

Effect of Oral and Dental Health on Combat Fitness- A Study Conducted in Military Dental Centre Cumilla

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Abstract

Background: The effect of oral and dental diseases of the deployed troops can seriously impair the operational activity. Combat fitness on oral and dental aspect means keeping soldier's oral health in such a state so that they can be quickly deployed, as well as military dental personnel staying in such a way that they can be moved in the front with all of their equipment and materials to treat patients.

Objective: To figure out the present oral health status of Bangladeshi troops and to correlate it's possible influence on combat situation.

Methods: This descriptive study was carried out in Military Dental Centre Cumilla from 01 March 2020 to 31 March 2022. All uniformed personnel reported to MDC with oral and dental issues were included in this study.

Results: A total of 4597 uniformed personnel were evaluated and treated. Among them sainik and lance corporals were highest 2289(50%). Dental caries was mostly diagnosed condition 1410(31%). In case of acute dental condition irreversible pulpitis cases were most in number 420(35%). Dental restoration was mostly performed procedure 1293(48%) and glass ionomer restoration was done 830(64%) in most of the cases. The dental emergency rate was 230 per 1000 soldier per year.

Conclusion: Disease non battle injury (DNBI) originating from dental pathologies obviously compromise the performance of high intensity missions. In this study, number of dental emergency rate (considering every dental visit) was found 230 per 1000 soldiers per year which is very similar to other countries.

Keywords: Oral and dental health, Combat fitness.

Introduction

A military person should constantly be in good physical and mental health to participate in combat operation. The effect of oral and dental diseases of the deployed troops can seriously impair the operational activity. Dental

pain that prevents one from sleeping or from eating might lower someone's morale, making them less likely to participate in military action.¹ Although dental pain may seem quite dull at first, if it gets severe a soldier may not be able to carry out his or her duty. Additionally, a lot of soldiers can be stationed distant from military dental support facilities, in these situations moving individuals with dental emergencies over hazardous terrain could increase the risk. When a vital uniformed member departs the unit for dental treatment the battle readiness of that unit may be impaired.

Combat fitness on oral and dental aspect means keeping soldier's oral health in such a state so that they can be quickly deployed, as well as military dental personnel staying in such a way that they can be moved in the front with all of their equipment and materials to treat patients. The aim of this study is to find out the present oral and dental health status of the serving military personnel in an Infantry division and Cumilla area and to correlate the possible influence of this condition in combat situation. This would help in better patient care in regards to oral and dental health in peace time and keep the troops fit and deployable in combat operation.

Materials and Methods

The present descriptive study was carried out in Military Dental Centre Cumilla, Bangladesh from 01 March 2020 to 31 March 2022. Ethical approval was obtained from ethical and research committee. All uniformed patients reported to Military Dental Centre Cumilla with oral and dental diseases were included in this study. Diagnosis of the different types of dental diseases were based upon naked eye examination, periapical view X ray and OPG X ray. The accumulated data were studied and analyzed to find out the rank wise distribution, types of oral and dental diseases they were presented with, modalities of treatment rendered and acute oral and dental conditions with which patient reported.

Results

A two years descriptive clinical and epidemiological study evaluated and treated 4597 uniformed patients of different ranks having oral and dental diseases. Among the reported patients most were sainik and lance corporals 2289(50%)

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followed by sergeant 758(16%). Officers were 452(10%) and junior commissioned officers (JCO) were 369(8%). Dental caries was mostly diagnosed condition 1410(31%) followed by irreversible pulpitis 420(09%). In case of acute dental condition irreversible pulpitis was most common diagnosis 420(35%) followed by grossly carious teeth needed extraction 319(26%). Dental restoration was mostly performed procedure 1293(48%) followed by scaling and polishing 371(14%) and endodontic treatment 344(13%). Glass ionomer restoration was done in most of the cases 830(64%).

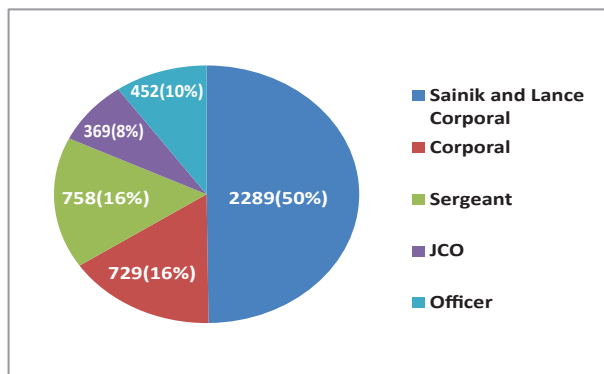


Figure-1 reveals that out of 4597 patients maximum 2289 were sainik and lance corporal followed by sergeant 758.

Table-I: Incidence of dental diseases basing on preliminary diagnosis (n=4597)

Parameters	n	%	95% CI
Inspection and medication	1549	34	32.32-35.35
Dental caries	1410	31	29.36-32.02
Irreversible pulpitis	420	09	8.30-10.00
Gingivitis	391	08	7.70-9.30
Grossly carious tooth needed extraction	319	07	5.30-6.70
Periodontal disease	275	06	2.60-3.60
Impacted 3rd molar	141	03	0.62-1.20
Minor oral surgical condition	39	01	0.44-0.90
Dental prosthesis	29	01	
Orthodontic problems	11	-	
Major oral surgery	13	-	

Table-I shows that out of 4597 patients, 1549(34%) were inspected and given medication, 1410(31%) were diagnosed as dental caries, irreversible pulpitis were 420(09%) cases and gingivitis cases were 391(08%).

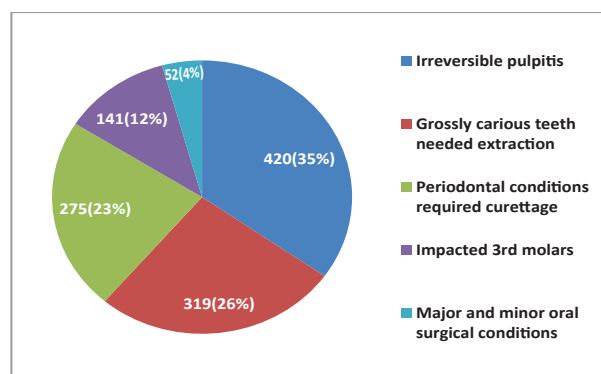


Figure-2: Acute oral and dental conditions (n=1207)

This Figure-2 depicts that among 1207 cases of acute dental conditions 420(35%) cases were irreversible pulpitis, grossly carious teeth needed extraction cases were 319(26%) and periodontal conditions required curettage were 275(23%).

Table-II: Types of dental treatment rendered to the patient (n=2693)

Modalities of treatment	n	%	95% CI
Dental restoration	1293	48	46.00-50.00
Scaling and polishing	371	14	13.00-15.00
Endodontic treatment	344	13	12.00-14.00
Extraction of teeth	269	10	8.90-11.00
Curettage	231	09	7.60-9.70
Surgical extraction	117	04	3.60-5.20
Minor oral surgical procedures	39	01	1.10-2.00
Crown, bridge, denture prosthesis	29	01	0.75-1.50

Table-II shows that dental restoration was mostly performed procedure 1293(48%) followed by scaling and polishing 371(14%) and endodontic treatment 344(13%).

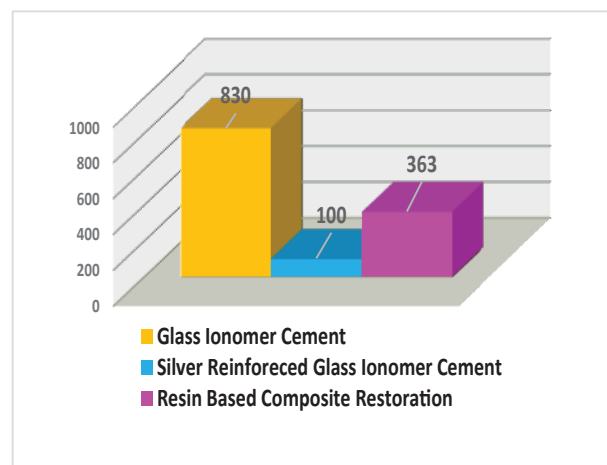


Figure-3: Types of dental restorations frequently performed (n=1293)

Figure-3 demonstrates among 1293 cases of dental restorations 830 cases were glass ionomer restoration followed by 363 cases of resin based composite restoration.

Discussion

Defence dentistry combines five important concepts. Patient centered care with a public health perspective means, dental care is provided utilizing a life course approach to guarantee that military personnel join, train, work, live and depart well. Occupational focus, clinical decision making, that is centered on the patient's occupational function and the setting in which they will work includes the length, remoteness, and austerity of the deployment. Deployable, providing dental treatment to military troops in a deployed setting in order to maintain operational effectiveness. Agile, a responsive uniformed dental workforce with strong sense of individual and group leadership that can shift resources across locations and swiftly adjust to situational changes in an operational setting. Holistic, oral health that is preventive in nature and easily fits into larger preventive pathways.²

In this study total 4597 uniformed personnel reported with oral and dental diseases among them most of them were sainik and lance corporal 2289(50%). Change of food habit like consuming more sweetened beverages and increased habits of taking fast food might be the cause of this higher percentage of young aged soldier having dental diseases. A large number of sainik and lance corporals reported with oral and dental disease, is a major concern because these soldiers will serve for a quite long time. To cut down this number all recruits must undergo a thorough dental checkup during their intake and an orthopantomograph (OPG) X-ray must be done for all recruits. If the OPG X-ray reveals, impacted 3rd molars, those can be removed before joining in military recruit training. All the training centres should have specialist dental surgeons like endodontist and oral and maxillofacial surgeon and all the recruits must report to dental surgeons and get necessary dental treatment during their recruit training period.

A study led by Armstong S and Dermont M found that individuals who receive the treatment they require during their initial recruit training are 30% less likely to develop dental morbidity for up to five years after the intervention and 64% less chance of developing subsequent dental diseases for up to 18 months.² Another study by Elmer et al found that 85% of army recruit, 90% of naval recruit and 97% of RAF recruits might be made dentally fit by service standards by delivering up to 2 hours of treatment.¹

Dental emergencies according to the study by Gunepin M et al are conditions including oral diseases, trauma, loss of function or other issues that force a patient to seek urgent dental treatment.³ Dental emergencies can significantly reduce the operational effectiveness of troops. If we consider every dental visit as a dental emergency, approximately 10,000 soldiers remain present in this infantry division and in Cumilla Area so dental emergency rate will be $(4597/10,000 \times 52 \text{ weeks})/104 \text{ weeks} \times 1000 = 230$ dental emergencies per 1000 soldier per year. A study by Moss LD in his article found dental emergency rate of 170 emergencies per 1000 soldiers per year.⁴ Mahoney GD and Coombs M in their study revealed that a well prepared dentally fit force can expect 150 to 200 dental casualties among 1000 soldiers per year. If the force were less prepared as in the case of reserve call out this figure would be likely to increase.⁵ A patient who needed endodontic treatment has required minimum three to four visits to complete the procedure and same goes to other dental procedures as well so in case of this study actual number of individual military personnel having dental condition was less but the overall dental reporting rate was higher. If we compare the dental emergency rate with other studies then it can be claimed that oral health status of the troops are well maintained.

A high prevalence of disease non battle injuries (DNBI) of dental origin in the operational area will significantly affect the achievement of the mission. Patients should be transferred to nearby field hospitals if dental facilities are not available in the front line, this evacuation process will involve another 3 to 4 military personnel. As a result these personnel won't be available in the operational area, there will be a risk of moving in combat condition and there will undoubtedly be some economic damage. In this area we had similar experience while patient from maneuver exercise at Swarno Deep (SRD) reported to MDC Cumilla.

According to the study by Gunepin et al, during operation serval the average total time that soldiers were unavailable for emergency dental treatments (from the evacuation demand to their return to the home unit) was 10.5 days.⁶ Another study by Colthirst et al found that the estimated direct economic cost of the dental emergencies that occurred to US troops serving in Iraq and Afghanistan during operation Iraqi freedom was \$14 million in order to get the soldiers back into the service. This was twice the cost of the treatment required for those dental events.⁷

In this study most of the patient reported with dental caries 1410(31%); 95% confidence interval [CI]: (29.36-32.02) followed by 420(09%) patients with irreversible pulpitis; 95% CI (8.3-10), 391(08%) patients had gingivitis; 95% CI (7.7-9.3), 319(07%) patients presented with grossly carious teeth beyond restorations; 95% CI (5.3-6.7). A large number of patients 1549(34%): 95% CI (32.32-35.35) were for fitness inspection and some were given medication and oral hygiene instruction, it also included the patients who had to come for multiple visits of a single modality of treatment like endodontic treatment.

A study by Dunn WJ revealed that most of the dental emergencies (34.8%) were due to caries and were resolved with the excavation of the caries and subsequent placement of dental restoration. Pain from third molars was the second most common reason for visiting the dental clinic (19.3%) followed by pain from a tooth that required endodontic therapy for relief (12.6%), periodontal emergencies accounted for 9.6% and 7.4 % emergencies could be attributed to teeth other than third molars that required extraction.⁸

The soldiers experience extreme physical and psychological strain during a conflict and their daily routines are also altered. The food they eat may not be abundant in fresh vegetables and vitamins. It is possible that their tooth brushing habit will alter. Their oral and dental health will suffer as a result of all these problems. They might have more periodontal problems, tooth decays and temporomandibular joint disorders.

A study conducted by Suman et al in Croatian army, they found more soldiers in the war group brushed their teeth infrequently, the majority of them less than once a day (55%) while the majority in the peace time group brushed more than once a day (58%), meals were less frequent (on average twice a day) and canned food was mainly eaten by the war group while in the control group food was mainly cooked and consumed three times a day.⁹

According to this study if we think about acute dental events which compelled the patients to seek immediate attention of dental surgeon, the majority of the cases were irreversible pulpitis 420(35%) followed by grossly carious teeth needed extraction 319(26%), periodontal conditions required curettage were 275(23%) of the cases, impacted 3rd molar issues were 141(12%), minor and major oral surgical cases were 52(04%) (n=1207).

A study conducted by Mair B found that the most common presentation at an emergency appointment accounting for 20.9% of the presentation was a defective restorations, this was closely followed by pain from 3rd molars that includes pericoronitis and trauma from over erupted 3rd molars. The relatively young patient population on board can explain the high number of wisdom tooth and orthodontic issues. Periodontal abscesses made up the third most common presentation.¹⁰ Another study by Lloro, et al found third molar problems were most prevalent and endodontic events were the second most common acute dental events.¹¹

According to this study dental restoration was the mostly performed procedure 1293(48%); 95% confidence interval [CI]: (46.0-50.0) followed by scaling and polishing 371 (14%); 95%CI (13.0-15.0), endodontic treatment was provided to 344(13%) patients; 95% CI(12.0-14.0), extraction other than 3rd molar were done in 269 (10%) cases; 95% CI(8.9-11.0), curettage of periodontal problems were done to 231(09%) patients; 95% CI(7.6-9.7) Surgical extraction of 3rd molar teeth were performed to 117(04%) of patients; 95% CI(3.60-5.20), crown and fixed dental prosthesis supplied to 29(01%) patients. Few orthodontic patients were referred to MDC Dhaka. In case of dental restoration 830(64%) cases were of glass ionomer restoration, 363 (23%) cases were of resin based composite restoration and 100(08%) cases were of silver reinforced glass ionomer cement restoration.

As large number of troops requiring dental treatment and that is reducing their daily unit activities therefore we have to give emphasis on preventive dentistry and on early intervention. An endodontic procedure takes a considerable time and requires three to four visits for completion after that a crown prosthesis must be placed over that tooth which will take further two visits. So if we could identify the

carious lesion earlier then in one visit a dental restoration would have been done. A study by Liewehr FR found that in a 16000 man division between 1067 and 2000 troops will require emergency endodontics in 1 year deployment, a highly significant number, which will require an enormous expenditure of dental resources and result in an unacceptable amount of lost duty time.¹²

Regarding pericoronitis of 3rd molar tooth, it may turn into serious health problem if not treated timely, because from it orofacial fascial space infection can result and which may become life threatening Ludwig's angina. In military number of young soldiers are very high and usually 3rd molars erupt in this age group 17 to 25 years, that's why this issue should be dealt meticulously. Proper screening of these patients by OPG X ray and prophylactic extraction can be done beforehand.

A study by Combes et al found that treatment modality in the theatre of southern Afghanistan and in Iraq, a total 314 third molars were symptomatic, 255(81.2%) of which were mandibular. Antibiotics were used in 129 cases (41.5%), combined with debridement in 81(26.9%), overall 103(34.2%) symptomatic teeth were extracted, 62(20.6%) of which were related to pericoronitis.¹³ The national institute for health and clinical excellence (NICE) guidelines state that a first episode of pericoronitis unless particularly severe, should not be considered as an indication for extraction but subsequent episodes are appropriate indications for surgery.¹⁴

In order to decrease dental emergencies and prevent the deployment of personnel with inadequate dental conditions, a number of military services in various countries implemented a dental classification system. Therefore, the main goal of this classification is to fulfill the mission.¹¹ This system consists of four categories: class 1, no treatment required, class 2, existing condition is unlikely to result in a dental emergency within the next 12 months. Class 3, existing condition is likely to result in a dental emergency within the next 12 months and class 4, dental examination is required. Conditions requiring endodontic therapy should be identified at the annual examination and should be considered as urgent priority by assigning the patient to dental fitness class 3 until his or her endodontic therapy is completed and the tooth is restored.¹² This type of classification will obviously improve the overall oral and dental fitness of the troops, if not possible to all it can be done for the troops which are prepared for the high intensity mission like commando battalions or the troops who are assigned in Chittagong hill tracts.

Regular oral and dental examination of the troops and treatment of the early lesion are essential to limit the frequency of dental emergencies. At present system all troops

has to go through a medical examination during annual performance report (APR) initiation on that time dental examination can be made mandatory and required treatment can be delivered. There is a provision of dental card to every troops which should be make up to date during visit to dental surgeon but unfortunately many of us report with only sick book so many information regarding dental treatment is not being properly maintained. Awareness among the troops regarding oral and dental health can be improved by arranging regular motivational classes by dental surgeons.

A sufficient number of dental surgeon and the assistant is required to provide high quality dental treatment. A study by Richardson PS revealed that the ideal ratio at army training centres should be approximately 1 dental officer per 500 patients and that for trained troops should be approximately 1 dental officer per 900 patients.¹⁴ In perspective of Bangladesh this ratio cannot be totally maintained but the quality of treatment will definitely be improved if number of dental surgeon and technician are increased.

At present system there is provision of a mobile dental team which will be attached with field ambulances during war time and to be placed in MDS (main dressing station) but there should be provision of attachment of dental personnel on more forward location like in the ADS (advance dressing station) so that the troops will be suffering from dental emergencies could be given immediate treatment. Mahoney GD and Coombs M in their study analyzed the available data in conflicts, U.N. deployments and exercises, stated that dentistry in the forward area is required, with 10 to 15% of all casualties expected to be of dental origin.⁵

Conclusion

This study was carried out to see the actual oral and dental health status of the troops in Cumilla area. DNBI originating from dental pathologies obviously compromise the performance of high intensity missions. In this study, number of dental emergency rate (considering every dental visit) was found 230 per 1000 soldiers per year which is very similar to other countries. The type of the dental condition with which most of the soldiers reported to us were mostly preventable. The present system of inculcating dental fitness among the troops can be reevaluated like more focus can be given to improve the oral health of recruits during their training. Further study and evaluation can be done in this regard to obtain the optimum oral and dental health status of the soldiers.

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