Original Article

Prevalence of Anterior Cruciate Ligament Injury among Amateur Footballers in Enugu, South-East Nigeria: The Need for Injury Prevention Programs

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Abstract

Background: Anterior cruciate ligament (ACL) injury is debilitating to any footballer. The injury is sustained in different ways during sporting events. There is need for injury prevention programs among the growing population of amateur footballers. **Aim:** This study was carried out to determine the prevalence of ACL injury among Amateur footballers in Enugu, South-East Nigeria. **Methodology:** An observational study involving 825 of the registered amateur footballers in Enugu Metropolis. Oral interview and adapted knee pain evaluation form were used to screen for knee injuries and followed by Lachman and Pivot shift test to confirm ACL injury. **Results:** The mean age of the participants was 22.7 ± 3.1. The prevalence of ACL injury was 3.6% among the study population (8% for females and 3.5% for males), 56.6% among the participants with a history of knee injuries. Nearly 37.3% of the injuries occurred as a result of torsion/twist, which is a noncontact mechanism, 3.3% due to overuse, 13.3% due to contact/person, and 10.0% due to contact/friction. 70.0% of the injuries occurred during a training session, while 30.0% occurred during competition. Furthermore, 50.0% of athletes sought medical attention from traditional bone setters, 6.7% from physiotherapists, 10.0% from medical doctors, while 30.0% had self-medication. **Conclusion:** The prevalence of ACL injury among amateur footballers in Enugu, South-east Nigeria, falls within that obtained among athletes worldwide, with most of the injuries occurring from noncontact mechanisms during a training session. The prevalence is more in females than males.

Keywords: Amateur footballers, anterior cruciate ligament injury, injury prevention, Nigeria

Introduction

The anterior cruciate ligament (ACL) is the weaker of the two cruciate ligaments of the knee joint. It arises from the anterior intercondylar area of the tibia. It extends superiorly, posterio-laterally to attach to the posterior part of the lateral condyle of the femur.[1-4] It is responsible for restraining the posterior rolling of the femoral condyle on the tibial plateau during flexion as well as stabilizing the knee in full extension.[1,3,5] It also stabilizes the tibia against excessive internal rotation and provides a secondary restraint tor valgus/varus stress with collateral ligament damage.[5] It achieves knee stability together with the thigh muscles, especially the hamstrings.[4]

The ACL injury occurs when there is strain/overstretch or a partial/complete tear of the ligament.[6,7] Excessive flexion and abduction are the common ways of sustaining injuries to the knee joint.[8,9]

An ACL injury could be suspected when a popping sound is heard following an impact with accompanying swelling and severe pain on flexion as well as buckling and locking during

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movement with relief on standing on the affected lower limb.[10] Arthroscopy, imaging modalities and clinical tests are used in diagnosing ACL injuries. Lachman test, anterior drawers test, and Pivot shift test are used clinically in the diagnosis of ACL injuries. Studies[11,12] have shown that a combination of Lachman test and Pivot shift test gives a high specificity and sensitivity. Nkanta[13] reported sensitivity of 95.9% and specificity of 100% for the Lachman test in the diagnosis of ACL injuries. Magnetic resonance imaging (MRI) is better in grading ACL injuries in addition to its use in the diagnosis of ACL injuries,[14] but its value is comparable with the two clinical tests in the diagnosis.[15] ACL deficient knees can have ACL injuries. It exhibit instability more than injuries to other ligaments and may result in functional knee instability in the athlete, causing further tears of the meniscus and their subsequent degenerative changes.[5,7,8,16]

The ACL injury is sustained in different ways during sporting events. By far the most common mechanism of injury involves a noncontact injury twist motion in which the foot is planted and the athlete is attempting to change direction and decelerate thus eliciting valgus stress and external rotation of the knee.[17] Occasionally, the mechanism of injury involves valgus stress, deceleration, and internal rotation.[17,18] Knee hyperextension combined with internal rotation can also produce a tear of the ACL.[2,17] All these are typical movements associated with football.

Football is a high-risk sport that injures the knee most commonly.[19] In recent times, football has become very popular and lucrative with more than 260 million active players,[19] thus there is a tremendous increase in football participation and establishment of football clubs.[20] This invariably will lead to an increase in the incidences of knee injury among these footballers.

Among football players, the ACL injuries global prevalence is between 0.5% and 6.0% for females and 0.6% and 8.5% for males from the earlier study.[19] This has continued to increase tremendously with the increase in participation, especially among the amateur and undocumented street footballers.[16]

In Enugu metropolis, Nigeria, there has been proliferation and registration of amateur football clubs in the past few years. These clubs have reportedly engaged in football activities with minimal input from professional trainers/sports health officials to avert injuries. Thus, there is a need to establish the prevalence of injuries among this group of players to help proffer possible solutions and policy adjustments.

Furthermore, there is a dearth of literature in Enugu Metropolis, Nigeria, regarding the prevalence of ACL injuries among amateur footballers. Therefore, this study seeks to determine the prevalence and mechanism of ACL injuries among amateur footballers in Enugu Metropolis.

Methodology

The present study was an observational study designed to study the prevalence of ACL injury among amateur footballers in Enugu metropolis.

The study area, Enugu, is the capital city of Enugu State, South-eastern Nigeria. It is located at the foot of the Udi Plateau at latitude 6° 27'10" N and longitude 7° 30'40" E. As a state capital, its population has been growing over the years, with an estimated population of about three million inhabitants. The metropolis is housing about seven hundred thousand people (National Population Commission, 2010).[21] It is the home of the famous Enugu Rangers football club and Nnamdi Azikiwe Stadium that has hosted several intercontinental competitions. The Enugu city accommodates numerous cadres of football clubs.

The research population for this study comprised all the registered 1320 amateur footballers spread across 33 amateur football clubs in the three local governments that constitute Enugu Metropolis. 825 amateur footballers (800 males and 25 females) consented to this study.

Oral interview and adapted knee pain evaluation form (Orthopedic Specialists of North Country Knee Pain Evaluation form), which was researcher administered, was used to screen for knee injuries and followed by Lachman and Pivot shift test to confirm ACL.

Ethical approval was obtained from the Training, Research, and Planning Directorate of Enugu State Sports Council, and informed consent was obtained from each participant before the study.

Procedure

Participants were recruited using an oral interview to identify those with a history of knee injuries. An adapted knee pain evaluation form [Appendix 1] was used to identify the athletes with possible ACL injury according to the complaints, characterization of symptoms, and mechanism of injury.

Lachman test and pivot shift tests were further used to identify those with ACL injury.[16,17]

The Lachman test had the participant lie supine on the couch with the knee flexed 20°–30°. The examiner placed one hand behind the tibia with the thumb resting on the tibia tuberosity and the other hand on the thigh laterally. The "thigh hand" stabilizes the femur, whereas the "tibia hand" pulls the tibia anteriorly. The test is positive when the tibia translates anteriorly with a soft mushy feel.

The Pivot Shift test assessed whether there was a sudden sublimation of the lateral tibial condyle on the distal femur when the knee was extended. The participant lies supine with legs relaxed. The researcher grasped the heel of the involved leg with researchers' opposite hand placed laterally on the proximal tibia just distal to the knee. The researcher then applies valgus stress and axial load while internally rotating the tibia as the knee is moved into flexion from a fully extended position. The test is positive if a "clunk" sound is heard alongside the subluxation of the tibia while the femur rotates externally followed by a reduction of the tibia at 30°–40° flexion. The "examiners" were two Physiotherapists and an orthopedic surgeon. They all did

their assessment independently and were also blinded to the result gotten by each other. The two physiotherapists specifically performed the tests with the third researcher (orthopedic surgeon) to come in if there was a conflict (his result was agreed would be overriding). If any of the tests is positive, the participant is classed as positive; however, both tests were positive for all the participants with ACL injury. There was no conflict and thus no input from the third researcher. Afterward, the results were collated and presented for the analysis.

Statistical analysis

Descriptive statistics of mean, standard deviation, frequency, and percentage were used to summarize data. Data analysis was done with the Statistical Package for the Social Sciences (SPSS) software version 25. IBM Corp, Armonk, New York.

Results

The total number of participants in this study was 825. Table 1 shows the demographic profile of the participants. It also shows the number of participants that reported knee injury and the participants that injured the ACL. Almost all the amateur footballers were males and were similar in age to the females.

Table 2 displays the age distribution of the participants with ACL injury, their relative frequency. The age range 21–25 recorded the highest number of ACL injuries at 70% followed by the age range 16–20 at 20%. The percentage frequency of ACL in the whole population was 3.6%.

Table 3 shows the mechanism of ACL injury and relative frequency. The majority of the participants (73.3%) sustained their injury during torsion or twist movements.

Table 4 shows the sessions during which the injuries occurred. Most of the injuries (21 participants [70%]) occurred during training.

Table 1: Gender and anthropometric measures of the participants

Participants	Male	Female	Total
Gender (%)	800 (96.97)	25 (3.03)	825 (100)
Average age in years±SD	22.7±3.1	21.3±2.2	
Average height in m±SD	174.88±6.63	169.21±2.37	
Average weight in kg±SD	72.40±6.67	71.01±7.63	
Average BMI±SD	23.61±0.85	24.84±2.90	

BMI: Body mass index, SD: Standard deviation

Table 5 shows where the athletes that had injuries sought medical attention. Half of the participants sought care from traditional bone setters.

Table 6 portrays the prevalence of ACL injuries in the study population with respect to gender.

Discussion

From the findings of this study, the prevalence of ACL injury in amateur footballers in Enugu metropolis is 3.6%. This falls within the global prevalence rate of ACL injuries (0.5%–8.5%) as was reported by Waldén *et al*.[19] and Mountcastle *et al*.[10] They also reported 3.24% and 3.25% prevalence rate among males and females, respectively. Some authors believed that females have a higher rate of ACL injuries than men. This is because they have smaller notches, smaller ligaments, increased generalized ligament laxity, increased knee laxity, and different landing biomechanics; in landing, women have a greater total valgus knee loading.[22] Therefore, it is not surprising that the prevalence of females in this study is 8.0%, while that for males is 3.5%. The prevalence could be interpreted to mean that facilities and level of play might not be contributory to the incidence of ACL injuries. This is because of the prevalence rate that falls within the global figure despite the wide variation in the training facility seen in the developed world compared to the ones seen in the developing world.[23] Furthermore, the majority of the injury in this study occurred at the age that is supposed to be the prime of career footballer (21–25 years); the age that has been analyzed to be the best morphologically, anatomically, and physiologically.[24]

Hewett *et al*.[25,26] and Caraffa *et al*.[27] in their different studies showed that neuromuscular training and proprioceptive training, respectively, as knee injury prevention program led to a significant reduction in the incidence of knee injury among athletes in their study. This invariably could mean that the prevalence of ACL injury among the study population, and the other studies may be as a result of poor injury prevention facilitation for the athletes which are a product of performance-focused training with little or no attention to injury prevention programs. Most (70%) of the ACL injury reported was sustained during training and not competitive matches. This could mean that attention needs to be paid to the training regimen and methods being employed, and the availability of sports health professionals.

Table 2: Age, frequency distribution, and prevalence of the participants with anterior cruciate ligament injury

Age (years)	Frequency of ACL injury	Relative frequency of ACL injury	Percentage of frequency of ACL injury among the study population (prevalence) (*n*=825)
16-20	6	20.0	0.7
21-25	21	70.0	2.6
26-30	2	6.7	0.2
31-35	1	3.3	0.1
Total	30	100	3.6

ACL: Anterior cruciate ligament

Table 3: Mechanism of anterior cruciate ligament injury and the relative frequency

Mechanism of ACL injury	Frequency	Relative frequency (%)
Contact/person	4	13.3
Contact/friction	3	10.00
Overuse	1	3.3
Torsion/twist	22	73.3
Total	30	100.0

ACL: Anterior cruciate ligament

Table 4: Session and stages of competition during which the injuries occurred

Session	Frequency	Percentage of frequency
Training	21	70.0
Preliminary	3	10.0
Quarter	5	16.7
Final	1	3.3
Total	30	100

Table 5: Medical attention sought by the athletes

Visited	Frequency	Percentage of frequency
TBS	15	50.0
Nil	9	30.0
Medical Doctors/surgeons	3	10.0
Physiotherapists	2	6.7
Nurses	1	3.3
Total	30	100.0

TBS: Traditional bone setter

Table 6: Gender and prevalence of the participants with anterior cruciate ligament injury

Gender	Frequency of ACL injury	Relative frequency of ACL injury	Prevalence (%; $n=825$)
Male	25	83.33	3.03
Female	5	16.67	0.61
Total	30	100	3.64

ACL: Anterior cruciate ligament

The need for sports health professionals is important because their services will go beyond injury prevention, but administering the right treatment and referring the player to the right specialist if need be. This is important because the result of the study showed that 80% of the athletes did not seek orthodox medical attention. Out of these 30% did self-medication, while 50% of ACL injured players sought medical attention from traditional bone setters (TBS). This may be due to ignorance and lack of health-care professionals in the clubs. A report observed that TBS was believed by some athletes to be in the best position to handle their musculoskeletal challenges than orthodox medical practitioners.[28] This patronage of the TBS could be socially accepted, but it could also come with a risk of complications such as compartment syndrome, extremity gangrene[29] thus jeopardizing the chances of a return to play.

The study also showed that torsion and twist accounted for most (73%) of the ACL injuries. This is in agreement with the studies of Dargel *et al*.,[5] Kiapour and Murray,[29] and Labella *et al*.[17] They opined that ACL injuries occur as noncontact (without a direct blow to the knee joint) injuries that follow landing from a jump and lateral cutting maneuvers. It is believed that it could occur in different athletic activities, but it is prevalent in football because the legs are predominantly used in the activities which involve different forms of jumps, twists, and lateral cutting maneuvers at different speeds that could be modulated by the opponent.[28]

Establishment of injury prevention programs in sports to reduce injuries to the lower limbs has been advocated.[30] Such programs are highly needed to reduce ACL injuries.

This work employed Lachman and pivot shift tests which have high sensitivity and specificity when combined to diagnose ACL injuries[11,12] in the population thus saving a lot of costs, but the involvement of a costlier MRI would have been better in grading the ACL injuries. Nkanta and AI Alabi[31] in Kano, Nigeria, demonstrated that in patients with deficient ACL, arthroscopy offers a concomitant advantage of early treatment of associated meniscal injuries. This approach could be of great help instead of resorting to TBS, especially in Enugu city where arthroscopic facilities equally, exist.

Conclusion

The prevalence of ACL injury among amateur footballers in Enugu, South-east Nigeria, falls within the global prevalence rate of ACL injury. It is more in females than in males. The majority of ACL injuries were noncontact injuries occurring as a result of torsion/twist during a training session. Therefore, coaches and players should pay attention to injury prevention programs such as regular neuromuscular training that is designed to enhance proprioception, balance, proper movement patterns, and muscle strength to reduce injuries that might ruin the playing potentials of the amateur footballers, especially ACL injuries.

Limitations of the study

The number of amateur footballers that did not give consent to the study 495 (37.5%) is much and this will reduce strength of the deduction from the study. The study would have been better if the diagnosis of the ACL injury was done with MRI scan, this will enable grading of the ACL injuries and more objective with a reduction in the number of examiners and associated bias, but for the cost.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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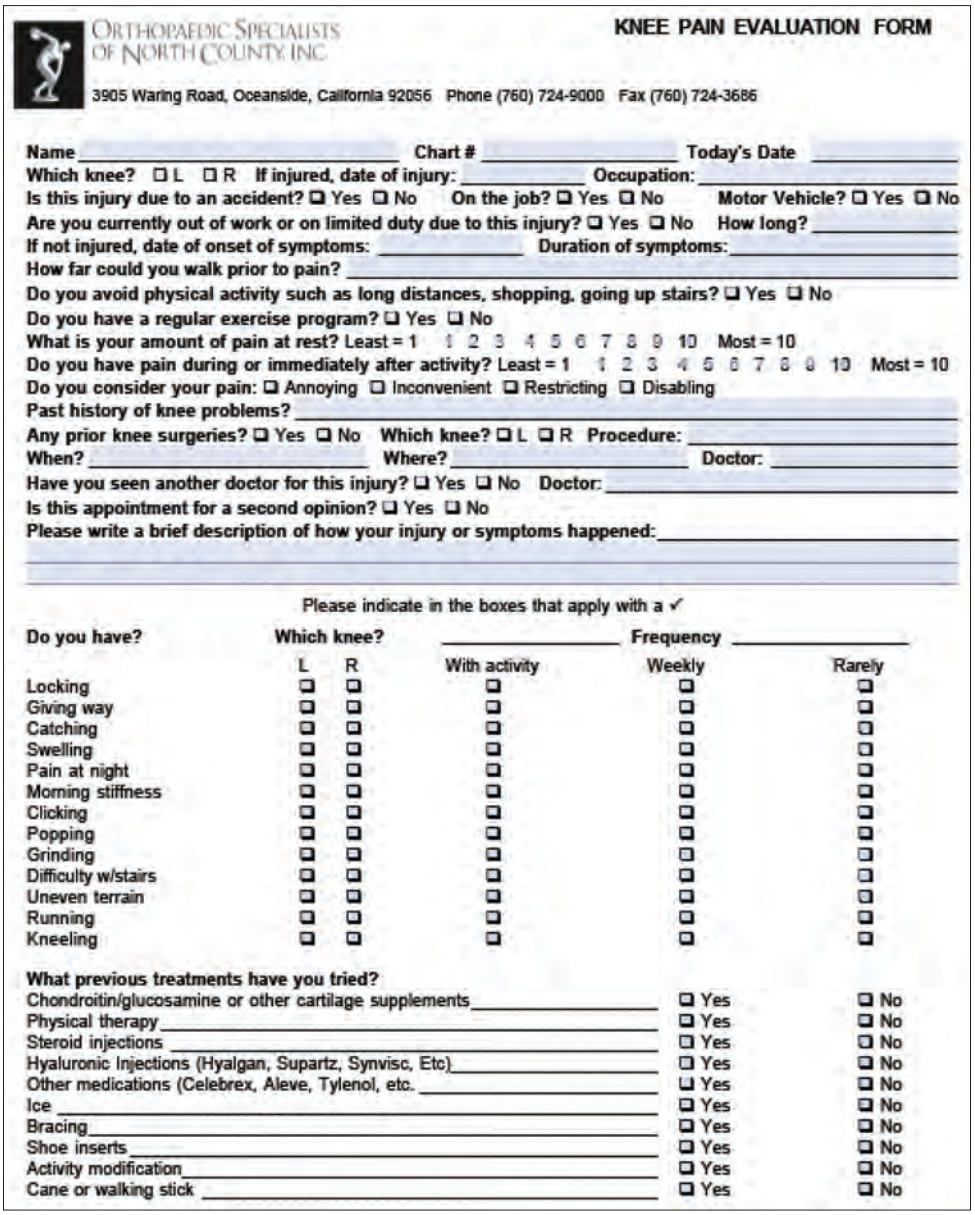

ORTHOPAEDIC SPECIALISTS OF NORTH COUNTY, INC.

KNEE PAIN EVALUATION FORM

3905 Waring Road, Oceanside, California 92056 Phone (760) 724-9000 Fax (760) 724-3686

Name _____ **Chart #** _____ **Today's Date** _____

Which knee? ❑ L ❑ R **If injured, date of injury:** _____ **Occupation:** _____

Is this injury due to an accident? ❑ Yes ❑ No **On the job?** ❑ Yes ❑ No **Motor Vehicle?** ❑ Yes ❑ No

Are you currently out of work or on limited duty due to this injury? ❑ Yes ❑ No **How long?** _____

If not injured, date of onset of symptoms: _____ **Duration of symptoms:** _____

How far could you walk prior to pain? _____

Do you avoid physical activity such as long distances, shopping, going up stairs? ❑ Yes ❑ No

Do you have a regular exercise program? ❑ Yes ❑ No

What is your amount of pain at rest? Least = 1 1 2 3 4 5 6 7 8 9 10 **Most = 10**

Do you have pain during or immediately after activity? Least = 1 1 2 3 4 5 6 7 8 9 10 **Most = 10**

Do you consider your pain: ❑ Annoying ❑ Inconvenient ❑ Restricting ❑ Disabling

Past history of knee problems? _____

Any prior knee surgeries? ❑ Yes ❑ No **Which knee?** ❑ L ❑ R **Procedure:** _____

When? _____ **Where?** _____ **Doctor:** _____

Have you seen another doctor for this injury? ❑ Yes ❑ No **Doctor:** _____

Is this appointment for a second opinion? ❑ Yes ❑ No

Please write a brief description of how your injury or symptoms happened: _____

Please indicate in the boxes that apply with a ✓

Do you have?	**Which knee?** L	R	With activity	Weekly	Rarely
Locking	❑	❑	❑	❑	❑
Giving way	❑	❑	❑	❑	❑
Catching	❑	❑	❑	❑	❑
Swelling	❑	❑	❑	❑	❑
Pain at night	❑	❑	❑	❑	❑
Morning stiffness	❑	❑	❑	❑	❑
Clicking	❑	❑	❑	❑	❑
Popping	❑	❑	❑	❑	❑
Grinding	❑	❑	❑	❑	❑
Difficulty w/stairs	❑	❑	❑	❑	❑
Uneven terrain	❑	❑	❑	❑	❑
Running	❑	❑	❑	❑	❑
Kneeling	❑	❑	❑	❑	❑

What previous treatments have you tried?

Chondroitin/glucosamine or other cartilage supplements	❑ Yes	❑ No
Physical therapy	❑ Yes	❑ No
Steroid injections	❑ Yes	❑ No
Hyaluronic Injections (Hyalgan, Supartz, Synvisc, Etc)	❑ Yes	❑ No
Other medications (Celebrex, Aleve, Tylenol, etc.	❑ Yes	❑ No
Ice	❑ Yes	❑ No
Bracing	❑ Yes	❑ No
Shoe inserts	❑ Yes	❑ No
Activity modification	❑ Yes	❑ No
Cane or walking stick	❑ Yes	❑ No

Appendix 1: Knee pain evaluation form