

Demographic Profile of Sports Injury among Cadets of National Defence Academy, Pune, Maharashtra, India

¹Mohit Kataruka, ²Mandeep Saini, ³Manas Pattnaik

ABSTRACT

Introduction: Injuries are recognized as a leading health problem in professional physical training. Many of these involve physical damage caused by microtrauma (overuse) in recreation, sports, training, and job performance. The National Defence Academy (NDA) is one of the precious training institutions of India. During 3 years of vigorous physical training, cadets undergo different musculoskeletal injuries. The purpose of this study was to determine the incidence of training-related musculoskeletal injuries and to classify different injuries.

Materials and methods: This retrospective case-control study was conducted at the NDA, Khadakwasla, Pune, India, from January to December 2017. All the cadets who reported sick with musculoskeletal problems were included in the study depending on inclusion and exclusion criteria. Injury profile of the cadets with which activity and how they got the injury was noted. After giving basic first aid, definitive treatment was prescribed.

Results: Male cadets between the age group of 17 and 21 years were included. Most of the injuries occurred during the early phase of training. Most common injury among cadets are knee contusion (16.23%) followed by low back ache (11.67%). Percentage of stress fracture is quite high, 14%, and mostly seen in 2nd term cadets. The incidence of upper extremity injury compared with lower extremity is 11.85%. Inflammation and pain (overuse) were the largest injury type category, including 80.03% of all injuries.

Conclusion: Considering the magnitude of training injuries in physical training, there is a substantial amount of work that remains to be performed, especially in the areas of surveillance, prevention, and treatment.

Keywords: Injury profile, Military training, National Defence Academy.

How to cite this article: Kataruka M, Saini M, Pattnaik M. Demographic Profile of Sports Injury among Cadets of National Defence Academy, Pune, Maharashtra, India. *Indian J Phy Med Rehab* 2018;29(2):43-46.

Source of support: Nil

Conflict of interest: None

¹Medical Officer, ²Commanding Officer, ³Graded Specialist Surgeon

¹⁻³Department of Radiology, Military Hospital Khadakwasla Pune, Maharashtra, India

Corresponding Author: Mandeep Saini, Commanding Officer Department of Radiology, Military Hospital Khadakwasla, Pune Maharashtra, India, e-mail: mandeepneelam@gmail.com

INTRODUCTION

Injuries are recognized as a leading health problem in the military training. Injury-related musculoskeletal conditions are common in this young, active population. Many of these involve physical damage caused by microtrauma (overuse) in recreation, sports, training, and job performance.

Because of the strenuous physical effort involved in military personnel activities, a high level of physical fitness is required by the individual, and, therefore, army recruits engage in a rigorous exercise training program during their initial months of military conscription. It is well known that basic training affects a variety of physiologic parameters like body mass index, skin folds, aerobic capacity, and muscular endurance.¹⁻⁵

The most common types of injuries seen in military and athletic populations are musculoskeletal overuse injuries. The majority of the injuries associated with military training occur at or below the knee. A study during Army infantry basic training reported that the five most commonly diagnosed conditions were pain attributed to overuse or stress syndrome (23.8%), muscle strains (8.6%), ankle sprains (6.3%), overuse knee injuries (5.9%), and stress fractures (3.0%).⁶ The incidence of overuse injuries, particularly in the lower limbs, is the major cause of training days lost during military recruit training. Stress fractures appear to be the most common problem reported during these training periods, with incidence rates ranging from 1.5 to 64%.⁷

The NDA is one of the prime institutes of the Indian Army. Approximately 300 cadets get admission to this prime institution in each semester and there are totally six semesters, each being for 6 months training. During 3 years of vigorous military training, they suffer different musculoskeletal injuries. The purpose of this study was to determine the incidence of injury-related musculoskeletal conditions in the military training and to classify different injuries.

AIMS AND OBJECTIVES

Aims and objectives of this study are to study the pattern of different musculoskeletal injuries during military training and suggest remedial measures to reduce the incidence.

MATERIALS AND METHODS

This retrospective case-control study was conducted at the NDA, Khadakwasla, Pune, India, from January

to December 2017. All the cadets who reported sick with musculoskeletal problems were included in the study depending on following inclusion and exclusion criteria.

Inclusion Criteria

- Injuries required medical attention for more than 3 days
- Injuries that hampered routine training activity

Exclusion Criteria

- Injuries that generally heal with rest within 72 hours
- Injuries associated with any systemic disorder

After getting ethical clearance, all the cadets who fulfilled the above criteria were included in the study. Injury profile of the cadets with which activity and how they got the injury was noted. After giving basic first aid, definitive treatment was prescribed.

RESULTS

In our study, all cadets were male in the age group between 17 and 21 years (Tables 1 and 2).

Total upper limb injuries are 69, which include shoulder contusion, dislocation, rotator cuff injury, elbow and wrist contusion, and scaphoid fracture (Graphs 1 to 4).

DISCUSSION

This case-control study was conducted at Military Hospital Khadakwasla, NDA, from January to December 2017. We included totally 677 cadets in our study.

Our study categorizes different injury patterns depending on the duration of training. In this study, we have analyzed different injuries based on the region affected.

It is evident from the table that most of the injuries occurred in the 2nd and 5th term cadets, whereas very less number of cadets of 6th term were affected.

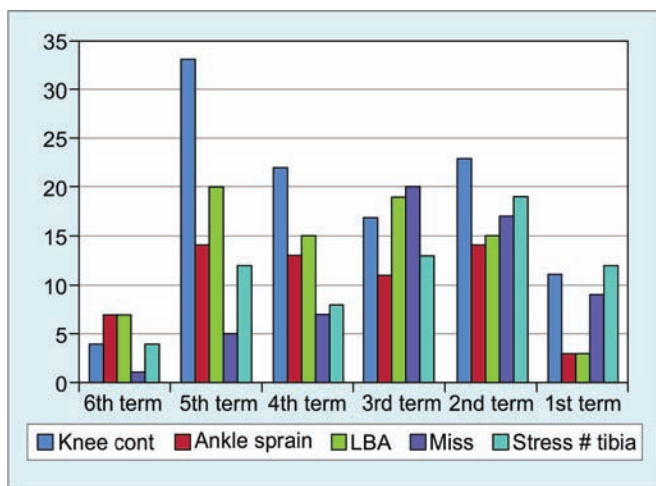
Table 1: Sick report number from January to December 2017

Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
599	925	966	982	507	55	811	1129	966	1301	1223	53

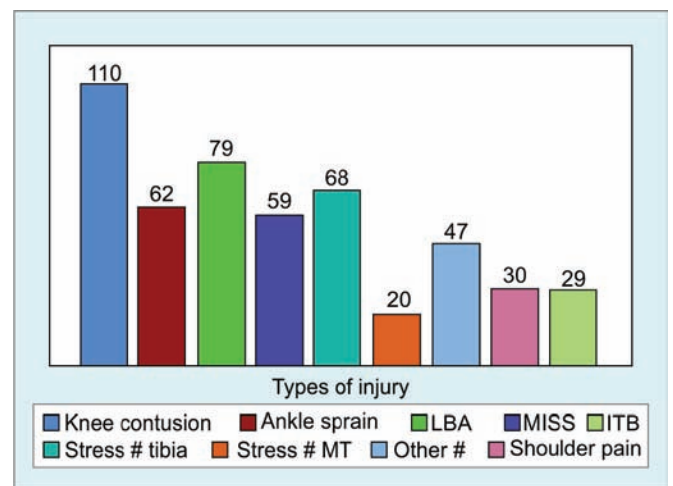
Table 2: Different injuries in cadets based on term

	Knee cont	Ankle sprain	LBA	MTSS	Stress tibia	Other fracture	Stress # MT	ITB	Shoulder pain	Others	Total
6th term	4	7	7	1	4	8	0	2	3	9	45
5th term	33	14	20	5	12	14	5	2	10	37	152
4th term	22	13	15	7	8	9	2	7	9	30	122
3rd term	17	11	19	20	13	6	3	9	2	35	135
2nd term	23	14	15	17	19	6	7	8	5	43	157
1st term	11	3	3	9	12	4	3	1	1	19	66
%	16.23	9.16	11.67	8.71	10.04	6.94	2.95	4.28	4.43	25.55	

LBA: Low back ache; MTSS: Medial tibial stress syndrome; MT: Metatarsal; ITB: Iliotibial tract

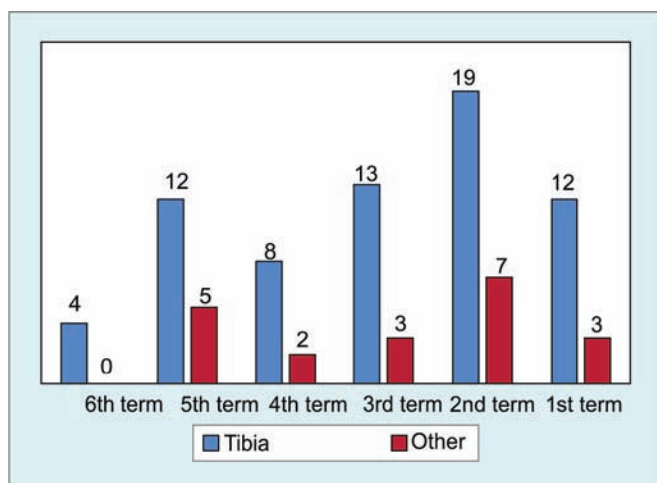


Graph 1: Multiple bar diagram showing injury pattern based on term. Knee contusion and low back ache (LBA) most common among 5th termers may be due to vigorous stress and strain of physical training, and knee contusion is the commonest injury among all term cadets, stress fracture is most common among 2nd termers, whereas MTSS is mostly seen among 3rd term cadets



Graph 2: Bar diagram showing the different injury patterns among cadets. In our study, knee contusion is the most common injury among cadets followed by low back pain





Graph 3: Multiple bar diagram showing rates of stress fracture among cadets. Stress fracture tibia is the most common stress fracture observed in cadets and 2nd term cadets are mostly affected

Most common injury among cadets are knee contusion (16.23%), followed by low back ache (11.67%). Percentage of stress fracture is quite high, 13%. Stress fracture is mostly seen in 2nd term cadets; 29.55% of total stress fractures occurred during 2nd term cadets. Among stress fracture, tibia was the most affecting, this being 77.27%.

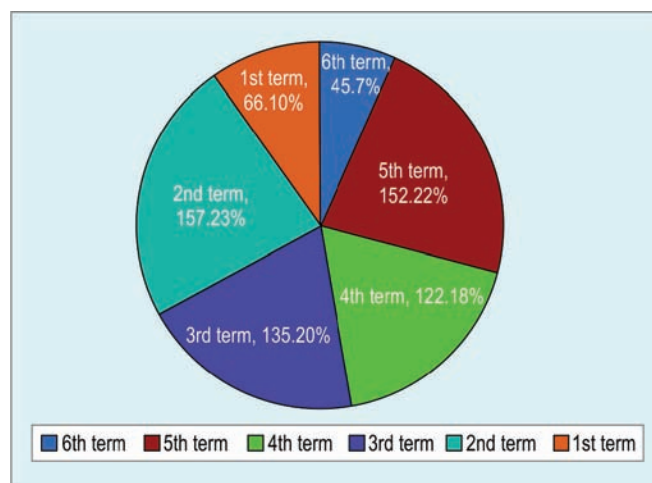
Among total injury cases, 2nd term cadets are mostly affected, being 23.19%, and least affected are 6th term cadets' percentage, being 6.65. The possible reason may be sudden increase in the physical activity after 1st term and at 6th term, muscle becomes strong enough to resist injuries.

In our study, the incidence of upper extremity injury compared with lower extremity is 11.85%. Hauret et al⁸ found incidence of upper extremity to be 14%, which is quite comparable to our study.

Inflammation and pain (overuse) were the largest injury type category, including 80.03% of all injuries which is also at par with the study done by Hauret et al.⁸ Inflammation and pain of lower extremity and lumbar region, being the most common injury, were 29.7 and 11.67% respectively. Upper extremity comprises 10.19% of all injuries and shoulder comprises 62% of upper extremity injury.

According to Kaufman et al,⁶ among 449 trainees, the incidence of the most common injuries was stress fractures (13.4%), iliotibial band syndrome (10.9%), patellofemoral syndrome (9.4%), Achilles tendinitis (6.7%), and periostitis (3.1%). In our study, the incidence of stress fracture is 13%, whereas incidence of ITB is 14%.

According to Rauh et al,⁹ the proportion of stress fracture was 8.6% with tibia being the most common site, 57.6%. In our study, the percentage of stress fracture is quite high, being 13%, and stress fracture tibia was 77%.



Graph 4: Pie diagram showing the incidence of injury at each term; 2nd term cadets are mostly affected followed by 5th term cadets

This study identifies different injury types that can be targeted and prevented and provides incidence of injury over time. Although some of these injuries may result from acute traumatic causes, they more often result from the cumulative effects of microtraumatic forces that are common in many physical activities and work settings. Activities commonly associated with these injuries can involve (1) overtraining, (2) overexertion, (3) repetitive movements and activities, (4) forceful actions, and (5) extreme joint positions. In addition to their direct effect in causing new injuries, these microtraumatic forces may also exacerbate or extend previous injuries or cause previous injuries to recur, such as in recurrent joint (shoulder) dislocations and recurrent back strains.

Preventive Strategies

Preventive strategies should be directed at the primary factors contributing to risks for musculoskeletal injuries, such as the amount and level of intensity of the training, and levels of physical fitness. The intervention may include reduction in the amount of running miles, reduced total running volume, running in ability groups, and greater variety in types of training exercises (i.e., multiaxial, neuromuscular, proprioceptive, and agility exercises), gradual build-up of exercise and military hiking, and emphasis on aerobic activities in early training phases before progressing to anaerobic activities and strength conditioning.^{8,10} Special attention may be emphasized on prevention of knee injuries by introducing protective orthosis, proprioceptive training, and muscle strengthening.

CONCLUSION

Considering the magnitude of training injuries in military populations, there is a substantial amount of work that

remains to be performed, especially in the areas of surveillance, prevention, and treatment. Modifiable risk factors have been identified, suggesting that overuse and other training injuries could be decreased with proper interventions. Given the size of the problem, a systematic process of prevention should be initiated starting with routine surveillance to identify high-risk populations for the purpose of prioritizing research and prevention. Properly planned interventions should then be implemented with the expectation of dramatically reduced lost work/training time, attrition, and medical costs, while increasing military readiness.

REFERENCES

1. Rosendal L, Langberg H, Skov-Jensen A, Kjaer M. Incidence of injury and physical performance adaptations during military training. *Clin J Sport Med* 2003 May;13(3):157-163.
2. Harwood GE, Rayson MP, Nevill AM. Fitness, performance, and risk of injury in British Army officer cadets. *Mil Med* 1999 Jun;164(6):428-434.
3. Marcinik EJ, Hodgdon JA, Mittleman K, O'Brien JJ. Aerobic/calisthenic and aerobic/circuit weight training programs for Navy men: a comparative study. *Med Sci Sports Exerc* 1985 Aug;17(4):482-487.
4. Williams AG, Rayson MP, Jones DA. Effects of basic training on material handling ability and physical fitness of British Army recruits. *Ergonomics* 1999 Aug;42(8):1114-1124.
5. Woodhead AB 3rd, Moynihan ME. The effect of Aviation Officer Candidate's School on aerobic and anaerobic fitness. *Mil Med* 1994 Feb;159(2):118-120.
6. Kaufman KR, Brodine S, Shaffer R. Military training-related injuries surveillance, research, and prevention. *Am J Prev Med* 2000 Apr;18(3 Suppl):54-63.
7. Hoffman JR, Chapnik L, Shamis A, Givon U, Davidson B. The effect of leg strength on the incidence of lower extremity overuse injuries during Military Training. *Mil Med* 1999 Feb;164(2):153-156.
8. Hauret KG, Jones BH, Bullock SH, Canham-Chervak M, Canada S. Musculoskeletal injuries description of an under-recognized injury problem among military personnel. *Am J Prev Med* 2010 Jan;38(1 Suppl):S61-S70.
9. Rauh MJ, Macera CA, Trone DW, Shaffer RA, Brodine SK. Epidemiology of stress fracture and lower-extremity overuse injury in female recruits. *Med Sci Sports Exerc* 2006 Sep;38(9):1571-1577.
10. Bullock SH, Jones BH, Gilchrist J, Marshall SW. Prevention of physical training-related injuries recommendations for the military and other active populations based on expedited systematic reviews. *Am J Prev Med* 2010 Jan;38(1 Suppl):S156-S181.