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Quarterly

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The possible role of dental plaque as extra-gastric reservoir of *Helicobacter pylori* in gastric re-infection: A science-metric study

Nader Navabi DDS, MD¹, Masoud Nazeri DDS, MD²

Review Article

Abstract

BACKGROUND AND AIM: *Helicobacter pylori* (*H. pylori*) infection is one of the most common infections which still affects individuals worldwide. The main route for transmission of *H. pylori* infection is the oral route and this microorganism has been detected in dental plaque. In past decades, there have been a number of controversies about the station of dental plaque in the recurrence of gastric *H. pylori* Infection after eradication by triple therapy. In this study, attempts have been made to illustrate the current body of high quality evidence in this field.

METHODS: All relevant studies published between 2000 and 2017 were included in this review. The creditable databases were searched for relevant key words. The cross-sectional, experimental, and interventional investigations assessing the existence of *H. pylori* in the plaque, the state of plaque in gastric re-infection, the presence of co-infection between the oral cavity and stomach, the influence of triple therapy on the plaque, and the impression of periodontal treatments on prevention of recurrent gastric *H. pylori* infection were included.

RESULTS: Science metric review of literature demonstrated considerable disagreement with no definite conclusion. Due to the existing diversity in methodology and population groups, wide variation in results was reported.

CONCLUSION: Further homogenous studies are required to more clarify the “*H. pylori* in dental plaque” theory.

KEYWORDS: *Helicobacter Pylori*; Dental Plaque; Gastritis

Citation: Navabi N, Nazeri M. The possible role of dental plaque as extra-gastric reservoir of *Helicobacter pylori* in gastric re-infection: A science-metric study. J Oral Health Oral Epidemiol 2019; 8(1): 1-8.

Helicobacter pylori (*H. pylori*) gastric infection is one of the most common infections worldwide in such a way that more than half of the world population are still infected with this microorganism. This incidence can reach 90%, even more, for populations living in the developing countries.¹⁻⁴ Anand et al.¹ and Al Sayed et al.² was the first investigator to report the existence of this microorganism in the oral cavity.^{1,2} Cheng et al.³ and Thomas et al.⁴ were the first ones to propose the hypothetical importance of existence of *H. pylori* in the dental plaque. Dental plaque provides a suitable environment for *H. pylori*, which is a gram negative and spiral

microorganism. The hypothesis for presence of *H. pylori* in oral cavity became interesting due to the discovery of an oral route transmission method for *H. pylori* contagion. Either the main extra-gastric reservoir for *H. pylori* is oral cavity or is just a transient sanctuary for *H. pylori* is not clear yet, but if the oral cavity plays a role as an extra-gastric reservoir, it has an important clinical implication.¹⁻⁵ Conventional treatment modality for *H. pylori* associated gastritis is comprised of a triple therapy within 14 days, so if the *H. pylori* is present in dental plaque it might not be eliminated through pharmacotherapy alone and recurrence is possible following successful gastric

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eradication of the microorganism.⁵⁻¹⁸ Interestingly, recurrence rate is considerable (approximately 13% annually) and this highlights the importance of eliminating H. pylori in other reservoirs as well. Thus, the question arises as is there any correlation between the risk of H. pylori reinfection and its existence in dental plaque? (For example, in periodontal pocket of subjects with periodontal disease).^{19,20}

The above mentioned hypothesis has been debated for several reasons. One of the most important claims is that in an immunocompetent subject, presence of H. pylori in dental plaque is not adequate for gastric reinfection and this is supported by the fact that dental plaque H. pylori is not a predictor of gastric reinfection in the future.²¹⁻²³ There is a pitfall for cross sectional studies assaying the simultaneous presence of H. pylori in the oral cavity and stomach of patients with dyspepsia and most of the studies debating the state of dental plaque H. pylori in gastric reinfection have used the cross sectional method.¹⁹⁻³⁴ The objective of these studies is the assessment of simultaneous existence of H. pylori in the oral cavity and stomach.⁵⁻³⁴ Navabi et al. reported 49.7% rate for the concurrent gastric and dental plaque H. pylori.²⁰ On the other hand, Gebara et al.⁵ and Ozdemir et al.¹⁰ evaluated the presence of H. pylori in dental plaque before and after triple therapy. The rationale for this method was to evaluate the effect of triple therapy as the treatment of choice for gastric infection on the dental plaque H. pylori, however some other investigators reported that elimination of dental plaque H. pylori by using the pharmacotherapy was difficult to achieve.³⁵⁻³⁷ The present study was carried out aiming to illustrate all high quality evidence about possible state of dental plaque (main extra-gastric reservoir of H. pylori) for gastric cancer recurrence.

Methods

In this science-metric study, all relevant

studies published in the English language between January 2000 and December 2017 were collected and included. In order to collect relevant studies, searching on creditable databases [Medline, Institute for Scientific Information (ISI) Web of Science, Scopus, and Google Scholar] was conducted by two investigators independently. The Medical Subject Headings (MeSH) system was used for performing the searches, so the key words were: "Helicobacter", "Helicobacter pylori", and "H. pylori" in combination with "dental plaque". The cross-sectional, experimental, and interventional investigations assessing the existence of H. pylori in the plaque, the state of plaque in gastric re-infection, the presence of co-infection between the oral cavity and stomach, the influence of triple therapy on the plaque, and the impression of periodontal treatments on prevention of recurrent gastric H. pylori infection were included. The abstracts of scientific congresses, grey literature, thesis, and non-English publications were not considered in the present study.

Results

Firstly, 125 studies were collected based on title/abstract search. In the next stage, the full text of each study was checked by two researchers separately and finally, 72 papers were included in the review. Regarding the laboratory assays for evaluation of H. pylori in dental plaque, at least four different methods were recruited as demonstrated in table 1.

Table 1. Helicobacter pylori (H. pylori) detection methods used in the studies assaying the presence of H. pylori in dental plaque and gastric mucosa (1-72)

Method	Studies [n (%)]
RUT	11 (34.3)
Culture	11 (34.3)
PCR	6 (18.9)
IP	4 (12.5)

RUT: Rapid urease test; PCR: Polymerase chain reaction; IP: Immunoperoxidase

Table 2. Development of research questions throughout time in the studies reviewed (1-72)

Research question	Studies [n (%)]
Concurrent presence of H. pylori in dental plaque and gastric mucosa of patients with dyspepsia	31 (42.5)
Evaluation of the presence of H. pylori in dental plaque following triple therapy	8 (11.0)
Comparison of H. pylori presence in dental plaque of periodontal and healthy subjects	20 (27.4)
Assessment of the effect of periodontal treatment on the elimination of dental plaque H. pylori	5 (6.8)
Assessment of different H. pylori strains with high virulence in dental plaque	9 (12.3)

H. pylori: *Helicobacter pylori*

Table 2 demonstrates the research question development throughout the time period. Table 3 presents the results of systematic reviews and meta-analysis performed on the subjects so far and as shown, most of the studies supported the role of dental plaque H. pylori in gastric H. pylori reinfection.

Table 3. Systematic review and meta-analysis studies regarding different aspects of the theory

Authors	Conclusion
Zou and Li ⁴⁰	Prevalence of H. pylori in oral cavity of patients with gastric H. pylori was higher and triple therapy had little effect on dental plaque H. pylori elimination.
Navabi et al. ²⁰	Concurrent presence of H. pylori in dental plaque and gastric mucosa of dyspeptic patients
Bouziane et al. ³⁸	Addition of periodontal treatment to triple therapy seemed to reduce the risk of gastric H. pylori recurrence.
Marbaix et al. ⁴¹	Association between oral H. pylori and gastric H. pylori infection
Adler et al. ⁴²	Dental plaque acted as a reservoir for H. pylori and maintenance of optimum oral hygiene was necessary to minimize the risk of gastritis recurrence.
Al Sayed et al. ²	
Ren et al. ³⁹	Periodontal treatment increased the chance of gastric H. pylori elimination.

H. pylori: *Helicobacter pylori*

Discussion

Despite the fact that the existence of H. pylori in dental plaque has been established for a long time, its clinical significance is not totally clear. This ambiguity seems to exist because of methodological diversities among numerous studies accomplished.

The most common methods are rapid urease test (RUT) and culture.^{5-37,43-46} In some studies, more than one laboratory test have

been used for evaluation of H. pylori to increase accuracy of diagnosis. Anand et al.⁸ recruited RUT and histology and Hardo et al.⁴⁷ used polymerase chain reaction (PCR) and culture simultaneously. Oshowo et al. employed three diagnostic methods including PCR, histology, and RUT.⁴⁸ Immunoperoxidase (IP) assay was used in the study by Savoldi et al.⁴⁹ The rationale for using PCR and RUT as the diagnostic assays was their high accuracy for revealing the presence of H. pylori. Liu et al.⁵⁰ recruited nested PCR and Sahin et al.⁵¹ used PCR-RFLP (restriction fragment length polymorphism). Diouf et al.⁵² recruited reverse transcriptase (RT)-PCR. These examples demonstrate the variability of methods recruited in different studies. Furthermore, despite the fact that PCR is the most accurate method, it might lead to false positive results. Riggio and Lennon⁴⁴ and Patthy et al.⁴⁵ were the first to use PCR to assay the presence of H. pylori in subgingival plaque of subjects with periodontitis, moreover, Teoman et al.²⁶ claimed that PCR technique was superior to other methods for detection of H. pylori in dental plaque and samples obtained from gastric mucosa. On the other hand, some investigations have suggested the culture of microorganism as "gold standard" for proving its existence, however some strains of H. pylori might not be cultured readily. Culture is not as sensitive as PCR and since H. pylori is a microaerophilic microorganism, it might not be transferred to the laboratory easily. Thus, there is no consensus regarding the best method to unravel the presence of H. pylori in dental plaque so far.^{1,2,20,53}

In few studies, it was claimed that there is a higher chance of detecting H. pylori in supragingival and subgingival plaque among

subjects with periodontal disease.^{7,8,22,37} Survival of *H. pylori* in dental plaque depends on its ability to interact with other bacterial species and the number of these bacterial species is increased in chronic periodontitis.¹ Different clinical criteria are used for inclusion of case and control subjects including level of attachment, depth of probing, and bleeding on probing.

Interventional studies were the next to emerge following these reports. Czesnikiewicz-Guzik et al. stated that dental plaque control using mouth rinses was effective against dental plaque *H. pylori*.²¹ Tarullo et al. concluded that following triple therapy, local administration of metronidazole, calcium phosphate, and potassium sulphate in periodontal pocket was effective against dental plaque *H. pylori*, though it seemed that these interventions had an ephemeral effect on the existence of microorganism in the dental plaque.⁵⁴ Therefore, the next question was that whether mechanical debridement performed by a trained dentist would help avoid gastric *H. pylori* recurrent infection? Butt et al. were the first to address this question.⁵⁵ Sheu et al. claimed that dental disease was a risk factor in the recurrence of gastric *H. pylori* in a three-year follow-up study,⁵⁶ but to unravel the effect of dental disease elimination on the recurrence rate of gastric *H. pylori*, more well-designed clinical trials were demanded. Thus, Jia et al. stated that periodontal treatment was correlated with lower chance of *H. pylori* recurrence.^{57,58}

The second clinical trial was performed by Zaric et al. and they demonstrated that addition of periodontal treatment to triple therapy might lead to a reduction in gastric *H. pylori* recurrence rate.⁵⁹ Gao et al. concluded that elimination rate of *H. pylori* was higher in subjects receiving both periodontal treatment and triple therapy, but unfortunately, their study lacked a clinical trial design.⁶⁰ Bouziane et al.³⁸ performed a systematic review on the studies led by Jia

et al.^{57,58} and Zaric et al.⁵⁹ and it was revealed that periodontal treatment prior to or simultaneous with triple therapy reduces the risk of gastric *H. pylori* reinfection, but more studies were needed to support this claim.³⁸ More recent studies, including the one by Paladino et al. claimed that nonsurgical periodontal treatments reduced the risk of gastric *H. pylori* reinfection.⁶¹ Ren et al. confirmed this conclusion, though they stated that more powerful multicenter clinical trials were needed to establish a firm conclusion.³⁹ There is a heterogeneity in *H. pylori* detection methods in the interventional studies as well, so that Zaric et al.⁵⁹ used urea breath test (UBT) and Jia et al.^{57,58} recruited PCR. In the systematic review performed by Bouziane et al.,³⁸ UBT was not comparable to PCR in its detection accuracy.^{38,57-59}

Another aspect addressed in the more recent studies is the possible role of *H. pylori* strains' virulence on the gastritis. For instance, cytotoxin-associated gene A (CagA gene) has been associated with gastric carcinoma while vacuolating cytotoxin A (VacA) is mostly associated with inflammatory conditions. While in some studies, there is no difference between these two strains of *H. pylori* and it seems that geographical distribution of studies leads to such heterogeneity. In case of a higher incidence of potent *H. pylori* in plaque, the state of plaque *H. pylori* in gastric *H. pylori* reinfection might be more prominent.⁶²⁻⁷¹ Assumpcao et al. demonstrated that in 89% of the subjects, there was a similarity between genotype (CagA or VacA) of dental plaque and gastric *H. pylori*.⁶⁸ However, Wang et al. believed that there is the chance of detecting more than one strain of *H. pylori* in an individual at a single time.⁶⁹

In studies such as the one by Dye et al., it has been long stated that oral hygiene plays an important role in subjects with *H. pylori* infections undergoing triple therapy, and clinicians that undertake the care of patients with gastritis with positive gastric *H. pylori* might notice this in their patients and stress

the importance of oral hygiene.³⁷

One of the limitations of the present study was that dental plaque is not the only source of *H. pylori* and dorsum of the tongue and saliva should also be taken into consideration in such studies, although it was supposed in the present study that the majority of the studies accomplished have still focused on dental plaque as oral harbor of *H. pylori*.⁷²

Conclusion

It seems that there is enough evidence about the existence of *H. pylori* in the dental plaque which could lead to recurrence of gastric infection. If the role of this potential reservoir in the recurrence of gastric *H. pylori* infection was established, a significant revolution might occur in the treatment modality of

these patients and dentists might play a prominent role in management of these patients, organizing a multidisciplinary management protocol, and merging periodontal therapy with the triple therapy. Further randomized clinical trials (RCTs) seem necessary for assessing the power of this multidisciplinary clinical protocol in order to establish standard guidelines regarding the proper dental management of patients with gastritis.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

None.

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A comparison of the effects of mouthwash obtained from green tea and chlorhexidine mouthwash on the oral health of patients admitted in the intensive care unit

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Original Article

Abstract

BACKGROUND AND AIM: In a normal non-diseased person, the throat condition is favorable for the growth of different germs. This investigation intended to assess the impression of mouthwash obtained from green tea and chlorhexidine on the oral sanitation in intubated subjects in the intensive care unit (ICU).

METHODS: In this clinical trial study, 46 subjects, who were being carried out mechanical ventilation in the ICU, were recruited. For the first group, mouthwashing was implemented with chlorhexidine solution for four days and then with green tea solution for another four days. In the second group, we first mouthwashed the cases with green tea solution, followed by another four days of mouthwashing with chlorhexidine solution. Ultimately, checklist of oral health evaluation was filled and compared between the studied groups.

RESULTS: On the first day, no statistically significant difference was detected between the two groups. Nonetheless, the amount of food leftover in teeth showed significant difference ($P = 0.020$). Furthermore, we found no difference in the mucosal and plaque score criteria at the beginning of the study between the two groups. On the other side, no significant difference was observed in the oral health settings between the groups after conducting mouthwashing. However, the two groups had statistically significant difference with respect to the plaque scoring criteria ($P = 0.029$).

CONCLUSION: It can be postulated that both green tea and chlorhexidine mouthwash possess similar impressions on the oral sanitation. Nonetheless, since green tea is obtained from natural compounds and is easily available, it is suggested to be utilized instead of a chemical compound, namely chlorhexidine.

KEYWORDS: Chlorhexidine; Green Tea; Oral Health

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One of the chief functions by nurses in hospital wards is to facilitate an oral sanitation to the cases hospitalized in various wards of hospitals.¹ It has been reported that intubated subjects in hospitals who are left with low care experience situations in their mouth that

contribute to the growth of various germs in the oral cavity.² A bulk of reports testify that there is a relationship between pneumonia and insufficient oral sanitation in the intensive care units (ICUs) of hospitals.^{1,3} Moreover, it has been established that there is a raising susceptibility to the pneumonia in

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subjects who experience mechanical ventilation that results in increased mortality rate compared with other patients.⁴

Providing a sanitary situation in the oral cavity decreases inflammatory gum disease, dental plaque, and ventilation-mediated pneumonia.⁵ A steady oral flora is seen in a healthy subject during time; however, the flora in the oral cavity is modified to confer a suitable condition for highly pathogenic gram-negative bacteria within 48 hours since hospitalization in hospital wards. As well, the opportunistic germs can grow in case of preferable settings, culminating in local and general diseases. It has been observed that there is a reduced amount of fibronectin (a supportive compound on the teeth surface) in cases hospitalized in the ICU. Decreased fibronectin on teeth surface results in augmented potential of the bacteria to bind to the teeth surface as well as to the epithelial cells in the oral mucosa and the pharynx. Finally, promoted attachment and accumulation of bacteria on the teeth surface result in the occurrence of a dental plaque.^{6,7}

Oral health is an important task in nursing care in individuals anesthetized in the ICUs who cannot perform oral sanitation, which makes the patient feel comfortable and relaxed.⁸ Currently, there are two main ways to remove the pathogens from the mouth cavity; first, mechanical implementations such as brushing or using swabs in anesthetized patients; second, mouthwashing with antimicrobial agents.⁹

The common approach of mouthwash is chlorhexidine solution, which is utilized as a washing solution for inhibiting the development of dental plaque and curing gingivitis.¹⁰ Being effective on both gram-positive and gram-negative bacteria, chlorhexidine is considered as a wide-spectrum anti-bacterial compound.¹¹ In the study of Houston et al., it was observed that chlorhexidine mouthwash decreased oral infections in the subjects after cardiac surgery,¹¹ while no favorable effect of this mouthwash was detected in reducing

ventilator-mediated pneumonia in other wards of hospital.⁹ It is not suggested to commonly utilize chlorhexidine solution in all subjects in the hospital wards because of unintended adverse effects as well as its contribution for the development of antibiotic resistance phenomenon.¹²

Currently, the use of medicinal plants is rising to the therapy of several complications, particularly infectious disorders, because of little adverse effects in comparison to the chemical compounds.¹³ *Camellia sinensis* (known as green tea) belongs to the theaceae family that have aromatic and white flowers.¹⁴ The tea polyphenol compound is composed of catechins which mediate the desired and potential impressions of green tea on the oral sanitation.¹⁵ The polyphenol compounds of green tea mediate unique features including anti-inflammatory, antioxidants, antibacterial, anticancer, and anti-inflammatory effects.¹⁶ Furthermore, tannins in green tea play antimicrobial roles. It has been established that green tea inhibits bacterial accumulation on teeth and constructing dental plaques and therefore, limits the release of human amylase, growth of bacteria, and the action of bacterial glucosyltransferase (GTF) enzyme, and finally restricts the adherence of glucan to the teeth surface.¹⁷

With respect to the above-mentioned evidence, this survey intended to assess the impact of 5% green tea and 0.2% chlorhexidine mouthwashes on the oral sanitation in the intubated patients hospitalized in the ICU.

Methods

As a crossover clinical trial study, herein intubated cases hospitalized in the ICU were enrolled. The study attempted to assess the impacts of 5% green tea extract and 0.2% chlorhexidine mouthwashes on the oral sanitation of the subjects with endotracheal intubation.

In this investigation, 46 anesthetized patients (38 men and 8 women) hospitalized

in the ICU were chosen via simple random sampling method. The subjects were included according to these criteria: having a tracheal tube via the mouth route, aged from 18 to 65 years old, not passing more than 12 hours since hospitalization in the ICU, not being hospitalized in the hospital prior to hospitalization in the special ward, not taking antibiotic medication prior to hospitalization, not being pregnant and having allergy towards plant agents, not having artificial teeth, not suffering from chronic and immune system complications, and not having a special lesion in the mouth.

However, the exclusion criteria were: moving a patient from ICU to other wards or subject's death prior to accomplishment of the investigation and not having any special injury through tracheal intubation. Furthermore, any subject was excluded in case of unwillingness to proceed the intervention.¹⁸

This study was approved by the Ethical Committee of Kerman University of Medical Sciences, Kerman, Iran (IR.KMU.REC.1394.651), and written informed consents were taken from all the subjects or a parent and/or legal guardian prior to inclusion in the study.

An expert nurse examined the subjects during this study. The study was initiated from the first day of hospitalization in the ICU and continued for eight days. The evaluations were conducted according to the crossover method in two groups. Initially, the oral health checklist (oral health form) was accomplished through two criteria of Beck Oral Assessment Scale (BOAS) and Mucosal-Plaque Score (MPS). Based on the BOAS criteria, oral sanitation is examined in 5 sections such as lips, tongue, gums and oral mucus, saliva, and teeth, which is calculated on a four-point Likert scale. The range of this scale is between 5 (no dysfunction) to 20 (maximum dysfunction). On the other hand, two sections (plaque and mucus) are evaluated by MPS criteria, in which a value less than 4 indicates a well oral sanitation.

During 6 months of sampling, due to the

reasons such as the amelioration of the conditions and moving the subjects prior to 8 days from the ICU to the admission departments (11 subjects), dead individuals (3 subjects), and airway damage (2 subjects), finally 16 individuals were removed from the intervention. Forty-six subjects were classified into two groups and were administered with chlorhexidine and green tea extract. The study was performed in a double-blind method. Basically, the individual performing the mouthwashing procedure was not aware of the kind of mouthwash solution. The vessels of both solutions were similar to each other and only badged with the names of solution-1 and solution-2. The statistician was also not aware of the solution types and only evaluated group-1 and group-2. During the preliminary four days, the chlorhexidine was given to the first group and the green tea was given for the other four days with solution. However, in the second group, mouthwashing was conducted for four days with green tea solution followed by other four days with chlorhexidine. The antimicrobial effect of chlorhexidine lasts for up to six hours after using,¹⁸ while the time of exposure to green tea is less than four hours.¹⁹ With respect to two times performing the mouthwash each day (once in the morning and next in the evening), to conduct the mouth cleaning process after first mouthwashing on the day four, the other mouthwash solution was administered after 12 hours.

The tongue surface and the oral cavity of the subject was cleaned using a chlorhexidine solution and a soft toothbrush, which then 10 cc of the chlorhexidine was used in the oral cavity, and a suction of throat and oral cavity was conducted after one minute.²⁰ At the termination of the day four, oral sanitation evaluation was carried out by the checklist. Next, the mouthwashing of the subject was carried out by green tea for four days. The mouthwashing process was conducted via a green tea solution and using a soft toothbrush, and the tongue and tooth

surfaces were administered with green tea with the toothbrush through forward and backward movements. At the termination of day eight, the checklist was completed again to perform the oral health evaluations.

To prepare the solution of the green tea mouthwash, the leaves of the plant were collected and a pharmacist validated it in Kerman Medical Science Laboratory. Afterwards, the leaves of green tea were grinded. Then, 100 g of grinded leaves was soaked in 500 ml methanol for 48 hours. Then, the solution was filtered and put on the drying pages at the laboratory temperature for 3-4 days. In the next step, the crystalline powder was obtained from the drying pages, and by mixing 0.5 g of green tea powder to 100 ml of distilled water, a 5% green tea solution was generated.²¹

SPSS software (version 22, IBM Corporation, Armonk, NY, USA) was applied for statistical analysis of the data. Chi-square test, chi-square test for trend, or Fisher's exact test were exploited to compare data between the two groups. Qualitative data were shown as number and percent. A P-value less than 0.050 was regarded to be statistically significant.

Results

Baseline data of the study subjects: 38 men (82.6%) and 8 women (17.4%) comprised the study population. 20 (43.5%) subjects were

smokers and 26 (56.5%) cases were non-smokers. Moreover, multiple traumas (MTs) were detected in 25 (54.3%) subjects (Table 1).

Oral sanitation assessment on the initial day: We detected that the two groups did not show significant difference in sanitation condition of gum, tongue, mucus, lip, and saliva at the initiation of the study. However, it was observed that the two groups had difference with respect to teeth health at the initiation of the study, in which the first group indicated a better health status.

Regarding the dental criteria, it was observed that 6 (26.1%) and 0 (0%) cases in the first and second groups, respectively, had no food leftover in their teeth. Moreover, 14 (60.9%) and 16 (69.6%) cases in the first and second groups, respectively, showed low food leftover in teeth. However, in the first group, 3 (13.0%) and in the second group 7 (30.4%) cases had more food leftover. A statistically significant difference was detected at the initiation day of the study in the tooth criteria. Therefore, the two studied groups represented difference at the initiation of the study (Table 2).

On the other hand, no statistically significant difference was identified between the two studied groups in the criteria for mucosal and teeth plaque (Table 2).

Table 1. Demographic data and clinical characteristics of the studied individuals

Characteristic (46 cases)	Value	
Gender [n (%)]	Men	38 (82.6)
	Women	8 (17.4)
Age (year) (mean $\pm$ SD)	Men	45.00 $\pm$ 12.91
	Women	48.00 $\pm$ 14.31
Smoking status [n (%)]	Smoker (men/women)	18 (39.2)/2 (4.3)
	Non-smoker (men/women)	20 (43.5)/6 (13.0)
MT [n (%)]		25 (54.3)
SDH [n (%)]		3 (6.5)
EDH [n (%)]		3 (6.5)
ICH [n (%)]		6 (13.0)
DAI [n (%)]		4 (8.7)
Laparotomy [n (%)]		1 (2.2)
SAH [n (%)]		4 (8.7)

MT: Multiple trauma; SDH: Subdural hematoma; EDH: Epidural hematoma; ICH: Intracranial hemorrhage; DAI: Diffuse axonal injury; SAH: Subarachnoid hemorrhage; SD: Standard deviation

Table 2. Comparison of oral health status criteria in the two groups of chlorhexidine- and green tea-treated at the beginning of the study

Characteristic	Group 1 (first chlorhexidine then green tea) [n (%)]	Group 2 (first green tea then chlorhexidine) [n (%)]	P*
Lips			
Smooth and pinky	13 (60.9)	16 (69.6)	0.540
Dried and red	9 (39.1)	7 (30.4)	
Gum			
Smooth and wet	17 (73.9)	21 (91.3)	0.240
Dried and pale	6 (26.1)	2 (8.7)	
Tongue			
Smooth and pinky	18 (78.3)	15 (21.7)	0.510
Dry and outward papillary	5 (21.7)	8 (34.8)	
Teeth			
Without food leftover	6 (26.1)	0 (0)	0.020
Less food leftover	14 (60.9)	16 (69.6)	
More food leftover	3 (13.0)	7 (30.4)	
Saliva			
Much watery	16 (69.6)	15 (65.2)	0.990
Increased saliva volume	4 (17.4)	5 (21.7)	
Less and a little thick	3 (13.0)	3 (13.0)	
Mucosa			
Normal	15 (65.2)	15 (65.2)	0.990
Mild inflammation	7 (30.4)	8 (34.8)	
Moderate inflammation	1 (4.3)	0 (0)	
Plaque			
Without plaque	1 (4.3)	1 (4.3)	0.990
Rare	10 (43.5)	9 (39.1)	
Mild	8 (34.8)	8 (34.8)	
Many	4 (17.4)	5 (21.7)	

*P-values were calculated by chi-square test and are about total analysis in each comparison; item in bold shows significant P-value.

Oral sanitation assessment after interventions: There was no statistically significant variation in the health

settings of mucus, lip, tongue, gum, and saliva indexes after intervention (Table 3).

Table 3. Comparison of oral health status criteria in two groups of chlorhexidine- and green tea-treated individuals at the end of the study (day 8)

Hygiene scoring	Group 1 (first chlorhexidine then green tea) [n (%)]	Group 2 (first green tea then chlorhexidine) [n (%)]	P*
Lips			
Worse	1 (4.3)	0 (0)	0.080
Similar	10 (43.5)	5 (21.7)	
Better	11 (47.8)	17 (73.9)	
Very better	1 (4.3)	1 (4.3)	
Gum			
Worse	1 (4.3)	0 (0)	0.460
Similar	9 (39.1)	6 (26.1)	
Better	11 (47.8)	17 (73.9)	
Very better	2 (8.7)	0 (0)	
Tongue			
Worse	0 (0)	1 (4.3)	0.830
Similar	1 (4.3)	1 (4.3)	
Better	7 (30.4)	5 (21.7)	
Very better	15 (65.2)	16 (69.6)	
Saliva			
Worse	1 (4.3)	4 (17.4)	0.340
Similar	6 (26.1)	4 (17.4)	
Better	14 (60.9)	14 (60.9)	
Very better	2 (8.7)	1 (4.3)	

*P-values were calculated by chi-square test and are about to total analysis in each comparison.

Table 4. Comparison of dental status in the two studied groups of chlorhexidine- and green tea-treated at the end of the study (day 8)

Hygiene scoring		Group 1 (first chlorhexidine then green tea)	Group 2 (first green tea then chlorhexidine)	P*
		[n (%)]	[n (%)]	
Teeth				0.630
Without food leftover	Similar	6 (100)	0 (0)	
Few food leftover	Similar	13 (92.9)	14 (87.5)	
	Better	1 (7.1)	2 (12.5)	
Moderate food leftover	Better	7 (100)	3 (100)	

*P-value was calculated by chi-square test and is about to total analysis in each comparison.

Because the tooth criteria of the oral health status had difference in the two studied groups at the initiation of the study, we analyzed it in separation and the comparison of the two subgroups was conducted. According to table 4, there was no statistically significant difference between the two groups and both groups acted similarly.

According to the table 5, no statistically significant disparity was seen among the two categories in terms of the mucosal item ($P = 0.350$). The outcomes of plaque criteria showed that there was a significant divergence among the two interventional groups. In the group that first took chlorhexidine and then green tea, 52.2% of cases had better plaque conditions in comparison to the second group (who first received green tea and then chlorhexidine) in which 86% of cases demonstrated better conditions ($P = 0.029$) (Table 5).

Discussion

In our study samples, men comprised maximum percentile of the study subjects, which was in accordance with previously-

conducted investigations.²⁰ This is somewhat acceptable because we chose cases from the ICU, which is a trauma ward, and men constitute most of the trauma subjects. Among our study population, 25 (54.3%) subjects suffered from MTs, which is in line with last surveys.²⁰

Here, we compared the effects of 5% green tea and 0.2% chlorhexidine on oral sanitation condition. Herein, we detected that the oral sanitation status of the subjects in both groups was ameliorated upon conducting the mouthwashing intervention. In a study by Balappanavar et al.,²² the impact of mouthwashes obtained from 0.5% tea, 2% neem, and 0.2% chlorhexidine on the oral sanitation was assessed. Mean plaque and gingival scores demonstrated a decline after completing the 3-week trial period. Anti-plaque effectiveness was observed in all three treatments, but the highest efficacy was observed in 0.5% tea-receiving group. Gingiva was better improved in neem- and tea-receiving groups in comparison to the chlorhexidine-treated individuals.

Table 5. Comparison of mucosal and plaque scoring criteria in two groups of chlorhexidine- and green tea-treated individuals at the end of the study (day 8)

Hygiene scoring		Group 1 (first chlorhexidine then green tea)	Group 2 (first green tea then chlorhexidine)	P*
		[n (%)]	[n (%)]	
Mucus				0.350
Worse		0 (0)	1 (4.3)	
Similar		9 (39.1)	3 (13.0)	
Better		12 (52.2)	17 (73.9)	
Very better		2 (8.7)	2 (8.7)	
Plaque				0.029
Similar		11 (47.8)	4 (17.4)	
Better		12 (52.2)	19 (82.6)	

*P-values were calculated by chi-square test and are about to total analysis in each comparison; item in bold shows significant P-value.

The efficacy of 0.5% tea was higher than 2% neem and 0.2% chlorhexidine mouthwashes. All the mentioned three mouthwashes had favorable effects on oral health. However, due to lower complications and their availability, the use of herbal mouthwashes was suggested.

The advantageous effects of chlorhexidine along with toothbrushing have been assessed in inhibiting the oral lesions in the various sections of the oral cavity. A relation was found between utilizing toothbrush and the oral sanitation status. However, no disparity was identified among the two groups in inhibition or amelioration of lesions in the lips, gums, as well as the tongue. That notwithstanding, tooth brushing resulted in a marked amelioration in the teeth plaque and mucus. Overall, toothbrushing was accompanied with a remarkable efficacy on the minimizing the oral lesions in the different sections of the oral cavity.²³ In this study, we did not evaluate the effect of toothbrush on improving the oral health in the patients, which needs to be assessed in further studies.

The present study did not state definitely that there were no complications and side effects of green tea mouthwash. Considering the previous studies, due to the herbal characteristics of green tea mouthwash, there are fewer side effects than chemical mouthwashes.^{21,24} Meanwhile, this mouthwash has been processed and used to be made much pure with less harmful materials as an usual beverage.

This study was not completely free from limitations. There was worry in the removing of the endotracheal tube and, therefore, the possibility of aspiration during the interventions. To resolve this possibility, the nurses performing the interventions were educated to decline this risk. Moreover, in this study, the number of patients according to the inclusion criteria was low; however, we attempted to settle this issue by increasing

the duration of investigation. Furthermore, some cases recovered from their diseases earlier than eight days of work and we tried to solve the problem by selecting new patients. Ultimately, death or disagreement of the subject's family in continuing the intervention could meddle in the investigation, which was again settled through choosing new cases.

Conclusion

Mouthwashes can be used as supplementary and complementary compounds contributing to oral health during daily brushing. Among other effects of mouthwashes are providing feeling of cleanliness and coolness in mouth. Our investigation indicated that there was no significant difference in the oral sanitation when the green tea or chlorhexidine mouthwashes were utilized. Previously, it has been indicated that green tea mouthwash has antibacterial properties; however, chlorhexidine mouthwashes have long been used with proven properties. Therefore, it may need further efforts to disclose the beneficial effects of green tea over chlorhexidine to utilize it as the best component.²⁵ Finally, because the green tea is prepared from natural herbs that have little side effects, it is highly suggested to be utilized rather than a chemical compound, namely chlorhexidine, that might be accompanied with adverse side effects.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

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Questionnaire-based study related to the level of awareness and knowledge about oral cancer among Turkish patients with dental diseases in 2018

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Original Article

Abstract

BACKGROUND AND AIM: In this study, the awareness and knowledge level of oral cancer (OC) was assessed among a group of patients with dental problems in Turkey.

METHODS: 509 individuals at the ages of ≥ 18 years, who attended to School of Dentistry of the Ordu University, Ordu, Turkey, were included in the study. To assess the respondents' awareness and knowledge of OC, a self-administered questionnaire with 30 items was used. Some socio-demographic characteristics and smoking/alcohol habits of respondents were also asked. The data were analyzed by calculating percentages, frequency distributions, and chi-square test to assess significance. The statistical significance level was set at $P < 0.050$.

RESULTS: In total, 61.9% of the respondents were informed of OC with no significant differences by sex ($P = 0.660$). Only 31.6% of the respondents reported knowledge on OC. The respondents who claimed to have some knowledge about OC, identified non-healing ulcer as early sign and smoking as risk factor as 35.4% and 48.4%, respectively.

CONCLUSION: The present study indicated an overall insufficiency of awareness and knowledge concerning OC among the subjects among a group of Turkish people with dental problems. It is recommended that effective health education programs be emphasized for the recognition of OC in Turkey.

KEYWORDS: Oral Cancer; Awareness; Knowledge; Early Diagnosis; Risk Factors

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Oral cancer (OC) is a malignant neoplasia which arises on the lip or oral cavity and is an important public health problem.¹ The etiology of OC is dependent on a number of factors, the most important ones being tobacco, heavy alcohol consumption, and betel-quid usage.² Heavy alcohol consumption, defined as more than one drink per-day for women and more than two drinks per-day for men, has been associated to an increased risk of several cancers, including cancers of the female breast, oral cavity, pharynx, larynx, esophagus, liver, colon, and rectum.³

Although early detection is easier with examining mouth due to its accessibility, most lesions are not diagnosed until advanced stages.⁴ When a localized tumor is diagnosed in a patient, a 5-year survival rate of 83.7% is expected, whereas this rate is reduced to 38.5% in case of the tumor metastasis.⁵ In 2012, approximately 300, 400 new cases and 145400 deaths due to oral cavity and lip cancer were recorded worldwide.⁶ The most important factors in reducing OC morbidity and mortality are early detection and treatment.⁷ Thus, increase in the awareness of risks, early signs, and

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symptoms of OC among the general population can help in prevention, prognosis, and cure of the disease. An overall insufficiency of awareness and knowledge concerning OC has been reported in previous studies,⁸⁻¹⁰ which is one of the causes for the delayed diagnosis. Therefore, the aim in the current study was to assess the awareness and knowledge level concerning OC among a group of Turkish people with dental problems, and a questionnaire on OC was distributed among these patients.

Methods

Between January and February 2018, a self-administered questionnaire was distributed among the patients with dental problems at the ages of ≥ 18 years, attending School of Dentistry of Ordu University, Ordu, Turkey.

Informed, signed consent form was obtained from all respondents, and participation in the study was voluntary. The study was performed according to the principles of the Declaration of Helsinki (DoH). Questionnaires from previous studies¹¹⁻¹⁴ were employed to design the questionnaire used in this study. The questionnaire consisted of 30 items in four sections; the first section included demographic information and habits including age, sex, education levels, smoking status, and alcohol consumption as well as their frequency (5 items); the second section included awareness and general knowledge on OC (10 items); the third section included early symptoms of OC (5 items), and the last section contained risk factors of OC (10 items). In the third and fourth sections, the respondents were asked to select one answer from three options: yes, no, or no idea. The questions in these sections were answered by the subjects who claimed to have knowledge about OC.

The self-administered questionnaires were provided to patients with dental problems and they were asked to answer the questions before their appointment time. One of the authors was readily available when

respondents needed to ask a question.

All statistical analyses were performed using SPSS for Windows software (version 15, SPSS Inc., Chicago, IL, USA). Frequencies and percentages were calculated to describe the prevalence of awareness on OC, associated risk factors, and early symptoms. The responses regarding awareness and knowledge were cross-tabulated with sex and education level. The chi-square test was employed to evaluate the statistical significance of the results. The level of statistical significance was set at 0.050 for all analyses.

Results

To evaluate the level of public awareness and knowledge on OC, a total of 530 questionnaires were distributed. Of these, 21 were excluded due to incompleteness of all the questions and 509 questionnaires were then available for analysis. The study population consisted 287 (56.4%) and 222 (43.6%) women and men, respectively (Table 1). The average age of the subjects was 33.24 ± 13.07 (range: 18-92) years.

Table 1. Socio-demographic information and smoking/alcohol habits of the respondents (n = 509)

Variable	n (%)
Sex	
Female	287 (56.4)
Male	222 (43.6)
Education	
Less than a diploma	32 (6.3)
Primary school	108 (21.2)
Secondary school	157 (30.8)
Bachelor's degree	198 (38.9)
Post-graduate degree	14 (2.8)
Smoking	
Yes	123 (24.2)
Ex-smoker	13 (2.5)
No	373 (73.3)
Alcohol use	
Heavy alcohol consumption	9 (1.8)
Ex-alcohol consumption	3 (0.6)
Less frequent/never	497 (97.6)

First, the overall awareness of OC was checked among the participants, and 61.9% of the respondents were informed about OC, with no significant differences by sex as the proportions were 62.7% and 60.8% for the

women and men, respectively ($P = 0.660$). Only 161 (31.6%) of the respondents reported that they had knowledge on OC. The groups with education levels of bachelor's and post-graduate degree had a significantly better awareness of OC in comparison to other groups ($P < 0.001$). Table 2 shows the distribution of OC awareness in terms of the education level.

In the current study, over half of the respondents [283 (55.6%)] indicated that they would have consulted a dentist if they had doubted that either they or their relatives might had OC; the rest of them indicated they would have consulted a physician. After evaluating the knowledge of OC, only 49 (9.6%) of the respondents reported that they had practiced oral self-examination, and 62 (12.2%) of them reported an OC examination by physicians or dentists within last year. Over three quarters of the respondents 395 (77.6%) believed that early diagnosis increased the success rate of treatment (Table 3).

Knowledge on the early symptoms of OC was assessed through questions 16-20. Generally, the respondents showed poor knowledge and chose the option of no idea on the early symptoms of OC. Only 35.4% of them who claimed to have some knowledge about OC identified non-healing ulcer as early symptoms. Overall, the proportion of the recognized clinical symptoms ranged from 14.3% to 35.4% (Figure 1).

The subjects who claimed to have some knowledge about OC, identified smoking and genetic inheritance as risk factors as 48.4% and 29.2%, respectively. Regarding non-risk factors, only 42.9% of the participants knew that intimate contact with patients with OC was not a potential risk of OC (Figure 2). Analyzing the awareness and knowledge of OC among the subjects taking into account their smoking habits revealed that 59.4% of the 123 smoker respondents were informed of OC and only 39.8% of them thought smoking was a risk factor.

Table 2. Distribution of responses in terms of education

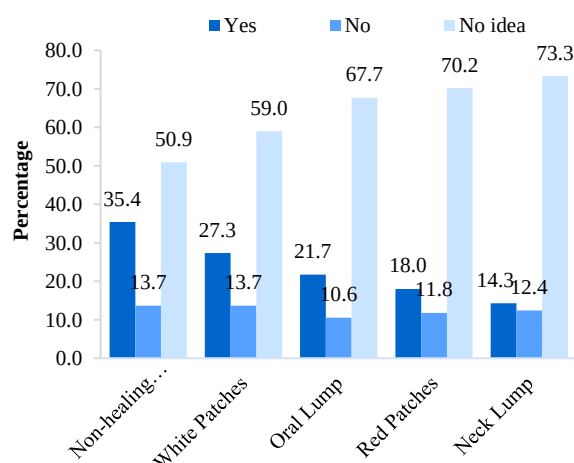
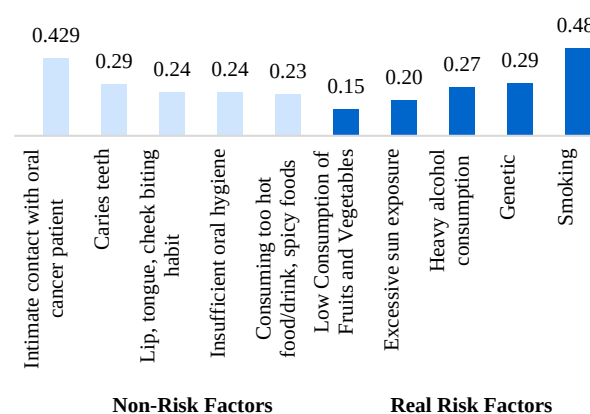
Education			
Question 1: Have you ever heard of oral (mouth, tongue, or lip) cancer?	Yes [n (%)]	No [n (%)]	
None	16 (50.0)*	16 (50.0)*	
Primary school	48 (44.4)*	60 (55.6)*	
Secondary school	90 (57.3)**	67 (42.7)**	
Bachelor's degree	150 (75.8)#	48 (24.2)#	
Post-graduate degree	11 (78.6)#	3 (21.4)#	
Total	315 (61.9)	194 (38.1)	
P	< 0.001	< 0.001	
Question 2: Do you have any knowledge about oral cancer?	Yes [n (%)]	A little [n (%)]	No [n (%)]
None	0 (0)*	11 (34.4)*	21 (65.6)*
Primary school	3 (2.8)**	9 (8.3)**	96 (88.9)**
Secondary school	3 (1.9)**	42 (26.8)#	112 (71.3)*
Bachelor's degree	12 (6.1)#	77 (38.9)*	109 (55.0)#
Post-graduate degree	2 (14.3)¥	2 (14.3)¥	10 (71.4)*
Total	20 (3.9)	141 (27.7)	348 (68.4)
P	< 0.001	< 0.001	< 0.001
Question 3: If you have any information, where did you learn/acquire it?	Mass media [n (%)]	People [n (%)]	Dentists-physicians [n (%)]
None	6 (54.6)*	5 (45.4)*	0 (0)*
Primary school	4 (33.3)**	7 (58.4)**	1 (8.3)**
Secondary school	28 (62.2)#	12 (26.7)#	5 (11.1)#
Bachelor's degree	69 (77.6)¥	14 (15.7)¥	6 (6.7)**
Post-graduate degree	2 (50.0)*	1 (25.0)#	1 (25.0)¥
Total	109 (67.7)	39 (24.2)	13 (8.1)
P	< 0.001	< 0.001	< 0.001

The differences between the groups in the same column, means followed by the same symbol are not significantly different at $P = 0.050$.

Table 3. Distribution of “correct” responses in terms of education

Question	Less than diploma [n (%)]	Primary school [n (%)]	Secondary school [n (%)]	Bachelor's degree [n (%)]	Post graduate degree [n (%)]	Total [n (%)]	P
Do you think oral cancer is a contagious disease?	10 (31.2)*	16 (14.8)**	29 (18.5)**	82 (41.4)#	7 (50.0)¥	144 (28.3)	< 0.001
Do you think oral cancer is more likely to occur at older age?	25 (78.1)*	46 (42.6)**	67 (42.7)**	131 (66.2)#	6 (42.9)**	275 (54.0)	0.035
Do you think early diagnosis increases the success rate of treatment?	22 (68.8)*	82 (75.9)**	113 (72.0)**	166 (83.8)#	12 (85.7)#	395 (77.6)	< 0.001
Do you think untreated oral cancer cases have a high mortality rate?	24 (75.0)*	64 (59.3)**	69 (44.0)#	118 (59.6)**	8 (57.1)**	283 (55.6)	< 0.001

The differences between the groups in the same column, means followed by the same symbol are not significantly different at P = 0.050.

**Figure 1.** Distribution of responses to the early symptoms of oral cancer (OC) by respondents who claimed to have some knowledge about OC (n = 161)**Figure 2.** Distribution of “correct” responses to real risk and non-risk factors of oral cancer (OC) by respondents who claimed to have some knowledge about OC (n = 161)

Discussion

Lack of public awareness and knowledge about OC plays a significant role in lateness of diagnosis. Approximately, half of the subjects with OC are not diagnosed until advanced stages, which results in increased mortality, hence aggressive care is required.⁹ Earlier diagnosis greatly increases a patient's chance of survival as mouth is very accessible for a clinical examination or even self-examination.⁸ Therefore, increasing the degree of awareness and knowledge of OC among public, dentists, and physicians is fundamental to recognize and detect this cancer early.

In the present study, more than half of the respondents indicated that they were informed of OC but were not aware of early symptoms and risk factors. Previously, several other studies have been carried out to investigate public awareness and knowledge of OC.^{8,9,15-19} In the current study, 61.9% of the respondents reported being aware of OC; this finding was similar to that of the study conducted by Al-Maweri et al. in Riyadh.¹⁵ This rate of awareness is higher than what was reported in other countries as 52.3% in Australia,¹² 56.0% in Great Britain,⁸ 45.6% in Jordan,¹⁶ and 39.3% in Turkey.⁹ However,

particularly higher levels of OC awareness have been reported in countries such as India (91.2%),¹⁷ Sri Lanka (95.0%),¹⁸ and Malaysia (84.2%)¹⁹ with a known high prevalence of OC. This indicates that the incidence of OC correlates with awareness, but it is important to increase public awareness before a great portion of people suffer from it.

In the present study, a significant association between OC awareness and the level of education was found. This study showed that the groups with a bachelor's and/or post-graduate degree had better awareness, similar to the studies carried out in India¹⁷ and in Malaysia.²⁰

Mass media such as television, radio, newspapers, and the Internet play a significant role in training people about OC.^{15,16} Furthermore, compared with other methods, television advertising was the main method of an OC awareness campaign.²¹ In the current study, most of the subjects were informed of OC via mass media. These results support previous findings reporting that mass media was a common source of information about OC.^{9,13,19,22} Mass media advertisements informing about OC prevention would increase the awareness on this topic.^{9,23} Accordingly, McLeod et al.²⁴ reported that an internet search for "oral cancer" in November 2003 revealed over 32000 pages, the same search in July 2018 revealed about 201000000 pages, indicating the increase in awareness over time thanks to advertisements over various media lines.

Dentists play an important role, particularly in early diagnosis of OC. In a study by Cruz et al.,²⁵ most respondents did not think of dentists as the most proper health care professionals to examine OC, and most of them declared that they would consult a physician in case of doubt about OC. However, in the current study, over half the participants reported that they would consult a dentist if they had doubted about OC. According to the opinion of the authors of the present study, the respondents may have been affected in their choice of a dentist

since this study was performed in a school of dentistry, similar to the result of the study by Peker and Alkurt.⁹

Oral self-examination is an efficient method for the early detection of OC. Due to the complex anatomy of the oral cavity, self-examination is more difficult than the breast/skin examination.²⁶ Monthly performed inspections in front of a mirror can help detecting some lesions of the oral cavity. For this examination, patients should move their tongue to both directions laterally, look at the bottom of their tongues, pull both cheeks laterally, and inspect carefully. Asymptomatic cancers can be detected by the patients themselves at the early stages through self-examination.²⁷ It is important to be well aware of the early symptoms of OC in order to perform self-examination of the oral cavity effectively.¹² In the study conducted by Ghani et al. in Malaysia, 75.0% of the respondents in the age group of 40-59 years old were aware of oral self-examination.¹⁹ In the current study, only 9.6% of the respondents reported having practiced self-examination for OC. Since OC is most commonly prevalent in South and South East Asian countries,¹⁹ it can be claimed that awareness of self-examination is higher in these areas. In another study assessing the level of coverage by the popular press on the OC issue, 18 newspapers and 32 magazines were identified and analyzed regarding OC. Only 14.0% suggested clinical OC examinations by a health care professional, and 8.0% advised the use of self-examination.²⁸ Public health education programs must be carried out for identification of early symptoms of OC and facilitate early diagnosis by self-examination.

The American Cancer Society (ACS) advises a cancer-related oral cavity examination for every individual aged 20 years and over, as examination in every 3 years from ages 20 to 39 years, and once a year after the age of 40 years.²⁹ At present, the principal test for OC is a comprehensive clinical examination that includes a visual

and tactile examination of the mouth, full protrusion of the tongue with the aid of a gauze wipe, and palpation of the tongue, floor of the mouth, and lymph nodes in the neck.¹⁰ In previous studies, the rates of experiencing an OC examination within the last year were respectively 29.0%³⁰ and 30.1%¹⁰. In the present study, lower rate of experience of an OC examination within last year may be related to the lack of awareness or experience of a periodic health examination.

In this study, most of the respondents (77.6%) believed that the detection of OC in early stages could increase the success of treatment. However, this rate is slightly lower than reported by Warnakulasuriya et al.⁸ and Monteiro et al.³¹ as 94.0% and 91.2%, respectively.

In several studies, the level of awareness and knowledge about early symptoms of OC were evaluated and they were correctly identified with the rates of 6.8%-53.2%, 6.5%-47.2%, and 17.5%-86.2% for white patches, red patches, and non-healing ulcers, respectively.^{9,10,12,13,32} In the present study, only one-third of the participants who claimed to have some knowledge about OC knew that presence of non-healing ulcer was an early symptom. The lack of public knowledge on early symptoms of OC leads to late clinical presentation and consequently, reduced survival rates. One of the major factors in the late diagnosis has been the patient's own delay in referring to hospital

after the onset of symptoms.³³ Therefore, enhancing awareness and training the general population on the early symptoms of cancers is imperative for early diagnosis and treatment of the disease.

Avoiding risk factors is effective in preventing OC. Unfortunately, the study group in this investigation showed inadequate knowledge regarding risk factors. Based on the investigations in previous studies, respondents could most correctly identify smoking and/or smokeless tobacco use as risk factors for OC,^{9,10,31,32} which was similar to this study, although they were identified with lower rates among the patients in the current study.

Conclusion

It was observed that there is a general deficiency in awareness and knowledge concerning OC among patients with dental problems. This study suggests that effective health education programs be emphasized in order for the recognition of OC in Turkey. After implementing OC training programs, further studies with larger sample sizes are highly recommended to be conducted in Turkey.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

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The comments of dentists contributed in congresses in the field of dentistry on questionnaire-based researches, Tehran, Iran, 2015

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Original Article

Abstract

BACKGROUND AND AIM: The questionnaire includes a category of questions that has been prepared based on some certain principles and dentists are requested to complete this form. The aim of this study was the investigation of dentists' opinions about researches based on questionnaires.

METHODS: The present investigation was a descriptive-analytical and cross-sectional study. The questionnaire, which was designed by the researcher, was distributed among 400 participants of congresses by the researchers as group-performance containing personal questions including age, year of graduation, educational degree, and etcetera, general questions, and questions related to dentists' comments about questionnaire researches. The results obtained from this research were analyzed using t-test and chi-square test in SPSS software.

RESULTS: In this evaluation, 400 questionnaires were distributed among 400 dentists; of this number, 305 questionnaires were returned (Response rate = 76.25). Of the participants, 125 people were male (40.9%) and 180 people were female (59.1%) (Ratio of male to female = 0.69). This research indicated that 100% of the participants had previously participated in a research in which the data collection tool was a questionnaire. Moreover, 290 dentists (95.0%) announced that the number of questions in the questionnaire affects their responsiveness. This research showed that there is a significant relation between level of attitude and age ($P = 0.01$), gender ($P = 0.02$), and educational degree ($P = 0.01$). Furthermore, from the viewpoint of women ($P = 0.02$) and younger people ($P = 0.01$), the number of questions in the questionnaire and the person who provides the questionnaire affect their responsiveness.

CONCLUSION: The present research revealed that more than half of the participants believed that using a questionnaire in research studies is a suitable method; however, 72.0% of participants had a contrary opinion. In addition, 32.7% of participants had very inclination toward participation in such investigations.

KEYWORDS: Dentists; Questionnaires; Research

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Research or investigation is a trying and organized process to find, restate, and review phenomena, events, behaviors, and tenets. Research is also used to utilize available phenomena to achieve practical solutions and

technologies. Research consists of the two aspects of finding the research question and answering that question.¹

Research techniques include interview, questionnaire, and analysis of documents and evidences. In many sciences, researches

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are conducted based on questionnaires and it is a conventional method of collecting field information. The questionnaire method is usually used in descriptive investigations and researches with high geographical area.²

The questionnaire includes a category of questions prepared based on certain principles and is provided in writing to people in order to obtain their answers based on their discernment. Several factors and elements are involved in the questionnaire method through the coordinated operation of which the researcher can collect his required information. These elements are the tools of collecting information or questionnaires, planning and executing the questionnaire method, respondents and factors of executing questionnaire method.³

The better the questionnaire is designed, the higher the correct answers and the lower the amount of uncompleted questionnaires are.⁴ Concurrent with the completion of a questionnaire by a person, the consideration of some measures such as managing communication with the audience is required because respondents are our audiences and they are supposed to help us in advancing the research, the respondent's satisfaction with completing the questionnaire is equivalent to consumer's satisfaction with the product of a company.⁴

In researches in which a questionnaire is used, the participants are themselves responsible for completing the questionnaire and returning it to the researcher. Thus, the questions and guidance related to them should be understandable and clear enough for respondents to perform the role of the interviewer and encourage the participation of the intended people.⁵

The conducted evaluations indicate that many researches in valid journals and websites have been conducted based on a questionnaire. The goal of this investigation was to evaluate the comments of dentists participating in the dentistry congresses in the field of questionnaire researches.

Methods

This study was designed as a descriptive-analytical and cross-sectional study with the ethical code 95000090. The intended population in this evaluation was dentists participating in the dentistry congresses held in Tehran, Iran, (2016-2017). The participants were selected through simple random sampling method. The questionnaire, which was designed by the researcher, was distributed among 400 participants of congresses by the researchers as group-performance containing personal questions, general questions, and questions related to dentists' comments about questionnaire researches.

Questions of this questionnaire were designed by two dentistry specialists and a statistics specialist. To evaluate the validity and reliability of the questionnaire, the scientific validity of the questionnaire was confirmed through its distribution among 10 dentistry specialists and the level and understandability of the questions were discussed; 16 questions were at suitable and very suitable levels and 2 questions were unsuitable that were removed from the questionnaire. The validity of the questionnaire's contents was at a favorable level. Then, this questionnaire was given to 30 general dentists within 2 weeks in order to evaluate its stability. Total stability of the questionnaire was obtained (0.75) through intraclass correlation coefficient (ICC) and was at a favorable level; the stability of the questions was between 0.89 and 0.71. The results obtained from this research were analyzed using t-test and chi-square test in SPSS software (version 18, SPSS Inc., Chicago, IL, USA). The significance level was $P < 0.05$.

Results

In this evaluation, 400 questionnaires were distributed among 400 dentists, of which 305 questionnaires were returned (Response rate = 76.25). Among these participants, 125 people were male (40.9%) and 180 people were female (59.1%) (ratio of male to female = 0.69) as it is tabulated in table 1.

Table 1. Demographic profiles of the participants (n = 305)

Parameter		n (%)
Sex	Male	125 (40.9)
	Female	180 (59.1)
Age (year)	< 30	145 (47.5)
	> 30	160 (52.5)
Years since graduation	< 5	150 (49.1)
	> 5	152 (50.9)
Degree of education	Dentist specialist	73 (23.9)
	General dentist	232 (76.1)
Type of activity	Clinic	45 (14.7)
	Dental office	220 (72.1)
	Dental faculty	15 (4.9)
	Multiple locations	26 (8.3)

This research indicated that 100% of the participants had previously participated in a research in which the data collection tool was a questionnaire, and about half of the people (44.3%) believed that they had not responded to questions accurately and patiently.

Equal to 72.0% (220 people) believed that the results obtained from this type of researches are not applicable (Table 2).

Among the participants, 290 people (95.0%) announced that the number of questions in the questionnaire has an important impact on their responsiveness. Moreover, 1.9% (6 people) of the participants consulted with another person in order to respond to questions and 41.6% of the participants always responded to questions based on their personal opinions (Table 3).

This research indicated that 23.0% of the participants were forced to respond to the questionnaire to politeness and that they had no interest in cooperation, and about 32.0% of questionnaires were completed under compulsion. In this investigation, 56 people (18.4%) of the participants responded to questions without much attention to them.

This research indicated a significant relation between questions of attitude and age ($P = 0.01$), gender ($P = 0.02$), and educational degree ($P = 0.01$). In other words, a more positive attitude toward questionnaire investigations was observed in women compared to men, in older individuals, and in specialists compared to general dentists. Furthermore, in the viewpoint of women ($P = 0.02$) and younger people ($P = 0.01$), the number of questions in the questionnaire and the person who provides the questionnaire have an effect on responsiveness to questions in the questionnaire (Table 4).

Discussion

This research showed that until now, 100% of the participants have participated in a research in which the data collection tool was a questionnaire and about half of the participants stated that they did not respond to questions in the questionnaires accurately and patiently. Moreover, 64.9% of the participants stated that investigation based on a questionnaire is a suitable method for research, and 65.2% agreed that the results of this type of investigations are attributable.

Chapple indicated that questionnaire research is an easy way for investigation; however, in the opinion of this researcher, questionnaire investigations may have some defects such as inaccuracy of registered information, invalidity of reported results, and a questionable conclusion.⁶ The investigations conducted by Wright indicate that investigation based on websites, online questionnaires, and even questionnaires that have been sent through E-mail are not verifiable and valid.⁷

Table 2. Responses of participants to general questions about questionnaire researches

Item	CA	A	CD	D	NC
	n (%)	n (%)	n (%)	n (%)	n (%)
Investigation based on questionnaire is a suitable method for research.	122 (40.0)	76 (24.9)	30 (9.8)	47 (15.4)	30 (9.8)
Results of such investigations are attributable.	54 (17.7)	145 (47.5)	36 (11.8)	40 (13.1)	25 (8.2)
I read all questions in the questionnaire accurately.	32 (10.5)	131 (42.9)	80 (26.2)	50 (16.4)	12 (3.9)
Results of such investigations are not valid.	77 (25.2)	143 (46.9)	20 (6.5)	45 (14.7)	20 (6.5)

CA: Completely agreeable; A: Agreeable; CD: Completely disagreeable; D: Disagreeable; NC: No comment

Table 3. Responses of participants to questions about designing the questionnaire and their accuracy and way of responding to questions

Question about designing questionnaire	Very high	High	Low	Very low
	n (%)	n (%)	n (%)	n (%)
Do the number of questions impact responsiveness?	90 (29.5)	200 (65.5)	10 (3.2)	5 (1.6)
Is a person who gives you the questionnaire effective on your responsiveness?	150 (49.2)	75 (24.6)	40 (13.1)	40 (13.1)
Is the appearance of the questionnaire (in terms of cleanliness, suitable font, and etcetera) important in your responsiveness?	85 (28.0)	125 (41.0)	70 (23.0)	25 (8.2)
To what degree are you inclined to participate in such investigations?	42 (13.8)	58 (19.0)	180 (59.0)	25 (8.2)
How do you evaluate the accuracy of results of questionnaire researches?	65 (21.3)	102 (33.4)	103 (33.8)	35 (11.5)
Questions about responsiveness	Always	Usually	Sometimes	Rarely
I respond to questions only based on my personal opinion.	127 (41.6)	125 (4.1)	49 (16.1)	4 (1.4)
I consult other people in responding to questions.	6 (1.9)	25 (8.2)	110 (36.1)	176 (57.7)
I leave responding to the questionnaire to another person.	37 (12.1)	55 (18.0)	85 (27.0)	128 (42.0)

The questionnaire consists of a series of questions that are written in accordance with certain principles and presented in writing to individuals, and questions are answered responsibly based on their own discretion. Based on a research, Francis Galton invented the questionnaire.⁸ The use of the questionnaire as a method to collect data has been increased in researches of national and international health cares in recent years.⁹⁻¹¹

Researchers can use the questionnaire to assess knowledge, attitude, emotion, cognition, purpose, or behavior.¹¹

Questionnaires have some advantages compared to other types of demographic methods such as they are cheap like telephone and lingual surveys, they do not require much effort by the interviewer, and often they have standard responses that simplify data collection.

Table 4. Relation between questions in the questionnaire and demographic characteristics

Questions	Degree of education		P**	Years since graduation		P**	Gender		P**	Age (year)		P**
	SD	GD		≤ 5	> 5		Femal e	Male		> 30	< 30	
Do you respond to questions in the questionnaire accurately?	65	105	0.050	150	120	0.050	100	70	0.040*	130	140	0.060
To what extent are inclined to participate in such investigations?	50	50	0.001*	55	45	0.070	60	40	0.080	70	30	0.010
In your opinion, what percentage of questions in the questionnaire is understandable and the reader does not require guidance for?	40	189	0.001*	127	102	0.040*	129	100	0.120	109	120	0.120
What percentage of questions in questionnaires is related to the evaluated issue?	35	203	0.001*	138	100	0.020*	143	95	0.001*	108	130	0.050
How do you evaluate the accuracy of results of questionnaire researches?	25	142	0.020*	100	67	0.010*	130	37	0.001*	112	55	0.001*
Do you respond to a questionnaire when you are not willing to?	35	35	0.001*	35	35	0.020*	40	30	0.050	40	30	0.210

SD: Specialist dental; GD: General dentist
P < 0.05 is significant. *t-test, **chi-square

One of the serious limitations of questionnaires is that they must be designed in a way that people can easily read and respond to them. Therefore, in some groups, the use of a questionnaire may not be appropriate for data collection. In addition, as a kind of survey, the questionnaire has many similar problems related to the structure and questioning of the questionnaires, and the bias in answering questions which can be similar in other surveys.^{9,10}

Based on published reports of types of papers published in recent years in Iran, more than half of papers are descriptive (mostly through questionnaire) and a lower number are analytical.^{12,13}

Moreover, scientometric studies found that a large percentage of published articles in the country were descriptive and used a questionnaire as a tool for data collection.¹²

Results obtained from this research indicated that in the opinion of 290 participants, the number of questions in the questionnaire has an important role in responsiveness. Furthermore, in the opinion of 210 participants, the appearance of the questionnaire (in terms of cleanliness, suitable font, and etcetera) is very important in responsiveness.

In researches using the questionnaire, the participating members or community partake by filling in the questionnaire and returning it to the researcher; therefore, questions and guidance related to it should be clear and understandable. The instructions, questions, and guidance should be designed in such a way as to encourage the interested individuals to continue to cooperate and return the questionnaire.⁸

Research has shown that questions in the questionnaire should be short and understandable (maximally between 16 and 20 words).^{13,14} In addition, Rattray et al.¹⁰ reported that increasing the quality of questions is very important.

Dillman argued that grammatical questions should be minimized.¹⁴ Furthermore, in the questionnaire,

researchers should use the present tense to replace the unknown and refrain from repeating words.¹⁴ Other ways to increase the willingness of people to respond to questionnaires are the using specific words rather than general terms, breaking complex questions into simple questions, avoiding ambiguous words to the extent possible, and perhaps not to use aware of the responses that are designed to be tailored to people's attitudes, as well as using words that provide a socially desirable response.^{14,15}

The results of this study showed that 62% of the participants were aware that the questionnaire was not readable. Moreover, 78% of the participants stated that the questions raised in the questionnaires were related to the subject under review.

According to a study by Yaghmaei, many questionnaires are not completed through the steps mentioned or the researcher has been silent about these steps.¹⁶ This research indicated that 23% of participants responded to questionnaires to observe politeness and that they were not interested in cooperation, and about 32% of questionnaires were completed under compulsion. The notable point in this investigation is that 56 participants (18.4%) responded to questionnaires without reading the questions.

The cause of this issue can be the low cost and easiness of collecting data of the investigation, irregular development of postgraduate education without providing the required infrastructures, and obligation of students and faculty members to publish papers. PubMed Website indicated that during the last 21 years (1995-2016), 11523 questionnaire investigations have been published on this website; among this number, 22.3% (2576 papers) were related to Iran, this number is approximately 5 times that published in the US.

Based on some researches, in addition to the rapid growth of descriptive researches, a reduction has been observed in researches that require demographic interventions to solve the problem.^{16,17}

The requirement for students to publish a paper forces them to use questionnaires to quickly carry out research and publish their results in the increasing number of internal medical journals. According to Aghili et al., at least 7 years after the publication of 9797 scientific articles published in scientific journals during the years 1998-2001, 90% of them were not referenced.¹²

Finally, this study showed that respondents were agree with 20 questions for every questionnaire. Eventually, all researches that use questionnaires should consider the following points in designing their questionnaire in order to obtain the cooperation of the respondents.

The name, family name, and address to which the questionnaire should be sent should be mentioned at the beginning and end of the questionnaire.

Questions should be given at the first of questionnaire and the way to respond them should be specified.

The arrangement of the questions should follow a logical order.

In questionnaires that are very long, the most important questions should not come at the end of questionnaire and questionnaires should be made shorter if possible.

Information should be expressed completely in each question so that the question is meaningful for respondents.

The length of questionnaires is effective on the accuracy of responses; thus, questionnaires should be concise if possible. In other words, only questions that are required to achieve the goals of the research should be incorporated into the questionnaire.

Conclusion

The results of this research indicated that more than half of the participants believe investigation based on the questionnaire to be a suitable method for research; however, 72.0% of participants believed that results from this type of research are not applicable and 32.7% of participants had very low inclination toward participation in such investigations.

Conflict of Interests

Authors have no conflict of interest.

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The effect of vocational awareness level on dental anxiety and oral health among the students of dentistry

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Original Article

Abstract

BACKGROUND AND AIM: The purpose of this study was assessing oral health status and dental anxiety differences between the freshman and senior dental students and the effect of awareness on dental practices.

METHODS: Freshman (n = 71) and senior dental students (n = 41) were included in this study. All participants were applied Corah Dental Anxiety Scale (C-DAS) and asked for the frequency of dental visits in a year. Gingival index (GI), plaque index (PI), bleeding on probing (BOP), probing depth (PD), clinical attachment level (CAL), and decayed, missing, and filled teeth (DMFT) index were recorded. Number Cruncher Statistical System (NCSS) program and Shapiro-Wilk, t, Mann-Whitney U, Pearson chi-square, and Fisher-Freeman-Halton tests were used for statistical analysis ($P < 0.0500$).

RESULTS: C-DAS score of the freshman students was found significantly higher than the senior students ($P < 0.0500$). There was a statistically significant difference in the frequency of dental visits between freshman and senior students ($P < 0.0010$). GI, PI, and BOP values of the freshman students were significantly higher than the senior students ($P < 0.0010$). There was no statistical differences between PD and CAL measurements ($P > 0.0500$). It was found that the DMFT index score of freshman students was significantly higher than the senior students ($P < 0.0010$).

CONCLUSION: This study has shown that dental anxiety decreases as awareness and consciousness increase in terms of dental practice. More anxious participants' oral health is weak, individuals with high dental anxiety make fewer visits to the dentists and need more dental practices.

KEYWORDS: Dental Anxiety; Oral Health; Awareness

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Although dental fear and dental anxiety are two of the most pressing issues for dentists, they do not mean the same thing. Generally, the feeling of unknown tension that emerges with the thought that something bad is about to happen is called anxiety, while the response to a danger with a known cause is called fear. Dental fear often begins with a traumatic dental procedure during childhood (85%), and the attitude of the dentist is of great importance when this fear begins. The most feared practices among dental

practitioners are the use of aerators and micromotors, local anesthetic administration, and tooth extraction.¹

The best methods for determining the dental anxiety caused by these fears are to use questionnaires and scales to assess questions that the individual has answered, and these methods have been used in many studies.^{2,3} These measures include the Dental Anxiety Scale (DAS), Modified DAS (MDAS), Dental Anxiety Questionnaire, and Photo Anxiety Questionnaire.⁴ Studies using these scales have shown that certain demographic

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characteristics, such as low educational level and low socioeconomic status, as well as age and gender have decisive influences on dental anxiety.² In addition, fear of dental treatment procedures can affect individuals compliance and cause the deterioration of their oral health status.^{2,3}

Periodontal disease and tooth decay are the most common oral diseases. These diseases are often the result of poor oral hygiene and poor compliance with dental treatment.⁵ Periodontal disease is an important cause of tooth loss in adults.⁶ It is not usually noticed during the early stages of the disease,⁷ but it becomes more noticeable as the disease progresses by showing signs of swelling and bleeding in the gingiva, and consequently, tooth mobility due to the loss of the structures that support the tooth.^{8,9} Tooth decay is another common oral disease and it is a lifelong threat. Previous studies conducted in developed countries have shown a decline in the caries prevalence, and this decline is the result of various factors, including oral hygiene education.¹⁰

Individuals with dental anxiety may develop periodontal disease or caries due to their non-compliance with routine dental practices; and thus, necessary treatments cannot be performed. Therefore, the purpose of this study was to assess the oral health status and dental anxiety differences between the students who are in the first year in dental school (freshman) with a low level of knowledge about dental practices and the students who are in the last year, i.e., 5th year in dental school (senior) who have learned dental practices in detail. In addition, the effect of the awareness of dental practices was compared among these variables.

Methods

Study population

This study's protocol was approved by the Ethics Committee of Van Yuzuncu Yil University, Van, Turkey (10.01.2018/No: 13) and it was conducted in the Department of Periodontology, School of Dentistry, Van

Yuzuncu Yil University. Non-smoker freshman (n = 71) and senior (n = 41) students of dentistry school with no systemic disease who had not use antibiotics in the last 6 months were informed about the aims and methods of the research and those who volunteered were included in this study. Informed consent was obtained from all of the participants, and their demographic information including age and gender was recorded.

Design of the study

The Turkish version of the Corah-DAS (C-DAS), a scale that is used frequently to assess the dental anxiety level, was administered to the subjects in this study.¹¹ In addition, all of the participants were asked how many times they visited a dentist in a year. Then, the gingival index (GI), plaque index (PI), bleeding on probing (BOP), probing depth (PD), and clinical attachment level (CAL) values were measured and recorded for the evaluation of their periodontal status. The decayed, missing, and filled teeth (DMFT) index findings of all the participants were also evaluated.

Measurements

C-DAS questionnaire: C-DAS, consisting of four questions, is used to measure dental anxiety. The scores of this scale range from 1 to 5: 1 = no anxiety and 5 = high anxiety. The Turkish version of this scale, which was previously found to be suitable for the Turkish population [internal consistency coefficient (α) = 0.81, correlation coefficient (r) = 0.71], was administered to the participants.¹¹ All of the questions on the scale were answered by them based on their personal thoughts. A score under 8 points was evaluated as "no anxiety", between 9-12 points was "middle level anxiety", 13-14 points was "high anxiety", and 15-20 points was "serious anxiety". Corah defined individuals as having "high dental anxiety" with a score of 13-20 points on this scale.¹² The purpose of selecting this scale was that the scale is short, accessible, and easy to understand.

Oral health indicators: The periodontal assessments were performed with a Williams periodontal probe based on various accepted scales indicating gingival health. No interventional procedures were applied during these examinations. The variables were assessed in six regions (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual, and distolingual) with the exception of the wisdom teeth (third molars). All of the examinations were applied by the same clinician.

The PI scoring¹³ was as follows: 0 = no plaque, 1 = invisible plaque but can be detected with a probe, 2 = visible plaque in the form of a thin band adjacent to the marginal gingiva with being non-visible at interdental space, and 3 = plaque in the form of a thick band adjacent to the marginal gingiva and filling the interdental space.

The GI scoring¹⁴ was as follows: 0 = no visual indication of gingival inflammation and no bleeding, 1 = slight change in the gingival color and texture but no bleeding, 2 = visual indications of gingival inflammation and bleeding when probing, and 3 = open inflammation indications and spontaneous bleeding.

The BOP¹⁵ was calculated as follows: BOP = number of bleeding regions/number of measured fields $\times$ 100.

PD was measured as the distance between the gingival margin and the gingival sulcus.

CAL was determined by measuring the distance between the gingival sulcus and the cemento-enamel junction.

The DMFT index was measured based on the World Health Organization (WHO)'s recommendation for epidemiological investigations.¹⁶ The missing tooth component (M) shows the teeth that are lost due to tooth decay and the teeth that are indicated for extraction. The filled tooth component (F) shows the teeth with solid permanent restorations.¹⁷ The DMFT score was evaluated with a probe and dental mirror, which are used routinely during the examinations in our clinic.

The statistical analyses were performed using the Number Cruncher Statistical System (NCSS) (version 07.1.20, NCSS, LLC, Kaysville, Utah, USA). Descriptive statistics were used, with the mean and standard deviation (SD) for the continuous variables and the median, frequency, percentage, minimum, and maximum for the discrete variables. The Shapiro-Wilk test was used to determine the normality of the data. The independent samples t-test was used to compare the means of two groups with normal distributions, and the Mann-Whitney U test was used to compare two groups of quantitative variables without normal distributions. The Pearson chi-square test and Fisher-Freeman-Halton test were used to compare the qualitative data. Statistical significance was accepted as $P < 0.0500$.

Results

The age of the students who participated in the study ranged from 18 to 34 years old, with a mean of 21.43 ± 2.65 . The gender ratio was 1:1 [50% ($n = 56$) each for men and women]. The freshman student ratio was 63.4% ($n = 71$) and the senior student ratio was 36.6% ($n = 41$). The descriptive statistics and the frequencies of the students' dental visits are given in table 1. There was a significant difference between the freshman and senior students (groups) with regard to the age ($P = 0.0001$). There was a statistically significant difference between the groups for the dental visit frequency ($P = 0.0001$). Most of the senior students reported their dental visit frequency as at least once every 6 months, and there was no senior student who did not visit a dental clinic in a year.

The C-DAS score for men was 7.68 ± 2.04 and it was 8.38 ± 2.83 for the women. There was no statistical difference in the C-DAS scores between the genders ($P = 0.1370$). In the freshman students, the C-DAS score was significantly higher than that of the senior students in terms of the total points ($P = 0.0160$). The results of all the questions are shown in detail in table 2.

Table 1. Descriptive statistics and comparison of the two groups

Variables	Total (n = 112)	Freshman (n = 71)	Senior (n = 41)	P
Age (year) (mean $\pm$ SD)	21.43 $\pm$ 2.65	19.87 $\pm$ 1.53	24.12 $\pm$ 1.93	0.0001 ^{##}
Gender [n (%)]				0.3270 [¥]
Men	56	33 (46.5)	23 (56.1)	
Women	56	38 (53.5)	18 (43.9)	
Frequency of dental visits [n (%)]				0.0001 ^{††}
None	11	11 (15.5)	0 (0)	
Sometimes	15	9 (12.7)	6 (14.6)	
In case of complaint	48	37 (52.1)	11 (26.8)	
One per 6 months	25	5 (7.0)	20 (48.8)	
One per a year	13	9 (12.7)	4 (9.8)	

[#]T-test for the independent samples; [¥]Pearson chi-square test; [†]Fisher-Freeman-Halton test; ^{*}P < 0.0100
SD: Standard deviation

The GI, PI, and BOP values of the freshman students were significantly higher than those of the senior students (P = 0.0001, P = 0.0001, P = 0.0001, respectively).

However, there was no statistical significant difference between the PD and CAL measurements (P = 0.3670, P = 0.2020, respectively) (Table 3).

Table 2. Evaluation of Corah Dental Anxiety Scale (C-DAS) questions according to the total points of the groups

Questions	Answers	Freshman (n = 71) n (%)	Senior (n = 41) n (%)	P
If you had to go to the dentist tomorrow, how would you feel about it?	I would look forward to it as a reasonably enjoyable experience	9 (12.7)	5 (12.2)	0.4610 [€]
	I wouldn't care one way or the other	22 (31.0)	19 (46.3)	
	I would be a little uneasy about it	33 (46.5)	16 (39.0)	
	I would be afraid that it would be unpleasant and painful	5 (7.0)	1 (2.4)	
	I would be very frightened of what the dentist might do	2 (2.8)	0 (0)	
When you are waiting in the dentist's office for your turn in the chair, how do you feel?	Relaxed	23 (32.4)	19 (46.3)	0.0410 ^{**€}
	A little uneasy	35 (49.3)	21 (51.2)	
	Tense	13 (18.3)	1 (2.4)	
	Anxious	0 (0)	0 (0)	
	So anxious that I sometimes break out in a sweat or almost feel physically sick	0 (0)	0 (0)	
When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?	Relaxed	19 (26.8)	14 (34.1)	0.3960 [€]
	A little uneasy	38 (53.5)	19 (46.3)	
	Tense	9 (12.7)	8 (19.5)	
	Anxious	4 (5.6)	0 (0)	
	So anxious that I sometimes break out in a sweat or almost feel physically sick	1 (1.4)	0 (0)	
You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?	Relaxed	16 (22.5)	20 (50.0)	0.0270 ^{**€}
	A little uneasy	43 (60.6)	16 (40.0)	
	Tense	8 (11.3)	4 (10.0)	
	Anxious	3 (4.2)	0 (0)	
	So anxious that I sometimes break out in a sweat or almost feel physically sick	1 (1.4)	0 (0)	
C-DAS total point	Mean $\pm$ SD	8.45 $\pm$ 2.61	7.29 $\pm$ 2.05	0.0160 ^{**#}
	Minimum-maximum (median)	4-18 (9)	4-11 (7)	

[#]T-test for the independent samples; [€]Fisher-Freeman-Halton test; ^{**}P < 0.0500
C-DAS: Corah dental anxiety scale; SD: Standard deviation

Table 3. Comparison of the groups according to gingival index (GI), plaque index (PI), bleeding on probing (BOP), probing depth (PD), and clinical attachment level (CAL)

Periodontal measurements	Freshman (n = 71)	Senior (n = 41)	P
	Mean $\pm$ SD	Mean $\pm$ SD	
GI	1.36 $\pm$ 0.63	0.75 $\pm$ 0.46	0.0001 ^{##}
PI	1.27 $\pm$ 0.68	0.81 $\pm$ 0.46	0.0001 ^{##}
BOP	57.50 $\pm$ 32.19	35.22 $\pm$ 23.96	0.0001 ^{##}
PD	1.59 $\pm$ 0.32	1.53 $\pm$ 0.31	0.3670 [#]
CAL	1.60 $\pm$ 0.32	1.52 $\pm$ 0.27	0.2020 [#]

[#]T-test for the independent samples; ^{##}P < 0.0100

GI: Gingival index; PI: Plaque index; BOP: Bleeding on probing; PD: Probing depth; CAL: Clinical attachment level; SD: Standard deviation

When the DMFT index was examined, it was found that the index score of the freshman students was significantly higher than that of the senior students (P = 0.0001). All of the details and statistics from the DMFT index are provided in table 4.

Discussion

We aimed with this study to combine the oral health findings with the dental anxiety in Turkey. Studies about the dental anxiety and dental fear of dental students in Turkey are available,^{18,19} but studies associating the dental anxiety with oral health are limited. We believed that such a study in a limited and controversial population, like dentistry students, would reduce the bias to minimum.

The Turkish version of the C-DAS was used to measure the dental anxiety of freshman and senior students in our study. According to Seydaoglu et al., the validity and reliability of the Turkish version of the C-DAS was appropriate for all age groups.¹¹ None of the freshman and senior students

who participated in our study received more than 12 total points from the survey of C-DAS. Corah et al.¹² described those individuals who obtained 12 points and above from the survey as anxious. The dental anxiety levels of the Turkish population, according to two separate studies conducted in 2005 and 2006, were 23.5% and 21.3%, respectively.^{20,21} Based on these rates, the dental students of Van Yuzuncu Yil University may be less anxious than the general Turkish population. In this study, there was no statistical difference between men and women according to the C-DAS, similarly to the literature.^{3,22-25}

The results of this study revealed that the anxiety level of the senior students was less than the freshman students. This situation was expected when compared with the literature.^{18,19,24,25} Researchers have attributed these results to the fact that education is related to dental anxiety, and the increase in educational attainment (especially in relation to dental practices) can reduce dental anxiety.

Table 4. Comparison of groups for decayed, missing, and filled teeth (DMFT) index

Scores		Freshman (n = 71)	Senior (n = 41)	P [#]
Decayed teeth	Mean $\pm$ SD	2.27 $\pm$ 2.45	0.46 $\pm$ 1.27	0.0001 [*]
	Minimum-maximum (median)	0-10 (1)	0-7 (0)	
Missing teeth	Mean $\pm$ SD	0.63 $\pm$ 1.14	0.32 $\pm$ 0.61	0.2860
	Minimum-maximum (median)	0-5 (0)	0-2 (0)	
Filled teeth	Mean $\pm$ SD	2.30 $\pm$ 2.50	1.71 $\pm$ 2.66	0.1070
	Minimum-maximum (median)	0-8 (2)	0-12 (0)	
DMFT	Mean $\pm$ SD	5.20 $\pm$ 3.42	2.49 $\pm$ 3.20	0.0001 [*]
	Minimum-maximum (median)	0-13 (5)	0-14 (1)	

[#]Mann-Whitney U test; ^{*}P < 0.0100

DMFT: Decayed, missing, and filled teeth; SD: Standard deviation

Among the freshman students who were asked about their dental visits in one year, there were students who did not visit the dentist at all. However, all of the senior students visited the dentist at least once a year. According to the literature, whether an individual goes to the dentist at regular intervals or not and the number of dental visits per year can provide information to the dentist about the individual's dental anxiety;²⁶ because, it has been reported that there is a correlation between dental fear and fewer dental visits.^{27,28} In the light of this information, as the awareness and education of students about dental practices increase, we can say that frequency of dental visits increases and anxiety level decreases similarly to the literature.

In our study, it was concluded that because the decayed teeth score (D) was higher, the freshman students had more dental anxiety. However, there is no statistical significant difference between the groups according to missing teeth score (M). Schuller et al. reported that people with more dental anxiety had more decayed and missing teeth, and they had fewer dental visits. They also reported that elderly individuals wanted to have their teeth removed instead of being treated, but younger people chose to restore their decayed teeth.²⁹ Our study results may be due to the young sample population.

The GI, PI, and BOP values of the senior students were lower than those of the freshman students that could be attributed to dental anxiety, because previous studies have reported that dental anxiety is associated with poor oral hygiene, bleeding gums, and increased dental needs.^{30,31} In terms of the PD and CAL, no statistical difference was found between the two groups. The GI, PI, and BOP values are associated with poor oral hygiene, whereas the PD and CAL values are associated with advanced periodontal disease.³² This is mostly due to the cumulative effects and aging, so the result in terms of the PD and CAL can be explained

also by the young age of the students.

In our study, the senior students had less dental anxiety and gave more importance to dental visits; thereby, they had the ability to provide oral health more effectively. Boyce et al. reported that the most important obstacle blocking individuals from receiving oral health services was pain and anxiety towards them.³³ Researchers emphasize that the treatment strategies are updated daily in dentistry, and that new topical and local anesthetic agents are being created which can minimize pain. They also argue that it is an obligation for dentists to share this progress with their patients and to educate them about oral health. In this way, the pain and dental concerns that individuals may feel during their procedures may be reduced.³³ So, our results can be attributed to the fact that senior students are better equipped for oral health and dental practices and these points are compatible with the literature.

Even though sociocultural status and education levels of our sample are better than the general population, the difference in the anxiety levels of the two groups emphasizes the importance of awareness on dental practices.

Implementing this study among dental students in order to remove bias does bring a number of limitations. One of them was that the age of the participants was young, and it does not refer to the whole population. In addition, different socioeconomic status and various educational levels were not included in this study. Moreover, there is a correlation between dental anxiety and psychological status, and these psychological conditions were not examined in this study. Finally, a general population without any relationship with dental education could be included as a control group.

Conclusion

In light of the findings of this study, we can say that dental anxiety decreases as awareness and consciousness increase in terms of dental practice. It is also clear that

the oral health status of more anxious people is weak. Individuals with high dental anxiety make fewer visits to the dentist, but they often need more dental treatments. Planning projects to increase the community's awareness level about dental practices may be beneficial, because properly-informed individuals can exhibit lower dental anxiety, an increased number of routine dental visits,

and healthier oral hygiene.

Conflict of Interests

Authors have no conflict of interest.

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Oral health status and oral health behavior of substance abusers in Kerman city, Iran, in year 2016

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Original Article

Abstract

BACKGROUND AND AIM: Drug addiction causes severe oral damage and the socio-economic problems. Prevention and treatment of oral and dental diseases among substance abusers may facilitate their rehabilitation procedure and recovery from drug dependence. The aim of the present study was to evaluate the relationship between drug abuse and oral health status and behavior in drug abusers in Kerman, Iran.

METHODS: This study was carried out on 204 addicts admitted to rehabilitation centers and 197 healthy controls referred to the urban health centers in Kerman City. Multistage random sampling method was applied. Data were collected including demographic data, questions related to oral health behavior, clinical examination for assessment of decayed, missed, and filled teeth (DMFT), Gingival Index (GI), and presence of oral lesions according to World Health Organization (WHO) standards. Data were analyzed using SPSS statistical software. T-test, analysis of variance (ANOVA), and chi-square test were used. $P < 0.050$ was considered as statistical significance.

RESULTS: 193 patients (94.6%) were men and the rest were women with mean age of 37.72 ± 11.89 years. Opium was the most common drug (89.2%). Age of first use of narcotic material in 45.1% was 18-24 years old. Duration of narcotic drugs use in 35.3% was between 6-10 years. There was significant difference between addicted and healthy participants in oral health behavior, oral lesions, and mean scores of GI and DMFT.

CONCLUSION: The results of the present study showed that there was statistically significant difference between addicted and healthy groups in using dental floss, attendance to dentist, having oral lesions, temporomandibular joint (TMJ) problems, and dental hypersensitivity.

KEYWORDS: Drug Abuser; Gingival Index; Oral Health; Oral Disease

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There are 800000-1700000 drug addicts in Iran with a mean age of 32 years, comprising a sizeable proportion of the population. The direct cost of addiction in Iran is approximately \$3 billion, which is almost 15% of the oil revenues.¹

The most commonly-used drugs abused in Iran are opioids. The most common opioids

available in Iran are opium, opium residue, heroin, and codeine, which are abused orally, by inhalation, and intravenously.² Substance abuse causes irreparable damage to the orodental health, apart from its various social and economic implications. In general, the orodental health status in drug abusers and those undergoing treatment with methadone is much poorer than none-drug abusers.

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Recent studies indicate that oral and dental diseases, including dental caries, lost teeth, gingival hemorrhage, and calculus are highly prevalent in heroin addicts and those under treatment with methadone.³ Xerostomia and hyposalivation are very common in these patients, which in turn can give rise to further dental caries.⁴ Drug abuse gives rise to bruxism, tooth hypersensitivity, and necrotizing gingivitis. Shekarchizadeh et al. reported that the majority of subjects who used heroin did not use toothbrush and toothpaste and seldom used dental floss. In addition, more than half of the drug addicts consumed sugary foods 2-3 times a day.⁵

Singh et al. showed that 17% of drug addicts did not brush their teeth regularly. The age of starting drug abuse was 21.0 ± 3.2 years.⁶

Akbari et al. showed that the orodental needs of drug abusers being rehabilitated were extensive and the oral health indexes deteriorated severely with an increase in the duration of drug abuse.⁷ Bhaskar et al. showed that oral health status of substance abusers was poor and a large number of oral mucosal lesions were noted in them.⁸

Poor oral health behavior is shown in Gijwani et al. study in drug addicts in India.⁹

One of the most important burdens inflicted on the society by drug abusers is their treatment and rehabilitation cost. In this context, the orodental complications that are directly or indirectly related to drug abuse are one of the most important health problems of these individuals.^{10,11} In addition, since the functional and esthetic problems of the teeth in the population undergoing rehabilitation give rise to isolation and psychosomatic problems in such individuals,⁷ it appears that intervention or dental supervision is effective in the rehabilitation team. Oral health is a very important and necessary component of an individual's general health, and this special group of the community should adopt orodental health measures. However, sufficient studies have not been undertaken

on the subject, especially in Iran and in particular in Kerman City, Iran. Cultural, geographic, and socioeconomic factors affect the results of studies; and it seems that it is absolutely necessary to undertake studies in this field. The aim of the present study was to evaluate the relationship between drug abuse and orodental health in drug abusers.

Methods

This study was carried out on 204 addicts admitted to rehabilitation centers and 197 healthy controls referred to the urban health centers in Kerman City during 2016. Controls were matched for demographic variables. Multistage random sampling method was applied. All centers in different parts of Kerman were considered as a cluster. Among them, ten centers were selected randomly. At each center, the cases were chosen randomly according to their records number. Controls were selected through non-probability convenience sampling and were adjusted by age and gender. The sample size was calculated using a confidence coefficient of 95% ($\alpha = 0.05$, $z = 1.96$). Mean and standard deviation (SD) of decayed, missed, and filled teeth (DMFT) in previous studies was 15.57 ± 6.57 and 12.00 ± 5.50 for addicts and healthy controls, respectively. A design effect of 2 (due to the sampling method) and 20% attrition was considered. Oral and dental clinical examination was done by two trained senior dental students using a questionnaire. This questionnaire included demographic data (age, gender, level of education, employment status), data about oral and dental hygiene behavior (teeth brushing, use of dental floss, frequency of sugary foods consumption, smoking, the history of oral lesions), and data related to addiction (type, amount, method, duration, frequency of usage). Dental and periodontal examination was performed under normal light using disposable scaler, mouth mirror, and periodontal probe. For each participant, DMFT was calculated,¹² also Gingival Index (GI) was determined for each participant.¹³

Dental attrition, pigmentation, bruxism, hairy tongue, and tooth sensitivity were also evaluated. This study was approved by The Ethics Committee of the Research Review Board at Kerman University of Medical Sciences, Kerman (ethical code: IR.KMU.REC.1394.10). All questionnaires were completed anonymously after that oral consent was obtained. The participants were assured that the data would be used for research purposes. Patients with history of systemic diseases and using drugs that could affect oral conditions were excluded. At the end, a pamphlet about oral and dental health was given and participants were taught about oral health and its impact on general health.

Data were analyzed using SPSS statistical software (version 19, SPSS Inc., Chicago, IL, USA). T-test, analysis of variance (ANOVA), and chi-square test were used. $P < 0.050$ was considered as statistical significance level.

Results

204 addicts and 197 healthy controls were evaluated in terms of oral and dental health. The mean and SD of age was 37.70 ± 11.80 and 34.02 ± 9.10 for addicts and controls, respectively. Out of 204 addicted persons, 94.6% were men and 10.9% were unemployed. Table 1 shows demographic

data of addicts admitted to rehabilitation centers and the healthy controls. Among addicts, the most common abused substance was opium. Duration of consumption in 35.3% was 6-10 years. The age of first use in 45.1% was 18-24 years. Table 2 shows addiction characteristics according to type, amount, method, duration, and frequency of usage. The mean of decayed (D) index in the case and control groups was 10.87 and 7.11, respectively, with mean of missing (M) indexes being 10.72 and 5.73, and mean of filled (F) indexes of 1.67 and 2.95, respectively. Mean and SD of DMFT in addicted and control groups were 23.29 ± 6.20 and 15.80 ± 6.40 , respectively. Mean and SD of GI indices in addicted and control groups were 1.23 ± 0.70 and 0.88 ± 0.70 , respectively. There were significant differences between DMFT and GI between two groups ($P = 0.001$). There was also statistically significant difference between addicted and healthy groups in using dental floss ($P = 0.010$), attendance to dentist ($P = 0.005$), having oral lesions ($P = 0.001$), and temporomandibular joint (TMJ) problems ($P = 0.001$). Table 3 shows comparison of oral health behavior and oral lesions status between addicts and healthy controls.

Table 1. Comparison of socio-demographic data in addicts admitted to rehabilitation centers and the healthy controls

Socio-demographic characteristics		Addicts [n (%)]	Healthy controls [n (%)]	P
Gender	Men	193 (94.6)	177 (89.8)	0.070
	Women	11 (5.4)	20 (10.2)	
Level of education	Illiterate	9 (4.4)	7 (3.6)	0.010*
	High school	107 (52.7)	47 (23.9)	
	Diploma	61 (30.0)	99 (50.3)	
Employment status	Academic	26 (12.8)	44 (22.3)	0.010*
	Employee	29 (14.4)	42 (21.8)	
	Self-employed	150 (74.6)	117 (60.6)	
Marital status	Unemployed	22 (10.9)	34 (17.6)	0.300
	Married	154 (75.9)	143 (73.7)	
	Single	45 (22.2)	50 (25.8)	
Residence status	Divorced	4 (2.0)	1 (0.5)	0.040*
	Urban	165 (81.3)	162 (88.5)	
	Rural	37 (18.2)	18 (9.8)	
	Suburban	1 (0.5)	3 (1.6)	

*Statistical significance

Table 2. Addiction characteristics according to type, amount, method, duration, and frequency of usage

Variables		n (%)
Abused substance	Opium	182 (89.2)
	Resin	146 (71.6)
	Heroin	45 (22.1)
	Codeine	3 (1.5)
	Marijuana	21 (10.3)
	LSD	9 (4.4)
	Ecstasy	4 (2.0)
Duration of consumption (year)	Cocaine	2 (1.0)
	≤ 1	2 (1.0)
	1 to 5	65 (31.9)
	6 to 10	72 (35.3)
Method of use	≥ 11	65 (30.8)
	Oral and inhalation	100 (49.0)
	Inhalation	85 (41.7)
	Oral	18 (8.8)
Age of first use (year)	Injection	1 (0.5)
	≤ 17	21 (10.3)
	18-24	92 (45.1)
	25-34	75 (36.8)
Frequency of daily consumption	≥ 35	16 (7.9)
	Once	30 (14.7)
	Twice	71 (34.8)
	Three times	87 (42.6)
	≥ three times	16 (7.9)

LSD: Lysergic acid diethylamide

Discussion

This study tried to investigate the relationship between drug abuse and orodental health in drug abusers in Kerman. Opium was the most commonly-used drug in the present study, consistent with the results of studies by Shekarchizadeh et al.⁵ in Tehran and Saied-Moallemi et al.¹⁴ in Isfahan, which might be attributed to the history of the abuse of this addictive agent in Iran. In relation to oral health behaviors, half of the subjects did not brush their teeth at all and 97.1% of the subjects did not use dental floss; the results reported by Shekarchizadeh et al. showed that 48.0% brushed their teeth once or less in a day.⁵ Saied-Moallemi et al. reported that 73.0% of addicts brushed their teeth very low.¹⁴ The results of a study by Morio et al. in the United States showed that 6.0% of drug addicts brushed their teeth twice a day or more.¹⁵ In a study in Brazil on drug abusers under rehabilitation, 30.0% of the subjects used dental floss.¹⁶ In the present study, 70.6% of the subjects took sugary snacks during the day for several times, consistent with the results of the two studies mentioned above.^{5,14}

Table 3. Comparison of oral health behavior and oral lesions status between addicts and healthy controls

Variables		Addicts	Controls	P
DMFT (mean ± SD)		23.29 ± 6.20	15.80 ± 6.40	0.001*
GI (mean ± SD)		1.23 ± 0.70	0.88 ± 0.70	0.001*
Tooth brushing [n (%)]	Yes	88 (43.1)	99 (50.3)	0.150
	No	116 (56.9)	98 (49.7)	
Dental flossing [n (%)]	Yes	6 (2.9)	18 (9.1)	0.010*
	No	198 (97.1)	179 (90.9)	
Using sweet snacks during the day [n (%)]	Yes	144 (70.6)	141 (71.6)	0.800
	No	60 (29.4)	56 (28.4)	
Smoking [n (%)]	Yes	131 (64.2)	60 (30.8)	0.001*
	No	73 (35.8)	135 (69.2)	
The last visit to the dentist [n (%)]	6 months ago	19 (9.5)	11 (5.7)	0.005*
	1 year ago	33 (16.4)	57 (29.5)	
	≥ 2 years ago	149 (74.1)	125 (64.8)	
Oral lesion [n (%)]	Yes	133 (65.2)	90 (45.7)	0.001*
	No	71 (34.8)	107 (54.3)	
Dry mouth [n (%)]	Yes	90 (44.1)	27 (13.7)	0.001*
	No	114 (55.9)	170 (86.3)	
Dental hypersensitivity [n (%)]	Yes	39 (19.1)	53 (26.9)	0.060
	No	165 (80.9)	144 (73.1)	
Bruxism [n (%)]	Yes	38 (18.6)	47 (23.9)	0.200
	No	166 (81.4)	150 (76.1)	
Need to emergency treatment [n (%)]	Yes	25 (12.3)	27 (13.7)	0.660
	No	179 (87.7)	170 (86.3)	
TMJ problem [n (%)]	Yes	20 (9.8)	0 (0)	0.001*
	No	184 (90.2)	197 (100)	

*Statistical significance

DMFT: Decayed, missed, and filled teeth; SD: Standard deviation; GI: Gingival index; TMJ: Temporomandibular joint

Studies showed that oral health status was poor in drug substance abusers.^{6,8,17}

It appears that the drug abuse rehabilitation centers should pay attention to tooth brushing and using dental floss in conjunction with other treatment modalities. Drug abuse gives rise to a decrease in motivation and self-confidence; therefore, there is a significant decrease in oral hygiene habits and the frequency of dental visits.¹⁸

In the present study, xerostomia was detected in 44.1% of the subjects. Drug abuse results in xerostomia, which in turn decreases the salivary pH and increases the formation of plaque and dental calculus. All these factors increase the incidence of dental caries and periodontal diseases.¹³ In addition, it has been reported that some addictive agents change the chemical composition of saliva, resulting in xerostomia. Dehydration resulting from drug abuse increases the metabolic rate, and an increase in physical activity results in xerostomia.¹⁹

In relation to lesions in the subjects, the most prevalent single lesion was hairy tongue. This lesion is seen in 0.5% of the adult population, the majority of which are heavy smokers. Other factors include general weakness, poor oral hygiene, and use of drugs that result in xerostomia.²⁰ The high prevalence of this lesion in subjects in the present study might be attributed to poor oral hygiene and xerostomia due to the concomitant use of tobacco and drug abuse.

In the present study, the second most prevalent lesion was oral pigmentation. In a study by Akbari et al.,¹⁸ 34.5% of the subjects and in a study by Shirzaei,²¹ 30.8% of the subjects had oral pigmentation, which is less than that in the present study. It should be pointed out that in similar studies, it has not been mentioned whether pigmentation has been a solitary lesion or it has been associated with other lesions. In the present study, 1.5% of addicted subjects had leukoplakia, that is lower than Akbari et al.¹⁸ study in which 4.0% had leukoplakia.¹⁸

The mean and SD of DMFT in the present

study was 23.29 ± 6.20 , with a significant difference from that in the control group. In the study by Akbari et al., DMFT was 21.80 ± 4.10 in women and 17.50 ± 2.80 in men.¹⁸ Drug abuse might increase the inclination to consumption of simple sugars, which is an etiologic factor for dental caries.

Rampant caries has been reported in intravenous heroin abusers, irrespective of their orodental hygiene status.²²

The plaque index of the subjects in the present study was 1.23 ± 0.74 , with a significant difference from that in the control group. This finding is similar to Saied-Moallemi et al.¹⁴ study. Opium and heroin abusers exhibit hyposalivation leading to xerostomia, burning sensation in the oral mucosa, and periodontal diseases.⁹

The means of D and F indices in the case and control groups were significantly higher in the case groups. This might be attributed to a lack of oral hygiene and lack of sufficient motivation to take care of teeth in drug abusers. In addition, apart from poor oral hygiene, the general hygiene is also poor in drug abusers. This is significant because 56.9% of the subjects did not use toothbrush and toothpaste and 97.1% did not use dental floss, with 70.6% taking sugary snacks.

In the control group, 50.3% of the subjects used toothbrush and toothpaste to clean their teeth, with no significant difference from the case group. In the control group, 9.1% of the subjects used dental floss, which was significantly different from the case group, which might be attributed to the higher oral hygiene in the control group. In the control group, 30.8% of the smoking subjects abused drugs, too, which is significantly different from that in the case group and is attributed to the psychological dependence on drugs. A total of 35.2% of the subjects in the control group had referred a dental office during the previous 6-month period, which was significantly different from that in the case group. This might be attributed to the great attention of non-drug abusers to their orodental health.

One of the reasons for a lack of significant differences in tooth sensitivity between the two groups might be the fact that in the present study the subjects were questioned about tooth hypersensitivity to cold and warm water, and thermal tests were not used. It is suggested that in future studies thermal tests be used.

This study showed that bruxism was more prevalent in drug abusers compared to the control subjects but the difference was not significant, which might be attributed to the fact that bruxism depends on factors such as anxiety, stress, and type of occlusion apart from drug abuse, and the factors above might have resulted in a lack of significant difference in this respect between the two groups.

The results of the present study showed no significant differences in emergency treatments between the two groups, which might be explained by the fact that since a rehabilitation clinic was referred to for selection of matched case and control groups to evaluate drug abuse, the subjects had only referred for restorative procedures and dental check-ups, which is different from those referring to dental offices and clinics for emergency treatments.

In the present study, there were significant differences in TMJ problems between the two groups, which might be attributed to the fact that addictive agents result in an increase in muscular activity, giving rise to bruxism and attrition, pain in maxillofacial muscles, and injuries to the TMJ.

Conclusion

The result of the present study showed that the means of DMFT and GI indexes were

significantly higher in addicted participants. Oral lesions, dry mouth, dental hypersensitivity, and TMJ problems were significantly higher in addicted participants.

One of the limitations of the present study was the incorrect responses of some drug abusers to some questions on the questionnaire, which were excluded from the study. The present study was done on the subjects who attended the rehabilitation centers and they were only a sample of the whole population of drug abusers. Therefore, the results of the present study cannot be generalized to the whole population of drug abusers.

It is suggested that the rehabilitation centers offer dental counseling, oral hygiene instructions, use of fluoride and a proper diet in addition to psychological counseling in order to improve the dental status, apart from the general health.

Moreover, it is suggested that the orodental effects of drug abuse, especially the effects of new drugs, be explained by dentists in the mass media. Furthermore, it is advisable to hold workshops by gaining assistance from the academic staff of universities on the management of orodental complications of drug abuse.

Conflict of Interests

Authors have no conflict of interest.

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Evaluating the knowledge, attitude, and behaviors of obstetricians and midwives regarding oral health in pregnant women

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Original Article

Abstract

BACKGROUND AND AIM: Poor oral health is known as a risk factor for adverse pregnancy outcomes such as low birth weight (LBW) and preterm birth. Few studies have evaluated the knowledge and behaviors of healthcare professionals about oral health during pregnancy and the possible role of periodontal diseases in adverse pregnancy outcomes. The present study aimed to compare the knowledge and practice behaviors of obstetricians and midwives about oral health.

METHODS: In this cross-sectional study, a self-structured questionnaire was randomly distributed among 80 obstetricians and midwives in Yazd, Iran. For analyzing data, chi-square test, t-test, ANOVA, and Spearman correlation test were used.

RESULTS: 80 women with an average age of 47 years participated in the study. 70.0% of the subjects selected the reversible gingival inflammation as the definition of gingivitis and 43.8% of them considered dental plaque as the main cause of periodontal diseases. 58.8% of the subjects believed that gingivitis occurs during pregnancy. 90.0% considered the second trimester of pregnancy as the safest time for dental treatments. Only 38.8% of the participants explained to their patients about the importance of oral health. There was no relationship between age and the knowledge level and behavior, but the attitude about the oral health improved as the age increased ($r = 0.294$). The relationship between the field of study and marital status with knowledge, attitude, and practice behavior was not significant. Academic sources were chosen as the first knowledge source (41.3%).

CONCLUSION: The level of knowledge and practice behaviors of participants were undesirable, but their attitude was acceptable. Updating the information of participants about oral health by inclusion of the oral health issues in their academic textbooks can improve their awareness and practice behaviors.

KEYWORDS: Gynecology; Midwives; Pregnancy; Oral Health; Awareness; Attitude; Behavior

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The level of sex hormones changes during the different periods of a woman's life such as puberty, menstruation, pregnancy, menopause, or oral contraceptive pills (OCP) usage.¹ Steroid sex hormones such as estrogen and progesterone, have potential effects on vascular system of periodontal tissues.² Hormonal changes can be associated with various oral manifestations such as

gingivitis and periodontitis, tooth mobility, burning mouth syndrome (BMS) as well as changes in sense of taste.³⁻⁶ On the other hand, oral diseases especially periodontitis may lead to adverse pregnancy outcomes such as low birth weight (LBW), preterm labor, and preeclampsia (PE) (pregnancy blood pressure).^{7,8} Periodontitis has an excellent prognosis if intercepted early⁹ and it will be managed well if patients be referred

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in time. So it is essential for a gynecologist to be aware of oral problems' role as a risk factor which may jeopardize the infancy health and also to be able to diagnose oral complications during different periods of women's life and refer the patients to a dentist when it is needed.¹⁰⁻¹⁴

In general, few studies in this area evaluated the level of knowledge, attitude, or behavior of obstetricians and midwives about oral health according to the content of scientific literature.^{15,16} For example, 34.0% of female gynecologists in Brazil were unaware of the potential role of periodontal disease in LBW.¹⁷ 14.9% of female gynecologists in the city of Mangalore, India, stated that periodontal disease was not a risk factor for preterm LBW at all.¹⁸

Unfortunately, there are also few studies in Iran, assessing the knowledge of gynecologists and midwives as one of the most important health care providers during women's life, about the oral health; as far as the authors know and for sure, there is no similar study done in Yazd City, Iran, before. Therefore, this study was conducted to evaluate gynecologists and midwives' knowledge about some different issues in oral health area. In addition, their practice in encouraging their patients to improve their oral health and giving them oral hygiene instructions during specific hormonal changes such as pregnancy was assessed. It should be noted that women are more affected by hormonal changes during pregnancy than other periods and also the complications resulting from these changes are more critical for the health of mother and her baby; so, this study was designed with a greater emphasis on oral health during pregnancy than other periods.

Methods

In this cross-sectional study, 40 gynecologists and 40 midwifery senior students in Yazd were selected. Then, a questionnaire which its reliability and validity were confirmed in a pilot study by using Cronbach's alpha test ($\alpha = 0.7$) was provided to the participants and

was completed by all. This study was approved by Ethics Committee of Yazd University of Medical Sciences, Yazd City, and the ethical code was P/17/1/223635. This questionnaire consisted of personal demographic information including age, marital status, employment in the public or private sector, years of work experience, and some other questions about the knowledge, attitude, and practice of the subjects regarding oral health during periodic hormonal changes especially pregnancy. The sections related to knowledge, attitude, and practice in the questionnaire included 4, 7, and 10 questions, respectively. At the end, the main source of knowledge about the oral health was questioned by a separate part in the final section of the questionnaire.

Data were analyzed with SPSS software (version 18, SPSS Inc., Chicago, IL, USA) using t-test, Spearman's correlation coefficient, and one-way ANOVA. Statistical significance was set at $P < 0.050$.

The quantitative impact method was used to determine the formal validity of the questionnaire.

The knowledge and performance of the subjects under study was considered as inadequate if their score was less than 50% of the maximum gained score and was acceptable if their score was between 50%-70% of the maximum score.

Chi-square test, t-test, and ANOVA were used for statistical analysis. Mann-Whitney U test was used for evaluation of relationship between the knowledge of participants and field of study.

Results

In this research, 80 women with an average age of 47 years participated (40 gynecologists and 40 midwifery senior students). 42 persons (52.5%) were married. The relationships between marital status of the subjects and their knowledge ($P = 0.584$), attitude ($P = 0.151$), and behavior ($P = 0.025$)

were not statistically significant.

There was no relationship between age of the subjects and their knowledge and behavior, but their attitude was related to the age ($r = 0.294$) ($P < 0.050$). It was not possible to measure the relationship between years of work experience and employment in the private or public sector with knowledge, attitude, and practice of individuals due to insufficiency of collected data in this field. The knowledge and performance of the individuals were inadequate, but their attitude was acceptable.

These findings showed that the relationship between the field of study (occupational field) of the subjects and their knowledge ($P = 0.532$), attitude ($P = 0.011$), and behavior ($P = 0.020$) were not statistically significant, meaning that there was no difference between midwifery students and gynecologists' scores. 70.0% of the subjects selected the reversible gingival inflammation as the definition of gingivitis and 43.8% of them considered dental plaque as the main cause of periodontal diseases (Table 1).

Table 1. Distribution of absolute and relative abundance in awareness of the correct definition of gingivitis and periodontal diseases

Answered questions	n (%)
Dental caries	1 (1.3)
Reversible gingivitis*	56 (70.0)
Removal of gum adhesion to the teeth	7 (8.8)
I do not know	16 (20.0)
Dental caries	34 (42.5)
Plaque*	35 (43.8)
Pregnancy	1 (1.3)
I do not know	10 (12.5)

Correct answer

The distribution of participants' answers to designated questions about the oral health during periodic hormonal changes especially pregnancy was shown in tables 2-5. 38.8% of the subjects most often explain to their patients the important sources of the oral health and specific issues related to it during pregnancy. 35.0% of the participants most often provide their patients with the nutritional and health advices to improve

their oral health.

Table 2. Distribution of absolute and relative abundance in awareness of events occurring during pregnancy in the oral cavity

Answered questions	n (%)
Increased dental caries	29 (36.3)
Gingivitis*	47 (58.8)
Gingival bleeding*	30 (37.5)
Increased dental mobility*	6 (7.5)
Removing calcium from the teeth and weakening their structure	23 (28.8)
I do not know	2 (2.5)

36.3% of the subjects rarely allocated a special time for oral examinations of their patients, and 20.0% never allocated any time for this purpose.

Table 3. Distribution of absolute and relative frequencies in awareness of the safest time for dental therapy in pregnant women

Answered questions	n (%)
The first trimester of pregnancy	3 (3.8)
Second trimester of pregnancy*	72 (90.0)
Third trimester of pregnancy	1 (1.3)
It is better not to treat dentistry during pregnancy	4 (5.0)

*Correct answer

55.0% of the subjects referred their patients to a dentist as a routine manner before pregnancy (Table 6). Academic textbooks were mentioned by 41.3% of the subjects as the first main source of knowledge about oral health, and other sources important in knowledge improvement of participants were indicated in table 7.

Table 4. Distribution of absolute and relative frequency in awareness of the consequences of periodontal disease in pregnant mothers

Answered questions	n (%)
LBW or premature baby birth*	47 (58.5)
Preterm delivery*	66 (82.5)
PE*	4 (5.0)
Sialorrhea (drooling)	9 (11.3)
There is no particular complication	2 (2.5)

*Correct answer

LBW: Low birth weight; PE: Preeclampsia

Table 5. Distributions of answers of participants to selected questions about oral health

Row	Questions	Yes [n (%)]	No [n (%)]	I don't know [n (%)]
6	Do periodontal treatments, such as scaling and root planning, have adverse effects on teeth during pregnancy?	8 (10.0)	58 (72.5)	14 (17.5)
7	Is gingivitis more severe than periodontitis?	15 (18.5)	27 (33.8)	38 (47.5)
8	Does the use of fluoride before baby's birth affect its dental evolution?	14 (17.5)	41 (51.3)	25 (31.3)
9	Which one is more effective in preventing dental caries in pregnancy period: using the toothpaste containing fluoride or how to brush?	12 (15.0)	52 (65.0)	16 (20.0)
10	Which one is more effective in preventing dental caries in pregnancy period: the times of using sugar or the amount of consumed sugar each day?	69 (86.3)	7 (8.8)	4 (5.0)

Discussion

No relationship was observed between age of the subjects and their knowledge and behavior, but their attitude was significantly related with age ($P < 0.050$). Shah et al. also indicated that there was no statistically significant relationship between age and knowledge of participants about oral health.¹⁹ In the study of Golkari et al., the knowledge of gynecologists was generally better compared to the midwifery group.²⁰ In our study, participants' fields of study did not have any significant effect on their knowledge score. The findings of this study showed that most of the subjects (70.0%) considered reversible gingival inflammation to be a proper definition of gingivitis, which is supported by the findings of Golkari et al.²⁰ and some other studies.^{21,22} 43.8% of the participants in this study considered plaque and calculus as the main cause of periodontal disease which is consistent with the results of Bhalla and

Anuradha,¹³ Wilder et al.,²¹ and Rahman et al.²³ studies in which the participants considered oral bacteria in dental plaque as the main cause of periodontal disease.

Most of the participants in the study selected gingivitis (58.8%) and gingival bleeding (37.5%) as events occurring in the oral cavity during pregnancy. In all of the studies by Bhalla and Anuradha,¹³ Laslowski et al.,¹⁷ Wilder et al.,²¹ Suri et al.,²⁴ and Hashim and Akbar,²⁵ subjects believed that gingival inflammation and bleeding occurs during pregnancy.

The results of the study indicated that most of the subjects (90.0%) considered the second trimester of pregnancy as the safest time to perform dental treatments which is confirmed by the study of Hashim and Akbar.²⁵ In the present study, most of the participants considered preterm delivery (82.5%) and LBW or preterm infants (58.5%) as the consequences of periodontal disease in pregnant women.

Table 6. Absolute and relative frequency response to performance measurement questions

Row	Questions	Always [n (%)]	Mostly [n (%)]	Sometimes [n (%)]	Rarely [n (%)]	Never [n (%)]
1	Do you explain to your patients the importance of oral and dental health and the specific issues associated with it during pregnancy?	21 (26.3)	31 (38.8)	14 (17.5)	10 (12.5)	4 (5.0)
2	Do you provide your patients with nutritional and health advices to improve their oral and dental health?	16 (20.0)	28 (35.0)	22 (27.5)	10 (12.5)	4 (5.0)
3	Do you allocate any time to do oral examinations for your patients?	5 (6.3)	11 (13.8)	19 (23.8)	29 (36.3)	16 (20.0)

Table 7. Distribution of absolute and relative frequency in relation to the source of knowledge of the subjects regarding oral health

Source of knowledge	n (%)
Academic resources	33 (41.3)
Post-graduate resources	19 (23.8)
Scientific journals	14 (17.5)
National media (radio-television)	10 (12.5)
Partners	20 (25.0)
Clinical experiences	19 (23.8)

This finding coincided with the results of Laslowski et al.,¹⁷ Shah et al.,¹⁹ Cohen et al.,²² Suri et al.,²⁴ Hashim and Akbar,²⁵ and Patil et al.²⁶ studies and is inconsistent with the study of Wagner and Heinrich-Weltzien²⁷ in which a very small percentage of the subjects selected these events as the consequences of maternal periodontal disease. One third of the participants in this study (33.8%) considered periodontitis more severe than gingivitis (Table 6), which was supported by the results of the study of Wilder et al. in which most participants considered periodontitis as a more serious clinical condition comparing to gingivitis.²¹

Less than half of the subjects reported time allocation to oral examinations of their patients, which is not consistent with Shah et al.¹⁹ study in which most of the participants had dedicated a time to this type of examinations. Moreover, more than half of the respondents (55.0%) explained that they referred their patients routinely to a dentist before pregnancy that is very close to the

study conducted by Golkari et al.,²⁰ but the result of this part of the present study is inconsistent with the results of studies by Wilder et al.²¹ and Patil et al.²⁶ in which they referred their patients to dentist periodically or rarely, respectively.

The main limitation of this study was that only gynecologists and midwifery students in one geographical location were surveyed.

Conclusion

The knowledge of participants was inadequate and needed to be promoted, but their attitude was acceptable. Obviously, updating the information of the target group of this study (gynecologists and midwives) by inclusion of oral health issues in their specialized academic text books can increase their awareness and improve the performance of this group of health providers. However, the level of the effectiveness of these educational interventions requires further studies in the future.

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Conflict of Interests

Authors have no conflict of interest.

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Economic sanctions and dental public health in Iran

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Short Communication

Abstract

BACKGROUND AND AIM: Economic sanctions on Iran cause parlous civilian hardship and important economic and social problems. Evidence regarding the impact of economic crisis on dental public health is very rare. This paper reviews the experience of other countries regarding this issue and the plausible solutions.

METHODS: In this paper, the outcomes of studies that investigated the impact of economic crisis on different countries of the world were summarized and their experiences in coping with such situations were reviewed.

RESULTS: One of the reasons for unfavorable health outcomes among the population is economic recession. Reduced income is associated with less health services utilization and reduced use of preventive care in general. Adoption of high-risk behaviors and increased physical and psychologic stress can be considered as secondary outcomes in such cases.

CONCLUSION: One of the best ways to deal with oral public health problems at the first months of financial crisis is focusing on the prevention of disease. The health policy makers in Iran should immediately organize the public health system through preventive oral health care.

KEYWORDS: Economics; Community Dentistry; Health Policy; Preventive Dentistry

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On May 8, 2018, the United States of America (USA) officially withdrew from the Joint Comprehensive Plan of Action (JCPOA) and reinstated harsher sanctions on Iran. There is now substantive cumulative evidence that these sanctions cause severe civilian hardship and profound social and economic problems. Looking at the same situation in other countries such as Cuba, Iraq, and Haiti, the imposition of economic sanctions will raise concerns about public health implications.^{1,2}

Dental and periodontal diseases are characterized by high prevalence among both adults and children. Although they are seldom life-threatening, many are chronic; typically, they have acute stages that are treatable and of short duration. Because of these characteristics, other chronic conditions are usually considered more serious public

health problems by policy makers.

The policy implications of the social approach to measuring the impact of oral conditions are significant. It is widely accepted that stroke, heart disease, and cancer have large and serious consequences in terms of disability, morbidity, mortality, and treatment costs. The conditions are personally devastating in these and other ways to the individual. However, the social costs of dental conditions may be as great as cancer and heart disease from the perspective of societal health objectives.

We do not have enough evidence regarding the impact of economic crisis on oral public health in other countries. However, some studies investigated the impact of financial crisis on general health and health inequalities among people of European countries during the years of

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economic recession.^{3,4} Based on the results of these investigations, reduced income is one of the causes of unfavorable health outcomes for the population. It is associated with reduced use of preventive care services and health services utilization in general, reduced food consumption, and increased adoption of high-risk behaviors such as smoking and alcohol consumption.

Methods

In this paper, the outcomes of studies that investigated the impact of economic crisis on different countries of the world were summarized and their experiences in coping with such situations were reviewed. Evidence regarding the impact of economic crisis on oral public health is very rare. This paper reviews the experience of other countries regarding this issue and the plausible solutions.

Results

The economic crisis certainly contributes to the contraction of the demand. The fall of disposable income, owing to an increase of both fiscal pressure and inflation, will drastically reduce purchasing power. Therefore, families plan to reduce the quantity and quality of goods and services and will implement strategies to cut spending in all sectors, including the health sector. Consequently, a drop in access to dental services will be observed since they are perceived as not urgent and extremely expensive.

On the supply side, during the economic recession, the shortfall in revenue of dentists would be happened not only by the reduction of attending patients but also by the increase in the cost of materials, taxation, and employee wages.⁴

On the other hand, financial crisis increases inequalities such as health inequalities in society.⁵ This means that following occurrence of financial crisis, the oral health status of people with lower socioeconomic status will be affected more than other people. In this regard, several

studies show that people with low income or with a low level of education, ethnic minorities, or people with the very weak networks of social capital experience greater difficulty in access to and use of dental services, despite actually having the greatest need.^{6,7}

Discussion

The structured primary health care (PHC) system in Islamic Republic of Iran was established in the 1970s, and integration of oral health care into the nationwide PHC network followed in 1997.⁸ In this regard, about 60% of PHC centers have an oral healthcare unit with a dentist who is in charge of basic services, such as restoration, scaling, and extraction, mainly for target groups consisting of children aged < 12 years, pregnant women, and nursing mothers. However, the PHC system in Iran has been not effective enough in dealing with oral diseases prevention.

In a recent study in Iran, it has been shown that there are many challenges around the oral public health system in Iran. This study classified the main obstacles of success in oral public health programs as educational, environmental, organizational, and school-based factors.⁹

Unfortunately, these main obstacles and problems in oral public health system in Iran coincide with the disastrous economic recession of Iran. The income and facilities of both private and public health sector have decreased, and the Ministry of Health has been affected by austerity measures.

Based on the current financial situation in Iran and the abovementioned oral public health system, it is important to learn from the experiences of other countries and forecast the problems and obstacles which will encounter us in near future. One of the best ways to deal with oral public health problems at the first months of financial crisis is focusing on the prevention of disease. The health policy makers in Iran should immediately organize the public health

system through preventive oral health care.

There are two obvious reasons regarding the importance of focusing on preventive oral health care during the financial crisis. First, many oral disease conditions are indeed preventable with early treatment. For instance, dental sealants can effectively prevent cavities in children.¹⁰

Second, it has been shown that established preventive interventions for childhood tooth decay, including early and regular preventive dental care, fluoridation, and sealants are effective in reducing disease burden and lowering costs.¹⁰

Indeed, the treatment of unmet dental needs in the context of the economic crisis is also so important. The treatment of chronic disease and acute problems, especially in underserved communities should not be neglected. In this

context, the innovative approaches for improving access to dental care for the underserved people should be organized.

Conclusion

It seems that oral public health department in the Ministry of Health and Medical Education of Iran, as the main responsible sector, should recall all dental public health scholars with the aim of revising policies and conducting immediate action before arising disasters in dental health status of people.

Conflict of Interests

Authors have no conflict of interest.

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