

PATTERN OF INJURIES AMONGST ARMED FORCES PERSONNEL RECEIVED DURING MILITARY ACTIVITIES

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Abstract

Introduction: Armed Forces personnel suffer from various patterns of injuries during their military training activities which may lead to considerable mortality & morbidity. The high incidence of injuries places a substantial burden on the health care delivery system. Successful treatment outcome and modifications can reduce the operational, fiscal, and health impact of these problems.

Objective: To find out the types, causes and morbidity pattern of common injuries received by the members of Bangladesh Armed Forces during their military activities.

Methods: This is a descriptive retrospective study carried out to explore the injuries amongst Bangladesh Armed Forces personnel due to military duties. The study population (193) included all injured indoor cases treated in Combined Military Hospital (CMH) Dhaka during the period of January 2009 to December 2009. Data was collected by reviewing the case sheets of patients and analyzed with the help of SPSS Version 11.5.

Results: Numbers of Injured subjects amongst the Army personnel were 132(68.4%) followed by 34(17.6%) in Navy and 27(14%) in Air Force. Among them 82(42.5%) belonged to fighting group, 50(25.9%) supporting and 61(31.6%) service group. Knee injury constituted the highest number of patients i.e. 43(22%), followed by

33(17%) Armand 25(13%) foot injuries. About one fourth, 53(27.5%) cases sustained injury in sports ground followed by 50(25.9%) in operation area and 28(14.5%) in training ground. Physical training events PT/Drill caused maximum injury 7(3.6%) followed by crossing 6ft wall 5(2.6%), horizontal rope 4(2.1%). Maximum duration of hospital stay among the cases were 1-2 weeks in 65(33.7%) followed by 3-4 weeks in 56(29%) and 1-3 months in 41(21.2%) cases. Eighty two (42.5%) injured cases suffered for 3 to 6 months followed by 43(24.4%) for 6 months to 1 year. Out of all cases 72(37.3%) were recommended for medical category C, 2(1%) for category B, 11(5%) were Medically Boarded Out (MBO).

Conclusion: The study revealed that musculoskeletal injuries especially in knee, foot, shoulder, forearm, ankle, lower leg and patella are prevalent in armed forces personnel. The high incidence of injuries places a substantial burden on the health care delivery system and leads to many lost training days. Careful study and analysis in this regard definitely will explore new dimension to prevent and combat this preventable health burden.

Key-words: Injury, Military activity, Armed Forces Personnel.

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Introduction

Injury is recognized as a leading health problem worldwide among both civil and military personnel. In 2002, some 161,269 people died as the result of injuries. Fatal injuries (n 106,742) were the leading cause of death for those aged between 1 and 45 years^{1,2}. In US, there were 743,547 injury-related musculoskeletal conditions in 2006. In the matrix, 82% of injury related musculoskeletal conditions were classified as inflammation/pain (overuse), followed by joint derangements (15%) and stress fractures (2%). The knee/lower leg (22%), lumbar spine (20%), and ankle/foot (13%) were leading body region categories³. Each year, an estimated 1.5 million people with injuries are discharged from hospitals, representing the 2nd most common discharge diagnosis and 30 million people are treated for injuries in hospital emergency departments, accounting for 30% of all emergency department visits⁴. Physical training and physical fitness are required to accomplish military missions. The fitness needed to function in an operational unit varies by the type of unit but in general, are higher in combat arms units than in combat support or combat service support units. Bangladesh Armed Forces personnel are involved in physical training or courses, physical efficiency test, various sports and games; UN adapted training, activities in the field like assault bayonet fighting, unarmed combat, organized drill, parade and basic military training. Coordinated, well-planned and multifaceted approaches based on understanding of the factors involved will have a positive impact on reducing the levels of injuries.

Materials and Methods

This descriptive retrospective study was carried out to explore the injuries amongst the Bangladesh Armed Forces personnel who received indoor treatment from Combined Military Hospital Dhaka, where referred cases of complicated injuries from all over the Armed Forces units are treated. A total of 772 injured cases received indoor treatment in the orthopaedic, surgical, neurosurgery and officers ward of CMH, Dhaka during the period of January 2009 to December 2009. Cases with injuries received during leave at home or due to personal reasons were excluded. The study populations were all serving uniformed personnel, males and females aged between 18 to 54 years Out of

772 cases every 4th case was selected as per the admission serial for the purpose of data collection; thereby a total of 193 cases had been selected as the study subjects. A checklist was prepared to gather information from case sheets of the treated cases. The research instrument consists of four parts. Part-I contains personal information, Part-II contains information regarding the injuries, Part -III regarding the causes of the injuries and Part-IV about the morbidity of the patients. Data was collected in every working day as per the schedule by scrutinizing/ reviewing the case sheets of the patients confirming it from hospital documents. Required checklist filled with data was edited by thorough checking and rechecking at the end of data collection for omissions or error. The data were entered in computer with the help of soft ware SPSS version 11.5. An analysis plan was developed keeping in mind the objectives of the study.

Results

The mean age of the cases was 31.52 ± 7.54 years and range was 18-52 years. About one third 67(34.7%) of the cases were in the age group between 32 -38 years followed by 51 (26.4%), 42 (21.8%) and 24 (12.4%) in the age groups between 25-31, 18-24 and 39-45 years respectively. Among the cases almost 1/3rd of the patients were in the rank of Sainik . Non Commissioned Officers (NCOs) composed 72(37%) and Junior Commissioned Officers (JCOs) 13(6.7%) of the cases. The remaining cases were Officers among which 17(8.85%) were Lt/Equivalent, 13(6.7%) Major; only 4(2.1%) were Captain and 4(2.1%) of the rank of Lt Col and above(Fig-1).

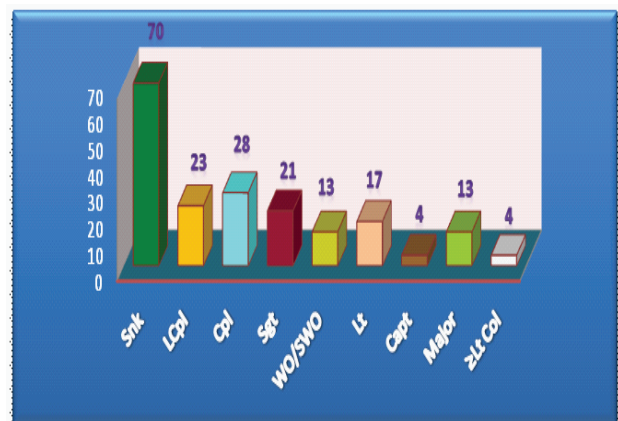


Fig-1: Bar diagram showing the cases according to rank (Equivalent rank of Army, Navy and Air Force) (n=193).

As many as 132(68.4%) were from Army, 34 (17.6%) from Navy and rest 27 (14.0%) personnel were from the Bangladesh Air force (Fig-2).

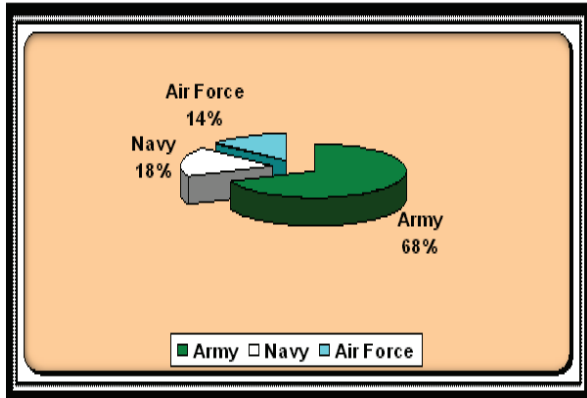


Fig-2: Pie-chart showing the cases according to the Armes Services.

Among all the cases (n=193) of the military personnel the number of members of the fighting group were 82 (42.5%), supporting group 50(25.9%) and service group 61 (31.6%) (Table-I).

Table-I: Distribution of the cases according to Arms / Services.

Arms/ Services	Injured persons	Percent
Fighting arms	82	42.5
Support arms	50	25.9
Service arms	61	31.6
Total	193	100

Regarding the injuries due to the military activities; games was the main event that has caused 53 (27.5%) case of injuries, followed by operation 40(20.7%), exercise 10(5.2%), physical training 28 (14.5%) and about one third 62 (32.1%) cases received injury during administrative duties (Table-II).

Table-II: Distribution of the cases of injury according to the event in military activities (n=193).

Military activity	Injured persons	Percent
Games	53	27.5
Operation	40	20.7
Physical training	28	14.5
Exercise	10	5.2
Administrative duties	62	32.1
Total	193	100

In the present study, knee injury constituted the highest number i.e. 43(22.3%), followed by 33(17.1%) cases of forearm, wrist and hand injuries, 25(13%) foot injury, 20(10.4%) shoulder and arm injury, 13(6.7%) lower leg injury, 10(13%) ankle and patella injury each, 8(4.1%) pelvis and hip injury, 7(3.6%) spinal injury, 5(2.6%) head and facial injury, 7(3.7%) were of injuries in the elbow, neck, Achilles tendon each and 12(6.2%) other injuries which included bullet injury and injuries in eye, ear and also cut, blunt, burn and scald and dental injuries etc (Fig-3).

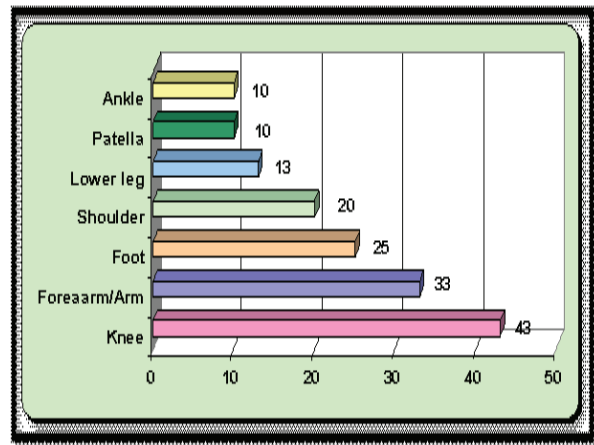


Fig-3: Bar diagram shows the location of injury (n=193)

Out of 28 injuries received during physical training events, PT/drill caused maximum i.e. 7(3.6%) cases followed by Crossing 6 ft wall 5(2.6%), Crossing horizontal rope 4(2.1%), and during assault course 3 (1.6%) among others (Fig-4).

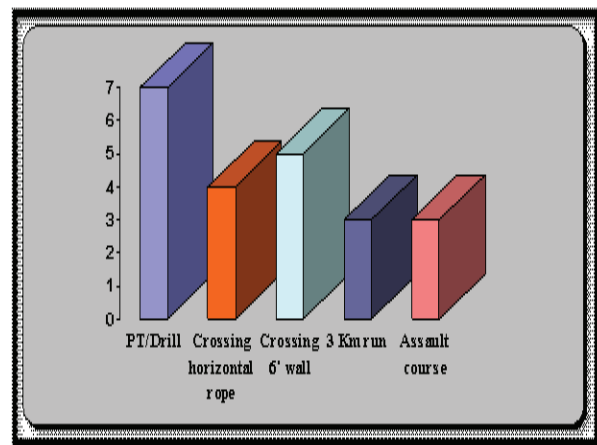


Fig-4: Bar diagram showing the cases of injury according to the events in physical training (n=193).

It was evident from the study that maximum 24(12.4%) injuries occurred during playing football followed by volley ball 13(6.7%) and basket ball 10(5.25%) (Table-III).

Table-III: Distribution of the cases of injury according to the event of games (n=193).

Events	Injured persons	Percent
Foot ball	24	12.4
Volley ball	13	6.7
Basket ball	10	5.2
Swimming	1	.5
Athletics	4	2.1
Others	1	.5
Total	53	27.5

Duration of hospital stay for different types of injuries was highest i.e. 65(33.7%) cases which is for 1-2 weeks, followed by 56(29%) for 3-4 weeks and 41(21.2%) cases stayed for >1 to <3 months (Table-IV).

Table-IV: Distribution of the cases according to duration of hospital stay (n=193).

Duration of hospital stay	Frequency	Percent
< 7 Days	30	15.5
1-2 weeks	65	33.7
3-4 weeks	56	29
>1 month<3 months	41	21.2
3 to 6 Months	1	.5
Total	193	100

Amongst the injured, maximum 82(42.5%) cases suffered for 3-6 months followed by 47(24.4%) for 6 months to 1 years and 45(23.3%) for 7-30 days. After completion of treatment majority 108 (56.0%) of the injured personnel returned to medical category A (AYE) followed by 72 (37.3%) medical category C (CEE) and 2(1%) medical category B (BEE), on the other hand 11(5%) cases were medically boarded out(MBO).

Discussion

In this study 132(68.4%) Army, 34 (17.6%) Navy and 27 (14.0%) Air force personnel constituted the sample, among them 82(42.5%) were from the fighting arms, 50(25.9%) from supporting arms and 61 (31.6%) cases from the service group. In a study conducted by Hawlader MAR⁵ at CMH Dhaka it was found that Army patients constituted 44.56%, followed by Navy 10.56% and Air force 9.78% of the sample.

Another study conducted by Zaman UIC⁴ showed that amongst the injured cases 34% were from fighting arms, 8% from supporting arms and 4% from services arms. Shahidullah M⁶ found that 70.30% belonged to fighting group and 29.7% were from supporting and service group. The findings of the present study are almost similar to the above study results. Regarding rank structure, Shahidullah M⁶ in his study found that highest number of injury personnel (44.4%) were Sainik, followed by 13.7% corporal, Lance corporal 11.4%, sergeant 5.3% and officer 22.4% amongst the respondents. This study confers with the present study. Soldiers belonging to the rank of Sainik sustain more injuries than the higher ranking soldiers since they under go more physical activities like; training activities, special training events and sports activities in the unit.

In a study conducted by Hawlader MAR⁵ on evaluation on trauma management at CMH,Dhaka it was found that musculoskeletal injury was found in 86.22% of cases, fracture femur in 5.78%, fracture tibia and fibula in 7.89% of cases, fracture radius and ulna 9.66%, fracture humerus 3.66%, fracture patella 6.11%, fracture clavicle 3.11%, spinal injury 9.11%, head injury 0.11%, dislocation shoulder 4.76%, sprain ankle 7.00%, knee injury 19.77%, muscle and tendon injury in 1.33% of cases. Hawlader MAR⁵ also showed that the games was the main events causing injury which occurred in 53(27.5%) cases, followed by operation/exercise 50(25.9%) and physical training 28(14.5%) and during performing daily routine work about one third 62(32.1%) of the cases received injury. Sports ground was the place where

maximum injuries of all types occurred, such as knee injury in 15(34.9%) of cases, foot in 8(32%), fore arm in 6(18.2%) followed by training ground amounting to knee injury in 10(23.3%), foot in 5(20%) and forearm in 8(24.2%) among others. The findings of our present study are almost similar to the above study results. In another study on basic military training, conducted on musculoskeletal injury among US marine recruits Linenger JM and West LA⁷ found that training related injuries occurred at a rate of 19.9 injuries per 100 recruits per month. Activities commonly associated with these injuries often involve overtraining, overexertion, repeatative movements and activities, forceful actions, vibratory forces, extreme joint positions, and prolonged static postures etc⁸⁻¹³.

In this study it has been found that the incidence of injury (n=193) related to football was maximum in 24(12.4%) of cases followed by volley ball in 13(6.7%) and basket ball 10(5.2%). A study conducted by Rahman MM¹⁴ on ankle sprain at CMH, Dhaka showed that the incidence of injury related to football was 40% and basketball/volleyball 15% to 17.5%.

Another study carried out by Chan KM et al¹⁵ in Thailand found that during sports, knee and the ankle were the commonest sites of injury occurring in 27.27(50.47%) and 16.78(24.67%) cases respectively.

In our study out of 28 injuries (n=193) received during physical training events, PT/drill caused maximum amounting to 7(3.6%) cases followed by Crossing 6 ft wall 5(2.6%) cases, Crossing horizontal rope 4(2.1%) and assault course 3 (1.6%) cases among others.

Awal MA¹⁶ conducted a separate study on knee injury management and showed that in Physical efficiency test (PET) the majority was caused by 9 ft ditch (12%), 6 ft wall (8.57%) and bayonet fighting (4.29%). Zaman UIC¹⁷ in their study on knee injury in Bangladesh Army found that PET is

a prime cause of knee injuries in military personnel (38.09%). These study outcomes showed similarity with the present study findings. This study also revealed that all those physical trainings had significant relations with the frequencies of the injuries.

This study showed that the average length of hospital stay (ALS) for different types of injuries were highest between 1-2 weeks in 65(33.7%) cases. Hawlder MAR⁵ in his study showed that the hospital stay of 42.89% patients were of 1-2 weeks, for 24.22% patients 3-4 weeks, for 20.22% patients 5-8 weeks, for 10% patients were 9-12 weeks and for 2.67% patients more than 12 weeks. According to duration of morbidity; this study showed that, out of 193 injury cases maximum 82(42.5) cases suffered for 3-6 months followed by 6 months to 1 year by 47(24.4%) cases, 45(23.3%) cases suffered for 7-30 days.

Shahidullah M⁶ showed that 12.7% cases suffered >5 years of disability and more than half in 50.7% of the cases required time for cure of between 6 months to 1 year and 42.3% cases suffered for 3-6 months. This study finding shows mild dissimilarity with the present study which may be due to the fact that the previous researcher studied only the knee injury cases.

The injuries and the duration of sufferings revealed in this study statistically are significant $p < 0.05$. In this study, after completion of treatment, 108 (56.0%) patients had been recommended for medical category A (AYE), followed by 72(37.3%) cases for medical category C (CEE) and 2(1%) for medical categories B (BEE).

A study conducted by Rahim SF¹⁸ at CMH, Dhaka on knee injury found that 33.33% were to be regarded as medical category A (AYE), 8% medical category B (BEE) and 14% were observed under medical category C (CEE). The results of the two studies are almost similar, mild deviation may be due to the differences in the pattern of injuries in the two studies.

Conclusion

The study revealed that musculoskeletal injuries especially in knee, foot, shoulder, forearm, ankle, lower leg and patella are prevalent in Bangladesh Armed Forces personnel who are involved in various kinds of operations, exercises, training, sports and tasks. Study findings also showed high frequency of morbidity in regard. It was evident from the study that a significant number of the injuries are not life threatening—most result only in limited duty for several days. Still the high incidence of injuries places a substantial burden on the health care delivery system and leads to many lost training days. Careful study and analysis in this regard definitely will explore new dimension to combat this preventable health burden.

References

1. Segui-Gomez M, MacKenzie EJ. Measuring the public health impact of injuries. *Epidemiol Rev* 2003;25:3–19.
2. Minino AM, Anderson RN, Fingerhut LA, Boudreault MA, Warner M. Deaths: injuries, 2002. *Natl Vital Stat Report* 2006;54(10):1–124.
3. Musculoskeletal Injuries, Description of an Under-Recognized Injury ;Problem Among Military Personnel Keith G. Hauret, MSPH, MPT, Bruce H. Jones, MD, MPH, Steven H. Bullock, DPT, MA, Michelle Canham-Chervak, PhD, MPH, Sara Canada, MPH *Am J Prev Med* 2010;38(1S):S61–S70.
4. Vyrostek SB, Annet JL, Ryan GW. Surveillance for fatal and nonfatal injuries—United States, 2001. *MMWR Surveill Summ* 2004;53(7):1–57.
5. Howlader MAR: A study on evaluation of treatment of trauma patients in CMH, Dhaka. *BAFMJ Jun*; 2004: 49-51.
6. Shahidullah M: Pattern of Knee injury due to physical stress amongst the soldiers attending Combined Military Hospital Dhaka. *BAFMJ*; 2005:22-25.
7. Linenger JM, West LA. Epidemiology soft tissue musculoskeletal injury among US marine recruits undergoing basic military training.[cited 2013 Jan 17] Available from <http://www.Pubmed.com>.
8. Yassi A. Repetitive strain injuries. *Lancet* 1997; 349(9056):943–7.
9. Yassi A. Work-related musculoskeletal disorders. *Curr Opin Rheumatol* 2000;12(2):124 –30.
10. Keyserling WM. Workplace risk factors and occupational musculoskeletal disorders, part 1: a review of biomechanical and psychophysical research on risk factors associated with low-back pain. *AIHAJ* 2000; 61(1):39 –50.
11. Keyserling WM. Workplace risk factors and occupational musculoskeletal disorders, part 2: a review of biomechanical and psychophysical research on risk factors associated with upper extremity disorders. *AIHAJ* 2000; 61(2):231– 43.
12. Aptel J, Aublet-Cuvelier A, Cnockaert J. Work-related musculoskeletal disorders of the upper limb. *Joint Bone Spine* 2002; 69(6):546–55.
13. Waters T, Collins J, Galinsky T, Caruso C. NIOSH research efforts to prevent musculoskeletal disorders in the healthcare industry. *Orthop Nurs* 2006; 25(6):380 –9.
14. Rahman MM: A comparative 'study on ankle sprain' at CMH, Ghatail. *BAFMJ*; June 2004: 17-21.
15. Chan KM, Yuan Y, Li CK et al. Five common sport injuries, Thailand *Royal Army Medical Journal* 1999 July (3): 8-12.
16. Awal MA. Study on knee injury management, CMH, Dhaka. *BAFM Journal*; Dec 1999: 23-27.
17. Zaman UIC: Knee injuries in Bangladesh Army. A retrospective study of 42 Cases, *BAFMJ* ;1988; 109-114.
18. Rahim SF: Study on evaluation ACL injury. *BAFMJ*; June 1997: 59-63.