

The silent epidemic of common oral diseases among the Arab population: An emerging health problem

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ABSTRACT

Oral diseases are often ignored in public health policy within the Arab world, despite being a prevalent public health problem exerting a significant continuous increasing socioeconomic cost. This review paper explored the current status of the common oral diseases (dental caries, periodontal disease, oral cancer, and oro-facial trauma) in the Arab world through a literature search of the PubMed, Scopus, Google Scholar, and Google databases between 1998 and 2021. The literature available revealed sufficient evidence to support that oral diseases are highly prevalent in Arab nations. Collective, multi-sectorial action to reduce and eliminate oral diseases among the Arab population has become an urgent need.

Keywords: Dental cavities, gum disease, oral cancer, oral diseases, oral infectious diseases, oral trauma, periodontal disease

Introduction

The World Health Organization (WHO) regards oral health as “being free of diseases and disorders that affect the mouth and oral cavity”. Social, behavioral, and medical factors all influence the progression of oral disease.^[1] Many countries have enhanced their populations’ oral health, but there is a vital need for further improvements in all age groups in several communities.^[2,3] The disadvantaged and poor population carry a heavy burden of oral disease in both the developing and developed countries.^[4] In the Arab world, the principal public health problems in terms of oral diseases and oral health are dental caries, periodontal disease, tooth loss, oral cancer, and dental trauma, all of which

significantly influence the general health quality of life (QoL) of the populace.^[5,6]

The Arab world describes 22 countries in North and North-East Africa and the Middle East. Dental care in majority of these countries is provided via a combination of public and private services. The recent literature highlights that hardly any attention has been paid to alleviating the burden of oral diseases in the Arab world in these countries.^[5,7] Therefore, we investigated the available published data on oral diseases in Arab countries to assess the current oral disease burden and to provide clinical advice regarding oral care and disease prevention tailored to the Arab population.

Methods

A search for literature on oral diseases was conducted using PubMed, Scopus, Google Scholar, and Google databases. Reports

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of the WHO and World Dental Federation were also reviewed. The search terms included prevalence, incidence, oral diseases, dental cavities, periodontal disease, gum disease, oral cancer, oral infectious diseases, oral trauma, quality of life, awareness, and the Arab world. The Arab world included the countries of Algeria, Bahrain, Qatar, Saudi Arabia, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Oman, Lebanon, Libya, Mauritania, Morocco, the Palestinian territories, Somalia, Sudan, Syria, Tunisia, the United Arab Emirates and Yemen. The Critical Appraisal Skills Programme (CASP) guideline was followed for the case-control and cohort studies as a framework to determine the quality.^[8] Studies revealing critical limitations in terms of methodology or reporting were excluded. Data concerning sample size, duration, design, and method of the study were extracted and used as quality examination indicators. In total, 57 citations of possible relevance have been identified (1998 to 2021 articles). The initial screening stage of titles and abstracts revealed that 31.6% of these retrieved papers did not meet the review's inclusion criteria, with 39 (68.4%) papers selected for full-text evaluation.

Dental caries

Dental caries (tooth decay) is the most prevalent chronic disease worldwide, so it poses one of the highest global public health challenges. Dental caries is not only the common childhood disease, but also affects people of all ages throughout their lives.^[9,10] The untreated decay of the permanent teeth is prevalent, affecting over 40% of the population at all ages, and it is the commonest condition of the 291 diseases listed in the Global Burden of Disease Study.^[11] Dental caries can induce eating and sleeping difficulties, which in turn may affect child development, and it is the main reason cited for absence from both school and work.^[12] Despite its importance, there is a lack of reliable, standardized data for dental caries in the Arab nations. One of the main reasons for this is that many Arab countries have not integrated oral health data into national disease surveillance programs, and separate national oral health surveys are regarded as both complex and expensive to conduct. This absence of up-to-date epidemiologic information limits the development of suitable approaches to ease the disease burden.^[12]

In a meta-analysis of 34 studies on dental caries in the primary dentition conducted in Gulf Cooperation Council (GCC) States, most of the reports (19/34) were from Saudi Arabia.^[13] Children in Saudi Arabia had a mean value of decayed, missing, and filled teeth (DMFT) ranging from 0.9 to 8.6, while the prevalence was in the range of 20.8 to 96%. Dental caries were more common in low socioeconomic groups. The most frequent cause of caries was exposure to a cariogenic diet.^[13] There were eight studies of dental caries in preschool children from the United Arab Emirates (UAE), reporting a mean DMFT range of 3.07 to 10.9 and a prevalence range of 41.5 to 99.4%.^[14,15] Studies from the UAE reported that better-educated parents and improved dietary habits and good oral hygiene practices like brushing twice daily were the leading causes of the decline in dental caries' prevalence over the last few years.^[14,15]

In one study from Abu Dhabi, UAE, 41% of 186 children had dental caries. Maternal education, rural nursery sites, irregular tooth brushing, high-frequency intake of sugar-rich food items, and Emirati nationality were significantly associated with dental caries.^[16] Omani children had a mean DMFT of 4.61 and prevalence of 84.5%, with poor oral hygiene and plaque and calculus accumulation the main reasons for dental caries.^[17] In Qatar, children had a mean DMFT of 7.6 and prevalence of 89.2% in their primary dentition, and socio-demographic factors were among the commonest reported risk factors for caries.^[13,18] A Tunisian report showed a relative frequency of dental caries among school children indicative of a significant inadequacy in the treatment of caries in primary as well as permanent teeth.^[19] A study from Lebanon reported that 88% of 6- to 8-year-old children had a history of caries, while 86% had primary teeth that had not been treated. Furthermore, 80% of 12-year-old children had a caries history in their permanent dentition, while 75% had untreated permanent teeth. Fifteen-year-old children were particularly affected, with 90% having a caries history and 81% having untreated teeth. Lebanese children had a higher degree of caries severity than their counterparts of the same age in Kuwait, Tunisia, Oman, Jordan, Syria, and Iran.^[20] In a cross-sectional study of 450 Moroccan adolescents, 387 (86%) had at least one untreated instance of dental caries, and 171 (38%) had at least one filled tooth.^[21]

A number of studies performed across various Saudi Arabia regions also indicated a high prevalence of dental caries in the population, particularly in older children.^[22,23] Recently a study stated that dental caries is the most common reason (49.1%) for teeth extractions among the Saudi population.^[6] In Qatar, a cross-sectional study of 250 kindergarten children reported a caries prevalence of 89.2%, with 15.6% of children examined revealing Early Childhood Caries (ECC) and 73.6% severe ECC.^[18] In another study from Qatar, the prevalence of dental caries among school children was regarded as critical, influenced mainly by socio-demographic factors. In this study, DMFT values were ranked the second-highest in the Eastern Mediterranean region, overtaken only by Saudi Arabia.^[24] Another study conducted among preschool children in Jordan specified that the ECC prevalence was 72.5% and 77.2% among 4 and 5-year-old children, respectively.^[25] A review of 11 published surveys of childhood caries in the UAE reported that the decayed DMFT in UAE children aged between 4 and 6 years was 5.1 to 8.4. The 12-year-old group showed a decayed DMFT range from 1.6 to 3.24.^[26] The high degree of dental caries was probably due to on-demand bottle feeding, high sweet intake, insufficient oral hygiene, an absence of fluoride prevention, and irregular dental visits.^[27] Further, one study stated that being female, overweight, or obese and belonging to the higher income group were among the independent risk factors for dental caries.^[28]

Periodontal disease

Periodontitis affects 10% to 15% of the global population, mainly via bacterial inflammation in the gingival pockets. It affects

adolescents, adults, and older individuals, so it is a significant public health concern with social, economic, and health system repercussions in the Arab world. Diabetes, atherosclerosis, and smoking are also related to periodontal disease. Good oral hygiene is essential for both disease prevention and treatment. Due to its shared risk factors and its two-way relationship with several systemic diseases like diabetes and atherosclerosis. Periodontal disease is beginning to attract the attention it deserves in the Arab nations. However, there is still a significant relatively higher percentage of the Arab population that are unaware of this disease and how to prevent it.^[29]

Much of the published literature on periodontal disease in the Arab world examines school children and adolescents. A few studies described the prevalence of periodontitis in adults in the Arab world, which were either analytical studies on the relationship between periodontitis and various risk factors or assessments of the effect of using traditional stick (miswak) or fluoride.^[7,30] Al-Harhi *et al.*,^[7] conducted a review of periodontal disease in the Arab world, and in doing so highlighted the lack of up-to-date data on the prevalence of periodontitis in the adult Arab population. The study reported that periodontitis was responsible for more than one-third of missing extracted permanent teeth in individuals aged over 40 years in the Arab world.^[7]

A recent study (2021) from Saudi Arabia stated that periodontal disease (18.4%) is one of the significant reasons for teeth extractions among the Saudi population.^[6] A study of a non-representative Saudi Arabian sample (114 children, 99 adolescents, and 99 young adults) reported that 37.4% had shallow pockets and none had deep pockets.^[30,31] Similarly, in a representative sample (3090 students) of young adults aged 20 to 24 years in Jeddah, none had deep pockets and only 7.2% had shallow pockets.^[32] In another recent Saudi Arabian study, males were reported to have significantly less periodontal disease than females; females had a higher percentage of bleeding and calculus, while the youngest age group showed a greater likelihood of having healthy gingiva.^[33] In a Kuwaiti study, the periodontal status was reported as the mean number of sextants with periodontal disease >3 mm, which was 1.5 for individuals aged 20 years and above. Furthermore, from a global standpoint, Kuwait was reported to have a high incidence of periodontal disease and dental caries with no indication of reductions, in contrast to most industrialized countries. Thus, periodontal diseases are common and affect a large percentage of the population.^[34]

In Libya, a large proportion of the adult population showed signs of destructive periodontitis; of 1,255 Libyan patients, only 4.7% revealed healthy periodontium, while 44.3% showed the presence of calculus, nearly 40.6% had shallow pockets, 6.3% experienced bleeding, and 4.06% had deep pockets.^[35] Another study of 452 adults reported that 52.65% had shallow pockets, 30.08% had calculus, 12.17% had deep pockets, and 3.3% had bleeding; only 1.33% were healthy and disease-free.^[35] In Iraq, a 1999 study of a

representative sample of 1,418 individuals aged 7 to 70 years from three randomly chosen rural villages in the Ninevah Governorate reported that 41.2% of those 25 years and above had shallow pockets and 22.6% had deep pockets.^[36] A Sudanese study reported a high prevalence of untreated, periodontal disease in the population.^[37] while a Yemeni study reported the presence of deep pockets in 12.5% of 35-44 year-olds. While this was less than the Iraqi estimates, it was higher than in Saudi Arabia. Jordan recorded the lowest periodontitis occurrence, with only 4.7% of 20-39 year-olds and 18.6% of 50-60 year-olds having shallow pockets and 4.1% and 11.1%, respectively, having deep pockets.^[7,30] The absence of adequate oral hygiene, hardly any use of antimicrobial drugs, antiseptics, and the complete lack of dental care may -to some extent- explain the high prevalence of periodontal pathogens leading to periodontitis.^[38,39]

Oral cancer

Oral cancer is the eighth most common cancer worldwide, with >300,000 cases annually. In the male, oral cancer incidence rates range from 1 to 10 cases per 100,000 inhabitants in several countries. A WHO (2010) report stated that the mortality rate due to oral cancer was around 2 per 100,000 in the Middle East, less than reported in highly populated countries like India and the United States.^[40]

Several cross-sectional studies have been performed in the Arab nations of Saudi Arabia, Jordan, Sudan, Libya, Yemen, UAE, and Syria and Arab populations living in Israel, Egypt, and Iraq, with sample sizes from 71 to 1787 patients.^[40-45] Except for one study from Saudi Arabia, all others histopathologically verified the diagnosis of oral cancer. The incidence of oral cancer showed wide variability from 0.5/100,000 in Syria to 10/100,000 in southern Saudi Arabia; even within the same study, wide regional variations were sometimes observed within the population.^[46] Two studies from Saudi Arabia and Yemen reported females showing a higher prevalence of oral cancer, while oral cancer was more prevalent in men in the remaining studies.^[40-45] A recent study from Iraq reported over 12 years that there was an upsurge in the oral malignancies in Sulaimani city, north of Iraq; they were predominated in males older patients.^[47] Further, a study concluded that relatively higher rates of oral and oropharyngeal cancers were found among the people of GCC countries with some sorts of diversity among GCC countries.^[48] Recently, the Saudi Cancer Registry identified (during 1994 and 2015) 172,424 cancer patients in Saudi Arabia. Of these, 3184 were oral cancer.^[49] Another study stated a very high prevalence of oral cancer in Saudi Arabia with the main relevant agent the use of smokeless tobacco Shamma.^[50]

In a multicenter study conducted in four leading hospitals in the UAE, 147 of 992 (14.9%) oral biopsy reports revealed malignant tumors. Of the 15 different malignant lesions diagnosed, oral squamous cell carcinoma (OSCC) occurred most frequently and accounted for 11.4% of the overall oral biopsies retrieved, while the commonest presentation was with ulceration (31.17%)

followed by lumps and white lesions.^[43] To identify oral cancer, the Arab world requires a comprehensive approach which must include health education and literacy, risk factor reduction, and early diagnosis.

While there were marked variations with respect to the distribution of the affected site, most studies reported oral cancer most commonly occurring on the tongue and lips. The gingiva and alveolus were particularly affected in patients from south-western Saudi Arabia (Jizan and Najran).^[51] Furthermore, in Sudan, there was a high prevalence of lesions that extended into an adjacent site.^[52] A few studies documented the clinical features of oral cancer. Swelling and/or ulceration were most commonly reported in oral cancer patients, while white mucosal patches and lumps were less frequently observed. In a study from the UAE, tongue lesions were the commonest oral cancer site (52%), with lesions on the cheeks and lips less frequently noted. 77% of all reported malignancies were OSCCs, and 20.8% of all OSCC cases resulted in neck dissections.^[43] With respect to risk factors, a study from Jordan revealed that 66% of patients were cigarette smokers, and 36% and 17% smoked narghile and consumed alcohol, respectively.^[53] In Sudan, toombak was the most prevalent tobacco type,^[46] with an adjusted odds ratio (OR) of acquiring oral cancer of 11.0 with toombak dipping over the long term compared to the control group.^[54] Similarly, in the Jazan province, Saudi Arabia, smokeless tobacco or shammah increased the risk of developing oral cancer by 29 times (OR = 29.3) compared to 10 times (OR = 10.5) for cigarette usage.^[55] It is also noteworthy that several oral cancer patients suffered from other oral health issues. In a study of 375 cancer patients in Saudi Arabia visiting oncology outpatient clinics, 86.1% had other oral health issues. Further, oral health problems in cancer patients were positively associated relatively with female sex, low income, smoking, the presence of breast cancer, anxiety, and stress.^[56] Interestingly, one study drew attention to the various areas of inadequacies in the knowledge of dentists in the Arab world with respect to the early detection of oral cancer.^[57]

The concept of tackling cancer as a broader healthcare concern has largely been neglected in the Arab world. There are few cancer registries in these areas, with resources in the region being directed solely towards treatment. There is now a pressing need to improve cancer registries' infrastructure in Arab nations beyond merely reporting strategies to extract high-quality data. Initiatives to implement preventive measures by local governments and international agencies (WHO and World Bank) are urgently needed to improve public awareness of the detrimental effects of high-risk behaviors such as tobacco usage on oral cancer. It is also essential that high-quality clinical services are provided to oral cancer patients in this part of the world.

Oral trauma

Oral trauma is common and can be prevented through improved public health policies and increased awareness of the risks associated with violence, sports, and road safety. 5% of all

injuries are oral injuries, with craniofacial trauma accounting for approximately 50% of the estimated 8.5 million trauma deaths across the world. Oral injuries have significant physical, psychosocial, and economic impacts and represent a prominent public health problem, especially in children and young adults in the Arab world.

A Kuwaiti study reported that oral trauma incidence was greater in boys than in girls and occurred more often in the maxilla than in the mandible. Most patients showed only one injured tooth, the maxillary central incisors being the most traumatized teeth. Around 90.3% of injuries involved unrepaired enamel or enamel/dentin fractures. The injuries chiefly included falls and blows occurring either indoors or outdoors, and about two-thirds of traumas were noted at age ten years or above.^[58]

A cross-section study of 1015 children in a Jordanian school reported a 16.3% prevalence of Traumatic Dental Injuries (TDIs), with 65% enamel fractures and TDIs occurring significantly more often in males and children (males and females) with inadequate lip coverage.^[59] A Palestinian study of 804 children showed a 17.7% prevalence of traumatic dental injuries. Enamel fractures and injuries involving dentine accounted for 41% and 42.5% of all injuries, respectively, with the upper central incisors most commonly affected (89%); however, only 5% of the injured teeth were treated. TDIs were again found to be more prevalent in boys and those with incompetent lip coverage.^[60] A Tunisian study of 100 patients aged between 3 and 60 years reported that TDIs most frequently occurred in the 11-20 years age group (35%), with a greater number of males affected, most commonly due to falls (33%), and enamel-dentin fractures without pulp exposure (38%) the commonest injury. However, only 9% of patients presented for dental care within 24 hours of injury. One of the reasons for the limited number of trauma cases reported in this study may be because patients failed to seek dental treatment after minor trauma or that the real incidence of dental trauma is low in Tunisia.^[61] Other Middle Eastern countries like Kuwait, Iraq, and Syria reported lower prevalences in the range of 11.5% to 14.7%.^[62,63] The difference in the prevalence of TDIs between studies can be attributed to the differences in methodologies applied, diagnostic criteria, populations, as well as geographic and cultural variations in the populations under investigation that affect children's activities.

Oral hygiene practice

Practicing a good oral hygiene routine, combined with regular and constant visits to the dentist, are essential for maintaining good oral health and eliminating dental diseases and infections i.e., dental caries, dental and periodontal diseases. Studies stated that keeping good oral health has a positive impact on general health, well-being, and QoL.^[64,65] A study from Saudi Arabia specified that plaque formation had a significant reverse relation with practicing oral hygiene behaviors and measures, such as the use of traditional stick (miswak), flossing and brushing. The study further stated among the children who brushed once

daily had higher plaque formation compared to children who brushed twice daily. Also, a higher level of DMFT was found among children who consume higher level of snacks and sugar.^[66] Another study from UAE indicated that 22% of individuals brushing their teeth once daily and 79% brushing their teeth twice daily or more often, the study further stated, among all study participants, 45% flossed their teeth once a day or more often, and 56% indicated they never flossed.^[67]

Challenges to optimal oral care

The Arab world in general faces major challenges to oral health research. Dental healthcare coverage is incomplete in some Arab regions, although some countries offer comprehensive public clinic coverage. Only a few countries i.e. UAE, Saudi Arabia, Qatar, and Oman have conducted dental research studies, with many Arab countries, notably Algeria, Bahrain, Comoros, Djibouti, and Egypt may not have as many research data on the oral disease.^[68]

Patients may be inclined to seek private treatment in the Arab world, with most countries only recently achieving adequate dentist coverage of the general population; however, most of these dentists are private. When they offer treatment sessions in public clinics, this dual employment apparently facilitates patients moving to their private offices.^[68] Even in those countries with social health and insurance, dental care has not yet been granted cover. Moreover, because of dentists' high clustering in cities, access to dentists for patients from rural areas becomes severely limited. The coverage of dental health services must be expanded in order to improve oral health.^[68] Recognizing the importance of oral health, prevention is the area in which primary care physicians can have the major impact on oral health. Family physicians can integrate oral health into their routine practice through counseling about oral hygiene, diet, smoking cessation, and fluoride supplementation.^[69] Positive changes in the life expectancy of people around the world as well as their lifestyles, together with the significant development of scientific discoveries that narrowed the previously existing gap between dental practitioners and practicing physician in their different specialties. Therefore, some primary care activities could be conducted in the dental clinic including -but not limited to- diabetics screening, managing hypertension, etc.^[70]

Economic burden

Even though oral diseases represent a major burden to the QoL and healthcare economics of Arab nations, little attention has been paid to restorative and preventive dental care. The aggregate direct treatment costs incurred for dental diseases globally were estimated to be around \$297.67B, with high-income countries accounting for 82% of the estimated expenditure (\$244.40B) while the Middle East and North Africa (MENA) contributing nearly \$8.33B.^[71] Oral injuries in particular exert a notable economic impact and represent a public health hazard, particularly in children and young adults. However, little, if any, recent evidence is available for dental care's economic burden in Arab countries.

Conclusions

This review concluded that oral diseases are among the most widespread diseases in the Arab nations and have major health and economic burdens, also affects the quality of life. Despite its marked socioeconomic impact, however, it is often ignored in public health policy. There is poor awareness of the value of oral health and best practices of accomplishing good oral hygiene. Currently, oral diseases vary in distribution and severity across the Arab world or even within the same country or region. Therefore, there is a need for more surveys on the prevalence, extent, and severity of oral diseases in Arab populations. These efforts will help practitioners and policy makers to develop strong dental care strategies specific to the Arab population. The long-term vision is for the entire Arab population to benefit from improved oral health through a decline in all types of oral diseases and conditions prevalent in this region, to have equitable access to cost-effective and high-quality oral healthcare, and to adopt healthy lifestyles.

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Conflicts of interest

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