the total of 334 musculoskeletal injuries during 2015-2016 sports season. Track athletes (sprinting and running) suffered more injures 37 (68.5%) than field athletes (throwing and jumping) 17 (31.4%). In addition, sprinters, hurdlers, and middle-distance runners sustained more acute type injuries, whereas jumpers and throwers experienced more overuse type injuries. The most common sites of injury was the knee 20 (37.0%), thigh 9 (16.7%%), ankle 7 (12.9%), back 5 (9.3%), elbow 5 (9.3%) and shoulder 3 (5.6%). The most common major musculoskeletal injuries were muscle strains 19 (35.2%), stress fractures 13 (24.1%), sprains 15 (27.7% including 11 back sprains), and cartilage and ligaments ruptures 7 (12.9%).

Conclusion: It is important to encourage the physiotherapists to record more comprehensive information regarding the time, cause, and the history of the injuries. More detailed information may aide the development of better prevention and rehabilitation programs. It is also very important to achieve adequate and constant cooperation with athletics clubs (coaches, athletes and administrative staff) to facilitate the research process. future studies are required to identify different age groups of track and field athletes that are at increased risk of injury which may develop better prevention for musculoskeletal injuries.

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Introduction:

The Sports Medicine and Health Awareness Center (SMHAC) in the state of Kuwait is affiliated with the Public Authority for Sport. In this way, athletes from a variety of sporting clubs, along with various departments of the Kuwaiti government, can receive care for any sport-related injury or rehabilitation need. While there are other available clinics within sporting clubs, sports federations, and other private physiotherapy centers, the author for the present study only recruited athletes that were registered at the SMHAC. Thus, all data was collected only from the athletes registered at the SMHAC in the state of Kuwait.

Track and field athletics may not be a contact sport, but injuries still occur. Track and field athletics encompass a variety of different events, most of which involve running, throwing, and jumping. Each of these events can lead to different injuries. The major events categories are as follows: sprint events (100, 200 and 400 m), hurdles (110 and 400 m hurdles) and relays (4 × 100 and 4 × 400), middle distance runs (800–1500 m), long-distance runs (5000–10 000 m), which including steeplechase (3000 m) and marathon, Jump events (high, long, triple and pole vault), and throw events (discus, javelin, hammer and shot put) (21).

An Athletics injury is defined as: “A physical complaint or observable damage to body tissue produced by the transfer of energy experienced or sustained by an athlete during participation in athletics training or competition, regardless of whether it received medical attention or its consequences with respect to impairments in connection with competition or training” (12). Also, injury can be defined by (6), as damage to any structure of the body causing discontinuity in function occurred as a result of participation in sport. According to the SMHAC in the state of Kuwait, musculoskeletal injuries are defined

as, 1) one that occurs as a result of participation in practice or competition, 2) one that requires attention from a physiotherapist, and 3) one that results in loss

of athlete's participation in their competitive sport.

An overuse injury is defined as a gradual-onset injury caused by repeated microtrauma without a single, identifiable event responsible for the injury,

whereas, an acute injury is defined as trauma resulting from a specific and identifiable event (6). Given this information about the different definitions of injury, the author of the current paper focused only on the incidence, severity, and type of musculoskeletal injuries sustained by athletes registered at the SMHAC.

The type of injury most commonly sustained by an athlete varies between sports. For example, the most common injury in sprint and relay events is muscle strains, specifically strains of the hamstring. Hamstring injuries can result in significant time away from training and competition, where early return or rushing of the rehabilitation process frequently results in re-injury. In long distance events, injuries are primarily classified as overuse and repetitive stress injuries. These include sprains and strains, as well as stress fractures and shin splints. Middle distance events are often a combination of sprint injuries and long-distance injuries. For long jumpers, high jumpers, pole-vaulters, and triple jumpers, these injuries can be broken down into either overuse or traumatic type injuries. Overuse injuries include tendinopathies and repetitive stress injuries, whereas traumatic injuries occur either at takeoff or landing and can include fractures, acute muscle tears, dislocations, serious ligament sprains (such as ankle sprains), and tendon ruptures. In javelin, shot put, hammer, and discus, these throwing events account for the vast majority of upper extremity injuries in track and field. These include injuries to the rotator cuff and shoulder labrum, as well as the Ulnar collateral ligament from the rotational throws, and lower extremity injuries from planting during a throw. Most track and field injuries involve the lower extremity with muscle and ligament strains and sprains being the most common diagnoses, (23, 26).

The fundamental goal for health professionals in SMHAC is to diagnose, treat, and prevent current and future injuries as well as to facilitate the athlete’s ability to quickly return to training and competitions. Thus, the study of epidemiological data is very important. Epidemiological data can be used to

identify and underline the most significant injuries, and be used to develop prevention strategies to reduce the injury mechanisms and overall risk, as well as to avoid overuse injuries.

Injuries usually occur due to a traumatic or overuse cause, with a greater proportion of injuries occurring during training (> 60 %), than in competition (~20 %) (4). Since there is no record explaining the cause of the injuries in the present study, the author did not instigate this variable.

Injury prevalence is calculated as the number of injures divided by total number of injuries $\times$ 100. Injury prevalence has been suggested as the most suitable measure of injury occurrence and injury rate in sports where athletes are at risk. There are several reasons why an athlete might be at risk. The authors hypothesize that a thorough analysis of each risk factor causing musculoskeletal injuries would be valuable in making an accurate diagnosis for providing appropriate treatment and implementing the appropriate prevention strategies.

Therefore, the authors assessed the incidence, distribution, and type of musculoskeletal injuries reported by 54 track and field athletes between 2015 and 2016, to help develop and implement appropriate injury prevention programs.

Method:

Subjects

During the study period, a total of 334 total musculoskeletal injuries were recorded by physiotherapists. The study sample consisted of 54 Kuwaiti track and field athletes from different sporting clubs, all registered at the Sports Medicine and Health Awareness Center (SMHAC) - Public Authority for Sport in the State of Kuwait during a one-year period from October 2015 to October 2016.

Detailed injury data was prospectively collected by physiotherapists and downloaded in a secure computer database. All data were analyzed using Statistical Package for Social Sciences (SPSS) version 21.0 with level of significant set at $p \leq 0.05$. Numerical values are expressed as means, standard deviations, and percentages.

Statistical significance of differences among the variables was estimated using a one-way analysis of variance (ANOVA), post hoc Tukey test was used to determine whether there were any significant differences between the means of independent groups.

Results:

All the 54 track and field athletes participated in the present study were categorized into the following groups by the SMHAC staff: 19 sprinters and hurdlers (mean age = 22.9 ± 2.2 years), 18 middle and long distance runners (mean age = 21.9 ± 2.4 years), 10 jumpers (mean age = 20.3 ± 2.1 years), and 7 throwers (mean age = 25.4 ± 2.5 years).

The mean height was 169.5 ± (5.3) cm for sprinters and hurdlers, 170.5 ± 5.2 cm for middle and long distance runners, 171.5 ± 5.4 cm for jumpers and throwers 174.4 ± 3.6 cm. The mean weight for sprinters and hurdles, middle and long distance runners, jumpers, and throwers were 67.9 ± 3.4 kg, 66.4 ± 3.5 kg, 65.7 ± 4.6kg, and 94.2 ± 4.1 kg, respectively. BMI (kg/m2) is as follows: sprinters and hurdles (23.8 ± 2.4), middle and long distance runners (22.8 ± 1.5), jumpers (22.6 ± 1.6), and throwers (31.4 ± 2.1).

Table 1: Mean anthropometric characteristic variables of Kuwaiti track and field athletes, illustrated as mean (SD).

Variables	Sprinters and hurdles Mean (SD) (n=19)	Middle and long distance Mean (SD) (n=18)	Jumpers Mean (SD) (n=10)	Throwers Mean (SD) (n=7)
Age (years)	22.9(2.2)	21.9(2.4)	20.3(2.1)	25.4(2.5)
Height (cm)	169.5(8.3)	170.5(7.7)	171.5(8.4)	174.4(7.6)*
Weight (kg)	67.9(6.4)	66.4(8.5)	65.7(8. 6)	84.2(9.1)*
BMI (kg/m^2)	23.8(2.4)	22.8(1.5)	22.3(1.6)	27. 7(2.1)*

**Significantly different between groups at P≤.05*

Height

A one-way analysis of variance between groups using height as a dependent factor yielded significant variations in height between groups, $F(3, 45) = 9.81$, $p < .001$. A post hoc Tukey test showed that throwers were significantly taller than sprinters and hurdlers, as well as middle and long-distance runners ($p < .001$ and $p = .002$, respectively), with no differences compared to jumpers ($p = .109$). In addition, jumpers were significantly taller than sprinters and hurdlers ($p = .023$), with no differences compared to middle and long distance runners ($p = .489$). There were no significant differences in height between sprinters and hurdlers, and middle and long distance runners ($p = .282$).

Weight

A one-way analysis of variance between groups using weight as a dependent factor yielded significant variations in weight between groups, $F(3, 45) = 52.861$, $p < .001$. A post hoc Tukey test showed that throwers weighed significantly more compared to any other group at $p < .001$, with no significant differences between any other group ($p > .188$).

BMI

A one-way analysis of variance between groups using BMI as a dependent factor yielded significant variations in BMI between groups, $F(3, 45) = 96.417$, $p < .001$. A post hoc Tukey test showed that the BMI of throwers was significantly higher compared to any other group at $p < .001$. In addition, jumpers BMI was significantly less compared to sprinters and hurdlers ($p < .001$), with no differences compared to middle and long distance runners ($p = .310$). Furthermore, sprinters had a significantly higher BMI than both middle and long distance runners ($p = .001$), and jumpers ($p < .001$).

Table 2: Prevalence of injuries according to the site of the body

Variables	All injuries recorded numbers (n) and percentage (%)	
Upper extremity 15 (27.8%)	Shoulder	3 (5.٦%)
	Elbow	5 (9.2%)
	Wrist	2 (3.7%)
	Trunk / back	5 (9.2%)
Lower extremity 39 (72.2%)	Hip	3 (5.٦%)
	Thigh	9 (9.2%)
	Knee	20 (37.0%)
	Ankle	7 (12.9%)
Total	**54 (100%)**	

Table (2) showed that the most common sites of injury were within lower extremity of the athletes, accounting for 39 out of a total 54 injuries. Out of 39 total lower extremity injuries, 20 were reported as knee injuries (37.0%), 9 thigh injuries (9.2%), 7 ankle injuries (12.9%) and 3 hip injuries (5.6%). For injuries in the upper extremity; there were 5 reported elbow injuries (9.2%), 5 trunk / back injuries (9.2%), 3 shoulder injuries (5.6%) and 2 wrist (3.7%).

Table 3: Prevalence of injuries according to the events.

Athletics Events	All registered subjects numbers (n) and percentage (%)		
Track Events	Sprinting	19 (35.2%)	37 (68.5%)
	Running	18 (33.3%)	
Field Events	Jumping	10 (18.5%)	17 (31.4%)
	Throwing	7 (12.9%)	
Total	**54**		**(100.0%)**

Table (3) showed that track events athletes (sprinting and running) suffered more injures 37 (68.5%) than field events athletes (throwing and jumping) 17 (31.4%).

Table 4: Prevalence of types of injuries among athletics events.

Diagnosis	Sprinters and hurdles	Middle and long distance	Jumpers	Throwers	Total
Muscle Strain	14 (73.7%)	3 (16.7%)	1 (10.0%)	1 (14.3%)	**19 (35.2%)**
Stress Fracture	2 (10.5%)	11 (61.1%)	–	–	**13 (24.1%)**
Sprain	1 (5.6%)	2 (11.1%)	–	1 (14.3%)	**4 (7.4%)**
Cartilage and ligaments ruptures	1 (5.6%)	1 (5.6%)	3 (30.0%)	2 (28.6%)	**7 (12.9%)**
Back Sprain	1 (5.6%)	1 (5.6%)	6 (60.0%)	3 (42.9%)	**11 (20.4%)**
Total	**19 (35.2%)**	**18 (33.3%)**	**10 (18.5%)**	**7 (12.9%)**	**54 (100%)**

Table (4) showed that according to the sampled group of 54 athletes, the most common diagnosed injury was muscle strains specifically hamstring strains, which accounted for 19 out of the total 54 reported injuries (35.2%). Second most common reported injury was stress fracture with 13 (24.0%) injures, followed by back sprains, which was reported 11 times (20.3%).

Injury patterns varied between athletes. For example, sprinters, hurdlers, and middle – long distant runners sustained more acute type injuries, whereas jumpers and throwers experienced more overuse type injuries. The most common acute injuries were sprains, strains and back sprain, which constituted almost two-thirds of all acute injuries (34 reported; 62.9%). Compared with overuse injuries, stress fractures, and cartilage and ligaments raptures constituted only (20 reported; 37.1%) of all injuries.

To determine if there was a relationship between any of the four groups of athletes and the type of injury that a particular group sustained, the author conducted a chi square test of independence. Adjusted residuals were obtained from the 4 x 5 contingency table and converted to corresponding p-values. Since our contingency table provided adjusted residuals for 20 different hypotheses, our

significance level was adjusted to a p-value of .0025 (0.05/20).

The chi square test of independence revealed that the relationship between the type of track and field athlete and the type of injury sustained was significant, X^2(12, N = 54) = 48.568, p < .001. The converted adjusted residuals revealed a significant relationship between sprinters and hurdlers and muscle strains (p < .001), a significant relationship between middle and long-distance runners and stress fractures (p < .001), and a significant relationship between throwers and back sprains (p < .001). There was no significant relationship between jumpers and any type of injury.

DISCUSSION

The purpose of this investigation was to record and provide epidemiologic data on the numbers and percentages of overuse and acute musculoskeletal injuries sustained by 54 Kuwaiti track and field athletes over a one year period (2015–2016).

O'Connor et al (17) and Pascal and Manuel (19) stated that epidemiological data make it possible to identify and highlight the most relevant injuries and thereby develop appropriate prevention strategies. For example, they surveyed the existing literature focusing on data linked injuries ranging from amateurs at the recreational level to the elite professionals in the IAAF World Championships and the Olympic games. Also, the use of epidemiological data is very important in identifying and underlining the most relevant injuries, the therefore author can develop prevention strategies adapted to the injury mechanisms and risk factors.

The rate of the injury prevalence is high among Kuwaiti track and field athletes (16.2%). When compared to the prevalence of sports injuries in the previous 12 months among Kuwaiti track and field athletes, it appears that sprinters and runners had the highest prevalence (35.2% and 33.3%, respectively) followed by throwers (12.9%) and jumpers (18.5%).

According to our results, we found the most common injury sites were within lower extremity, with the most common diagnosed injury being muscle

strains, specifically stress fractures and back sprains. These results can be compared with already published studies. Marwan et al (13) studied the sports injuries among professional male athletes in Kuwait by looking at the prevalence and associated factors of sports injuries in four ball games - football (soccer), basketball, handball and volleyball. These sports are highly prevalent among professional athletes in Kuwait. They observed, similar to our study, that lower limbs (73.1%) were the most common site of injuries, and joint injuries (43.6%) were the most common type.

According to the data sampled from the SMHAC, sprains and strains were the most common types of injury. These results are in line with other studies. For example, Requa and Garrick (20), in their two-year study of 308 track and field injuries from four high schools found that sprains accounted for 15.5% of all injuries and strains accounted for 45.1%, together accounting for nearly two thirds of the injuries. Hootman et al (7) summarize 16 years of National Collegiate Athletic Association (NCAA) injury surveillance data collected from 15 sports. They suggested that more than 50% of all injuries occurred within the lower extremity. Ankle ligament sprains were the most common injury over all sports, accounting for 15% of all reported injuries. American football had the highest injury rates, whereas men's baseball had the lowest rate in practice.

Dick et al (2) also used 16 years of National Collegiate Athletic Association (NCAA) injury surveillance data for football. The frequency of injuries across 5 general body parts (head/neck, upper extremity, trunk/back, lower extremity, and other/system) was recorded during fall games. More than 50% of all injuries that were within the lower extremity were upper leg contusions, joint knee and ankle ligament sprains. Another study by Kay et al (10) described the epidemiology of severe injuries within 25 National Collegiate Athletic Association (NCAA) sports in the 2009–2010 through 2014–2015 academic years. A total of 3183 severe injuries were reported, Common severely injured body parts were the knee (32.9%), lower leg/ankle/foot (22.5%), and head/face/ neck (11.2%). Common severe injury diagnoses were sprains (32.9%), strains (16.9%), and fractures (14.4%).

Many studies investigate collegiate and high school student athletes. For example, Kerr et al (11, 12) described the epidemiology of injuries among collegiate and high school student-athletes across America. A total of 11 899 injuries were reported; with the most commonly injured body part being the hip/thigh/ upper leg (17.5%) and hand/wrist (18.2%). At both levels, contusions, sprains, and strains were the most frequent diagnoses. Also, Requa and Garrick (20), in their two-year study of 308 track and field injuries in four high schools reported 85% of the all injuries involved the lower extremities. In this study, musculotendinous injuries were the most common. In addition, Tyidis et al (24) recorded injuries sustained by 2045 track and field students who attended athletic schools during September 2009 to May 2010. Most of the injuries (34%) were sprains and strains. Knee and ankle were the most frequent anatomical sites in which injuries (43.9%) occurred. The is further supported by Yang et al (25), who reported 1317 injuries sustained by 573 National Collegiate Athletic Association Division I university athletes during the 2005–2008 seasons. A total of 386 (29.3%) overuse injuries and 931 (70.7%) acute injuries were reported. Football had the highest rate of overuse injury. Therefore, the most common site and type of injury for a track and field athlete does not differ across studies, sample size, or groups.

Several studies follow the Pascal approach to investigate the injuries. For example, Mujalli et al (15) investigated 272 common sports injuries among physical activities practitioners at the physical fitness centers in Jordan. Results showed that the most common sports injury was muscular tears 27.7%, followed by muscle spasms 20.7%, and ligament tears 20.2%. The most exposed parts of the body to injury were the lumbar area 26.8%, and elbows 16.9%, followed by the shoulders 8.9%. Also, Sreekaarini et al (22) studied 461 athletes from athletic training centers in Mangalore, India. They stated that lower limb injuries were found to be more common, as the prevalence was 65% in this study. Ortiz et al (18) observed that ankle region is most frequently injured in jumpers, with the Achilles tendon rupture being the most diagnosed injury.

In general, Kuwaiti track and field athletes sustained more injuries in the lower extremities. Specifically, sprinters and runners sustained mainly knee and ankle injuries. Most of the injuries in the present study occurred within the lower extremities (39/54; 72.2%). These results are similar to studies previously published. For example, Edouard et al (4, 5) studied the occurrence of musculoskeletal injury during one season (9 months) on 1186 athletes from two athletic sporting clubs. They recorded a total of 33 injuries, with the majority occurring within the lower limb and result is similar to Eckard et al (3) and Hunt et al (8). Requa and Garrick (20), in their two-year study of 308 track and field injuries from four high schools reported 85% of the injuries were involved in the lower extremities. Zemper (26) searched databases using Medline and sports discus with search terms (track or field or running) and injuries. The results showed that the lower extremities account for the majority of injuries which is similar to Messier et al (14). Jacobsson et al (9) stated that injury prevalence is high among Swedish elite track and field athletes. Most of the injuries affect the lower extremities. Also, Anita et al (1) studied 78 athletes from the national track and field team of Serbia and reported that the majority of injuries (90.8%) were on the lower extremities. Finally, Ortiz et al (18) stated that ankle region is most frequently injured in jumps and the Achilles tendon rupture was the most diagnose injury. The reasons for high parentages of lower extremities injuries are due to the fact that lower limbs are critical to performance in every event. Especially for sprinters and jumpers where indirect forces on the muscle-tendon junction in joints is exerted (16, 19, 26).

On the other hand, upper extremity injuries are reported frequently in throwers, with shoulder injuries representing the main injury (19). In the present study, out of the 15 upper extremity injuries, elbow and trunk / back injuries are the most diagnosed, representing 10 cases (66.6%), whereas wrist and shoulder injuries were only reported in 5 cases (33.3%).

Conclusion:

The prevalence of musculoskeletal injury among Kuwaiti track and field athletes reported from Sports Medicine and Health Awareness Center (SMHAC) was 16.2% of total musculoskeletal injuries over a 1-year period 2015-2016.

It is important to encourage the physical therapist to record more comprehensive information regarding the time, cause, and the history of the injuries. More detailed information may aide the development of better prevention and rehabilitation programs. It is also very important to achieve adequate and constant cooperation with athletic clubs (coaches, players and administrative staff) to facilitate the research process.

Additional studies are needed to develop communication techniques to provide better prevention and rehabilitation programs for musculoskeletal injuries that ultimately aid the physical therapist in identifying athletes who are at greater risk. Also, future studies are required to identify different age groups of track and field athletes that are at increased risk of injury

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