



THE ROLE OF DENTISTRY IN MAINTAINING THE HEALTH OF SOLDIERS: PREVENTION, DIAGNOSIS, AND TREATMENT IN THE CONTEXT OF MILITARY SERVICE



Rola stomatologii w utrzymaniu zdrowia żołnierzy:
prewencja, diagnostyka i leczenie
w kontekście służby wojskowej

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Abstract

Introduction: Dentistry, which encompasses preventive, diagnostic, and therapeutic care, plays a crucial role in maintaining the health of soldiers. In the context of military service, where physical and psychological demands are exceptionally high, maintaining oral health is essential not only for the comfort of soldiers but also for preserving their operational performance. Oral health problems can adversely affect operational efficiency; therefore, military dental care should further include preventive measures and early detection of any abnormalities. Polish soldiers receive specialized dental care, including routine check-ups, conservative treatment, and surgical procedures, particularly those specialized. **Objective:** The aim of this literature review was to raise awareness of the current oral health needs among soldiers and the necessity of adapting dental practices to meet their specific needs. **Materials and methods:** A review of scientific reports was conducted using the PubMed database, taking into account the impact of military conditions on oral health. **Conclusions:** Dentistry plays a key role in maintaining soldiers' health. It influences their combat, as well as physical and mental readiness. Oral health issues such as cavities, infections, or injuries can compromise physical performance, concentration, and even morale. In Poland, soldiers have access to comprehensive dental care, including diagnosis, treatment, and prevention. Stress, mental disorders, and addictions can further deteriorate oral health. In wartime situations, access to dental services is limited, making preventive measures and the development of mobile dental units crucial.

Streszczenie

Wstęp: Stomatologia odgrywa kluczową rolę w utrzymaniu zdrowia żołnierzy, obejmując aspekty prewencyjne, diagnostyczne i lecznicze. W kontekście służby wojskowej, gdzie warunki fizyczne i psychiczne są szczególnie wymagające, dbanie o zdrowie jamy ustnej ma istotne znaczenie nie tylko dla komfortu żołnierzy, ale również ich gotowości bojowej. Problemy zdrowia jamy ustnej mogą negatywnie wpłynąć na efektywność pracy żołnierza, dlatego opieka stomatologiczna obejmuje także profilaktykę i wczesne wykrywanie nieprawidłowości. W Polsce żołnierze objęci są szczególną opieką stomatologiczną, która zapewnia im m.in. badania kontrolne, leczenie zachowawcze i zabiegi chirurgiczne, szczególnie dla osób pełniących specjalistyczne funkcje. **Cel:** Celem przeglądu piśmiennictwa jest zwiększenie świadomości na temat aktualnych potrzeb dotyczących zdrowia jamy ustnej żołnierzy i konieczności adaptacji praktyk stomatologicznych do ich potrzeb. **Materiał i metoda:** Przeprowadzono przegląd doniesień naukowych, wykorzystując bazę danych PubMed, uwzględniając wpływ warunków wojskowych na zdrowie jamy ustnej. **Wnioski:** Stomatologia odgrywa kluczową rolę w utrzymaniu zdrowia żołnierzy, wpływając na ich gotowość bojową, fizyczną i psychiczną. Problemy zdrowotne jamy ustnej, takie jak próchnica, infekcje czy urazy, mogą prowadzić do zmniejszenia sprawności fizycznej, koncentracji, a także osłabienia morale żołnierzy. W Polsce żołnierze mają dostęp do szerokiej opieki stomatologicznej, obejmującej diagnostykę, leczenie i profilaktykę. Stres, zaburzenia psychiczne, nałogi mogą pogarszać stan zdrowia jamy ustnej. W przypadku działań wojennych dostęp do usług z zakresu stomatologii jest ograniczony, dlatego kluczowe staje się wprowadzenie działań prewencyjnych oraz rozwoju mobilnych jednostek stomatologicznych.

Keywords: oral hygiene; mental health; military dental care; military conditions; mobile dental units

Słowa kluczowe: higiena jamy ustnej; zdrowie psychiczne; opieka stomatologiczna w wojsku; warunki wojskowe; mobilne jednostki stomatologiczne

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Introduction

Dentistry plays an important role in maintaining the health of military personnel across preventive, diagnostic, and therapeutic domains. In the context of military service, where physical and psychological demands are exceptionally high, maintaining proper oral health is essential not only for the comfort of soldiers, but also for preserving their operational performance. Poor oral health can impair operational performance and effectiveness during military operations [1–3]. Therefore, military dental care needs to extend beyond treatment alone and include comprehensive preventive and diagnostic strategies that facilitate early detection of abnormalities and their timely, effective management [3]. Nobel Prize winner Rudyard Kipling once stated that “War is not only a battlefield, but also a testing ground for medicine. Without doctors who treat and inventions that support them, war would be much shorter”. These words underscore the crucial role that medicine has played since World Wars I and II. Armed conflicts have significantly contributed to the development of several medical disciplines, general, maxillofacial, and dental surgery in particular. Sir Archibald Hector McIndoe, a New Zealand plastic surgeon who served in the Royal Air Force during World War II and improved the treatment and rehabilitation of badly burned aircrew, deserves particular recognition [4, 5]. Contemporary research increasingly focuses on the impact of war on the mental health of soldiers. Post-traumatic stress disorder (PTSD) is one of the most commonly diagnosed conditions among veterans deployed to Iraq and Afghanistan, underscoring that military activities have profound and lasting effects on human health [6, 7]. Furthermore, soldiers experience oral health problems both during armed conflict and in peacetime, which may adversely affect their operational performance and daily functioning.

Polish military personnel are entitled to special dental care in accordance with the Regulation of the Minister of National Defense of 27 June 2023, which defines the rules for providing additional dental services and materials. This regulation outlines the scope of available services, including dental checkups, hygiene procedures, conservative and endodontic treatment, surgical interventions, and the management of periodontal and mucosal diseases. These services are provided both within military units and through cooperation with external medical facilities.

The regulation is intended to ensure comprehensive dental care for soldiers exposed to substantial physical and psychological strain. Military professionals, including pilots, divers, and members of special units, are eligible for this expanded package of benefits. By guaranteeing regular diagnostic workup, preventive measures, and dental treatment, these provisions support the maintenance of a high level of health and combat readiness within the Polish Armed Forces [8].

Aim

The aim of this review was to investigate the available literature discussing the oral health of military person-

nel, taking into account the specific needs of soldiers, and to highlight the need for adapting dental practices to the unique conditions of military service [9].

The importance of dentistry in the context of operational performance

Dentistry plays a crucial role in ensuring combat readiness, as oral health directly impacts the overall performance of soldiers. Dental problems, such as pain or infection, can lead to hospital admission, resulting in loss of performance and the ability to perform duties. Dental pain in the military, especially during intense training or prolonged exposure to challenging conditions, can significantly compromise both the ability to focus and physical performance in soldiers. Dental infections can also lead to more serious systemic complications. Furthermore, oral health impacts soldiers' mental well-being and morale, and even minor ailments can be crucial in a military setting, where physical and mental resilience are crucial [3].

Consequently, specialized dental care supports both physical and mental well-being of military personnel, which translates into their operational performance. Military dentistry therefore has a significant impact on improving the operational effectiveness of the armed forces.

Oral health issues among military personnel

The oral health of military personnel requires special attention. Banakar et al. [2] conducted a study to assess the oral health status, dental caries, and related factors, as well as the impact of socioeconomic and behavioural determinants among Iranian soldiers.

This cross-sectional study included 658 male soldiers aged 18–30 years from three military barracks in Fars Province, Iran. Data were collected using a structured questionnaire and clinical oral examinations. Oral health status was assessed using DMFT (Decayed-Missing-Filled) index and the Simplified Oral Hygiene Index (OHI-S), a measure of overall oral health. The study revealed a complex interaction between socioeconomic conditions and oral health habits among Iranian soldiers [2].

Figure 1 shows correlations between socioeconomic factors, health habits, and oral health outcomes described in Banakar et al. [2]. Socioeconomic status is conceptualized as a formative construct formed by various multiple factors, such as place of residence, personal and parental education, insurance, birth order, ethnicity, income, and costs of living. These indicators jointly influence oral health behaviours (e.g., brushing, flossing, sugar intake) and oral health (DMFT and OHI-S) [2].

The results underscore the need for targeted preventive interventions aimed at reducing modifiable risk factors and improving access to preventive dental care within military settings [2].

Mendoza et al. [10] demonstrated that soldiers are exposed to dental injuries during service. Dental surgery

was the most common type of intervention in cases of dental trauma, accounting for 55.8% of all procedures [10]. Struthers et al. [11] showed that the majority of emergency cases (38.60%) were associated with tooth fractures or dental caries. Dental pain requiring endodontic treatment was the second most common reason for dental visits (16.81%). Musculoskeletal dental pain or pain unrelated to endodontic treatment accounted for 16.10% of cases and was most likely to be stress-related. Periodontal problems accounted for 14.33% of emergency presentations, while the need for tooth extraction was identified in 7.16% of cases [11].

Statistics

The World Dental Federation reported that tooth decay is one of the most common diseases globally, with up to 90% of the population affected by oral health problems. Polish epidemiological data from the Oral Health Monitoring programme implemented by the Ministry of Health indicate that up to 99.9% of individuals aged 35–44 years present with dental caries.

In their study involving 176 naval personnel, Nik Azis et al. [1] highlighted another important issue, i.e. poor oral hygiene. The authors reported a high prevalence of dental plaque (30.7%) and gingival bleeding (39.6%). CPITN (Community Periodontal Index of Treatment Needs), which is used to assess the frequency of selected periodontal symptoms, revealed that a substantial portion of participants (52.1%) required advanced periodontal treatment (CPITN 3 or 4). DMFT indicated a substantial disease burden, with a mean score of 4.59 ± 4.24 , including untreated caries (1.15 ± 1.63). Assessment of oral health-related quality of life using the Oral Health Impact Profile (OHIP-14) revealed low scores in some participants (mean 13.47, with a maximum possible score of 42). Additionally, oral health behaviours were found to be inadequate, with 12% of participants reporting irregular toothbrushing and 68.2% indicating limited use of interdental cleaning tools [1]. Figure 2 summarizes the main findings by Nik Azis et al. [1].

In the study by Lavrin et al. [12], 348 soldiers of the Ternopil zonal department of the Military Law Enforcement Service (TZDMLES) underwent a clinical assessment for dental caries. The DMF index was used to evaluate caries intensity. The analysis revealed a high prevalence of dental caries among TZDMLES personnel, ranging from 83.08% in the 20–25-year age group to 100% in the 36–40 and 41–45-year age groups. Caries severity demonstrated an upward trend in both men and women across all age groups [12]. These findings underscore the substantial problem of inadequate oral hygiene.

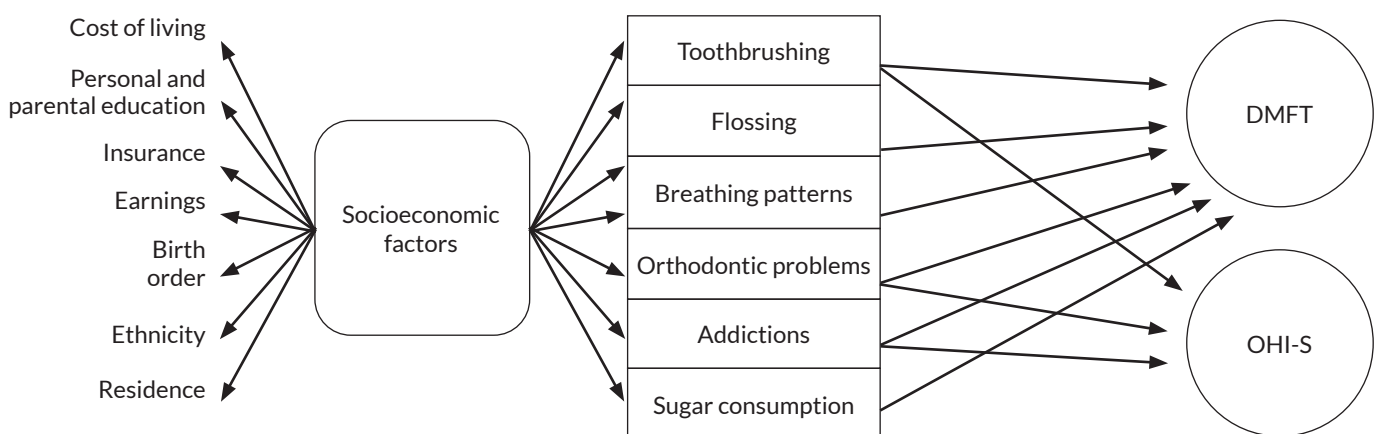
Poor mental health as a risk factor for dental problems

Ryan et al. and Scott et al. [13] reported that veterans have an increased risk of dental caries, and that depressive individuals are more likely to develop active caries than non-depressed veterans. Karimi et al. [14] showed that tooth loss, pain, and reduced oral function were correlated with higher rates of depressive symptoms. Greater tooth loss was associated with a higher risk and severity of depression. Oral pain exacerbated depressive symptoms, while difficulty chewing and speaking were linked to a higher risk of depression [14]. These findings indicate a reciprocal relationship between oral health and depression, underscoring the urgent need for comprehensive public health interventions.

Military stress is also a significant problem. It has a substantial impact on daily functioning and causes bruxism in many soldiers, especially those with coexisting PTSD. Wörner et al. [15] highlighted the consequences of bruxism for oral health, particularly its detrimental effects on the temporomandibular joint, resulting in degenerative changes and pain [15].

The effect of tobacco use on oral health

Military personnel often start smoking tobacco as a means to relieve stress and tension, especially during challenging missions or training. In a study by Smith



DMFT – decayed-missing-filled teeth; OHI-S – Oral Hygiene Index – Simplified

Fig. 2. The relationship between the type of work performed and the frequency of toothbrushing

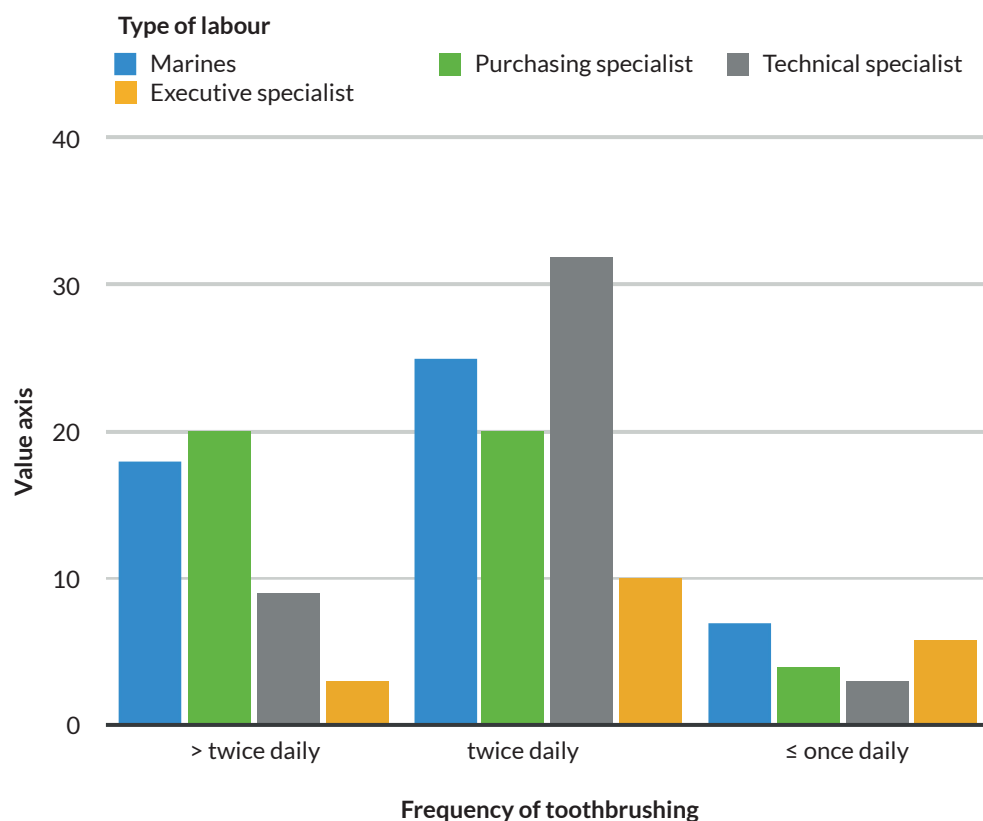


Fig. 2. The relationship between the type of work performed and the frequency of toothbrushing

et al. [16], individuals who experienced combat during deployment were found to have a 1.6-fold higher risk of starting smoking compared to those who had never smoked (95% CI 1.2–2.3), and a 1.3-fold higher risk of resuming smoking among former smokers compared to those who had never had such experience [16]. Both tobacco and nicotine affect oral health. Rafati et al. [17] showed a significantly higher DMFT values in smokers, indicating that these substances have negative effects on oral health. Similarly, Beklen et al. [18] confirmed the substantial impact of tobacco on periodontitis, showing that smokers had a markedly higher rates of periodontal disease compared with nonsmokers [18].

The data presented indicate a high prevalence of tobacco smoking among military personnel and highlight the significant health risks associated with this habit.

Factors limiting access to dental care during deployment

The Russian-Ukrainian armed conflict has underscored the challenges of ensuring adequate dental care in combat conditions. According to Mendoza et al., Ukrainian military personnel received dental care from, among others, two clinics in Germany [10]. The Corporate Dental System (CDS) report, a repository of dental treatment records used by the U.S. Army, included 408 cases involving Ukrainian military personnel. During the 9-month reporting period in 2023, 360 Ukrainian soldiers received treatment for dental trauma [10]. Al-

though military operations take place in Ukraine, some soldiers were required to seek treatment in Germany.

Combes et al. [19] reported 278 patients who were stationed far from a dental centre and required transport solely for dental consultation, including 79% by helicopter. The mean time lost was 24 hours compared with only one hour for military personnel stationed near a dental facility. In the study group, 37 out of 118 soldiers (31.4%) who returned from Afghanistan and had requested dental care during deployment were unable to receive the necessary treatment [19].

Discussion

It can be concluded from the presented research that although dental problems among military personnel are not the primary health concern, they nonetheless constitute an important factor that affects both comfort and operational performance during deployment.

Lavrin et al. [12] suggested that the implementation of NATO dental care standards and the modernization of the existing care system could significantly improve the oral health of Ukrainian soldiers, thereby enhancing their combat performance.

The introduction of mobile dental units, along with the promotion of oral hygiene practices consistent with NATO guidelines, could effectively address the most common dental problems observed among military personnel [12]. In view of the findings reported by Nik Aziz

et al. [1], attention should be directed toward strengthening educational and hygiene programmes for military personnel. Furthermore, the development of dental care within the armed forces, including a comprehensive approach to prevention and treatment, is essential for addressing the high prevalence of dental caries and ensuring effective oral health management among soldiers [12].

Referring to Ryan and Scott et al. [13] and Wörner et al. [15], it becomes evident that pervasive stress and mental disorders have a detrimental impact on the stomatognathic system, leading to masticatory dysfunctions, including bruxism. Moreover, poor oral health may further exacerbate the already compromised well-being of depressive individuals [13]. There is also noteworthy evidence linking tobacco smoking to poor oral health. These findings indicate that military deployment may increase the risk of initiating smoking [16].

Rafati et al. [17] reported a deterioration in dental health among smokers. Beklen et al. [18] also demonstrated a significant adverse impact of tobacco use on periodontal tissues.

Conclusions

Dentistry plays a crucial role in maintaining good health among military personnel and has a direct physical and psychological impact on their combat performance. During deployment, when military personnel are exposed to challenging environmental, physical, and mental conditions, oral health problems can significantly impair performance, concentration, and overall morale. Polish soldiers receive special dental care that includes a comprehensive range of diagnostic, therapeutic, and preventive services, ensuring early detection and effective management of oral diseases.

Oral conditions, including tooth decay, infections, and trauma, may significantly impair the ability of soldiers to perform operational duties. Furthermore, mental health conditions such as depression and PTSD frequently exacerbate oral health problems, while chronic stress may contribute to bruxism, which in turn leads to temporomandibular joint dysfunction and associated pain. Inadequate oral hygiene, along with unhealthy habits such as smoking, poses a significant threat to oral health. In wartime conditions, such as the Russian-Ukrainian conflict, access to dental care is markedly limited. Therefore, preventive and educational strategies, better access to treatment, and the development of mobile dental units are essential to improve the oral health of military personnel.

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