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Training related ENT morbidity: a study amongst cadets of a military training institute

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ABSTRACT

Background: Military training involves a harsh and rigorous regimen leading to inadvertent injury and bodily dysfunction. The ear, nose and throat are vulnerable given the nature of the training, which invariably involves combative sports and organized firing practice, which may lead to increased morbidity. This article is based on a population study of training related ENT morbidity amongst cadets undergoing training at a military institute.
Methods: The study was carried out in three parts including determinations of morbidity statistics due to ENT illnesses amongst cadets during training, awareness levels and attitudes of cadets towards common ENT ailments and effect of military training on the audiometric parameters.
Results: Daily cadet sick report was 250 – 270 a month with 21% being respiratory/ENT in nature. Of these 33% were nasal trauma, 18% ear ache with uri, 12% hearing loss/tinnitus, 25% throat symptoms and 12% with allergic symptoms. Overall incidence of hearing loss during the study period was 60.1 per thousand per year, which was mostly transitory.
Conclusions: Injuries caused due to training lead to loss of motivation and reduction in combat efficacy as a result of decreased training time. Increasing awareness and better planned training schedules are the need of the hour.

Keywords: Military training, ENT morbidity, Awareness

INTRODUCTION

Military training involves a harsh and rigorous regimen, which may lead to inadvertent injury and bodily dysfunction. The ear, nose and throat are especially vulnerable given the nature of the training. Regular exposure to loud noise of training firearms, combative nature of the schedule and the physically tough and demanding training may cause ENT morbidity. The present study relates to the cadets of a military training academy undergoing training for induction into the Armed Forces.

In military training, a multitude of loud noise exposures may compromise the auditory wellbeing of the cadets. Noise-induced hearing loss and tinnitus are not uncommon during military training and subsequent service.[1,2] This morbidity causes loss of training man-hours and reduced combat readiness, which has a huge impact on cost of training. Moreover cadets undergoing training belong to the young adult age group. During this time other factors may also play a causative role in hearing loss. These include pre enrollment occupational or recreational noise exposure, pre-existing middle ear disease, a positive family history or previous head injury.[3,4]

Studies to date describing the patterns of disease and injury in under training military populations have dealt almost exclusively with orthopaedic and musculoskeletal injuries. Despite evidence that suggests that cadets/ recruits are at a greater risk to certain types of training and combat-related illnesses and injuries, the nature and magnitude of these problems has not been fully

evaluated. Precise information on the specific diagnoses and occurrences of illness and injuries is necessary to determine the impact on training in terms of costs and loss of man hours, operational readiness, and the overall health and wellbeing of this population. This is particularly critical in light of current efforts to expand the role of the army in combat-related missions/ non-combat role in internal disaster management.

When assessing the problems faced due to more subtle diseases, classical morbidity and mortality data fail to assess the true hardships faced by the population. The common ENT related problems faced by the under training populations could be nasal bleeding, ear ache, reduction in hearing, nasal injury and hoarseness. This study was aimed at conducting a population based study of ENT related problems amongst cadets undergoing military training to estimate the morbidity due to ENT illnesses amongst cadets during their training in the academy, assess awareness levels and attitudes of cadets towards common ENT ailments and to analyze effects of military training on audiometric parameters amongst cadets including effect of exposure to training related noise.

METHODS

The objectives were fulfilled by data collection in three parts. First part was an analysis of ENT morbidity amongst cadets during their training in the training academy. Data were obtained from the OPD attendance and admission details in respect of all cadets of the institution for a period of two years. The variables included causes of seeking medical attention, diagnosis wise breakdown of admitted cadets, man-hours of training lost due to the different ENT ailments, epidemiological factors leading to the ailment and incidence of ENT trauma in the academy.

The distribution of a health event, in this case being the occurrence of ENT morbidity was then described using incidence rates and man hours of training lost were calculated based on the duration of the disease or illness in question. Time trends are also of interest, such as the relationship of morbidity to phase of training.

The assessment of awareness level and attitude of cadets towards common ENT ailments was done using an unlinked, anonymous knowledge, attitudes, and practice (KAP) questionnaire for all cadets of the institution. A total of 1800 cadets were administered the questionnaire and valid responses were obtained from 1287 cadets. A subset of cadets selected by simple random sampling was interviewed to gather more information.

As there was no appropriate validated questionnaire as a study tool, a questionnaire suitable for the purpose of the study was designed and pretested in the third part of the study, effect of military training on hearing, using pure tone audiometry, impedance audiometry and OAE analysis was studied in a longitudinal descriptive design.

194 cadets of the course at the commencement of their training at the institute were included in the study. Any cadet having prior history of ENT ailment was excluded. The nature of the study was explained to the subjects and informed consent was obtained. All subjects were given the freedom to withdraw from the study at any time.

All subjects underwent a detailed baseline audiometric evaluation including pure tone audiometry, impedance audiometry measuring both the tympanometry and acoustic reflex and OAE analysis (DPOAE), which was mandatory. The tests were performed at the training academy in a soundproof room. Hearing thresholds were recorded for all frequencies from 250 Hz to 8000 Hz. Thresholds were confirmed using the Hoods' plateau method.

Audiometric profile was reassessed at the end of one year of training and again at the end of two years. Any significant change in thresholds between audiometric recordings (change of at least 15 dB between two readings of a particular frequency) was noted. This change was rechecked for lack of transience the next day. The incidence of significant change was correlated with specific training events such as firing practice and weapon firing demonstrations. The incidence of hearing loss over this period was obtained.

RESULTS

The daily cadet sick report for all ailments was in the range of 250 – 270 a month (median 260). Of these 54% were musculoskeletal, 21% were respiratory/ENT in nature, and the remaining 25% pertained to ophthalmological, dermatological, gen surgical and psychiatric in nature. Thus the incidence rate of ENT ailments was 3.6 per thousand per year as given in Table 1.

Table 1: OPD cases (median 260/month).

S. no.	System affected	Cases (%)
1.	Musculoskeletal	54
2.	Respiratory/ ENT	21
3.	Ophthalmic, skin, general surgery and psychiatry	25

The respiratory/ENT cases in a month were followed up either at the dependent hospital or if referred for specialist treatment, at the referral hospital. Of these 31% suffered from nasal trauma (nasal bleeding/ nasal bone fracture), 18% ear ache with upper respiratory infection, 12% reduction in hearing/tinnitus, 2% had traumatic perforation of the tympanic membrane, 25% throat pain/fever/ ac tonsillitis/hoarseness, 12% headache/ sinusitis/ allergic symptoms (running nose, sneezing, watering from eyes) as shown in Table 2.

Table 2: ENT OPD cases/month.

S. no.	Diagnosis	Cases (%)
1.	Nasal bleeding/ nasal bone fracture	31
2.	Ear ache with upper respiratory infection	18
3.	Loss of hearing/tinnitus	12
4.	Traumatic perforation of the tympanic membrane	2
5.	Throat pain/fever/ Ac tonsillitis/hoarseness	25
6.	Headache/ sinusitis/ allergic symptoms	12

ENT trauma resulted in Nasal bone fractures during boxing/fall during other training events like equestrian training. Traumatic tympanic membrane perforations were reported after boxing/unarmed combat training. Thus the incidence of ENT trauma was 1.21 per thousand per year.

Hospital admission was required for cases of epistaxis, nasal bone fracture, acute tonsillitis with fever and in cases of traumatic perforation of the tympanic membrane. The average hospital stay in these cases was 07 days with a maximum of 21 days for fracture nasal bones needing surgery and traumatic perforation of the TM, which in all cases was managed conservatively and healed spontaneously. Excuse from physical training, parade and games were granted in other cases ranging from 3 days to 10 days. Man hours of training were also lost in OPD reporting and attending specialist OPD at the referral hospital.

1087 (60%) cadets were aware of ENT ailments in general but not sure of their occurrence in relation to training and hence were unaware of any long-term morbidity as a consequence to the above. Nasal bleeding due to blunt trauma nose was the commonest problem identified followed by Upper Respiratory infection and throat pain.

945 (52.5%) cadets were aware of over the counter medication for symptoms such as common cold, headache and throat pain and most had tried self-medication on more than one occasion. Though not sure about the exact dosages or the pharmacological composition, most cadets relied on inputs from peer group and on an average reported ENT consultation not more than once in the entire duration of training.

210 (11.66%) cadets associated noise induced hearing loss with training events such as firing but were not aware of the level of hearing protection provided by devices such as ear muffs. 913 (50.7%) cadets did not consider reporting sick immediately for an ENT related problem and were of the opinion that most were self-limiting were hesitant due to peer group pressure as shown in Figure 1.

No abnormalities were detected during the initial examination (Ist term). During the second Examination (IIIrd term) after one year,12 (6.1%) cadets were found to have retracted TM with mild conductive hearing loss on PTA; on tympanometry a B type curve was recorded. A history of recent upper respiratory infection was elicited in all cases. Twenty-two (11.3 %) cadets gave history of tinnitus following exposure to firing during traing event, which resolved spontaneously over the next few days. Serial examinations showed complete resolution of symptoms in our study as shown in Figure 2.

Two year follow up showed, 07 (3.6%) cadets to have mild conductive hearing loss on PTA. Examination with otoendoscope revealed healed perforation TM with mild scarring. All seven cadets gave history of traumatic perforation TM due to blunt trauma during organized games (boxing, hockey, swimming). They had been managed conservatively at the referral hospital.

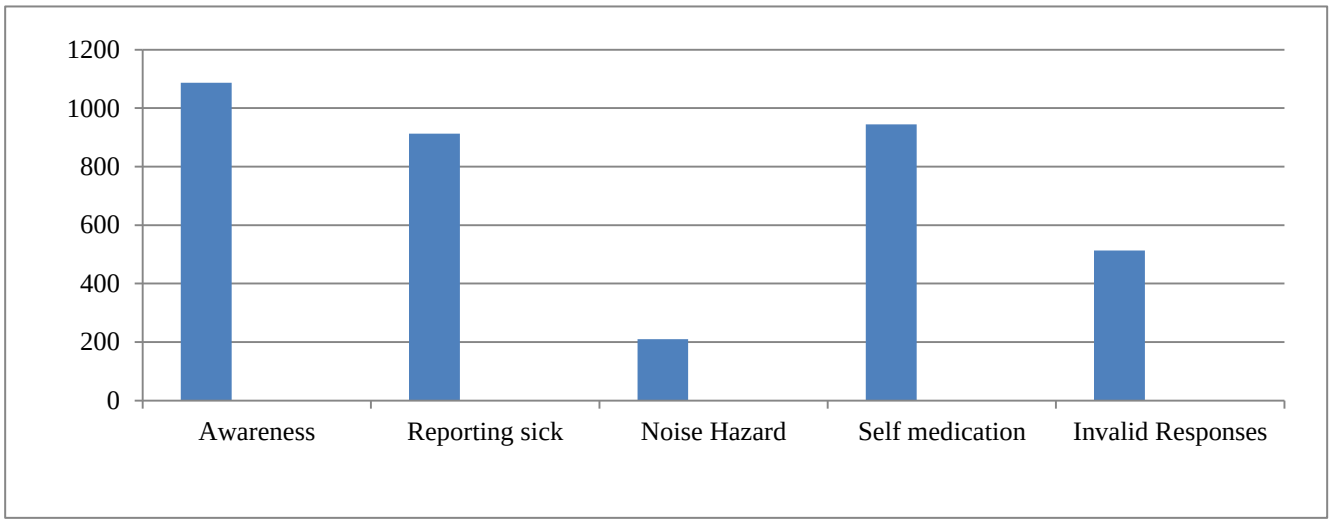

Figure 1: KAP survey (N=1800).

5 cadets (2.5%) were found to have mild sensorineural hearing loss in higher frequencies with normal impedance, which was found to have recovered spontaneously on repeated audiological examination as seen in Figure 3. Thus the incidence of hearing loss was found to be 60.1 per thousand populations per year.

Severe URI with acute otitis media, exposure to impulse noise and traumatic perforations were the leading causes of hearing loss. No case of persistent hearing loss was however reported as all cases had recovered.

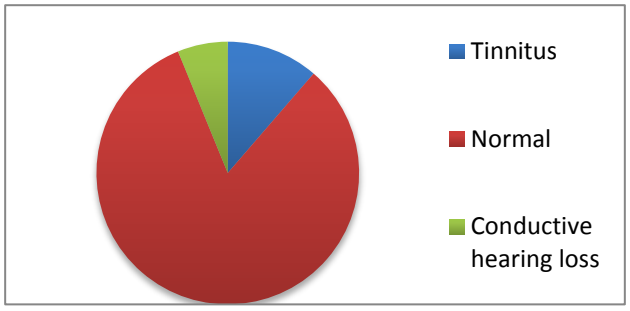

Figure 2: Hearing status after one year of training.

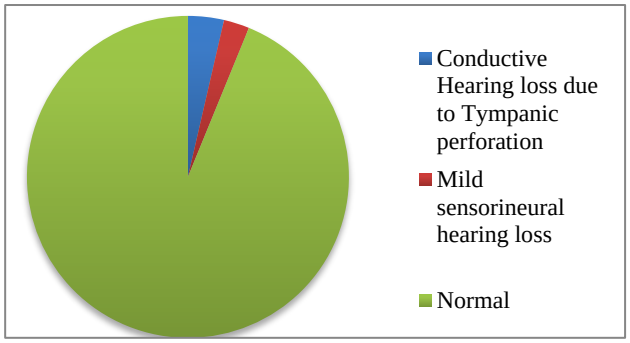

Figure 3: Hearing results after two years of training.

DISCUSSION

In a study on conscripts in Denmark, overall injury rate was 28% mainly in the initial period due to sudden exposure to the unaccustomed harsh training regimen. Training periods, which involved tougher physical activities, saw a corresponding rise in injury levels.[5] In our study we found that the incidence of ENT injury was maximum during the initial term at the academy, which corroborates similar trends due to sub-optimal physical fitness and lower level of physical activity prior to joining the training institute making them vulnerable to injury.[5]

Our study also found an increase in incidence of ENT morbidity in the fifth term with increased exposure to outdoor activity and weapon training. This finding is similar to a study carried out in Navy and Marine Corps where recruit training programs have very regimented schedules and morbidity can be distributed according to week of training.[6]

Our study saw hospital admissions at the referral hospital primarily due to fractured nasal bones as a result of contact sports, traumatic perforation of tympanic membrane, acute upper respiratory infections and acute or chronic middle ear disease. A total of 42 cadet admissions were noted over a two-year period. The duration of hospital stay ranged from 7 to 21 days. No data is available in literature in this regard.

A KAP analysis of British infantry soldiers' knowledge of hearing conservation found that all of the soldiers included in the study felt their hearing could be affected by their job. However, a number of factors prevented the proper use of the personal hearing protection devices even though they were aware of their effectiveness in the reduction of noise hazard. These included communication difficulties, discomfort, and the impracticability of using them in certain circumstances.[7]

In our study, the KAP survey established that most cadets were unaware of the long-term consequences of ENT morbidity and its effect on service, hearing protection devices or hearing conservation. Due to the disciplined and structured training schedule, noise exposure due to leisure time activities was minimal. Use of over the counter medication for symptoms perceived as 'normal cold and flu' was common. As in the above quoted survey, the participants in our study too found use of hearing protection devices to be incompatible with other gear, uncomfortable and an impediment to hearing and communication.[7]

Other military studies have found that acoustic trauma in conscripts could be prevented with suitable, well-fitted protection devices and proper safety measures while planning training schedules.[8,9] However in the present study our survey revealed low levels of awareness towards hearing protection devices.

Exposure to noise is unfortunately inevitable in military training. As part of the project, evaluation of cadets at the time of joining the academy revealed no abnormality, which was the expected outcome as they had been subjected to an exhaustive medical examination prior to being admitted to the academy.

Various studies have found that military training may cause high frequency hearing loss in almost 5% of the subjects. This hearing loss is usually unilateral and asymmetrical. Of these nearly 0.5% had symptomatic hearing disablement.[10,11] In our study 3.6% cadets developed mild conductive hearing loss over the period of observation and 2.5% cadets developed transient sensori neural hearing loss. Since in all cases the hearing recovered completely, there were no cases of hearing disablements

In another study, a group of soldiers undergoing training for artillery weapons firing were tested for hearing impairment. Immediately after the noise exposure, 25%

of the study group developed mild to moderate hearing loss, which improved spontaneously. Trauma to the tympanic membrane was also seen more in the right ear, as most subjects were right handed. The "phenomenon of head screening" reduced noise exposure of the left ear.[12,13] In the present study, 2.5% subjects developed transient sensori neural hearing loss on exposure to loud noise of firing practice. No particular side predilection was however seen.

In a study on the Israeli army, incidence of hearing loss due to basic training was examined in a sample of 1000 recruits before enlistment and after 4 months of basic training. Audiometric tests and personal questionnaires revealed that after basic training 33.7% had high frequency hearing loss, 3% had noise-induced hearing loss, 3.5% had hearing impairment due to various other causes while 60% still had normal hearing.[14,15]

Perceived auditory symptoms increased with the duration of the training period. In our study 22 cadets reported tinnitus in the overall period of study. Increase in incidence coincided with exposure to firing practice. Muhr et al have reported that self-limiting tinnitus after exposure to loud noise was common in the under training population. In fact the incidence of tinnitus varied with the period of training, showing a gradual rise with the progress of training period. Sensitivity to noise increased similarly. Acute acoustic trauma increased the risk of tinnitus and sensitivity to noise fourfold and a six time decrease in high frequency hearing thresholds was also seen. An elevation in the prevalence values of tinnitus, sensitivity to noise and hearing impairment was seen at release compared to before joining military service.[16]

In our study only 5 cadets reported with hearing loss immediately following exposure to loud noise after firing practice. Audiometry revealed a mild deterioration of hearing in the frequencies between 3-6 kHz. Serial audiograms done over a period of 4 weeks saw spontaneous recovery of hearing thresholds. 17 other cadets later gave history of similar complaints and spontaneous recovery. No cadet reported prolonged/permanent hearing loss.

CONCLUSION

To conclude, military training is associated with various injuries. Noise induced hearing loss may result on exposure to loud noise of both small arms firing and medium/large gun firing demonstrations. In most cases initial exposure may resolve completely. It is recommended that prevention of training related ENT injuries should be prioritized. Susceptible population should be identified early to reduce the loss of training man-hours, cost of training and to significantly increase combat readiness. Knowledge and attitudes towards potential training related injuries should be improved by increasing awareness levels and live demonstrations. Training schedules need to be planned to accommodate the lag time while physical standards improve, noise exposure should be graded to prevent acute acoustic trauma and the system of regular medical examination needs to be strengthened to allow timely intervention.

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