

Original Article

Exploring the Factors Affecting Oral Health-Related Quality of Life in Adults

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ABSTRACT

The objective of this study was to evaluate the influence of oral health on Oral Health Related Quality of Life (OHRQoL) in individuals who sought oral health management at the Periodontology Department, Oral Pathology, and Dental Prophylaxis at the Dental Clinic (UDC) University in Kraków. This cross-sectional study, involving 250 adult patients, incorporated both intraoral clinical examinations and questionnaire-based surveys. A statistically significant negative relationship was observed between the self-assessment of OHRQoL and OHIP-14 concerning teeth, oral mucosa, and dentures. Compared to patients who did not report caries concerns, those who did had a poorer OHRQoL. Reports of OHRQoL self-evaluations were lower among those who wanted prosthetic therapy than among those who did not. Patients referring the clinic for follow-up visits had a better self-assessment of OHRQoL compared to those seeking management. OHRQoL demonstrated a negative and statistically significant association with these factors: 1) DMFT index, 2) count of decayed teeth, and 3) count of missing teeth. Dental health care providers should maintain the prevention of tooth decay as their main objective so that patients can retain as many healthy teeth as possible. It seems that the effect of regular dental visits on patients' well-being is less significant.

Keywords: OHIP-14, Caries, Periodontal diseases, Oral mucosal diseases, OHRQoL, DMFT

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Introduction

The World Health Organization defines health as "a complete state of physical, mental, and social well-being and not merely the absence of disease," prompting scholars and clinicians to revise their understanding of infection [1]. Dental professionals are now required to evaluate not only clinical parameters that facilitate precise diagnosis and objective assessment of the stage and severity of oral disease but also to consider patient-centered outcomes, such as Health-Related Quality of Life (HRQoL) and Oral Health-Related Quality of Life (OHRQoL) [2]. Incorporating the individual's expectations and experiences into the diagnostic process can influence therapeutic decision-making and facilitate consideration of the patient's mental and social well-

being. It should have a favourable impact on the patient-dentist connection as well as the patient's loyalty and trust. Furthermore, the cost-effectiveness of the recommended course of treatment should be evaluated in light of the advantages for the whole healthcare system [3].

OHRQoL encompasses various dimensions and is a broad principle that evaluates the implications of oral health on well-being and Quality of Life (QoL). Authors Cohen and Jago were the first to advocate for the development of subjective indicators, such as the Oral Health Impact Profile (OHIP) [4]. This tool evaluates how oral complaints have affected a person's well-being in their assessment over the past year. The OHIP-14 questionnaire, created by G. Slade [5], is a condensed version of the OHIP-49 form, originally

developed by G. Slade and A. Spencer [6], both in English. Their foundation is a theoretical framework of oral health that evaluates seven aspects: handicap, emotional anguish, physical impairment, mental impairment, social impairment, functional limitation, and physiological discomfort. Die Kurzversion besteht aus 14 Items (jeweils 2 für jede Dimension). For an instrument to reliably assess the defined objective, it is essential to use a questionnaire that has been tailored and validated for the specific population, considering cultural and linguistic differences. A multitude of studies regarding the validations and modifications of OHIP-14 have been carried out to date [7-10].

Using a questionnaire that has been approved for the specific patient group, this study aims to examine the relationship between OHRQoL and the general health of the oral cavity in patients with periodontal pathologies, oral mucosa illnesses, and caries at the University Dental Clinic (UDC) in Kraków, Poland [11].

Materials and Methods

Procedures

Ethical approval for the study was obtained from the Ethics Committee of the Jagiellonian University Medical College in Kraków (No. 122.6120.354.2016). The cross-sectional study included adult patients seeking dental treatment at the UDC in Kraków's Department of Periodontology, Dental Prophylaxis, and Oral Pathology. All participants received both verbal and written information about the study and provided informed consent. Exclusion criteria included a lack of consent to participate and being under the age of eighteen.

The research involved 250 individuals. Every one of them went through an intraoral clinical examination and filled out a questionnaire survey. A single calibrated dentist collected the clinical data by performing an examination under artificial light with a WHO periodontal probe and a dental mirror. This involved evaluations of the periodontium and oral mucosa, along with tallying decayed, missed (regardless of reason; excluding third molars), and filled teeth. The data collected from the questionnaire included: self-assessments of QoL and OHRQoL, OHIP-14 results, the reason for the UDC visit, and information on whether the patient is continuing treatment or is new to UDC.

Questionnaire

In this study, the authors utilized a modified Polish version of the OHIP-14 questionnaire, which had been validated for individuals at UDC in Kraków's

Department of Periodontology, Dental Prophylaxis, and Oral Pathology [11]. The modifications were designed to assess OHRQoL in greater detail. Specifically, each item was examined individually in relation to teeth (subscale 1), oral mucosa and soft tissues (subscale 2), and dentures (subscale 3). Additionally, two new response options, "I don't know" and "not applicable," were introduced. Respondents rated the OHIP-14 items using a five-point Likert-type frequency scale: never (0), almost never (1), sometimes (2), fairly often (3), and almost all the time (4). Higher OHIP-14 scores were associated with a higher frequency of issues related to teeth, oral mucosa, or dentures, as well as a reduction in OHRQoL.

Furthermore, participants were questioned unequivocally regarding their self-evaluation of QoL and OHRQoL. The replies (with assessment) were: very bad (0), bad (1), satisfactory (2), good (3), very good (4).

Statistical analysis

All statistical tests were performed using a significance level of 0.05. R version 4.1.1 was used for the analyses. was the program utilized for calculations. Qualitative variables among groups were compared using the chi-squared test (with Yates' correction for 2x2 tables). Fisher's exact test was used for low values in contingency tables. To compare quantitative and ordinal variables between two groups, the Mann-Whitney test was utilized. For comparisons encompassing additional 2 groups, the Kruskal-Wallis test (with Dunn post-hoc test) was employed. To assess the connection between two quantitative and/or ordinal variables, Spearman's correlation coefficient was applied. The median and quartiles were used to summarize quantitative variables.

Results and Discussion

Out of the 250 participants (age range: 18–82 years, average age: 52.16 years, SD = 15.85; men: 34.80%) who signed up for the study, completed the questionnaire and underwent an intraoral examination.

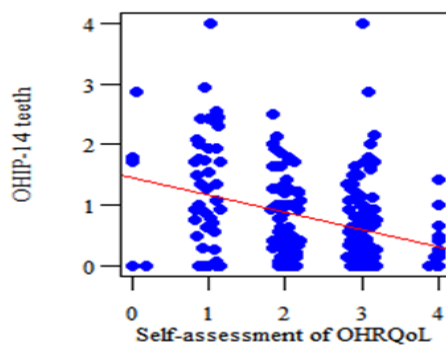


Figure 1. Relationship between self-evaluation of OHRQoL and OHIP-14 concerning teeth ($r=-0.3$, $p<0.001$).

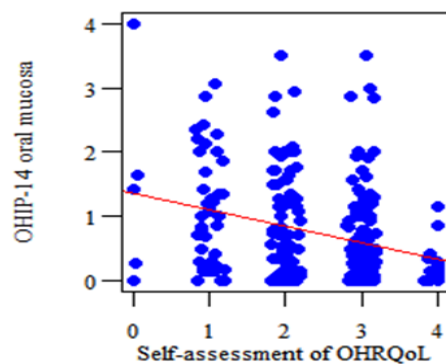


Figure 2. Relationship between self-evaluation of OHRQoL and OHIP-14 regarding oral mucosa ($r=-0.274$, $p<0.001$).

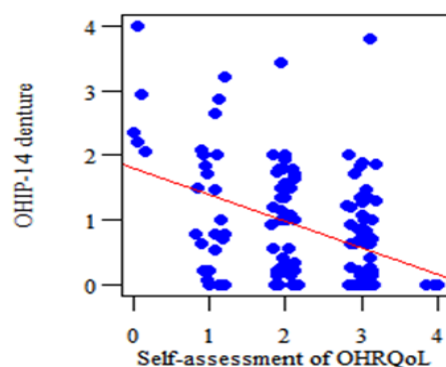


Figure 3. Relationship between self-evaluation of OHRQoL and OHIP-14 in relation to dentures ($r=-0.388$, $p<0.001$).

The researchers of this study conducted a contrast between the OHIP-14 questionnaire and direct inquiries regarding OHRQoL and QoL. The objective was to establish if there is a connection between basic questions and the validated instrument. A statistically substantial negative association in relation to self-assessment of QoL and OHIP-14 was found only across subscale 2 ($p<0.05$, $r<0$). This suggests that as the quantity of oral mucosa issues evaluated by OHIP-14 diminishes, the self-assessment of overall

QoL enhances. In subscale 1 (**Figure 1**), 2 (**Figure 2**), and 3 (**Figure 3**), a statistically significant negative correlation was found between self-assessment of OHRQoL and OHIP-14 ($p<0.05$, $r<0$). This suggests that a lower OHIP-14 score and a reduced number of disorders associated with teeth, oral mucosa, and dentures are linked to a better self-evaluation of OHRQoL.

This implies that the OHIP-14 questionnaire was regarded by the participants as being as intelligible as basic enquiries. The study found that systemic disorders were present in 78.6% of individuals with diseases of the oral mucosa. Many oral mucosal illnesses are treated with medications, and the excruciating pain they cause might have an impact on how people evaluate their general quality of life.

Patients were categorized into five groups based on their reasons for visiting the UDC: group 1 – periodontal diseases ($n=114$, 46.8%), group 2 – oral mucosal diseases ($n=95$, 38%), group 3 – caries and other dental issues ($n=33$, 13.2%), group 4 – prosthetic treatment ($n=12$, 4.8%), and group 5 – follow-up visits ($n=25$, 10%).

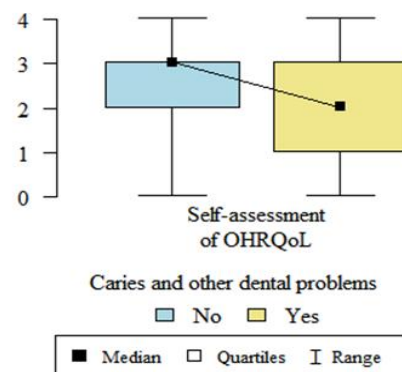


Figure 4. Self-evaluation of OHRQoL in individuals that have caries and dental problems and does who do not.

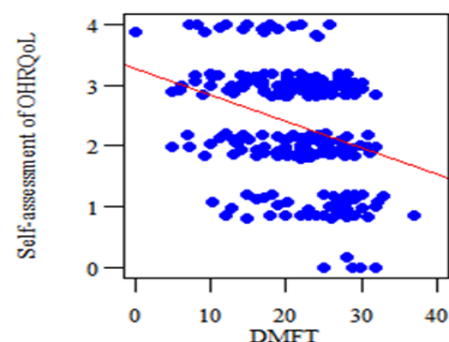


Figure 5. Relationship amongst self-evaluation of OHRQoL and DMFT index ($r=-0.28$; $p<0.001$).

In group 3, which consisted of patients who reported caries complaints, the OHRQoL self-assessment was

lower compared to those who did not complain (2 (1-3) vs 3 (2-3); $p=0.013$). The DMFT index showed variation among all participants, with an average value of 21.72 (SD=6.63, min. 0, max. 37). The averages were 1.98 decayed teeth (SD=3.02), 8.34 missing teeth (SD=8.36), and 11.4 filled teeth (SD=5.67). The self-assessment of OHRQoL exhibited a negative ($r<0$) and statistically significant ($p<0.05$) correlation with the following factors: 1) DMFT index (**Figure 5**), 2) count of decayed teeth, and 3) count of missing teeth. The worse the self-assessment of OHRQoL, the higher these scores are.

Earlier research has verified that decayed teeth adversely affect the OHRQoL [12, 13]. According to Coles *et al.* there may be an impact of decayed and missed teeth on depression [14]. Endodontic treatment improves OHRQoL, according to Neelakantan *et al.*'s systematic study [15]. However, Dahl *et al.*'s study does not confirm that dental decay affects OHRQoL, most likely because the patients' cavities is not severe [16]. The results of our research indicated a negative association with respect to the DMFT index, missing and carious teeth, and self-perception of the OHRQoL. Moreover, individuals that have cavities assessed their OHRQoL as lower than that of individuals who did not show any indications of cavities or its symptoms. The findings of Batista *et al.* correspond with ours regarding the effect of edentulous on OHRQoL [17]. Furthermore, they emphasize that this parameter is influenced not only by the presence of some missing teeth but also by the position (anterior or posterior) of the absent teeth in the mouth. The number of filled teeth does not affect the perception of OHRQoL in this study.

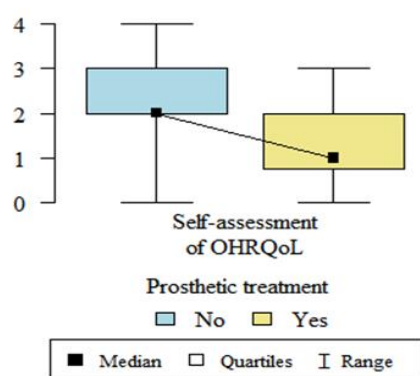


Figure 6. The self-assessment of OHRQoL was compared between patients with prosthetic complaints and those without.

In the list of individuals who require treatment in relation to prostheses (e.g., creating a new denture, adjusting or replacing the existing one; group 4), self-

evaluation of the OHRQoL was worse in comparison to those who do not require such (1 (0.75-2) vs 2 (2-3); $p<0.001$). Other research corroborates that OHRQoL enhances after receiving prosthetic treatment with both conventional [18] and dentures supported by implants [18-20]. According to Reissmann *et al.*'s systematic review, receiving prosthetic therapy enhances OHRQoL [21]. They claim that, statistically speaking, no management strategy—conventional or implant-supported fixed dental prosthesis—is better for individuals who are partially dentulous. Nevertheless, depending on their particular personality traits and clinical situation, some edentulous individuals may see a significant influence from implant treatment on their OHRQoL. In this study, among the patient group employing prosthetic restorations, 49.62% relied solely on removable prostheses, 15.79% utilized a combination of removable and fixed prostheses, and 34.59% used only fixed dental prostheses. All of these prosthetic therapy approaches come with their own pros and cons, which impact OHRQoL. Masticatory satisfaction and OHRQoL are significantly linked in patients who have removable partial dentures [22]. Kurosaki *et al.* conclude that, after prosthetic treatment, the OHRQoL score remains significantly higher 6 years post-therapy only for patients with implant-supported fixed dentures, in comparison to those using conventional fixed and removable partial dentures [23]. This study included only three patients using implant-supported fixed dental prostheses, representing 2.3% of all prosthetic restoration users.

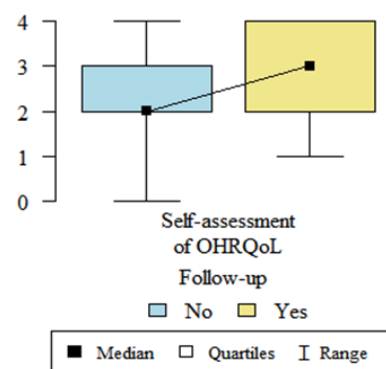


Figure 7. The self-assessment of OHRQoL in patients visiting the UDC for follow-up visits was compared to those seeking treatment.

In group 5, individuals who visited UDC for follow-up appointments had a more positive self-assessment of OHRQoL than those who require initial therapy (3 (2-4) vs 2 (2-3); $p=0.003$) (**Figure 7**). It might be connected to the patient's understanding of the

disease's cause and prevention, modification of detrimental habits, fewer worrying symptoms (such as pain), and a satisfactory treatment outcome (like improved dental stability from periodontal therapy or aesthetic improvements from caries or tooth wear treatment). Among the patients who continued treatment (60% of respondents), their OHRQoL self-assessment was more favorable compared to first-time patients (3 (2-3) vs 2 (1-3)); $p=0.042$). It is unquestionable that a visit to the clinic and dentist already familiar may have a positive effect on the patient's mindset and lessen fear. In their research, Collins *et al.* affirm that patients with regular dental visits experience a better OHRQoL [24]. An additional research shows a link in relation to postponing dental consultations due to monetary issues and the self-reporting of moderate or poor oral health [25]. Keir *et al.* [26] indicate that the time since the last dental visit and anxiety of dentist are statistically significantly connected.

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Conclusion

This research corroborates the impact of inadequate oral health on OHRQoL. Considering that OHRQoL is affected by the DMFT index and the count of decayed

and missing teeth, dentists' primary patient-centered objectives should include caries prevention and the preservation of as many healthy teeth as possible in patients' mouths. According to WHO [30], one of the essential strategies recommended is to concentrate on prevention. Patients who continued the management had a better OHRQoL compared to those who were beginning the therapy. This implies that patients' future well-being depends on their regular dental visits.

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Conflict of Interest: None

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References

1. World Health Organization. Constitution of the World Health Organization. In: Basic Documents, WHO, Geneva; 1948. 1 p.
2. Yalcinkaya Y, Mumcu G, Özdemir FT, Kuruş RE, Ünal AU, Direskeneli H, et al. Are salivary gland ultrasonography scores associated with salivary flow rates and oral health-related quality of life in sjögren syndrome? J Rheumatol. 2020;47(12):1774-9. Available from: <https://pubmed.ncbi.nlm.nih.gov/32358157/> doi:10.3899/JRHEUM.190849
3. Lopes Martins AF, Nogueira TE, Morais MO, de Sousa-Neto SS, Oton-Leite AF, Valadares MC, et al. Cost-effectiveness randomized clinical trial on the effect of photobiomodulation therapy for prevention of radiotherapy-induced severe oral mucositis in a Brazilian cancer hospital setting. Support Care Cancer. 2021;29(3):1245-56. Available from: <https://pubmed.ncbi.nlm.nih.gov/32621262/> doi:10.1007/S00520-020-05607-6
4. Cohen L, Jago J. Toward the formulation of sociodental indicators. Int J Heal Serv. 1976;6(4):681-98.
5. Slade G. Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol. 1997;25(4):284-90. doi:10.1111/j.1600-0528.1997.tb00941.x
6. Slade GD, Spencer A. Development and evaluation of the oral health impact profile.

- Community Dent Health. 1994;11(1):3-11. Available from: <https://pubmed.ncbi.nlm.nih.gov/8193981>. Accessed November 22, 2021
7. Gera A, Cattaneo PM, Cornelis MA. A Danish version of the oral health impact profile-14 (OHIP-14): translation and cross-cultural adaptation. BMC Oral Health. 2020;20(1):254. Available from: <https://pubmed.ncbi.nlm.nih.gov/32912220/> doi:10.1186/S12903-020-01242-Z
8. He S, Wang J, Wei S, Ji P. Development and validation of a condition-specific measure for chronic periodontitis: oral health impact profile for chronic periodontitis. J Clin Periodontol. 2017;44(6):591-600. Available from: <https://pubmed.ncbi.nlm.nih.gov/28278366/> doi:10.1111/JCPE.12716
9. Tesic M, Cankovic M, Jevtic M, Stevanovic D. Validation of the oral health impact profile - 14 in patients with head and neck cancer. Med Oral Patol Oral Cir Bucal. 2020;25(6):e739-44. Available from: <https://pubmed.ncbi.nlm.nih.gov/32388514/> doi:10.4317/MEDORAL.23765
10. El Osta N, Haddad E, Fakhouri J, Saad R, El Osta L. Comparison of psychometric properties of GOHAI, OHIP-14, and OHIP-EDENT as measures of oral health in complete edentulous patients aged 60 years and more. Qual Life Res. 2021;30(4):1199-213. Available from: <https://pubmed.ncbi.nlm.nih.gov/33226604/> doi:10.1007/S11136-020-02709-W
11. Wąsacz K, Pac A, Darczuk D, Chomyszyn-Gajewska M. Validation of a modified oral health impact profile scale (OHIP-14) in patients with oral mucosa lesions or periodontal disease. Dent Med Probl. 2019;56(3):231-7. doi:10.17219/dmp/109388
12. Bernardino RMP, Silva AM, Costa JF, Silva MVB, Santos IT dos, Dantas Neta NB, et al. Factors associated with oral health-related quality of life in homeless persons: a cross-sectional study. Braz Oral Res. 2021;35:e107. Available from: <https://pubmed.ncbi.nlm.nih.gov/34816895/> doi:10.1590/1807-3107BOR-2021.VOL35.0107
13. Shao R, Hu T, Zhong YS, Li X, Gao YB, Wang YF, et al. Socio-demographic factors, dental status and health-related behaviors associated with geriatric oral health-related quality of life in Southwestern China. Health Qual Life Outcomes. 2018;16(1):98. Available from: <https://pubmed.ncbi.nlm.nih.gov/29784008/> doi:10.1186/S12955-018-0925-8
14. Coles E, Chan K, Collins J, Humphris GM, Richards D, Williams B, et al. Decayed and missing teeth and oral-health-related factors: predicting depression in homeless people. J Psychosom Res. 2011;71(2):108-12. Available from: <https://pubmed.ncbi.nlm.nih.gov/21767692/> doi:10.1016/J.JPSYCHORES.2011.01.004
15. Neelakantan P, Liu P, Dummer PMH, McGrath C. Oral health-related quality of life (OHRQoL) before and after endodontic treatment: a systematic review. Clin Oral Investig. 2020;24(1):25-36. Available from: <https://pubmed.ncbi.nlm.nih.gov/31712982/> doi:10.1007/s00784-019-03076-8
16. Dahl KE, Wang NJ, Holst D, Öhrn K. Oral health-related quality of life among adults 68-77 years old in Nord-Trøndelag, Norway. Int J Dent Hyg. 2011;9(1):87-92. Available from: <https://pubmed.ncbi.nlm.nih.gov/21226856/> doi:10.1111/J.1601-5037.2010.00445.X
17. Batista MJ, Lawrence HP, de Sousa M da LR. Impact of tooth loss related to number and position on oral health quality of life among adults. Health Qual Life Outcomes. 2014;12:165. Available from: <https://pubmed.ncbi.nlm.nih.gov/25433483/> doi:10.1186/S12955-014-0165-5
18. Zhang L, Lyu C, Shang Z, Niu A, Liang X. Quality of life of implant-supported overdenture and conventional complete denture in restoring the edentulous mandible: a systematic review. Implant Dent. 2017;26(6):945-50. Available from: <https://pubmed.ncbi.nlm.nih.gov/29189390/> doi:10.1097/ID.0000000000000668
19. Farzadmoghadam M, Mohammadi TM, Goudarzi R, Mohammadi M, Hasheminejad N. Is there a relationship between general and oral health-related quality of life in partially edentulous patients before and after implant treatment? a quasi-experimental study. Clin Oral Implants Res. 2020;31(6):557-64. Available from: <https://pubmed.ncbi.nlm.nih.gov/32119138/> doi:10.1111/clr.13593
20. Machuca C, Vettore MV, Robinson PG. How peoples' ratings of dental implant treatment change over time? Qual life Res. 2020;29(5):1323-34. Available from: <https://pubmed.ncbi.nlm.nih.gov/31907871/> doi:10.1007/S11136-019-02408-1

21. Reissmann DR, Dard M, Lamprecht R, Struppek J, Heydecke G. Oral health-related quality of life in subjects with implant-supported prostheses: a systematic review. *J Dent.* 2017;65:22-40. Available from: <https://pubmed.ncbi.nlm.nih.gov/28789860/> doi:10.1016/j.jdent.2017.08.003
22. Yoshimoto T, Hasegawa Y, Salazar S, Kikuchi S, Hori K, Ono T. Factors affecting masticatory satisfaction in patients with removable partial dentures. *Int J Environ Res Public Health.* 2021;18(12):6620. Available from: <https://pubmed.ncbi.nlm.nih.gov/34202944/> doi:10.3390/IJERPH18126620
23. Kurosaki Y, Kimura-Ono A, Mino T, Arakawa H, Koyama E, Nakagawa S, et al. Six-year follow-up assessment of prosthesis survival and oral health-related quality of life in individuals with partial edentulism treated with three types of prosthodontic rehabilitation. *J Prosthodont Res.* 2021;65(3):332-9. Available from: <https://pubmed.ncbi.nlm.nih.gov/33281174/> doi:10.2186/JPR.JPR_D_20_00095
24. Collins JR, Elías 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):234. Available from: <https://pubmed.ncbi.nlm.nih.gov/31675959/> doi:10.1186/S12903-019-0931-1
25. Hadler-Olsen E, Jönsson B. Oral health and use of dental services in different stages of adulthood in Norway: a cross sectional study. *BMC Oral Health.* 2021;21(1):257. Available from: <https://pubmed.ncbi.nlm.nih.gov/33985488/> doi:10.1186/S12903-021-01626-9
26. Kheir OO, Ziada HM, Abubakr NH, Abdel-Rahman ME, Fadl SM, Ibrahim YE. Patient-dentist relationship and dental anxiety among young Sudanese adult patients. *Int Dent J.* 2019;69(1):35-43. Available from: <https://pubmed.ncbi.nlm.nih.gov/29992551/> doi:10.1111/IDJ.12409
27. Eltas A, Uslu MO, Eltas SD. Association of oral health-related quality of life with periodontal status and treatment needs. *Oral Health Prev Dent.* 2016;14(4):339-47. Available from: <https://pubmed.ncbi.nlm.nih.gov/26870844/> doi:10.3290/J.OHPD.A35613
28. Botelho J, Machado V, Proença L, Bellini DH, Chambrone L, Alcoforado G, et al. The impact of nonsurgical periodontal treatment on oral health-related quality of life: a systematic review and meta-analysis. *Clin Oral Investig.* 2020;24(2):585-96. doi:10.1007/s00784-019-03188-1
29. Parlatescu I, Tovar M, Nicolae CL, Sfeatcu R, Didilescu AC. Oral health-related quality of life in different clinical forms of oral lichen planus. *Clin Oral Investig.* 2020;24(1):301-8. Available from: <https://pubmed.ncbi.nlm.nih.gov/31098713/> doi:10.1007/s00784-019-02951-8
30. Lamster IB. The 2021 WHO resolution on oral health. *Int Dent J.* 2021;71(4):279-80. doi:10.1016/J.IDENTJ.2021.06.003