Determinants of oral-health-related quality of life among adult people in Iran

Amir Hossein Nekouei¹, Shahla Kakoei², Hamid Najafipour², Sina Kakooei⁴, Moghaddameh Mirzaee⁵

¹Social Determinants on Oral Health Research Center, Kerman University of Medical Sciences, Kerman, Iran ²Oral and Dental Diseases Research Center, Kerman University of Medical Sciences ³Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences ⁴Endodontology Research Center, School of Dentistry, Kerman University of Medical Sciences. ⁵Department of Biostatistics and Epidemiology, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran

ABSTRACT

Background: Oral health-related quality of life (OHRQoL) assesses the subjective perception of oral health and its impact on the quality of life. The aim of this study is to measure the OHRQoL and its determinants among adult people living in Kerman, Iran.

Materials and Methods: In this cross-sectional study, a total of 5657 adult people (18–64 years) residing in the Kerman district, both in the rural and urban areas, were enrolled in the study between September 2014 and April 2018. The Oral Health Impact Profile (OHIP-14) and the oral health indices, such as the total decayed, missing, filled teeth (DMFT), community periodontal index (CPI), gingival index (GI), and xerostomia, were measured by an experienced dentist. The demographic variables of gender, age, educational status, and marital status were also recorded. The impact of the studied variables on OHRQoL was evaluated with multiple logistic regression.

Results: Participants were 2239 (39.58%) men, and average age was 45.39. The mean scores for OHRQoL, DMFT, CPI and GI were respectively: 24.07 (7.76), 10.7 (6.86), 0.76 (0.96), 0.63 (0.8). The frequency of people with xerostomia was 37.4. 301 (53.3%) of people had poor quality of life related to oral health. In multivariable analysis, there was a statistically significant increase in OHRQoL with an increase in the DMFT (P<0.001), xerostomia (P<0.001), CPI, (P<0.001). Men had a significantly higher OHIP score than women (P<0.001).

Conclusion: According to the results of this study, DMFT, xerostomia, and CPI scores are strongly related to OHRQoL. In addition, between CPI and GI scores, the CPI score is the better predictor.

Key Words: Decayed, filled teeth, missing, periodontal index, quality of life, xerostomia

INTRODUCTION

Oral health has a significant role in general health, by WHO definition including the oral cavity and the relevant tissues health, and the absence of gingival bleeding, xerostomia, lost teeth, periodontal diseases, and disorders that affect the mouth and oral and teeth.[1]

Oral diseases can cause many problems such as eating and speaking disorders, making dissatisfied and disturbed physical health, and interfering with social and daily activities. Oral health could affect facial appearance, masticatory problems, social relationships, emotional health, concentration on...
learning, job absenteeism, and control of diseases in particular.[2-4]

In the last two decades, the oral health-related quality of life (OHRQoL) has attracted special attention in the fields of dentistry and psychology, it has been considered a critical factor in the quality of life. Measuring OHRQoL and its related concepts were developed based on WHO quality of life definition.[5] Therefore, OHRQoL as an outcome could lead to widespread changes in attitude toward treatment’s goals.[6] Several measurement tools were developed to cover various aspects of OHRQoL. Oral Health Impact Profile (OHIP-14) is a well-known tool which has 14 questions in seven domains: Functional limitation, physical pain, psychological discomfort, physical disability; psychological disability, social disability.[7]

Oral health has an important contribution to the quality of life. The impact of various oral health statuses on OHRQoL was studied very frequently by researchers and recently in a systematic review 28 of the 37 studies showed a significant relationship between OHRQoL and periodontal diseases by OHIP-14.[8] Buset et al. showed that periodontal condition, measured by Community Periodontal Index (CPI) index related, affected OHRQoL level of elderly.[9]

Dental caries and tooth loss is important determinant of OHRQoL. Gerritsen et al. by systematic review showed that tooth loss has a strong effect on OHRQoL.[10] Haag et al. measure the effect of the total decayed, missing, filled teeth (DMFT) index on OHRQoL. Their study showed that the DMFT index negatively affects the OHRQoL.[9]

Recently, some studies showed that xerostomia has a negative effect on OHRQoL. Locker studied the effect of xerostomia on OHRQoL of the elderly institutionalized population and showed that xerostomia has a significant effect on OHRQoL of them.[11] Thomson measured this relationship among young people and achieved a similar result.[12]

Various oral health aspects affect the OHRQoL in different ways. Masood and their colleagues showed that wearing denture, dental pain, and caries are associated with OHRQoL along with demographic factors in elderly people.[13] Ulinski et al. showed that the clinical and sociodemographic factors affect the OHRQoL in the elderly.[14]

Although, many studies investigated the relationship of OHRQoL and oral health indicators. So far, we cannot find a study which examine the association of various oral health indexes and oral health-related quality along with demographic variables. Therefore, the purpose of this study is to evaluate the association of oral health indices (various clinical and demographic factors) and the OHRQoL, using the OHIP-14.

**MATERIALS AND METHODS**

This cross-sectional study was a part of the second phase of the Kerman coronary artery disease risk factors cohort (conducted from September 2014 to April 2018). Totally, 6000 subjects were selected from four predefined urban and preurban areas of the city using the cluster-randomized sampling technique. More technical details about the sampling method and frame can be found in Najafipour et al. study[15] The people with age between 18 and 64 years old were entered into the study (Eligibility criteria). Finally, 5657 (2662 male) individuals participated.

The dependent variable of this study is defined based on the OHRQoL of participants. All the participants were asked about their OHRQoL by the OHIP-14 questionnaire after explaining the goal of the study and getting the subjects’ consent. Persian version of the questionnaire was previously validated in Iran.[16] Cronbach’s alpha coefficient was 0.85, and the ICC coefficient was also calculated at 0.88 in the re-evaluation of the test (95% confidence interval: 0.80-0.93).[16] The answers were scored on a 5-point Likert scale: 0= never; 1= hardly ever; 2= occasionally; 3= fairly often; 4= very often/every day. The OHIP-14 scores can range from 0 to 56. Higher OHIP-14 scores indicate poor OHRQoL. The OHIP-14 scores were calculated by summing the items and dichotomized using median splits. One of the advantages of this method is the easier interpretation of the effect of independent variables on the dependent variable and it has been used by many studies.[17-20] The scores above the median were deemed as having poorer OHIP. An indicator variable for poorer OHIP is defined as the dependent variable.

Additional questions were asked to collect demographic data such as gender, age, marital status, educational status, and employment status. The employment status of the participants was divided
into three categories: Employed, unemployed, and economically inactive. The last category covered anyone who did not seek any jobs, including students, retired, disabled people, etc.

A checklist was used by the researcher that was completed by a single well-trained dentist after the oral examination under the dental unit light and on the dental chair. In the checklist, the total number of decayed, missing (due to caries only), and restored teeth were recorded. These records were used to calculate the DMFT index. Periodontal health status was measured by the CPI index and scored in terms of healthy, bleeding on probing, supra- or sub-gingival calculus pockets 4–5 mm in depth, and pockets >6 mm in depth.[21] Gingival conditions of the participants were measured by the standard inflammation index of the gingival index (GI) and categorized as mild, moderate, and severe inflammation.[22] To assess xerostomia Fox questionnaire was used which is a well-known subjective tool.[23] People with at least one positive answer to the questions were considered as having xerostomia.

At the end, gender, age, marital status, educational status, and employment status, DMFT, CPI, GI and having xerostomia are considered as independent variables. The relationships between the independent variables and dependent variable were examined by t-test, Chi-square and multivariable logistic regression, and the best predictors OHIP indices was assessed by a backward elimination procedure.

Ethical considerations
This study was conducted as a research project. The protocol of the study was approved by the Ethical Review Board of Kerman University of Medical Sciences under the code (Permission No. 93/310KA). The research process and its objectives were explained to the participants then the informed consent was signed by the subject or the subject's parents/legal authorized representative before the beginning of the project. The questionnaires were anonymous, and the subjects were reassured about the confidentiality of data.

Data analysis
The data were transferred to SPSS 20. (SPSS Inc., Chicago, Illinois) for statistical analysis. Multiple logistic regression was used to study the variables that could predict the OHIP score. The goodness of fit of the models is examined by Akaike information criterion (AIC) index. The level of significance was set at \( P < 0.05 \).

RESULTS
In this cross-sectional study, 5657 participants were evaluated. The mean scores for OHRQoL, DMFT, CPI, and GI were, respectively, 24.07 (7.76), 10.7 (6.86), 0.76 (0.96), and 0.63 (0.8). Minimum score of OHIP was 24.07, minimum score was 16, and maximum score was 66. The mean score of OHIP was 23.5 in males and 24.42 in females \((P < 0.001)\). Tables 1 and 2 presents descriptive statistics of variables. Of all participants, 60.42% were female and 39.58% were male. The mean age of participants was 38.1 years. Most of the participants were married, and nearly 50% were high school graduates or had a higher education level; 67% of the participants were unemployed. The mean of DMFT, CPI, and GI score was higher in men \((P < 0.001)\) and xerostomia was more frequent in women \((P < 0.001)\).

Univariate analysis
Table 3 presents the results of the univariate analysis regarding the relationship between poor OHIP and demographic and socioeconomic variables. The results showed that the chance of having a poor OHRQoL in women was 1.27 times higher
Finally, analysis of the relationship between DMFT and poor oral health showed that the chance of poor quality of life increased by 1.08 times per unit increase in DMFT ($P < 0.001$). This means a person with a DMFT of 20 should have a 4.7 higher chance of poor OHRQoL compared to those with DMFT of zero.

**Multivariate analysis**

To find the most important variables affecting the chance of having poor OHIP, a multivariate analysis was run by multiple logistic regression, and a backward elimination procedure was used to find the best subset of variables. The results of the backward elimination procedure are shown in Table 4.

The final model showed that gender, age, and education remained as effective variables among demographic and socioeconomic variables; xerostomia, CPI index, and DMFT index remained as effective variables among oral health status variables.

The results of the final model in Table 4 shows that females had a higher chance of poor OHIP compared to males ($P < 0.001$), and the chance of poorer OHIP decreased in the 55–64 and 65–74 age groups ($P = 0.002$, $P = 0.003$) the role of age changed to be a protective factor, surprisingly.

For participants with a high CPI index, the chance of poor OHIP was 2.105 times higher than that in subjects with a normal CPI index. Furthermore in participants with xerostomia, the chance of poor OHIP increased by 1.7 ($P < 0.001$), and the chance of poor OHIP increased by 1.2 times per unit increase in DMFT index ($P < 0.001$).

**DISCUSSION**

Our results showed that the decayed, missed, and filled teeth and bad periodontal conditions of people have negative effect on their OHRQoL. Furthermore, the participants with xerostomia had lower OHRQoL than others. The aged people did not have poorer OHRQoL than the younger people and women had poorer OHRQoL than men. The education level of people negatively affected the OHRQoL of them.

In this study, we measured the impact of demographic variables (gender and age) on OHIP and their controlling effect on oral health indices. The data showed that women were 1.27 times more probable to have a poorer OHRQoL compared to men. The results are supported by different studies with large

| Variables | DMFT (SE) | Xerostomia (percent) | GI score (SE) | CPI score (SE) |
|-----------|-----------|----------------------|--------------|--------------|
| Sex       |           |                      |              |              |
| Male      | 10.87 (0.18) | 804 (35.91) | 0.6 (0.02) | 0.77 (0.95) |
| Female    | 10.6 (0.12) | 1314 (38.45) | 0.65 (0.02) | 0.45 (0.62) |
| Age       |           |                      |              |              |
| 15-24     | 4.17 (0.16) | 170 (34.41) | 0.27 (0.03) | 0.54 (0.82) |
| 25-34     | 8.07 (0.15) | 366 (34.14) | 0.46 (0.02) | 0.75 (0.93) |
| 35-44     | 10.45 (0.18) | 413 (34.22) | 0.62 (0.02) | 0.98 (1.03) |
| 45-54     | 13.04 (0.22) | 422 (37.31) | 0.77 (0.03) | 1.05 (1.06) |
| 55-64     | 14.7 (0.27) | 459 (41.5) | 0.86 (0.03) | 1.18 (1.1) |
| 65-74     | 16.67 (0.52) | 223 (43.98) | 1 (0.06) | 0.42 (0.75) |
| Marital status | | | | |
| Single    | 5.65 (0.19) | 229 (33) | 0.35 (0.02) | 0.81 (0.98) |
| Married   | 11.48 (0.11) | 1709 (37.26) | 0.67 (0.01) | 0.89 (1.02) |
| Divorced  | 11 (0.77) | 30 (43.48) | 0.77 (0.11) | 1.11 (1.04) |
| Widowed   | 14.96 (0.57) | 150 (49.02) | 0.96 (0.07) | 1.3 (1.09) |
| Education | | | | |
| Illiterate | 17.24 (0.49) | 269 (51.93) | 1.11 (0.06) | 1.13 (1.05) |
| Primary school or less | 13.98 (0.27) | 482 (42.84) | 0.97 (0.03) | 0.79 (0.96) |
| Middle and high diploma | 10.82 (0.24) | 401 (37.27) | 0.66 (0.03) | 0.61 (0.89) |
| Diploma and above | 9.24 (0.12) | 966 (32.89) | 0.49 (0.01) | 0.8 (0.97) |
| Employment status | | | | |
| Employed | 10.47 (0.17) | 602 (33.74) | 0.54 (0.02) | 0.77 (0.97) |
| Unemployed | 10.9 (0.13) | 1486 (39.09) | 0.68 (0.02) | 0.69 (0.94) |
| Economically inactive | 7.51 (0.8) | 29 (42.03) | 0.38 (0.08) | 0.77 (0.95) |

DMFT: Decayed, missing, filled teeth; GI: Gingival index; CPI: Community periodontal index; SE: Standard error

than that in men ($P < 0.001$). Furthermore, an association was found between age and poor quality of life (OHIP) ($P < 0.001$). Finally, the chance of having a poor OHIP was higher in married, divorced, and widowed participants compared to single subjects ($P < 0.001$) by 1.38, 2.13, and 1.62 times, respectively.

The relationship between OHIP and oral health indexes is present in Table 3. The chance of having a poor quality of life in subjects with xerostomia was 2.03 times higher than that in those without xerostomia ($P < 0.001$), and the chance of having a poor quality of life in people with mild and severe gingivitis was 1.93 and 4.30, respectively, compared to those with healthy gingiva ($P < 0.001$, $P < 0.001$). The chance of poorer quality of life was 1.205 and 1.120 times higher in participants with supra- or subgingival calculus and pocket with 4–5 mm depth compared to healthy CPI index.
### Table 3: Univariate analysis of relation between oral health impact profile level and independent variables

| Variables       | Levels                        | OR (crude) | 95% CI       | Significance |
|-----------------|-------------------------------|------------|--------------|--------------|
| Gender          | Male (reference)              | 1          |              |              |
|                 | Female                        | 1.27       | 1.141-1.415  | <0.001       |
| Age             | 15-24 (reference)             | 1          |              |              |
|                 | 25-34                         | 1.380      | 1.321-1.441  | <0.001       |
|                 | 35-44                         | 1.126      | 1.059-1.198  | <0.001       |
|                 | 45-54                         | 1.156      | 1.097-1.219  | <0.001       |
|                 | 55-64                         | 1.180      | 1.119-1.243  | <0.001       |
|                 | 65-74                         | 1.204      | 1.143-1.269  | <0.001       |
| Marital status  | Single (reference)            | 1          |              |              |
|                 | Married                       | 1.389      | 1.179-1.633  | <0.001       |
|                 | Divorced                      | 2.132      | 1.290-3.521  | 0.003        |
|                 | Widowed                       | 1.629      | 1.242-2.135  | <0.001       |
| Education       | Illiterate (reference)        | 1          |              |              |
|                 | Primary school or less        | 0.977      | 0.928-1.029  | 0.388        |
|                 | Middle and high               | 0.972      | 0.922-1.024  | 0.279        |
|                 | Diploma and above             | 0.974      | 0.93-1.021   | 0.275        |
| Employment status| Employed (reference)         | 1          |              |              |
|                 | Unemployed                    | 1.017      | 0.989-1.046  | 0.238        |
|                 | Economically inactive         | 1.038      | 0.921-1.171  | 0.539        |
| Xerostomia      | Have not                      | 1          |              |              |
|                 | Have                          | 2.035      | 1.824-2.27   | <0.001       |
| GI              | Healthy                       | 1          |              |              |
|                 | Mild inflammation             | 1.061      | 0.921-1.221  | 0.408        |
|                 | Moderate inflammation         | 1.939      | 1.673-2.245  | <0.001       |
|                 | Severe inflammation           | 4.306      | 2.020-9.175  | <0.001       |
| CPI             | Healthy                       | 1          |              |              |
|                 | Bleeding on probing           | 1.045      | 0.998-1.095  | 0.063        |
|                 | Supra-or subgingival calculus | 1.205      | 1.166-1.246  | <0.001       |
|                 | Pocket with 4-5 mm depth      | 1.120      | 1.033-1.215  | 0.006        |
| DMFT            | Per unit                      | 1.081      | 1.07-1.091   | <0.001       |

DMFT: Decayed, missing, filled teeth; GI: Gingival index; CPI: Community periodontal index; OR: Odds ratio; CI: Confidence interval

### Table 4: Odds ratios of final model of backward multivariate logistic regression

| Variables       | Levels                        | OR (adjusted) | 95% CI       | Significance |
|-----------------|-------------------------------|--------------|--------------|--------------|
| Gender          | Male (reference)              | 1            |              |              |
|                 | Female                        | 1.276        | 1.111-1.467  | 0.001        |
| Age             | 15-24 (reference)             | 1            |              |              |
|                 | 25-34                         | 1.288        | 0.996-1.665  | 0.054        |
|                 | 35-44                         | 1.090        | 0.838-1.417  | 0.519        |
|                 | 45-54                         | 0.800        | 0.603-1.061  | 0.123        |
|                 | 55-64                         | 0.617        | 0.450-0.846  | 0.003        |
|                 | 65-74                         | 0.511        | 0.331-0.788  | 0.002        |
| Education       | Illiterate (reference)        | 1            |              |              |
|                 | Primary school or less        | 1.160        | 0.804-1.673  | 0.427        |
|                 | Middle and high               | 1.203        | 0.826-1.753  | 0.334        |
|                 | Diploma and above             | 1.658        | 1.159-2.374  | 0.006        |
| Xerostomia      | Have not                      | 1            |              |              |
|                 | Have                          | 1.704        | 1.480-1.962  | <0.001       |
| CPI             | Healthy                       | 1            |              |              |
|                 | Bleeding on probing           | 0.973        | 0.792-1.196  | 0.375        |
|                 | Supra-or subgingival calculus | 2.105        | 1.810-2.447  | <0.001       |
|                 | Pocket with 4-5 mm depth      | 1.194        | 0.816-1.746  | <0.001       |
| DMFT            | Per unit                      | 1.205        | 1.158-1.269  | <0.001       |

DMFT: Decayed, missing, filled teeth; GI: Gingival index; CPI: Community periodontal index; OR: Odds ratio; CI: Confidence interval
sample sizes. Furthermore, Cohen-Carneiro et al., in their review article, reported a low level of OHRQoL in women. Some studies with moderate and small sample sizes have not shown this relationship. Steele et al. and Batra et al. reported that the OHIP-14 scores of females were higher in the United Kingdom and Australia, which is different from the results of the present study. In addition, the evidence relates women’s poorer quality of life to dental anxiety. Therefore, it seems reasonable to expect a relationship between OHRQoL and gender.

Analysis of OHIP in age categories showed that older people had not poorer OHIP. But people experience caries and tooth loss with aging, which is aggravated by developing systemic diseases, and consequently, periodontal diseases in older people. However, it has been shown that tooth loss as a factor of DMFT and age affect the OHRQoL independently. Therefore, we should expect that OHRQoL depends on age. However, in a study by Collins et al., there was no significant relationship between age, and OHRQoL, which might be attributed to the effect of oral health status on the quality of life, especially in adolescents, resulting in satisfaction with the appearance or a feeling of shame in social contacts. The relationship between poor OHIP and age may be related to lower levels of education in the elderly.

In the present study, the dental status of the participants was measured in terms of the DMFT index, and the analysis of the index showed that the participants with a higher DMFT had a poorer OHIP. The study showed that with each unit increase in DMFT, the quality of life associated with oral health was 1.2 times lower. Some studies suggest that DMFT might not be a predictor of the quality of life. Since dental caries is only detected by observation, only visible caries and missing teeth are recorded. In the present study, the dental status of the participants was measured by the DMFT index, and the analysis of the index showed that participants with a higher DMFT had a poorer OHIP, consistent with many previous studies. Decayed and missing teeth directly affect functional limitations and physical discomfort. Therefore, an inverse relationship between the DMFT index and OHIP score is reasonable.

In this study, the participants with xerostomia had 1.704 times higher chance of poorer OHIP compared to those without xerostomia. Xerostomia is a subjective cause, and because of different methods of measuring xerostomia, it is difficult to compare the results of different studies. Thomson showed that chronic dry mouth (xerostomia) is directly associated with poorer OHRQoL in middle-aged participants. Previous studies have shown that age is a factor affecting the development of xerostomia, in a study by Locker, aging resulted in a decrease in OHRQoL. Several studies have shown a relationship between xerostomia and OHIP. Niklander et al. showed that participants with xerostomia had higher OHIP scores or poorer quality of life.

The results of the present study showed that subjects with higher CPI were 2.105 times less likely to have poor OHIP than those without periodontal disease. Previous studies have shown that severe periodontitis can result in significantly poorer OHIP. However, attachment loss in patients with severe periodontitis can impair dental aesthetics and function; therefore, it is an effective factor in OHIP. However, patients with mild-to-moderate periodontitis do not know much about the symptoms of their primary symptoms. The presence or severity of periodontal diseases can be related to other variables, such as age and underlying disorders such as diabetes, drugs, special treatments, or infectious diseases such as AIDS.

Moreover, the present study showed that higher education level increases OHIP scores. Hassel et al. showed that the educational level significantly affected OHIP and Cohen-Carneiro showed this similarity in a systematic review of 323 articles with subjective indicators of the impact on the OHRQoL.

In the present study, the dental status of participants measured by DMFT index and analyzing the index showed participants with the higher DMFT have the poorer OHIP. This result repeated by many studies. OHIP-14 questioner was designed to measure functional limitation, physical discomfort, psychological discomfort, physical disability, psychological disability, social disability, and handicaps. Furthermore, decayed and missing teeth affect functional limitation physical discomfort, directly. Therefore, inverse relation between the DMFT index and OHIP is reasonable.

The sample size is a very important condition for inferring to a larger population, however, the sample size calculation must be estimated according to a specific hypothesis. The strength of the study was the
large sample size, which ensured the power of the study. Therefore, statistical tests could detect even weak relationships and the value of odds ratios are more meaningful. A limitation of the present study was that women had a higher response rate, which might be related to the fact that women pay more attention to their health. Another limitation was the effect of some factors such as population heterogeneity of culture, health habits, psychological factors, and economic factors remain unknown. Another limitation of the study was the subject measurement of xerostomia. Answering xerostomia questioner for older people and lower educational levels make some difficulty in measurements. Therefore, it is suggested that psychological factors and oral health behavior and economic factors are considered for future studies.

CONCLUSION

By comparing the range of variables and their coefficient, it can be concluded that DMFT, xerostomia, and CPI scores are strongly related to OHIP scores, respectively. Furthermore, of CPI and GI score, the CPI score has more predictive power. Therefore, in future studies, it could be advisable to use the CPI score for periodontal status. Therefore, it is necessary to pay more attention to effective and relevant factors when planning oral health interventions.

Informed consent

The authors have obtained the informed consent of the subject or the subject’s parents/legally authorized representative.

Acknowledgments

We would like to acknowledge the valuable assistance of the physiology research center of Kerman university of medical sciences providing and Mrs. Shadkam for her kind assistance and supports.

Financials support and sponsorship

The authors would like to gratitude Physiology Research Center, Kerman University of Medical Sciences for their funding(99000518).

Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

REFERENCES

1. Petersen PE, Bourgeois D, Brathall D, Ogawa HJ Bot WHO. Oral health information systems-towards measuring progress in oral health promotion and disease prevention. 2005;83:686-93.
2. Kakoei S, Nekouei AH, Kakoei S, Najafipour H. The effect of demographic characteristics on the relationship between smoking and dry mouth in Iran: a cross-sectional, case-control study. Epidemiol Health. 2021;43:e2021017.
3. Kakoei S, Afzali S, Parirohk M, Kakoei S, Mostafavi M, Nekouei A. The Knowledge and Attitude of Diabetic Patients Regarding Oral and Dental Disorders in Kerman Diabetes Clinics. J Dent (Shiraz). 2020;21:195-201.
4. Nekouei AH, Kakoei S, Najafipour H, Kakoei S. Oral Health Determinants among Opium Users in Kerman, Iran. Addict Health. 2021;13:156-64.
5. Slade GD. Measuring oral health and quality of life: Department of Dental Ecology, School of Dentistry, University of North Carolina; 1997.
6. Sischo L, Broder HJ odr. Oral health-related quality of life: what, why, how, and future implications. 2011;90:1264-70.
7. Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. Community Dent Health. 1994;11:3-11.
8. Haag DG, Peres KG, Balasubramanian M, Brennan DS. Oral Conditions and Health-Related Quality of Life: A Systematic Review. J Dent Res. 2017;96:864-74.
9. Buset SL, Walter C, Friedmann A, Weiger R, Bognakke WS, Zittmann NU. Are periodontal diseases really silent? A systematic review of their effect on quality of life. J Clin Periodontol. 2016;43:333-44.
10. Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NH. Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. Health Qual Life Outcomes. 2010;8:126.
11. Enoki K, Matsuda K-i, Ikebe K, Murai S, Yoshida M, Maeda Y, et al. Influence of xerostomia on oral health-related quality of life in the elderly: a 5-year longitudinal study. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2014;117:716-21.
12. Thomson W. Dry mouth and older people. 2015;60:54-63.
13. Massod M, Newton T, Bakri NN, Khalid T, Masood Y. The relationship between oral health and oral health related quality of life among elderly people in United Kingdom. J Dent. 2017;56:78-83.
14. Ulinski KG, do Nascimento MA, Lima AM, Benetti AR, Poli-Frederico RC, Fernandes KB, et al. Factors related to oral health-related quality of life of independent brazilian elderly. Int J Dent. 2013;2013:705047.
15. Najafipour H, Mirzazadeh A, Haghdoost A, Shadkam M, Afshari M, Moazenazadeh M, et al. Coronary Artery Disease Risk Factors in an Urban and Peri-urban Setting, Kerman, Southeastern Iran (KERCADR Study): Methodology and Preliminary Report. Iran J Public Health. 2012;41:86-92.
16. Navabi N, Nakhaee N, Mirzadeh A. Validation of a Persian Version of the Oral Health Impact Profile (OHIP-14). Iran J Public Health. 2010;39:135-9.
17. Parish CL, Feaster DJ, Pereyra MR, Alcaide ML, Weber KM, Cohen M, et al. Oral health-related quality of life and unmet dental needs among women living with HIV. J Am Dent Assoc. 2020;151:527-35.
18. Locker D, Matear D, Stephens M, Lawrence H, Payne B. Comparison of the GOHAI and OHIP-14 as measures of the
oral health-related quality of life of the elderly. Community Dent Oral Epidemiol. 2001;29:373-81.
19. Rodakowska E, Mierzynska K, Baginska J, Jamiołkowski J. Quality of life measured by OHIP-14 and GOHAI in elderly people from Bialystok, north-east Poland. BMC Oral Health. 2014;14:106.
20. Rodakowska E, Wilczyńska-Borawska M, Fryc J, Baginska J, Naumnik B. Oral health-related quality of life in patients undergoing chronic hemodialysis. Patient preference and adherence. 2018;12:955-61.
21. Schütte U, Walter M. Dental Public Health Dental public health. In: Kirch W, editor. Encyclopedia of Public Health. Dordrecht: Springer Netherlands; 2008. p. 242-53.
22. WHO. Oral health surveys: basic methods: World Health Organization; 2013.
23. Fox PC, Busch KA, Baum BJ. Subjective reports of xerostomia and objective measures of salivary gland performance. J Am Dent Assoc. 1987;115:581-4.
24. Dahl KE, Wang NJ, Skau I, Ohrn K. Oral health-related quality of life and associated factors in Norwegian adults. Acta Odontol Scand. 2011;69:208-14.
25. Drachev SN, Brenn T, Trovik TA. Oral Health-Related Quality of Life in Young Adults: A Survey of Russian Undergraduate Students. Int J Environ Res Public Health. 2018;15.
26. Cohen-Carneiro F, Souza-Santos R, Rebelo MAB. Quality of life related to oral health: contribution from social factors. Ciência & Saúde Coletiva. 2011;16:1007-15.
27. Moeintaghavi A, Arab H, Sargolzaei N, Dorri M, Darvishzadeh F, Alizadeh M. Oral Health-Related Quality of Life: A Cross-Sectional Survey among Adult Patients in Mashhad, Iran. Journal of Dental Materials and Techniques. 2013;2:114-20.
28. Sun L, Wong HM, McGrath CPJ. The factors that influence oral health-related quality of life in young adults. Health and quality of life outcomes. 2018;16:1-14.
29. Steele JG, Sanders AE, Slade GD, Allen PF, Lahti S, Nuttall N, et al. How do age and tooth loss affect oral health impacts and quality of life? A study comparing two national samples. Community Dentistry & Oral Epidemiology. 2004;32:107-14.
30. Batra M, Shah AF, Dany SS, Raipur P. Determinants Related to Oral Health-Related Quality of Life Among Subjects Attending a Dental Institute in Moradabad City—A Cross-Sectional Study. Journal of Indian Association of Public Health Dentistry. 2017;15:23.
31. Iacopino AM, Cutler CW. Pathophysiological relationships between periodontitis and systemic disease: recent concepts involving serum lipids. Journal of periodontology. 2000;71:1375-84.
32. Fowler EB, Breault LG, Cuenin MF. Periodontal disease and its association with systemic disease. Military medicine. 2001;166:85-9.
33. Collins JR, Elias AR, Brache M, Veras K, Ogando G, Toro M, et al. Association between gingival parameters and Oral health-related quality of life in Caribbean adults: a population-based cross-sectional study. BMC oral health. 2019;19:1-12.
34. Khalifa N, Allen PF, Abu-bakr NH, Abdel-Rahman ME. Psychometric properties and performance of the Oral Health Impact Profile (OHIP-14s-ar) among Sudanese adults. Journal of Oral Science. 2013;55:123-32.
35. Maia CdVR, Mendes FM, Normando D. The impact of oral health on quality of life of urban and riverine populations of the Amazon: A multilevel analysis. PLoS One. 2018;13:e0208096.
36. Yamane-Takeuchi M, Ekuni D, Mizutani S, Kataoka K, Taniguchi-Tabata A, Azuma T, et al. Associations among oral health-related quality of life, subjective symptoms, clinical status, and self-rated oral health in Japanese university students: a cross-sectional study. BMC Oral Health. 2016;16:1-8.
37. Thomson WM. Dry mouth and older people. Australian dental journal. 2015;60:54-63.
38. Rad M, Kakoie S, Brojeni FN, Pourdamghan N. Effect of long-term smoking on whole-mouth salivary flow rate and oral health. Journal of dental research, dental clinics, dental prospects. 2010;4:110.
39. Kakoei S, Navabi N, Aghaabbasi S, Hashemipour MA. Oral health related quality of life in patients with diabetes mellitus type 2 in the year 2012. Journal of Oral Health and Oral Epidemiology. 2016;5:186-91.
40. Kiesswetter E, Keijser BJF, Volkert D, Visser M. Association of oral health with body weight: a prospective study in community-dwelling older adults. European Journal of Clinical Nutrition. 2020;74:961-9.
41. Niklander S, Veas L, Barrera C, Fuentes F, Chiappini G, Marshall M. Risk factors, hyposalivation and impact of xerostomia on oral health-related quality of life. Braz Oral Res. 2017;31:e14.
42. Ustaöğlu G, Gölber Bulut D, Gümüş KÇ, Ankarali H. Evaluation of the effects of different forms of periodontal diseases on quality of life with OHIP-14 and SF-36 questionnaires: A cross-sectional study. International journal of dental hygiene. 2019;17:343-9.
43. Kim J, Amar S. Periodontal disease and systemic conditions: a bidirectional relationship. Odontology. 2006;94:10-21.
44. Hassel AJ, Steuker B, Rolko C, Keller L, Rammelsberg P, Nitschke I. Oral health-related quality of life of elderly Germans—comparison of GOHAI and OHIP-14. Community Dent Health. 2010;27:242-7.
45. Cohen-Carneiro F, Souza-Santos R, Rebelo MABJC, Coletiva S. Quality of life related to oral health: contribution from social factors. 2011;16:1007-15.
46. Batista MJ, Lawrence HP, de Sousa MdA L. Impact of tooth loss related to number and position on oral health quality of life among adults. Health Qual Life Outcomes. 2014;12:165.
47. Yamane-Takeuchi M, Ekuni D, Mizutani S, Kataoka K, Taniguchi-Tabata A, Azuma T, et al. Associations among oral health-related quality of life, subjective symptoms, clinical status, and self-rated oral health in Japanese university students: a cross-sectional study. BMC Oral Health. 2016;16:127.