# Awareness about Cruciate Ligament Injury among General Population of Albaha City

Fares A.M. Alzahrani, Raed A.M. Alzahrani, Abdulrahman A. Alghamdi, Abdulrahman H.A. Alghamdi, Saeed Y.S. Alghamdi, Mashhour M.H. Alghamdi, Ali M.A. Alamri

Faculty of Medicine, Albaha University, Albaha, KSA

## ABSTRACT

**Background:** Anterior cruciate ligament (ACL) injury is very common in young and active individuals who have continued active participation in sports. This injury might cause functional disability with many economic and social consequences. So, there is a need to raise awareness of the general population about this type of injury in order to decrease its incidence and complications.

**Objective:** This cross sectional study was undertaken to investigate the awareness of the general population in Albaha city, Saudi Arabia towards ACL injury.

**Methods:** A self-administered questionnaire was randomly distributed to individuals aged 18-60 years of both sexes, 464 subjects agreed to participate, answered the questionnaire and were involved in the study.

**Results:** Findings showed that 77.8% of the study participants were aware of ACL injury and ranked it as a serious disease. Great percent (36.0%) of the studied persons realized the role of sports as a risk factor of ACL injury. The majority (60.8%) proposed an interaction between two or more of; incorrect technical movements, lack of self- protection awareness, insufficient preparation and overload of exercise. Low percentages of all participants considered prolonged walking, prolonged standing, going up and down stairs, prolonged sitting, getting up from a sitting position, kneeling or squatting or running  actions that might increase the incidence of ACL injury.

**Conclusion:** Findings showed reasonable awareness of the general population in Albaha city about the seriousness of ACL injury, but there was lacking in their information about risk factors other than sports, dangerous actions that increase incidence of ACL injuries and their characteristic symptoms. There is a need for increasing health education and raising awareness and more implementation of prevention programs for ACL injuries.

**Keywords:** anterior cruciate ligament; injury; sports.

## INTRODUCTION

Cruciate ligament consists of two large ligaments each about the size of little finger inside the knee that cross deep inside the joint. They are called the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) and they go from the femur to the tibia. Cruciate ligaments stabilize the knee and allow it to glide through a smooth range of motion as the leg bend and straighten. The ACL is the ligament in the front. It is one of the main static and functional stabilizing structures of the knee and the one most commonly injured [1]. It creates the connection between the femur and the tibia, and serves to prevent anterior translation of the tibia relative to the femur [2].

ACL injury is associated with sports and leisure activities [3]. **von Porat et al.** [4] and **Lyman et al.** [5] reported that this form of injury is very common in individuals who have continued active participation in sports, which affect young and active individuals in the majority of cases. ACL injury is common among athletes and occur primarily in individuals involved in sports with knee pivoting movements such as soccer, football, team handball, basketball and alpine skiing [6,7]. In particular, playing football on a regular basis is one of the main causes of injury [8,9]. **Al Mutawa et al.** [10] reported that the total incidence of the injuries that are associated with football is high in Saudi Arabian athletes. Anterior cruciate ligament injuries in athletes are common, with female athletes having a two to eight times higher incidence of ACL injuries compared with male athletes [11].

About 85% of all ACL injuries occur during training and competitions. **Bispo et al.** [12] reported that road traffic accidents have also been considered as a cause to certain cases of ACL injury. **Agel et al.** [13] assessed that non-contact injuries such as stopping after fast running; cutting to a different direction; and sudden deceleration prior to a change of direction or landing motion from a jump all are responsible about 60% of ACL injuries. By contrast, contact injuries account for approximately 40% of ACL injuries. Generally, they occur when the knee joint is placed in valgus collapse following direct contact with another player [3,14]. ACL rupture can lead to a considerable loss of knee function and disability, and therefore, a reduction in a person's quality of life and has serious clinical and economic consequences [15,16].

Incidence of anterior cruciate ligament injuries in general population ranges from 0.01 to 0.08% [17,18] and the incidence is significantly higher among sports active population (1.5-1.7%) than the entire population but lower than among professional athletes where it ranges between 0.15-3.7% [17,18,19]. **Davarinos *et al.* [20]** estimated that the annual incidence of ACL injury is about 1 in 3,000 amongst the general population in the USA. Anterior cruciate ligament injury is the most common injury associated with sports participation and accounts for approximately 30 injuries per 100,000 individuals in the USA [21]. **Alshewaier [6]** reported that the prevalence of ACL in Riyadh is about 31 per 100,000 individuals. He reported that ACL injury is the most prevalent knee related injury (53%), with young active participants being mostly affected (60%).

Several reports have examined the risk factors for noncontact ACL injury. **Hewett *et al.* [22]** and **Myer *et al.* [23]** reported that decreased notch width, greater tibial slope, poor neuromuscular control, ligamentous laxity, high body mass index (BMI), sex, knee abduction (valgus), and knee laxity are all reportedly associated with an increased risk of ACL injury. In addition, many researchers showed that patients with ACL are at high risk of developing osteoarthritis 10 to 15 years after injury, regardless of treatment [4,24,25]. Therefore, prevention is important in reducing the effect of ACL injury.

ACL injury might be prevented and reduced by raising awareness of techniques that used to help reduce the effect of ACL injury. Such techniques include paying attention in the game and not making a sudden movement that can destabilize knee. Warm up drills also help reduce the injury and stretching the knee and lower body can build muscle and reduce the risk [26].

**Ramjug *et al.* [27]** reported that education and enforced awareness of dangerous positions and mechanisms of ACL injury decreases ACL injuries. It is important to teach athletes to avoid biomechanically disadvantageous and dangerous positions in any sport [27].

Raising awareness about ACL injury and its prevention and treatment may reduce the prevalence of such injury and its complications. **Alshewaier [6]** reported that there is a high the prevalence of ACL injury in younger and active individuals in Riyadh. According to our knowledge, the general level of awareness amongst people among ACL injury is still limited, a fact that highlight the importance to increased awareness about ACL for people in KSA to set appropriate preventative practice to reduce the incidence of ACL injury. However, according to that no study has specifically examined the awareness about cruciate ligament in KSA and especially for the general population in Albaha city. Thus, our aim was to investigate the awareness about cruciate ligament injury among general population in Albaha city in KSA.

**METHODS**

This study was conducted from 1/5/2017 to 1/8/2017, and the study design was approved by the institutional review board of the Faculty of Medicine, Albaha University. An informed consent was obtained from each participant.

This study had a random cross-sectional design that was used to assess awareness of the general population about the ACL injury. This study was carried out among general population of Albaha city in Saudi Arabia.

People who approved to participate in the study were included, but those not achieving inclusion criteria and those with incomplete data were excluded from the study.

A sample size of 464 person, aged between 18 to 60 years both males and females were randomly selected in Albaha city (population size 80,000 person, and a confidence level of 95%, confidence interval of 4).

A self-administered questionnaire was used for data collection. The questionnaire had two parts. The first part was about personal information of the participants. The second part was about awareness and knowledge of people regarding the causes, symptoms and diagnosis of ACL injuries. The questionnaire was distributed to the participants by direct contact with them. Data were confirmed then coded and entered to a personal computer. Thanks and appreciations were used to inspire the participants to be involved in the study.

***Statistical design***

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 20.0. Numerical data were tested for normality using Shapiro-Wilk test and were represented using median and interquartile range (expressed as 25th-75th percentiles). Categorical data were represented as numbers and percentages in brackets and Pearson's Chi Square test was used to examine associations between two variables. Significance was adopted at $p < 0.05$ [28].

## RESULTS

The present study was carried out on 464 participants who completed the questionnaire. Males outnumbered females (58.6% vs 41.4% respectively). Their ages ranged from 18 to 60 years with about half (51.1%) of them belong to the age group 22-<31. Most of the study participants were students and teachers (34.0% and 23.0% respectively). Married participants constituted 51.2% while single ones were 47.1%. All the participants were educated with higher percentage (79.7%) of them in the level of higher education. Their weight ranged from 35.0 – 190.0 with a median of 70 kg and the height ranged from 142.0-200.0 with a median of 166.50 cm (Table 1).

Table (2) shows that more than half (58.2%) of the studied population were practicing sports. Most of them reported walking and football as their favorite sports (40.3% and 17.8% respectively).

Table (3) demonstrates the participant's information about causes of ACL injuries. Higher percentages (77.8%) considered ACL as a serious disease. In addition, nearly half of them (51.9%) considered this injury as a multi-factorial incident resulting from a combination of any of the following risk factors; sports, high body weight, heavy housework and car accidents. But, 36.0% of them attributed sports activities alone as a cause of ACL injuries. The role of high body weight as a cause of ACL injury was considered by 5.6%. Regarding mechanisms responsible about occurrence of ACL injuries during playing sports, 14.9% of the study population attributed this only to incorrect technical movements. The majority (60.8%) proposed a combination of two or more of incorrect technical movements, lack of self-protection awareness, insufficient preparation and overload of exercise.

In this study, only 64 (13.8%) subjects had developed ACL injury with about two thirds of them (65.6%) were for the first time. Half of these participants reported intermittent pain that started with sports and activities. The majority of (85.7%) these participants stated that ACL injury was in the front of the right knee. Most of the injured participants currently returned to normal (40.5%) or nearly normal activity (39.2%) as shown in table (4).

The awareness of the participants about actions that increase the incidence of ACL injuries was illustrated in table (5). Only 6.9% of all participants stated that prolonged walking might increase the incidence of ACL injuries. On the other hand, higher number 324 (69.8%) of them didn't believe this idea. Individuals with previous ACL injury also reported low risk (6.2%) of prolonged walking. The same was observed for other questions where most of the participants didn't consider prolonged standing, going up and down stairs, prolonged sitting, getting up from a sitting position, kneeling or squatting or running responsible about increased incidence of ACL injury (50.6%, 44.0%, 47.0%, 37.5, 65.5% and 43.1%). Alternatively, the majority (38.6%) of the study participants associated the occurrence of ACL injury to sports activities alone with no major differences between individuals with or without previous injury (34.4% and 39.2% respectively).

Regarding the participant's information about methods that could decrease pain of ACL injury, table (6) shows that more than half (59.3%) of all participants stated that rest could alleviate pain. Moreover, higher percentage (65.6%) of individuals with previous ACL injury confirmed this. Ice was chosen as a method to decrease pain of ACL injury by 59.9% of all participants. Additionally, those with pervious ACL injury supported the role of ice significantly more than the remainder (68.8% versus 58.5%, p= .005). Prescription pain medications were selected by 76.9% of all participants and a greater percentage (87.5%) was recorded by individuals with history of ACL injury. On the other hand, only 11.0% of all participants nominated heat and over the counter medications with higher frequencies reported by those with previous ACL injury (15.6% and 12.5%).

Table (7) shows that 44.2% of all participants considered weakness in the leg as a symptom of ACL injury but a lower percentage (34.4%) was reported by individuals with ACL injury compared to those without injury (45.8%). Among all participants, 317 (68.3%) considered giving way or buckling of knee as a symptom with nearly equal frequencies (65.6% and 68.8%) reported by those with or without previous ACL injury. Locking of knee was selected by 59.5% of the participants but, it was rated more frequently (62.5%) by those with previous ACL injury. Clicking, swelling and stiffness of knee joint in addition to pain at night were considered as symptoms by only 33.2%, 52.8%, 28.4% and 34.9% respectively. Higher percentages (46.6% and 43.8%) of the participants didn't know whether stiffness or pain at night might be symptoms of ACL injury.

Table (1): Socio-demographic characteristics of the study participants.

| | | N | % |
|---|---|---|---|
| Sex | Female | 192 | 41.4 |
| | Male | 272 | 58.6 |
| | Total | 464 | 100.0 |
| Age groups (years) | 18- <22 | 54 | 11.6 |
| | 22- <31 | 237 | 51.1 |
| | 31- <41 | 94 | 20.3 |
| | 41- <51 | 59 | 12.7 |
| | 51-60 | 20 | 4.3 |
| | Total | 464 | 100.0 |
| Occupation | Student | 96 | 34.0 |
| | Teacher | 66 | 23.4 |
| | No | 40 | 14.2 |
| | Employer | 34 | 12.1 |
| | House wife | 14 | 5.0 |
| | Doctor | 12 | 4.3 |
| | Police officer | 10 | 3.5 |
| | Engineer | 10 | 3.5 |
| | Total | 282 | 100.0 |
| Marital status | Married | 235 | 51.2 |
| | Single | 216 | 47.1 |
| | Divorced | 8 | 1.7 |
| | Total | 459 | 100.0 |
| Educational level | Primary education | 9 | 1.9 |
| | Secondary education | 73 | 15.8 |
| | Higher education | 369 | 79.7 |
| | Post graduate | 12 | 2.6 |
| | Total | 463 | 100.0 |
| Weight (kg) | Minimum- Maximum | 35.00-190.00 | |
| | Median | 70.00 | |
| | IQR | 60.00 - 84.00 | |
| Height (cm) | Minimum- Maximum | 142.00-200.00 | |
| | Median | 166.50 | |
| | IQR | 159.00-172.00 | |

Table (2): Types of sports practiced by the study participants.

|  |  | N | % |
|---|---|---|---|
| Do you practice any sporting? | yes | 270 | 58.2 |
|  | No | 194 | 41.8 |
|  | Total | 464 | 100.0 |
| Type of sports | Walking | 104 | 40.3 |
|  | Football | 46 | 17.8 |
|  | Football + Walking | 12 | 4.7 |
|  | Weight Lifting | 12 | 4.7 |
|  | Running | 11 | 4.3 |
|  | Physical Fitness Exercises | 11 | 4.3 |
|  | Walking + Running | 9 | 3.5 |
|  | Body Building | 8 | 3.1 |
|  | Football + Swimming | 8 | 3.1 |
|  | Swimming | 7 | 2.7 |
|  | Abdominal Exercises | 6 | 2.3 |
|  | Physical Fitness Exercises + Walking | 5 | 2 |
|  | Football + Body Building | 4 | 1.6 |
|  | Running + Football | 4 | 1.6 |
|  | Walking + Swimming | 3 | 1.2 |
|  | Running + Weight Lifting | 2 | 0.8 |
|  | Volley Ball | 2 | 0.8 |
|  | Jumping | 2 | 0.8 |
|  | Jogging | 2 | 0.8 |
|  | Total | 258 | 100.0 |

Table (3): Information about causes of ACL injury.

|  |  | N | % |
|---|---|---|---|
| Do you consider ACL as a serious disease? | Yes | 361 | 77.8 |
|  | Don't know | 91 | 19.6 |
|  | No | 12 | 2.6 |
|  | Total | 464 | 100.0 |
| Which of the following actions do you think cause ACL injury? | During sporting activity | 167 | 36.0 |
|  | High body weight | 26 | 5.6 |
|  | Heavy housework | 14 | 3.0 |
|  | Car accidents | 10 | 2.2 |
|  | Combined causes | 241 | 51.9 |
|  | Others | 6 | 1.3 |
|  | Total | 464 | 100.0 |
| What do you believe is the cause of ACL injury during Movement or playing sports? | Incorrect technical movements | 69 | 14.9 |
|  | Lack of the self-protection awareness | 38 | 8.2 |
|  | Insufficient preparation | 33 | 7.1 |
|  | Fatigue/poor quality | 20 | 4.3 |
|  | Body collision | 18 | 3.9 |
|  | Overload of exercise | 4 | 0.9 |
|  | Combined causes | 282 | 60.8 |
|  | Total | 464 | 100.0 |

Table (4): Characters of ACL injury in the study participants.

|  |  | N | % |
|---|---|---|---|
| Do you have ACL injury? | Yes | 64 | 13.8 |
|  | No | 400 | 86.2 |
|  | Total | 464 | 100.0 |
| Is it the first time you having ACL injury? | Yes | 42 | 65.6 |
|  | No | 22 | 34.4 |
|  | Total | 64 | 100.0 |
| Did your pain start with a particular sport or activity? | Yes | 8 | 50.0 |
|  | No | 8 | 50.0 |
|  | Total | 16 | 100.0 |
| Injured Knee | Right | 10 | 50.0 |
|  | Neither | 6 | 30.0 |
|  | Left | 4 | 20.0 |
|  | Total | 20 | 100.0 |
| How would you describe your pain? | Constant | 2 | 16.7 |
|  | Severe | 4 | 33.3 |
|  | Intermittent | 6 | 50.0 |
|  | Total | 12 | 100.0 |
| What part of your knee hurts? | Front | 12 | 85.7 |
|  | Inside | 2 | 14.3 |
|  | Total | 14 | 100.0 |
| How would you rate your current level of daily activity? | Normal | 188 | 40.5 |
|  | Abnormal | 78 | 16.8 |
|  | Severely abnormal | 16 | 3.4 |
|  | Nearly normal | 182 | 39.2 |
|  | Total | 464 | 100.0 |

Table (5): Awareness about actions that increase the incidence of ACL.

|  |  | Previous ACL injury | | | | | | Pearson Chi-Square | |
|---|---|---|---|---|---|---|---|---|---|
|  |  | Yes N= 64 | | No N=400 | | Total=464 | | | |
|  |  | N | % | N | % | N | % | $X^2$ | P |
| Prolonged walking | Minimally | 4 | 6.2 | 104 | 26.0 | 108 | 23.3 | 12.61 | .002* |
|  | No | 56 | 87.5 | 268 | 67.0 | 324 | 69.8 |  |  |
|  | Yes | 4 | 6.2 | 28 | 7.0 | 32 | 6.9 |  |  |
| Prolonged standing | Minimally | 10 | 15.6 | 118 | 29.5 | 128 | 27.6 | 6.10 | .045* |
|  | No | 40 | 62.5 | 195 | 48.8 | 235 | 50.6 |  |  |
|  | Yes | 14 | 21.9 | 87 | 21.8 | 101 | 21.8 |  |  |
| Going up or down stairs | Minimally | 12 | 18.8 | 131 | 32.8 | 143 | 30.8 | 5.17 | .075 |
|  | No | 34 | 53.1 | 170 | 42.5 | 204 | 44.0 |  |  |
|  | Yes | 18 | 28.1 | 99 | 24.8 | 117 | 25.2 |  |  |
| Prolonged sitting | Minimally | 14 | 21.9 | 103 | 25.8 | 117 | 25.2 | 1.13 | .56 |
|  | No | 34 | 53.1 | 184 | 46.0 | 218 | 47.0 |  |  |
|  | Yes | 16 | 25.0 | 113 | 28.2 | 129 | 27.8 |  |  |
| Getting up from a sitting position | Minimally | 18 | 28.1 | 127 | 31.8 | 145 | 31.2 | .42 | .80 |
|  | No | 26 | 40.6 | 148 | 37.0 | 174 | 37.5 |  |  |
|  | Yes | 20 | 31.2 | 125 | 31.2 | 145 | 31.2 |  |  |
| Kneeling or squatting | Minimally | 10 | 15.6 | 68 | 17.0 | 78 | 16.8 | 1.64 | .44 |
|  | No | 46 | 71.9 | 258 | 64.5 | 304 | 65.5 |  |  |
|  | Yes | 8 | 12.5 | 74 | 18.5 | 82 | 17.7 |  |  |
| Running | Minimally | 26 | 40.6 | 117 | 29.2 | 143 | 30.8 | 9.92 | .007* |
|  | No | 16 | 25.0 | 184 | 46.0 | 200 | 43.1 |  |  |
|  | Yes | 22 | 34.4 | 99 | 24.8 | 121 | 26.1 |  |  |
| Sports | Minimally | 14 | 21.9 | 129 | 32.2 | 143 | 30.8 | 6.46 | .040* |
|  | No | 28 | 43.8 | 114 | 28.5 | 142 | 30.6 |  |  |
|  | Yes | 22 | 34.4 | 157 | 39.2 | 179 | 38.6 |  |  |

*significant at p<0.05.

Table (6): Knowledge about methods that could decrease pain of ACL injury.

| | | ACL injury | | | | | | Pearson Chi-Square | |
|---|---|---|---|---|---|---|---|---|---|
| | | Yes N= 64 | | No N=400 | | Total =464 | | | |
| | | N | % | N | % | N | % | $X^2$ | P |
| Rest | Minimally | 10 | 15.6 | 57 | 14.2 | 67 | 14.4 | 2.18 | .33 |
| | No | 12 | 18.8 | 110 | 27.5 | 122 | 26.3 | | |
| | Yes | 42 | 65.6 | 233 | 58.2 | 275 | 59.3 | | |
| Ice | Minimally | 2 | 3.1 | 78 | 19.5 | 80 | 17.2 | 10.45 | .005* |
| | No | 18 | 28.1 | 88 | 22.0 | 106 | 22.8 | | |
| | Yes | 44 | 68.8 | 234 | 58.5 | 278 | 59.9 | | |
| Heat | Minimally | 8 | 12.5 | 72 | 18.0 | 80 | 17.2 | 2.42 | .30 |
| | No | 46 | 71.9 | 287 | 71.8 | 333 | 71.8 | | |
| | Yes | 10 | 15.6 | 41 | 10.2 | 51 | 11.0 | | |
| Over the counter medicines | Minimally | 14 | 21.9 | 74 | 18.5 | 88 | 19.0 | .69 | .71 |
| | No | 42 | 65.6 | 283 | 70.8 | 325 | 70.0 | | |
| | Yes | 8 | 12.5 | 43 | 10.8 | 51 | 11.0 | | |
| Prescription pain medicines | Minimally | 6 | 9.4 | 73 | 18.2 | 79 | 17.0 | 4.67 | .097 |
| | No | 2 | 3.1 | 26 | 6.5 | 28 | 6.0 | | |
| | Yes | 56 | 87.5 | 301 | 75.2 | 357 | 76.9 | | |

*significant at p<0.05.

Table (7): Knowledge about symptoms of ACL injury.

| | | Previous ACL injury | | | | | | Pearson Chi-Square | |
|---|---|---|---|---|---|---|---|---|---|
| | | Yes N= 64 | | No N=400 | | Total 464 | | | |
| | | N | % | N | % | N | % | $X^2$ | P |
| Weakness in leg | No | 16 | 25.0 | 83 | 20.8 | 99 | 21.3 | 2.89 | .235 |
| | Don't know | 26 | 40.6 | 134 | 33.5 | 160 | 34.5 | | |
| | Yes | 22 | 34.4 | 183 | 45.8 | 205 | 44.2 | | |
| Giving way or buckling of knee | No | 6 | 9.4 | 28 | 7.0 | 34 | 7.3 | .51 | .77 |
| | Don't know | 16 | 25.0 | 97 | 24.2 | 113 | 24.4 | | |
| | Yes | 42 | 65.6 | 275 | 68.8 | 317 | 68.3 | | |
| Locking of knee | No | 4 | 6.2 | 48 | 12.0 | 52 | 11.2 | 1.84 | .39 |
| | Don't know | 20 | 31.2 | 116 | 29.0 | 136 | 29.3 | | |
| | Yes | 40 | 62.5 | 236 | 59.0 | 276 | 59.5 | | |
| Clicking or catching in knee | No | 24 | 37.5 | 137 | 34.2 | 161 | 34.7 | .57 | .75 |
| | Don't know | 18 | 28.1 | 131 | 32.8 | 149 | 32.1 | | |
| | Yes | 22 | 34.4 | 132 | 33.0 | 154 | 33.2 | | |
| Swelling of knee | No | 4 | 6.2 | 61 | 15.2 | 65 | 14.0 | 3.83 | .147 |
| | Don't know | 22 | 34.4 | 132 | 33.0 | 154 | 33.2 | | |
| | Yes | 38 | 59.4 | 207 | 51.8 | 245 | 52.8 | | |
| Stiffness | No | 16 | 25.0 | 100 | 25.0 | 116 | 25.0 | .004 | .99 |
| | Don't know | 30 | 46.9 | 186 | 46.5 | 216 | 46.6 | | |
| | Yes | 18 | 28.1 | 114 | 28.5 | 132 | 28.4 | | |
| Pain at night | No | 8 | 12.5 | 91 | 22.8 | 99 | 21.3 | 4.21 | .12 |
| | Don't know | 34 | 53.1 | 169 | 42.2 | 203 | 43.8 | | |
| | Yes | 22 | 34.4 | 140 | 35.0 | 162 | 34.9 | | |

## DISCUSSION

This cross-sectional study was undertaken to investigate the awareness of general population in Albaha city, Saudi Arabia towards ACL injury. This will enhance the current knowledge of the ACL injury and help to reduce its incidence and complications. A self-administered questionnaire was randomly distributed to individuals aged 18-60 years of both sexes. 464 subjects agreed to participate, answered the questionnaire and involved in the study.

In this study, 64 participants gave history of ACL injury with a prevalence rate of 13.8%. Most of the injured participants currently returned to normal (40.5%) or nearly normal activity (39.2%). **Waldén *et al.*** [9] stated that the risk of suffering ACL injury is quiet low in the general population compared to sports teams' players. The observed high prevalence seems to be due to that 51.1% of the studied population were young and active belong to the age group 22-<31 in addition to more than half (58.2%) of them were practicing sports. Studies on the prevalence rate of ACL injury in Saudia Arabia population were limited. A recent study based on a questionnaire distributed to the students of Physical Education College at Umm Al-Qura University reported a prevalence rate of 5.3% [29].

Findings showed that 77.8% of the study participants were aware of ACL injury and ranked it as a serious disease. This conclusion agrees with what was reported **Mather *et al.*** [16] who found that ACL rupture can lead to a considerable loss of knee function and disability and therefore, a reduction in a person's quality of life. There is a continued emphasis on the prevention of ACL injury [30]. That's why raising awareness of the general population about this type of injury is highly warranted.

Great percent (36.0%) of the studied persons realized the role of sports as a risk factor of ACL injury. Many studies reported the strong association between occurrence of ACL injury and active participation in sports especially those involving knee pivoting movements such as soccer, football, team handball, basketball and alpine skiing [6,7,9,31]. As regards the retrieved knowledge about the potential mechanisms that could result in ACL injuries during playing sports, 14.9% of the study population attributed this only to incorrect technical movements. The majority (60.8%) proposed an interaction between two or more of; incorrect technical movements, lack of self-protection awareness, insufficient preparation and overload of exercise. In agreement with this, **Walden *et al.*** [32] reported that most of sport-related ACL injuries occurred as non-contact injury that could result from quick sudden deceleration, hyperextension or sudden rotation. Fortunately, these common dangerous positions and mechanisms could be prevented by education and enforced awareness of athletes and the general population practicing sports [26].

In this study, 5.6% of the study population considered high body weight as a predisposing factor to ACL injury. This corroborated with the findings of **Evans *et al.*** [33], **Kluczynski *et al.*** [34] and **Sayampanathan *et al.*** [35] who reported statistically significant higher body mass index in patients with ACL injuries as compared to the general population and attributed this to the increased axial strain placed on the ACL.

In this study, low percentages of all participants considered prolonged walking, prolonged standing, going up and down stairs, prolonged sitting, getting up from a sitting position, kneeling or squatting or running actions that might increase the incidence of ACL injury. Instead, the majority didn't believe this and associated the occurrence of ACL injury to sports activities with no major differences between individuals with or without history of previous injury .Several reports have examined the risk factors for noncontact ACL injury. **Hewett *et al.*** [22] and **Myer *et al.*** [23] reported intrinsic factors such as decreased notch width, greater tibial slope, poor neuromuscular control, ligamentous laxity, high body mass index , sex, knee abduction (valgus), and knee laxity that are associated with an increased risk of ACL injury.

In the current study, there was a substantially high awareness about methods that could decrease pain of ACL injury such as rest, ice and prescription pain medications. Yet, the role of heat and OTC medications was not well known by most of the participants. On the other hand, knowledge of the study participants about symptoms of ACL injury such as weakness in the leg, clicking, swelling and stiffness of knee joint in addition to pain at night were noticeably low (44.2%,33.2%, 52.8%, 28.4% and 34.9% respectively). Hence, there is a need for more health education as when the problems continue to persist without early proper interventions, serious long term impairments such as muscle atrophy and osteoarthritis can ensue [36].

In conclusion, findings indicated reasonable awareness of the general population in Albaha city about the seriousness of ACL injury but, there was lacking in their information about risk factors other than sports, dangerous actions that increase incidence of ACL injuries and their

characteristic symptoms. Hence, there is a need for increasing health education and raising awareness and more implementation of prevention programs for ACL injuries in order to decrease the incidence and consequences of these injuries. Furthermore, national studies addressing the prevalence rate of this injury in the general population and athletes is highly recommended.

## REFERENCES

1. **Margo BJ, Radnay CS, Scuderi GR (2010):** Anatomy of the knee. In: Scuderi, G. R. and Tria, A. J. Jr., editors. The knee: a comprehensive review. Hackensack, NJ: World Scientific Publishing, pp. 1-17.

2. **Rumian AP, Wallace AL, Birch HL (2007):** Tendons and ligaments are anatomically distinct but overlap in molecular and morphological features – a comparative study in an ovine model. Journal of Orthopaedic Research, 25: 458-464.

3. **Kobayashi H, Kanamura T, Koshida S et al. (2010):** Mechanisms of the anterior cruciate ligament injury in sports activities: A twenty-year clinical research of 1,700 athletes. Journal of Sports Science & Medicine, 9(4): 669-675

4. **von Porat A, Roos EM, Roos H (2004):** High prevalence of osteoarthritis 14 years after an anterior cruciate ligament tear in male soccer players: a study of radiographic and patient relevant outcomes. Annals of the Rheumatic Diseases, 63:269e273.

5. **Lyman S, Koulouvaris P, Sherman S et al. (2009):** Epidemiology of anterior cruciate ligament reconstruction: trends, readmissions, and subsequent knee surgery. The Journal of Bone & Joint Surgery, 91(10): 2321- 2328.

6. **Alshewaier S (2016):** Developing A Standardised Preoperative Physiotherapy Programme To Improve The Outcomes Of Patients Undergoing Anterior Cruciate Ligament Reconstruction In Riyadh (KSA). PhD thesis. Manchester Metropolitan University.

7. **Neuman P (2010):** Anterior Cruciate Ligament injury, Patient Variables, Outcomes and Knee Osteoarthritis. Doctoral thesis. Lund University, Sweden.

8. **Lohmander LS, Englund PM, Dahl LL et al. (2007):** The long-term consequence of anterior cruciate ligament and meniscus injuries: osteoarthritis. The American Journal of Sports Medicine, 35(10):1756-1769.

9. **Waldén M, Hägglund M, Werner J et al. (2011):** The epidemiology of anterior cruciate ligament injury in football (soccer): a review of the literature from a gender-related perspective. Knee Surgery, Sports Traumatology, Arthroscopy, 19:3-10.

10. **Almutawa M, Scott M, George KP et al. (2014):** The incidence and nature of injuries sustained on grass and 3rd generation artificial turf: a pilot study in elite Saudi National Team footballers. Phys Ther Sport, 15(1): 47-52.

11. **Goshima K, Kitaoka K, Nakase J et al. (2014):** Familial predisposition to anterior cruciate ligament injury. Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology, 1: 62e66.

12. **Bispo RZ, Kawano CT, Guedes AV (2006):** Chronic multiple knee ligament injuries: epidemiological analysis of more than one hundred cases. Clinics, 63(1): 3-8.

13. **Agel J, Arendt EA, Bershadsky B (2005):** Anterior cruciate ligament injury in national collegiate athletic association basketball and soccer: a 13-year review. American Journal of Sports Medicine, 33: 524-530.

14. **Olsen OE, Myklebust G, Engebretsen L et al. (2004):** Injury mechanisms for anterior cruciate ligament injuries in team handball: A systematic video analysis. The America Journal of Sports Medicine, 32(4): 1002-1012.

15. **Keays SL, Bullock-Saxton JE, Newcombe P et al. (2006):** The effectiveness of a pre-operative home-based physiotherapy programme for chronic anterior cruciate ligament deficiency. Physiotherapy Research International, 11(4): 204-218.

16. **Mather RC III, Koenig L, Kocher MS et al. (2013):** Societal and economic impact of anterior cruciate ligament tears. The Journal of Bone & Joint Surgery, 95: 1751-1759.

17. **Moses B, Orchard J, Orchard J (2012):** Systematic review: annual incidence of ACL injury and surgery in various populations. Res Sports Med., 20: 157-79.

18. **Beynnon BD, Ettlinger CF, Johnson RJ (2007):** Epidemiology and mechanisms of ACL injury in alpine skiing. In: Hewett TE, Shultz SJ, Griffin LY, editors. Understanding and Preventing Noncontact ACL Injuries. Champaign, IL: American Orthopaedic Society for Sports Medicine, Human Kinetics. p. 183-8.

19. **Salmon L, Russell V, Musgrove T et al. (2005):** Incidence and risk factors for graft rupture and contralateral rupture after anterior cruciate ligament reconstruction. Arthroscopy, 21(8): 948-57.

20. **Davarinos N, O'Neill BJ, Curtin W (2014):** A Brief History of Anterior Cruciate Ligament Reconstruction. Advances in Orthopedic Surgery, Article ID 706042, 6 pages.website

21. **Csintalan RP, Inacio MC, Funahashi TT (2008):** Incidence rate of anterior cruciate ligament reconstructions. Perm J., 12(3): 17-21.

22. **Hewett TE, Lynch TR, Myer GD et al. (2010):** Multiple risk factors related to familial predisposition to anterior cruciate ligament injury: fraternal twin sisters with anterior cruciate ligament ruptures. Br J Sports Med., 44: 848e855.

23. **Myer GD, Ford KR, Paterno MV et al. (2008):** The effect of generalised joint laxity on risk of anterior cruciate ligament injury in young female athletes. Am J Sports Med., 36: 1073e1080.

24. **Gillquist J, Messner K (1999):** Anterior cruciate ligament reconstruction and the long-term incidence of gonarthrosis. Sports Med., 27:143e156.

25. **Myklebust G, Bahr R (2005):** Return to play guidelines after anterior cruciate ligament surgery. Br J Sports Med., 39:127-131.

26. **Havens K (2016):** ACL Injuries in Female Athletes: Awareness and Stretching Exercises. Costal Orthopedics. https://www.coastalorthoteam.com/blog/acl-injuries-in-female-athletes-awareness-and-strengthening-exercises.

27. **Ramjug S, Ghosh S, Walley G *et al*. (2008):** Isolated anterior cruciate ligament deficiency, knee scores and function. Acta Orthop Belg., 74: 643-651

28. **Dawson B, Trapp RG (2001):** Basic & clinical biostatistics, 3rd ed, New York, Lange Medical Books-McGraw-Hill.

29. **Alghamdi W, Alzahrani A, Alsuwaydi A *et al*. (2017):** Prevalence of Cruciate Ligaments Injury among Physical Education Students of Umm Al-Qura University and the Relation between the Dominant Body Side and Ligament Injury Side in Non-Contact Injury Type, American Journal of Medicine and Medical Sciences, 7: 14-19.

30. **Waldén M, Atroshi I, Magnusson H *et al*. (2012):** Prevention of acute knee injuries in adolescent female football players: cluster randomised controlled trial. BMJ., 344: e3042.

31. **Alrefaei F (2017):** Anterior Cruciate Ligament (ACL) Injuries in Athletes. World Journal of Pharmaceutical and Medical Research, 3(1): 393-394.

32. **Walden M, Krosshaug T, Bjorneboe J *et al*. (2015):** Three distinct mechanisms predominate in non-contact anterior cruciate ligament injuries in male professional football players: a systematic video analysis of 39 cases. British journal of sports medicine, 49(22): 1452-60.

33. **Evans K, Kilcoyne K, Dickens J *et al*. (2011):** Predisposing risk factors for non-contact ACL injuries in military subjects. Knee Surg Sports Traumatol Arthrosc., 20: 1554–1559.

34. **Kluczynski MA, Marzo JM, Bisson LJ (2013):** Factors associated with meniscal tears and chondral lesions in patients undergoing anterior cruciate ligament reconstruction: a prospective study. Am J Sports Med., 41(12): 2759–2765.

35. **Sayampanathan AA, Howe BK, Bin Abd Razak HR *et al*. (2017):** Epidemiology of surgically managed anterior cruciate ligament ruptures in a sports surgery practice. Journal of Orthopaedic Surgery (Hong Kong), 25(1): 1-6.

36. **Simon D, Mascarenhas R, Saltzman BM *et al*. (2015):** The relationship between anterior cruciate ligament injury and osteoarthritis of the knee. Advances in Orthopedics, 2015:1-11.