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Incidence of Anterior Cruciate Ligament Injury in Collegiate male Soccer and volleyball player

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ABSTRACT: In this study tried to investigate the prevalence of incidence of anterior cruciate ligament (ACL) injury in collegiate male soccer and volleyball. Because it seems the injury in ACL is more common in soccer and volleyball players. The anterior cruciate ligament (ACL) is one of the most commonly disrupted ligaments in the knee. Male college athletes have higher rates of anterior cruciate ligament injury. Rates of anterior cruciate ligament injuries for men in collegiate in two sports activity have not been examined. Understanding anterior cruciate ligament injury incidence in soccer and volleyball, a contact and non-contact sport for men, could further injury prevention efforts. Data were collected from Sports Cultural Olympiad male students 2012-2014 and analyzed to compare anterior cruciate ligament injuries in male college soccer and volleyball athletes from the questionnaire (n=447) and through interviews with injured players. Our results indicate volleyball players are a high-risk sport for anterior cruciate ligament injury although this sport is among non-contact activity. Our study indicated that soccer has the greatest number of ACL injuries (α =1%) rather than volleyball. Our finding may be explained by the fact that soccer involves more contact than volleyball. Factors such as age, sex, chronicity of injury, associated pathology, activity level, attitude, range of motion and motivation must all be considered to compare of ACL injury. It was suggested that these data would be helpful for the reduction of injury risks and the costs besides with proper onsite precautions.

Keywords: anterior cruciate ligament, collegiate, injury

INTRODUCTION

The anterior cruciate ligament (ACL) is one of the most commonly disrupted ligaments in the knee. The injury of the ACL is a typical injury of the knee joint that occurs during sports activities. The ACL is the primary passive restraint against anterior tibial translation and hyperextension of the knee. As a secondary stabilizer, it restrains the varus and valgus as well as internal and external stresses on the knee (Butler *et al.*,1980). It acts like a guide rope during knee extension from flexion (roll-and-glide mechanism of the knee). It averages 31-38 mm in length and 8-11 mm in width (Girgis *et al.,* 1975) and is not a single cord but a collection of fascicles that fan out over a broad flattened area, with a wider and stronger tibial than femoral attachment (Furman *et al.,* 1976). The injury of the ACL is a typical injury of the knee joint that occurs during sports activities (Arendt and Dick 1995, Bjordal *et al.,* 1997, Gray *et al.,* 1986).

It has been well recognized that multiple factors, whether individually or in combination, contribute to non-contact ACL injury. The ongoing mission of the ACL research retreat is to bring clinicians and researchers together to present and discuss the most recent advances in ACL injury epidemiology, risk factor identification, and injury-risk screening and prevention strategies and to identify future research directives (Shultz et al., 2012).Researchers have utilized a range of measurement techniques focused on different at risk groups, evaluated many sports, identified an array of injury mechanisms, and utilized different study designs. Current investigations concerning ACL injury risk focus on a range of potential factors, and the majority of these studies are based on small sample sizes and, as a result, are underpowered. Nowadays, most athletes return to competition following reconstructive surgery, but the time loss from sport and the financial cost of suffering an ACL injury are high (Gillquist and Messner 1999). ACL tear in soccer is quite frequent and they seriously affect players' career with short-term and long-term consequences. It has also been seen that ACL injuries are very invalidating events that require surgical treatments and keeps majority of soccer and volleyball players out of competition at least four months every season. In professional players in two activities it has significant economic consequences. Soccer is particularly known as a sport with a reasonably high risk for ACL injuries (Gwinn *et al.,* 2000, Powell and Barber-Foss 2000).

Injury rates as high as 2.8 and 3.2 injuries per 10,000 athlete exposures have been reported in women's collegiate volleyball and soccer. ACL tears can also occur during rough play, mover vehicle collisions, falls, and work-related injuries (Mihata *et al.,* 2006). About 80% of sports-related ACL tears are "contact" injuries. This means that the injury occurs with the contact of another athlete, such as a tackle in soccer. Most often ACL tears occur when pivoting or landing from a jump such as volleyball. The knee gives-out from under the athlete when the ACL is torn. Non-contact ACL injuries typically occur during deceleration and change of direction with the foot fixed Knee torsion that results from making a sudden directional change on a planted foot has been implicated as a cause of ACL tears. Data such as contact versus non-contact, position of the knee and lower leg, direction of knee collapse, direction of body twisting, and other events were recorded. The number of variables an athlete must respond to in team sports may explain the higher incidence of injuries in sports such as soccer, basketball and taekwondo (Kasbparast *et al.,* 2014). The purpose of this study was (1) to update the rates of ACL injury in matched men's sports (soccer, taekwondo and basketball) and (2) to compare these ACL injury rates to those in men's among this sports activity. We hypothesized that a lower rate of ACL injuries in soccer, taekwondo and basketball athletes would be evident over the past 5 years if any of the excess ACL risk in men athletes was owing to shorter length of participation in organized sport and possibly lower fitness level. We also hypothesized that the risk of ACL injury would be lower in both men's taekwondo when compared with basketball and soccer. We were further motivated by the increasing popularity of soccer and a desire to better understand the differences and trends in injury patterns between soccer, taekwondo and basketball.

MATERIALS AND METHODS

Data were collected from Sports Cultural Olympiad male students 2010-2014 in 2 different ways, from the questionnaire (n=372) and through interviews with injured players (n=138). The sport activities that were considered for the study included: soccer, basketball and Taekwondo male athlete (Table 1). This study aimed to investigate the incidence of knee injuries among collegiate soccer, basketball and taekwondo player and also compared the injury in ACL among sport activities that mentioned. As a result, all acute injuries that occurred during training activities or during competition are reported and collected in the injury registry. All injured players were interviewed during the 2010-2014 to compare player recall with the questionnaire. The interview data were also used to check whether the questionnaire we obtained was a representative sample. The entire athletes were diagnosed as having an ACL injury confirmed by magnetic resonance imaging (MRI) and/or an arthroscopic procedure. Approximately seventy five percent of the subjects visited the clinic within one month, and 25 percent of the subjects visited the clinic within one week after an ACL injury incident. We classified the activity of the subject at the time of the ACL injury in two categories (A) competitions (B) practice.

RESULTS

Our result showed an ACL injury occurred more often during a practice than during competition. The situations during a competition and a practice are different in many respects. Athletes usually spend a much longer time in practice than in competition. Acute or traumatic injuries occur due to a sudden force, or impact, such as a fall or a stumble. Overuse injuries occur over time due to stress on the muscles, joints and soft tissues without proper time for healing. Both types of injuries may result from overuse, lack of proper rest, lack of proper warm ups or poor conditioning. The majority of soccer injuries are caused by trauma; the proportion of overuse injuries accounts for between 9% and 34% of all injuries (Arnason *et al.,* 1996, Nielsen and Yde 1989).

Soccer injuries affect predominately the ankle and knee as well as the muscles of the thigh and calf (Fried and Lloyd 1992, Inklaar 1994).

The incidence of soccer injury has been investigated in several studies, and varies for male outdoor players (>16 years) from 12-35 injuries per 1000 match hours. For youth players, the reported incidences range from 0.5-13.7 injuries per 1000 hours exposure (Dvorak and Junge 2000, Sullivan *et al.,* 1980, Peterson et al., 2000).

In this study injury was defined as any physical complaint caused by soccer and volleyball during inter collegiate training and matches. The duration of absence due to an injury was categorized according to the severity grading up to one week, 8-21 days, or more than 21 days. An injury was categorized as overuse if it was caused by repetitive micro trauma with no identifiable traumatic event. Non-contact injuries included overuse injuries. The classification of an injury as caused without or by contact with another player was based on information about the circumstances of the injury given by the player. The main injury to the ACL being torn is usually non-contact involvement. When it happens though, it is most often in contact sports such as soccer. Of course there are both of injuries in volleyball as well. The reason for this difference in the type of sport and how it happens involves the activities done in each sport. There is usually a rapid change of direction or landing form a jump involved. The most frequent way that the ACL is torn is the athlete has a planted foot with the knee in an almost extended position (sometimes hyper-extended).

Table 1: Sports activities participation (n= 434).

Sport	N	Rate(%)	Height(m)	Weight(kg)	Age(yrs)
Soccer	268	60	1.73	72.3	24.7
Volleyball	179	40	1.87	81,4	21.5

Table 2: Activity at the time of the injury.

Time of injury	Total(434)	Rate (%)
Practice	275	63.4
Competition	159	36.6

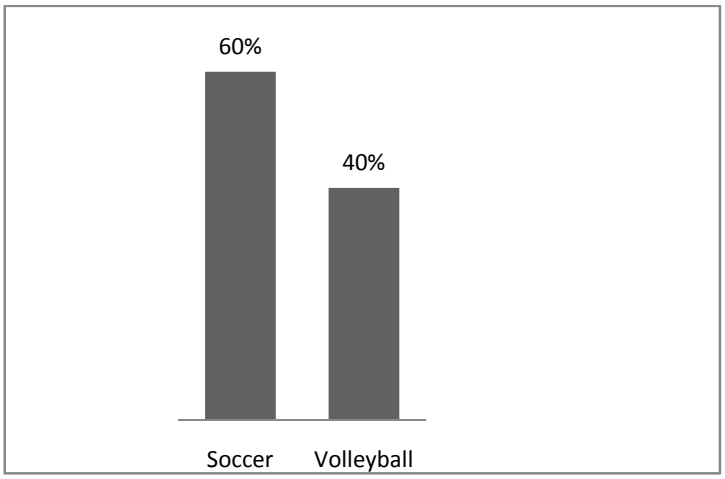

Fig. 1. Comparison ACL injury among soccer and Volleyball.

The most participants in the two sports activities were soccer with 268 athletes and then in volleyball. The sport activities and demographic Characteristics that were considered for the study included: soccer and volleyball male athlete (Table 1). Our results also indicate most time of injury were in during practice (Table 2).

Comparison of ACL injury among sport activities in our study indicated that soccer has the greatest number of ACL injuries (α =1%) with 60% and then volleyball with 40% (Fig. 1).

DISCUSSION

Our main findings demonstrate collegiate athlete male in two sports activity are at risk of ACL injury after participation in the training program and competition. Along with longer commitment, athletes usually challenge new team formation and technique during a practice rather than during a competition, which might increase the risk of injury. However, a more stressful situation might be imposed on the athletes during a competition than during a practice both physically and mentally. The present study is a prospective investigation of the incidence of ACL injury in soccer, and volleyball players. Although the teams were selected to be of a similar age and skill level, the soccer and volleyball players differed substantially in almost all baseline characteristics as well as in the amount of time spent in matches. The proportion of high and low skill level teams did not vary significantly between the groups. Before the results of the comparison of soccer and volleyball injuries are discussed, the incidence of injury for each sport will be compared with the incidences reported in other studies of injury, for the given sport. One of the main problems encountered in attempting to compare incidences of sports injuries reported in the literature is that different evaluation methods and definitions of injury have been used (Finch, 1997, Junge and Dvorak 2000, Van mechelen *et al*, 1992).

Another important aspect in comparing the incidence of sports injuries is the influence of the ratio of time spent in practice relative to time spent playing competitions. Usually, more injuries occurred during practice than during competition sessions and, as such, differences in the ratio of practice and competition hours may bias calculations of the overall incidence of injury. For this reason, it is recommended that the incidence of competition injuries in relation to the time spent in matches, and of practice injuries in relation to the time spent in training, are reported and compared separately.

The rate of soccer ACL injuries over this 2 years period is higher in volleyball. This finding may be explained by the fact that soccer involves more contact than volleyball. Incidental trauma or minimal trauma, which may lead to an awkward landing position or a disturbance in the neuromuscular patterns that protect the knee, may be key factors in ACL injuries (Boden *et al.*, 2000, Feagin and Lambert 1985).

However, without information on the mechanism of how the injuries occurred, this remains a hypothesis (Nisell, 1985). Another possibility for injury differences between this two sport activities can be related to surface that activity done on it. Because, soccer field turf grasses let to athlete to glide and increase risk of injury but in volleyball glide is less. Finally, direct comparisons between soccer and volleyball are problematic because the rules of play are fundamentally different and further study of ACL injury patterns and prospective identification of specific risk factors are warranted and essential to the goal of decreasing injury among an ever-growing group of athletes.

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