journal homepage: https://pathfinderpub.com/index.php/pathfinder-of-research/

Pathfinder of Research

ISSN (3007-3863), Vol. 2, Issue 1, April 2024

Original Research

Proportion of Knee Injuries Among the Army Population Attending Orthopedic Department, Combined Military Hospital, Dhaka

Most. Shamima Khatun[a*], Shahafuj Alam Apu[b], Md. Mosaddir Hossain Foysal[c], Farhana Irin[d]

[a]MPH, Institute of Biological Science (IBSc), Rashahi University, Rajshahi -6205.
[b]PhD, Advocate, SA Legal Counsel, Baridhara DOHS, Dhaka, Bangladesh
[c]Students, Civil Aviation School and College, Dhaka, Bangladesh
[f]Health and Nutrition Care Center, Khulna, Bangladesh

Corresponding author: shamima.megh@outlook.com

ARTICLE INFO

Article History:
Received: 15 January 2024
Accepted: 05 April 2023
Online: 09 April 2024

Keywords
Knees, knee injuries, army personnel, ACL tear, osteoarthritis

ABSTRACT

Knees are essential for everyday movements, and deficiencies can lead to disability. A cross-sectional study of 83 army men at CMH Dhaka sought to determine the incidence of knee injuries. The majority were male (92.8%), Muslim (97.6%), and aged 20-29 (45.8%), with a mean age of 34.80 ± 13.29 years. The majority (71.1%) were married, had HSC education (55%), and worked as ORS (73.5%). The monthly income of 45.8% varied between Tk. 26000 and Tk. 47000. ACL tear (55.4%), osteoarthritis of the knee (21.7%), medial meniscus tear (19.3%), fracture of the shaft tibia (12.0%), posterior cruciate ligament tear (8.4%), lateral meniscus tear (7.2%), fracture of the shaft femur (7.2%), knee dislocation (6.0%), and patella fracture (4.8%). ACL tears peaked at 20-29 (54.9%) and medial meniscus tears at 20-29 (62.5%), respectively, whereas osteoarthritis was most prevalent at 40-49 (27.8%). There was a significant association ($p<0.05$) between knee injuries and age. Given the high frequency of knee injuries among army personnel, increased awareness initiatives are critical. Larger sample sizes are recommended for thorough knowledge.

1. Introduction

Knee injuries cause trauma to one or more of the tissues that comprise the knee joint, including ligaments, tendons, cartilage, bones, and muscles (Tufael et al., 2024). These injuries can result from a fall, a strong twisting of the knee, or a severe impact from a car accident or another force (Beynnon et al., 2014; Rana et al., 2024). Knee disorders are quite frequent, affecting people of all ages. Knee difficulties can make it difficult to participate in sports or even get out of a chair and walk. This can have a significant influence on life (Bari et al., 2023). It is one of the most often damaged body parts. Common knee ailments include sprains, strains, bursitis, dislocations, fractures, meniscus tears, anterior cruciate ligament (ACL), and overuse problems (Salam et al.,

2024; Sazzad et al., 2023). Knee injuries are often caused by a twisting or bending force exerted to the knee, or by a direct strike, such as in sports, falls, or accidents. The majority of knee injuries are caused by an external force that bends or twists the knee in an unnatural way. Common causes of knee injuries include twisting mechanisms from falls, sports, or accidents. A twisted knee can harm the ligaments and cartilage (Beynnon et al., 2014; Kuddus et al., 2022).

Knee pain affects one-third of all young adults at some point in their lives. This is often caused by an imbalance in the muscles around the knee joint, which affects the knee cap (patella).It is also known as runners' knee since it is more frequent in those who run or participate in other sports (Moniruzzaman et al., 2023; Sunny et al., 2023). The most prevalent location of injury was the knee (42.1% of all injuries) (Jennings et al. 2008). According to a Sheffield study, the knee is the most often injured joint, with soccer and rugby posing the largest dangers. Our national game has been compared to a knee condition rather than a sport. Knee injuries may necessitate surgery. A knee injury may necessitate surgery and months of therapy, as well as permanent impairment from both sports and employment (Webb and Corry 2000; Islam et al., 2023).

Knee injuries are the most common musculoskeletal injuries in the Army, most likely because to the mechanically strenuous nature of many sorts of Army occupations, and they are particularly relevant since they frequently result in disability. On the other hand, is described as the loss of mental or physical abilities. From 1999 to 2008, 6.6 million knee injuries were reported to US emergency rooms, with diagnoses including strains and sprains (42.1%), contusions and abrasions (27.1%), and lacerations and punctures (10.5%) (Gage et al. 2012; Hossain et al., 2023a).

Approximately 40% of all sports injuries involve the knee joint. According to knee injury data, over 30,000 injuries occur annually in frontal motor vehicle incidents in the United States.Soccer accounts for 35% of these injuries. Half of those who have an ACL damage do not return to their prior sports activities (Beynnon et al., 2014; Hossain et al., 2023b; Salam et al., 2024). The prevalence of knee injury was 23.2% (n=112). The majority of them were wounded while participating in sports, particularly soccer, with 68.7% sustaining injuries through non-contact mechanisms. The most common diagnosis among individuals who visited a hospital was contusion (31.4%), followed by meniscus rupture, ACL, and collateral ligament damage (Almaawi et al. 2020; Alam et al., 2023a). The distribution of knee injuries revealed that anterior cruciate ligament (ACL) injuries were the most prevalent kind. There was a distribution of knee injuries, with anterior cruciate ligament (ACL) injuries accounting for the majority at 45.2%. Meniscus injuries and internal derangement injuries came in second and third, respectively (Albashri et al. 2021; Alam et al., 2023b).

Soldiers serving in the military must do physically demanding tasks, which can lead to significant physiological stress (Hill et al. 2013; Chakma et al., 2022). According to Kovčan et al. (2019), members of the Bangladesh Armed Forces carry out duties including firing rifles, carrying rucksacks, walking, sprinting, excavating, transporting heavy objects like ammunition, hanging

from hand grips, crawling, climbing, and rope descents. The Bangladesh Armed Forces undertake their sacred duty of preserving peace in the Chittagong hill tracks, an outstanding and crucial role in nation-building operations, and play a significant role in disaster management as part of the broader national disaster response plan (Emran et al. 2020; Kuddus et al., 2020).

Overuse injuries accounted for 66% of injuries sustained by Bangladesh Kirra Shikha Protistan participants, whereas direct injuries impacted 34% of participants. Also, according to Bristi 2010), the total participant history of recurrence is 56% greater than the non-recurrence rate of 44%. As per (Rahman et al. 2020), the most prevalent kind of knee injury was an ACL damage, accounting for 37.9% of cases. Sprain/contusion (12.4%), meniscus injury (10.5%), combined ACL and medial meniscus injury (12.4%), and patellar fracture/dislocation (2%) were the least common injuries. Preventive cruciate ligament (ACL) injuries accounted for 48% of all impacted knee injuries. Sports-related injuries occurred on athletic fields during games and sports, training-related injuries occurred at stadiums, and other activities caused injuries at 26.5%, 27.2%, and 26.5% of cases (Beynnon et al., 2014; Salam et al., 2024).

Knee injury is one of the major public health issues in Bangladesh. In particular, armed forces personnel are particularly vulnerable to knee injury due to factors such as increased susceptibility to joint injury, direct damage to joint tissues, or impaired repair processes in damaged joint tissue (Dulay et al., 2015; Sunny et al., 2017; Kuddus et al., 2021). Despite this, there is a need for data regarding the pattern of knee injury that is pertinent, feasible, and urgently needs to be collected regarding Bangladeshi armed forces personnel.

The Combined Military Hospital (CMH) in Dhaka has designated this study's purpose to investigate the patterns of knee injuries among Army patients who visit the orthopedic department. By reducing man-hour loss and improving operational capabilities, the study's findings will assist policy makers in taking the proper steps to avoid and manage knee injuries among members of the armed forces, which will eventually boost the nation's socioeconomic growth. The study's outcome also aids future researchers in their research by providing a deeper analysis of this issue.

2. Research Methodology

The purpose of this cross-sectional study was to determine the percentage of knee injuries among army personnel who visited the orthopedic department at the Combined Military Hospital (CMH) in Dhaka, Bangladesh, between July and December of 2022. The research was carried out in a tertiary-level hospital that serves members of the military services, their families, civilians, and those rescued from mishaps and natural disasters. The facility is renowned for its advanced diagnostic and therapeutic capabilities. Using a basic random sampling approach based on probability, 83 individuals in total were selected. In order to collect data, in-person interviews were conducted using a semi-structured questionnaire and checklist. Careful attention was paid to ethical issues, such as providing appropriate briefing, obtaining informed consent, addressing

sensitivities, upholding participant rights, protecting privacy, and avoiding any potential personal gain for the researcher. SPSS 26 was used to analyze the data.

3. Results and Discussion

3.1. Sociodemographic characteristics

The first table shows the demographic characteristics of the study population, which included 83 respondents. The age distribution shows that 45.8% of respondents are between 20 and 29 years old, with a mean age of 34.80 ± 13.29. Notably, males make up 92.8% of all responders. The religious mix is primarily Muslim (97.6%). It also shows that 71.1% of the respondents are married. In terms of educational standing, 55% have finished HSC/equivalent schooling. 73.5% of responders fall under the Other Ranks (ORS) group. Finally, the monthly household income distribution shows that 45.8% falls between TK.26000-47000. This detailed breakdown of demographic information offers the groundwork for a nuanced investigation of knee injuries among the army population at CMH Dhaka.

Table-1 Distribution of sociodemographic characteristics among the respondents

Variables	Parameters	Frequency	Percentages (n=83)	Statistics
Age(years)	20-29	38	45.8	Mean± SD (year)
	30-39	20	24.1	= 34.80 ± 13.29(year)
	40-49	14	16.9	Minimum=20 years
	50-59	05	6.0	Maximum=74 years
	60-69	03	3.6	
	≥70	03	3.6	
Sex	Male	77	92.8	
	Female	06	7.2	
Religion	Muslim	81	97.6	
	Hinduism	01	1.2	
	Buddhism	01	1.2	
Marital status	Married and	59	71.1	
	Unmarried	24	28.9	
Educational status	Secondary (VI -X)	04	5.0	
	SSC/Equivalent	17	21.0	
	HSC/Equivalent	46	55.0	
	Graduate/equivalent	14	17.0	
	Masters and above	02	2.0	
Occupational status	Officers	04	4.8	
	JCOs	06	7.2	
	ORS	61	73.5	
	Retired	12	14.5	

Monthly family income	6000- 25000	35	42.2	Mean±SD (Tk) =30795.18± 17710.93 (Tk) Minimum=6000 Tk Maximum=100000 Tk
	26000-47000	38	45.8	
	48000-67000	6	7.2	
	68000-87000	2	2.4	
	≥88000	2	2.4	

3.2. Proportion of knee injuries:

Table 2 shows that among the respondents, the maximum was 46 (55.4%) with ACL tear, 18 (21.7%) with knee osteoarthritis, 16 (19.3%) with medial meniscus tear, 10 (12.0%) with tibia shaft fracture, 7 (8.4%) with PCL, 6 (7.2%) with lateral meniscus tear, 6 (7.2%) with femur shaft fracture, 5 (6.0%) with knee dislocation, and 4 (4.8%) with patella fracture.

Table -2: Proportion of knee injuries among the respondents

Type of knee injury	Frequency	Percentage
ACL (Anterior Cruciate ligament) tear	46	55.4
MCL (Medial Collateral ligament) tear	04	4.8
PCL (Posterior Cruciate ligament) tear	07	8.4
Medial meniscus tear	16	19.3
Lateral meniscus tear	06	7.2
Fracture of patella	04	4.8
Fracture of shaft of femur	06	7.2
Dislocation of knee	05	6.0
Osteoarthritis of knee	18	21.7

3.3. Cross tabulation regarding knee injury and age

Table 3 demonstrates that the maximal ACL tear is 25 (54.9%), while the greatest MCL tear is 2 (50%). There were 6 (85.7%) PCL tear maximums and 10 (62.5%) medial meniscus tear maximums among those aged 20 to 29. Among osteoarthritis of the knee, the greatest five (27.8%) were within the age bracket of 40-49 years

Table 3 shows the age distribution of knee injury respondents (n=83).

Knee injury	Age (year)						Total	P value
	20-29 f (%)	30-39 f (%)	40-49 f (%)	50-59 f (%)	60-69 f (%)	≥70 f (%)		
ACL tear	25(54.9)	12(26.1)	9(14.6)	0(0.0)	0(0.0)	0(0.0)	46(100.0)	0.007
MCL tear	2(50.0)	1(25.0)	1(25.0)	0(0.0)	0(0.0)	0(0.0)	4(100.0)	0.06
PCL tear	6(85.7)	0(0.0)	1(14.3)	0(0.0)	0(0.0)	0(0.0)	7(100.0)	0.01

Medial meniscus tear	10(62.5)	3(18.8)	3(18.8)	0(0.0)	0(0.0)	0(0.0)	16(100.0)	0.000
Lateral meniscus tear	4(66.7)	1(16.7)	1(16.7)	0(0.0)	0(0.0)	0(0.0	6(100.0)	0.007
Fracture of patella	1(25.0)	2(50.0)	1(25.0)	0(0.0)	0(0.0)	0(0.0)	4(100.0)	0.028
Fracture of shaft of femur	1(16.7)	3(50.0)	0(0.0)	2(33.3)	0(0.0)	0(0.0)	6(100.0)	0.001
Fracture of shaft of tibia	3(30.0)	4(40.0)	2(20.0)	1(10.0)	0(0.0)	0(0.0)	10(100.0)	0.004
Dislocation of knee	3(60.0)	1(20.0)	0(0.0)	1(20.0)	0(0.0)	0(0.0)	5(100.0)	0.002
Osteoarthritis of knee	1(5.6)	3(16.7)	5(27.8)	3(16.7)	3(16.7)	3(16.7)	18(100.0)	0.000

4. Discussion

In the current study, 45.8% of respondents were between the ages of 20 and 29. The mean age of the respondents was 34.80 years, with a standard deviation of 13.29 years, which is nearly similar to the findings of the study conducted by Rahman et al. (2020) on "Pattern of knee injury cases attending combined Military hospital Dhaka" among army population in Bangladesh, where they found that the majority of the respondents (41.8%) were between the ages of 25 and 34 years. A different study done by Majewski et al. (2006) on "Epidemiology of Athletic Knee Injuries" among sport societies in Germany indicated that the majority of respondents (43.1%) were between the ages of 20 and 29. The reason of increased knee injury among 20-29-year-olds in a two-person study might be attributed to the fact that the majority of respondents in this age group participate in various sorts of play, physical activity, and physical training, as well as too much of two respondents in this age range.

The results of the current study showed that the age group of 40–49 years had the highest percentage of osteoarthritis (27.2%), which differs with the findings of the study by Paradowski et al. (2006), which found that "knee complaints vary with age and gender in the adult population." The maximum 68% of osteoarthritis cases among adult population of knee injury and osteoarthritis patients in Sweden were found to be within the age group of 18–84 years, according to population-based reference data for the knee injury and osteoarthritis outcome score (KOOS). This finding may have been caused by differences in the age group and study area.

The mean age of the respondents in the current study was 34.80 years, which differed from the mean age of the respondents in a study by Collins et al. (2013) on the "Cumulative incidence of ACL reconstruction after ACL injury in adults: role of age, sex, and race" among adult population in America, which showed that the mean age of the respondents was 47.00 years. ORS (Sainak to Sergent) in the defense service contributed to a further increase in the young population, which now accounts for nearly three-quarters (73.5%) of the overall population.

The current survey showed that the majority of respondents (92.8%) were male and 7.2% were female. This research's conclusion is consistent with a study done by Sallis et al. (2001) on "comparing sports injuries in men and women" among athletes, which showed that 54.3% were male and 45.7% were female. Morgan et al. (2017) did another study on "the role of gender and physical performance on injuries: an army study" in the United States, and discovered that 42% were male and 53% were female. The source of dissimilarity with the current study may be related to changes in sample size, study population and sampling technique.

Another study conducted in London by Hede et al. (1990) on "epidemiology of meniscal lesions in the knee: 1,215 open operations in Copenhagen 1982-84" found that 90.2% were male, which is consistent with the current study. According to this research, 97.6% of the participants were Muslims. It is consistent with Bangladesh's demographic profile, which shows that Muslims make up 90.4% of the population.

The current study's findings, which show that more than half of the respondents (55%) were HSC/equivalent qualified, are comparable to research done in 2002 on "soldiers with musculoskeletal injuries" among US army personnel (Jennings et al., 2008). That study also found that 54% of the respondents had college degrees. A different study was carried out by Bristi (2010) on the "prevalence of sports injuries among female athletes" and in 2013 by Hill et al. (2013) on the "risk factors for soft tissue knee injuries in active-duty U.S. army soldiers, 2000–2005" among US army soldiers. The results of these studies showed that 38% and 2/3rd of the respondents, respectively, had secondary (high school) level education. The present study indicates a decline in secondary level and a gain in HSC/equivalent, which might indicate that the educational status of the population has improved. Additionally, the majority of respondents were service people.

The current study's findings that 73.5% of the population were ORS are almost identical to those of a study done by Lovalekar et al. (2016) on the "descriptive epidemiology of musculoskeletal injuries in the army 101st airborne (air assault) division" among US army personnel, which found that 70% of the population were soldiers. In a different study on "soldiers with musculoskeletal injuries" among US army population Jennings et al. (2008) found that 86% of the population were soldiers. This finding differs from the current study and could be attributed to differences in sample size, sample technique, and study population.

In the present study, it was revealed that the mean monthly income of respondents were Tk 30795.18, which is similar to the study conducted by Ferdous et al. (2020) on "Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study" among the general population in Bangladesh, and Chang et al. (2022) on "patient-reported quality of life before and after total knee arthroplasty: a prospective multicenter cohort study," where it was found that the mean income of the respondents were Tk >30000 and Tk >28000 (>2000 CNY), respectively. Another distinct study done by Feng Xie et al. (2008) on "a study indirect and intangible costs for patients with knee osteoarthritis in Singapore" where the

mean monthly income of the respondents was Tk 110,071,74 (US$1200) The current study's lower income might be attributed to Singapore's higher economic development than our nation.

The percentage of knee injuries among soldiers was gathered via a check list in which respondents indicated whether or not they answered the question. ACL tears were found in 55.4% of the respondents in the current study, which is almost identical to the results of studies by Beynnon et al. (2014) and Gianotti et al. (2009) among the general population in New Zealand on the "Incidence of anterior cruciate ligament injury and other knee ligament injuries: A national population-based study" and among American women on the "increased slope of the lateral tibial plateau subchondral bone is associated with greater risk of noncontact ACL injury in females but not in males" respectively.

ACL tears affected 68.6% of young people in America, according to different research by. Sanders et al. (2016) titled "Incidence of anterior cruciate ligament tears and reconstruction: a 21-year population-based study." ACL injuries affected 22.6% of adult Americans, according to different research by Collins et al. (2013) on the "cumulative incidence of ACL reconstruction after ACL injury in adults: role of age, sex, and race." Another study on "factors associated with the mechanism of ACL tears in the national football league was carried out by (Brophy et al. 2021) among American athletes revealed that 70% of ACL tears. The reason why the current study differs from the prior study might be because of the sample size, population sampled, and sampling method used.

In the present study, it was shown that 21.7% were suffering from osteoarthritis, which is nearly similar to the findings of the study conducted by Wilder et al. (2002) "history of acute knee injury and osteoarthritis of the knee: a prospective epidemiological assessment, the clearwater osteoarthritis study" among older adults, where they found that 27.3% were osteoarthritis. Another research done by Neogi (2013) on "The epidemiology and impact of pain in osteoarthritis" among adult population in the United Kingdom, where they discovered that 33.6% were suffering from osteoarthritis. A further study on 'anterior cruciate ligament injury and knee osteoarthritis: an umbrella systematic review and meta-analysis discovered that 36% of patients had OA (Webster and Hewett 2022). A study among elderly population in Nigeria found that 52.4% were suffering from osteoarthritis (Yılmaz et al., 2019). The current study differs from earlier studies due to a different sample size, sampling demographic, and sampling strategy. In this study, 19.3% had medial meniscus tears, which is substantially identical to a study on meniscal tears associated with anterior cruciate ligament injury which reported 19.9% had meniscal tears (Hagino et al., 2015).

Kilcoyne et al. (2012) did a separate investigation on the "epidemiology of meniscal injury associated with ACL tears in young athletes" among military athletes in the United States, and discovered that 39.6% had a meniscal tear. The higher risk of meniscal tear in the prior study compared to the current analysis might be attributed to the inclusion of an ACL tear with meniscus damage. In a population-based cohort study of young adults in Sweden found 10.5% had a

meniscal tear (Snoeker et al., 2020). The previous research's lower rate of meniscal tears was owing to the fact that the study cohort consisted of civilians who were not at risk of vigorous activities. This study found 10 (12.0%) tibial shaft fractures, which differs from a study done in German, where they discovered that 49.4% to 63.2% of patients suffered fractures of the tibial shaft (Bode et al., 2012). The greater rate of tibial fracture in the prior study might be attributed to the fact that it was a review of tibial fractures.

4. Conclusion and recommendation

The knee is a complicated joint that works like a door hinge, allowing a person to bend and straighten their legs to sit, crouch, leap, and run. It is made up of four components: bones, cartilage, ligaments, and tendons. The study was conducted to determine the proportion of knee injuries among army personnel who visited both the outdoor and indoor orthopedic departments at the joint military hospital in Dhaka, Bangladesh. According to the study, the most common knee injuries include ACL tears, osteoarthritis of the knee, medial meniscus tears, lateral meniscus tears, tibia shaft fractures, femur shaft fractures, and knee dislocations. The majority of responders with ACL tears, medial meniscus tears, lateral meniscus tears, and dislocation of the knee were between the ages of 20 and 29. In this study, all forms of fractures, such as tibial shaft fractures, femoral shaft fractures, and patella fractures, were identified in people aged 30-39. The majority of responders with osteoarthritis were between the ages of 40 and 49. In this case, a health education campaign should be implemented among the research population to avoid ACL tears, medial meniscus tears, lateral meniscus tears, and knee dislocations, with a focus on male responders aged 20 to 29. Steps should be done to avoid osteoarthritis among responders, with a focus on the 40-49 age range. A motivational program should be developed for past cases of all sorts of fractures, including tibia shaft fractures, femur shaft fractures, and patella fractures. By participating in health education and raising knowledge about the presentation of knee injuries. More in-depth research on a representative sample might be undertaken to establish the proportion of knee injuries among the army community.

Funding
This work had no outside funding.

Author Contribution
Each author took involved in the creation of the study design, data analysis, fieldwork, and execution stages. Every writer gave their consent after seeing the final work.

Acknowledgments

We would like to thank the beneficiary for providing the information that was needed during the interview.

A statement of conflicting interests

The authors declare that none of the work reported in this study could have been impacted by any known competing financial interests or personal relationships.

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