Nutritional Status and Causes of Anterior Cruciate Ligament Injury in Relation with Exercise Habit Among Patients of a Tertiary Care Hospital

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Abstract

Background: ACL injuries, is a serious problem in sports. Treatment of ACL injury is costly and it often takes 12 months or more to return to sports or in worst case and lead to early retirement. The long term outcome is also concerning issue. **Objective:** The goal of this study was to identify the nutritional status and causes of injury in relation with exercise habit among the patients with anterior cruciate ligament injury. **Methods:** A cross-sectional descriptive study was carried out in a super specialty modern tertiary care level hospital in Dhaka, Bangladesh. Total 63 samples were collected purposively to conduct this study. Data were collected through face to face interview by pretested semi-structured questionnaire and anthropometry was measured by standard technique. Prior data collection written consent was taken from the respondents. Descriptive as well as inferential statistics were used for data analysis. **Results:** The mean age (±SD) of the respondents was 27.52 (±7.59) years where 95.3% were male patients and 4.7% were female patients. Regarding their nutritional status, 23.8%, 55.6% and 20.6% were normal, over weight and obese respectively. Moreover 61.9% respondents had regular exercise habit whereas 38.1% respondents had no regular exercise habit. Besides there was no significant association (p>0.05) found between causes of injury and types of injury with exercise habit. **Conclusion:** Most of the patients were over nourished and no significant association was found between vehicle used and causes of injury. Further large scale study is needed to get actual picture.

Key words: Nutritional Status; Exercise Habit; ACL Injury.

INTRODUCTION

The anterior cruciate ligament (ACL) is one of the most common injury prone ligaments of the knee joint. The incidence of ACL injuries is currently estimated at approximately 200,000 per year and 100,000 ACL reconstructions performed per year[1]. The primary anatomical and structural factors examined relative to ACL injury include ACL morphology, tibial and femoral surface geometry, knee-joint laxity and lower limb structural alignments. Most of what is known is based on sex comparisons and females greater susceptibility to ACL trauma[2]. It is estimated that 70 percent of ACL injuries occur through non-contact mechanisms where as 30 percent result from direct contact in sports[1].

The ACL database was initiated in 1990 to identify demographic, anthropometric and mechanistic variables associated with intra-articular injury. Height best predicted tibial and patellar damage. Body Mass Index (BMI) better predicted medical femoral condyle lesions, whereas weight better predicted lateral and patellofemoral injury[3].

ACL injuries, is a serious problem in sports. Treatment of ACL injury is costly and it often takes 12 months or more to return to sports or in worst case and lead to early retirement. The long term outcome is also concerning issue. A majority of athletes will develop osteoarthritis within 15 to 20 years after an ACL injury. A recent literature review had been found in 23 studies that female football players have 2 to 3 times higher ACL injury risk compared to their male counterparts. Females also tend to sustain an ACL injury at younger age than male[4].

ACL injury occurs for two reasons: the failure load of the ligament and the mechanical load\applied to it. Female ACLs will fail at relatively lower loads than males, and female's pelvic anatomy also predisposes women to higher mechanical loads on the knee. The combination of these factors leads to increased four to six times ACL tear for female than males[5]. ACL tear can also happen in older individuals through slips and falls and more commonly seen in over 40 years of age[6]. To identify socio-demographic characteristics, nutritional status and causes of ACL injury among the patients with ACL tear was my ultimate goal.

MATERIALS & METHODS

Study design: This study was a cross-sectional hospital based study.

Study population: Patients were those who attending for the treatment of ACL injury in Apollo Hospitals Dhaka.

Inclusion criteria: Patients with ACL injury undergoing reconstruction surgery and Physiotherapy treatment (Rehabilitation) and age 16+years or skeletally mature.

Exclusion criteria: History of damage to structures in addition to the ACL. If they had history of rheumatological, neurological, cardiovascular or congenital conditions affecting the lower limbs.

Sample Size: Sampling was designed on the basis of the availability of patients in the study place. As there was no previous study and scarcity of sample as well as time constrain I had to take 63 samples.

Sampling technique: Samples were allocated purposively

Study Place: Knee Centre, Apollo Hospitals Dhaka

Study period: From January 2013 to December 2013

Data collection technique: Face to face interview

Data collection Instrument: Pre-tested semi structured questionnaires, height and weight measuring machine and BMI was determined according WHO cut off value for Asian people[7].

Method of data analysis: All interviewed patients were coded and entered into the computer using SPSS 11.5 version of computer technology for data entry and analysis. Data were checked and rechecked by researcher himself thoroughly. Data were presented tabular as well as graphical form.

Ethical consideration: Permission was taken from the research committee of Bangladesh Diabetic Samity (BADAS). Permission was also taken from authority of Apollo Hospitals Dhaka.

RESULTS

Demographic characteristics of respondents were summarized in table 01. Maximum respondents (22.2%) were in 26-30 years age group and the mean age (± SD) of the respondents was 27.52 (±7.59) years. Male and female distribution was 95.3% and 4.7% respectively. In terms of occupation 42.8%, 30.2%, 19.0%, 4.8% and 3.2% were student, service holder, businessmen, house wife and armed forces personnel respectively. Besides SSC, HSC, graduate and post graduate were 4.8%, 36.5%, 34.9 and 23.8% respectively.

Table 1 : Distribution of the respondents according to their socio-demographic status (n=63)

Characteristics	n (%)
Age in years	
Mean (±SD)	27.52 (±7.59)
Minimum	16
Maximum	46
Range	30
Age group in years	
(16-20) years	13 (20.6)
(21-25) years	12 (19.0)
(26-30) years	14 (22.2)
(31-35) years	13 (20.6)
(36-40) years	7 (11.1)
(41-45) years	3 (4.8)
≥ 46 years	1 (1.6)
Sex	
Male	60 (95.3)
Female	3 (4.7)
Occupation	
Service	19 (30.2)
Armed forces personnel	2 (3.2)
Student	27 (42.8)
Business	12 (19.0)
Housewife	3 (4.8)
Education	
Master's Degree and above	15 (23.8)
Bachelor Degree/ Graduate	22 (34.9)
HSC/A Level	23 (36.5)
SSC/O Level	3 (4.8)

Results were expressed as number and percentage

This figure showed that most of the respondents (61.9%) belonged to upper middle income group (21301-65800), 15.9% were high income group (>65801) and 19% were lower middle income group (5001-21300) and 3.2% were lowest income group according to 2006 Gross National Income (GNI) per capita and using the calculation of World Bank[8].
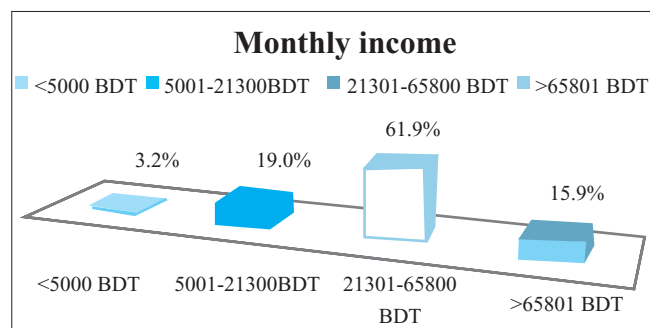
Figure 1 : Distribution of the respondents by monthly family income (n=63)

Morethan half of the respondents 55.6% were over weight, 20.6% respondents were obese and 23.8% respondents were in normal BMI among the total 63 patients.
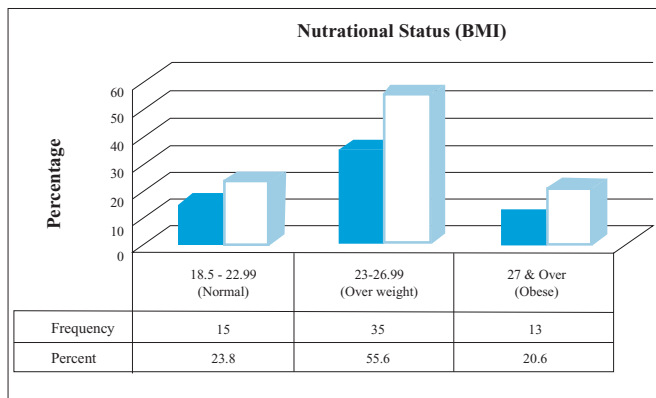
Figure 2: Distribution of the respondents according to nutritional status (n=63)

Figure 3 : Distribution between regular exercise/sports activity habit and injury type of the respondents (n=63)

Table 2 showed that 61.9% respondents had regular exercise habit and their mean 0.421 SD ±0.345 whereas 38.1% respondents had no regular exercise habit with their mean 0.494, SD±0.443. This table revealed that there was no significant association found between causes of injuries and types of injury in relation with exercise habit $x^2/p = 10.482/ 0.163$ (p = > 0.05).

ACL injury with history of twisting was only two patients. These result also shows there were no significant relationship between causes of ACL injury and type of vehicle used $x^2/p=15.19/0.76$, (p<0.05).

Table 3 : Association between vehicles used and causes of injury (n=63)

Causes of Injury	Type of Vehicle use N (%)							χ^2/p
	Rickshaw	Car/Jeep	Bus	Bi-cycle	Motorcycle	Others	Total	
Sports injury/ Sustained trauma in sports	14(36.8)	11(28.9)	8(21.1)	1(2.6)	4(10.5)	0(0)	38(100.0)	15.19/0.76
RTA	4(23.5)	2(11.8)	5(29.4)	0(0)	5(29.4)	1(5.9)	17(100.0)	
Fall from height/ Accidental fall	2(50.0)	1(25.0)	1(25.0)	0(0)	0(0)	0(0)	4(100.0)	
Twisting injury	0(0)	0(0)	1(50.0)	0(0)	1(50.0)	0(0)	2(100.0)	
Others	0(0)	1(50.0)	0(0)	0(0)	1(50.0)	0(0)	2(100.0)	
Total	20(31.7)	15(23.8)	15(23.8)	1(1.6)	11(17.5)	1(1.6)	63(100.0)	

A cross-tabulation was performed where $x^2/p=15.19/0.76$, (p<0.05)

Table 2: Ratio statistics for causes of injury/ type of injury with exercise habit (n=63)

Exercise Habit	Frequency (Percentage)	Weighted Mean	Std. Mean	Deviation	Coefficient of Dispersion	Coefficient of Variation (Median Centered)
Yes	39 (61.9)	0.421	0.351	0.345	0.815	129.8%
No	24 (38.1%)	0.494	0.380	0.443	0.810	141.7%
Overall	63 (100%)	0.449	0.362	0.383	0.743	120.1%

Chi-square test were performed between exercise habit with types of injuries

$\chi^2/p = 10.482/ 0.163$ and exercise habit with causes of injuries $\chi^2/p = 2.414/0.660$.

Figure 3 showed that 26% had total ACL tear, 41% had total ACL tear with medial miniscus injury, 13% ACL total tear with lateral miniscus injury, 13% comples injury and only 2% had partial ACL tear with lateral miniscus injury among the respondents who had regular exercise habit. On the other hand 8% respondents had partial ACL tear, 13% total ACL tear, 13% ACL partial tear with medial miniscus injury, 38% ACL total tear with medial miniscus injury, 17% ACL total tear with lateral miniscus injury and 8% had complex injury among the respondents who had no regular exercise habit.
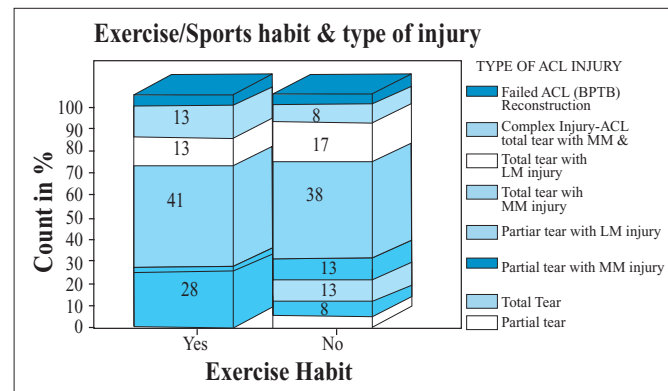
DISCUSSION

The recent practice trend in the physical therapy profession has been "evidence-based practice." Sample size was sixty-one individuals with acute ACL tears (21 females, 40 males) with a mean age of 26.03 ±7.99 years (range, 14–47 years)[9]. Another Study were shown that eighty-four patients (86% males; overall mean age=39 years, SD=9, range=21–58; female mean age=39 years, SD=9, range=24–58; male mean age=40, SD=9, range=21–58)[10]. Whereas in this study the mean age and (± SD) of the respondents was 27.52 (±7.59).The age range were minimum 16 and maximum 46. Among the total respondents of 63, male and female was 60 (95.3%) and only 3 (4.7%) respectively. A study was conducted to compare functional out comes after primary hamstring-graft anterior cruciate ligament reconstruction in patients with body mass index (BMI) classes. They reviewed 92 patients among them 49 were normal BMI and 43 were high BMI.

Results showed that there were no significant differences between the groups in pre and post operative ligament laxity; whereas high BMI group had slightly increased post operative complication rather than normal BMI group[11]. From the present study we found that there were no significant association between BMI category and causes of ACL injury $\chi^2/p = 4.31/0.828$ (p = <0.05). More than half of the respondents 55.6% were over weight, 20.6% respondents were obese and only 23.8% respondents were in normal BMI. Mean and SD of BMI was 2.97 (± 0.61). Sports injury were common cause of ACL injury and the most of the non-contact ACL injuries occurred during sudden twisting motion. Other common causes of ACL injuries occurred fall from bike and motor bike[12]. Whereas common causes of ACL injury in this study were 60.32% from sports injury that was the main cause responsible for more than half of the ACL injury, 27% ACL injury occurred from RTA, 6.34 % ACL injury occurred from fall and twisting were responsible only 3.17 % of ACL tear.

CONCLUSION
This study identified that most of the respondents were overnourished and there were no significant relationship between causes of injury and type of injury with regular exercise habit. Besides no significant association was seen among vehicle used and causes of ACL injury. Further large scale study was needed and this study result should not be generalize.

DISCLOSURE
All the authors declared no competing interest.

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