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# Oral Health Impact Profile in adult Polish population

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Abstract: Background: Oral Health Related Quality of Life (OHRQoL) is a significant patient-oriented outcome which should be considered in diagnostic, decision making and therapeutic process by dentists.
Objectives: To evaluate the influence of a condition of teeth, oral mucosa and dentures on the OHRQoL among patients seeking dental treatment in the University Dental Clinic (UDC) in Kraków, Poland.
Material and Methods: 250 patients took part in a cross-sectional study conducted in the UDC in Kraków. Collected clinical data included: oral mucosa and periodontal condition, number of Decayed, Missed and Filled Teeth (DMFT index), presence of dentures. Questionnaire part of the study has been based on OHIP-14 questionnaire.
Results: The condition of teeth worsened OHRQoL in following groups of patients: first-time visitors, smokers, with periodontal diseases and without oral mucosal diseases. There was a positive significant correlation between number of decayed teeth and OHRQoL related to teeth. The condition of oral mucosa significantly impaired OHRQoL in: women, patients with oral mucosal diseases and those who undergone prosthetic treatment in the last year. There was a correlation between number of missing teeth, DMFT index, age and subscale 2 of the form. The condition of dentures significantly impaired the OHRQoL in patients: who used removable dental prostheses, undergone prosthetic treatment in the last year and females. There was a positive correlation between subscale 3 of the questionnaire and number of missing teeth and DMFT index and a negative correlation with number of filled teeth within this subscale.
Conclusions: Evaluation of patient's OHRQoL is one of important components for successful dental treatment.

**Keywords:** OHIP-14, mOHIP-14-pl, OHRQoL, periodontal diseases, oral mucosal diseases, caries.

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## Introduction

Quality of Life (QoL) is defined by World Health Organization (WHO) as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [1]. It is a complex and multidimensional concept affected by health, psychological and social factors, beliefs and many others. Pointing out the influence of physical health on well-being, the term of Health Related Quality of Life (HRQoL) has been distinguished. By analogy, the impact of oral health on QoL is described by Oral Health Related Quality of Life (OHRQoL). Maintaining appropriate level of QoL and HRQoL is one of important aspects assessing human's life, not only in young or elderly people who have overcome a serious disease, e.g. cancer, due to medicine development [2, 3]. The idea of preserving QoL refers also to healthy children, youth and adults.

As WHO specified a definition of health not only as a lack of disease, but complete physical, psychological and social well-being [4], focusing on patient's well-being and HRQoL should become one of important goals for health care workers and other professionals (e.g. physicians, dentists, nurses [5], physiotherapists, psychologists [3, 6, 7], nutritionists [8]) in their work. It should start at the diagnostic stage and cover also treatment planning and therapeutic process. This attitude benefits especially patients, by focusing on their real needs and expectations and by avoiding prolonged treatment.

To evaluate OHRQoL in an appropriate way, the use of specially designed, calibrated and validated tools is essential. The linguistic and cultural adaptation of every instrument is required, to adjust the instrument for a studied population. To date, many questionnaires assessing the impact of oral conditions on well-being has been developed. Some of them are dedicated to check children's [9, 10], adults' [11, 12], elderly people's [13] or the whole family's [14] well-being. Nowadays the forms are commonly used to appraise oral condition in specific populations, e.g. with mental disorders [15, 16], with hematologic cancers [17], with rheumatic diseases [18], during pregnancy [19], with periodontal diseases [20, 21], with cleft lip [22], with partial dentition [23], with worn teeth [24].

The objective of this study was to evaluate in detailed way the impact of teeth, oral mucosa and dentures conditions on OHRQoL in the group of patients looking for dental treatment in the University Dental Clinic (UDC) in Kraków. The authors used a modified Oral Health Impact Profile-14 (OHIP-14) questionnaire in Polish language version (mOHIP-14-pl), previously validated in this population [25].

## Material and Methods

### *Study design*

Ethical approval from the Ethics Committee of the Jagiellonian University Medical College in Kraków was obtained (No. 122.6120.354.2016). Adult patient seeking dental treatment in the UDC in Kraków took part in this cross-sectional study. All of the patients gained detailed verbal and written information on the study. Exclusion criteria were following: lack of a consent for participation in the study and age below 18 years. 250 adult patients gave their written informed consent and were involved in the study, which consisted of intraoral clinical examination and a self-completed questionnaire survey. Intraoral examination was conducted by one calibrated dentist, with the usage of dental mirror and periodontal probe WHO, in an artificial light. Gained clinical data included: oral mucosa and periodontal condition, number of Decayed, Missed and Filled Teeth (DMFT index, excluding third molar teeth), presence and type of dental prostheses, API (Approximal Plaque Index – assessment of the presence or absence of plaque in the interdental spaces) [26], mSBI (modified Sulcus Bleeding Index — assessment of the presence or absence of bleeding after gentle interdental gingiva probing, indicating early gingivitis) [27]. Questionnaire data involved: selected demographic-social characteristics, mOHIP-14-pl, information on smoking and underwent prosthetic treatment in the last 12 months, self-assessment of: oral health condition, dental hygiene and dental treatment needs.

### *Questionnaire*

The original OHIP form was developed in 1994 by Slade and Spencer [12] and consisted of 49 items (OHIP-49). Its shorter version (OHIP-14) was created by Slade [28] to facilitate its usage in clinical settings. To thoroughly analyze the influence of oral condition on OHRQoL in polish adult population, the authors used a modified Polish language version of OHIP-14 questionnaire. The implemented adjustments of the form consisted in 1) asking about all of the items independently in relation to teeth (subscale 1), oral mucosa and oral soft tissue (e.g. tongue; subscale 2) and dentures (subscale 3) and 2) adding answers 'I don't know' and 'not applicable'. The questionnaire was validated in the group of patients looking for dental treatment in the UDC in Kraków [25]. The answers were given values: never (0), almost never (1), sometimes (2), fairly often (3) and almost all of the time (4). The higher the sum of the points, the more often the patient suffered from problems with teeth (subscale 1), oral mucosa (subscale 2) or dentures (subscale 3) and the worse was his OHRQoL.

### *Statistical analysis*

Significance level for all statistical tests was set to 0.05. Mann–Whitney test was used to compare quantitative and ordinal variables between two groups. Relationship between two quantitative and/or ordinal variables was assessed with Spearman's coefficient of correlation. Quantitative variables were summarized with median (quartiles). Program R, version 4.1.1 [29] was used for computations.

## Results

A group of 250 patients (age: 18–82 years, mean age: 52.16 years, SD = 15.85; females: 65.2%) took part in the study. Analyzing a subscale 1, patients: with diagnosed periodontal disease, without diagnosed oral mucosal disease, first-time visiting the clinic and smokers reported significantly worse OHRQoL because of condition of teeth. There was a significant positive correlation between subscale 1 of mOHIP-14-pl and number of decayed teeth. Results are shown in Table 1.

**Table 1.** Subscale 1 of mOHIP-14-pl.

| Subscale | Variables | Values | p-value |
|---|---|---|---|
| Subscale 1 | Diagnosis: periodontal disease (undiagnosed vs diagnosed) | 0.29 (0–1.14) vs 0.64 (0.29–1.29) | p = 0.019 |
| | Diagnosis: oral mucosal disease (undiagnosed vs diagnosed) | 0.71 (0.29–1.29) vs 0.36 (0–1.09) | p = 0.015 |
| | First-time visiting patient (vs continuing patients) | 0.79 (0.29–1.36) vs 0.5 (0.14–1) | p = 0.029 |
| | Smoking (yes vs no) | 0.93 (0.54–1.96) vs 0.47 (0.14–1.14) | p = 0.002 |
| | Number of decayed teeth | r = 0.164 | p = 0.012 |

Investigating a subscale 2, the condition of oral mucosa significantly worsened the OHRQoL in patients: with oral mucosal disease, who underwent any prosthetic treatment in the last year and in women. There was a statistically significant positive correlation between subscale 2 of mOHIP-14-pl and: DMFT index, number of missing teeth and age (Table 2).

Examining a subscale 3, a presence of a denture in the oral cavity negatively affected the OHRQoL in patients who underwent any prosthetic treatment during the last year, used removable or removable and fixed dental prostheses and in women. There was a statistically significant positive correlation between subscale 3 of mOHIP-14-pl and: DMFT index and number of missing and a negative one with the number of filled teeth (Table 3).

**Table 2.** Subscale 2 of mOHIP-14-pl.

| Subscale | Variables | Values | p-value |
|---|---|---|---|
| Subscale 2 | Diagnosis: oral mucosal disease (undiagnosed vs diagnosed) | 0.29 (0–1) vs 0.84 (0.21–1.71) | p <0.001 |
| | Prosthetic treatment during last year (no vs yes) | 0.43 (0.07–1.16) vs 1 (0.3–2) | p = 0.005 |
| | Sex (males vs females) | 0.29 (0–0.93) vs 0.64 (0.14–1.36) | p = 0.002 |
| | DMFT index | r = 0.228 | p <0.001 |
| | Number of missing teeth | r = 0.158 | p = 0.013 |
| | Age | r = 0.203 | p = 0.001 |

**Table 3.** Subscale 3 of mOHIP-14-pl.

| Subscale | Variables | Values | p-value |
|---|---|---|---|
| Subscale 3 | Prosthetic treatment during last year (no vs yes) | 0.43 (0–1.18) vs 1.5 (0.7–2) | p <0.001 |
| | Type of denture used (removable-A vs fixed-B vs removable and fixed-C) | 1.14 (0.51–1.85) vs 0.14 (0–0.82) vs 0.64 (0.2–1.39), A,C >B | p <0.001 |
| | Sex (males vs females) | 0.21 (0–1) vs 0.79 (0.15–1.71) | p = 0.011 |
| | DMFT index | r = 0.315 | p <0.001 |
| | number of missing teeth | r = 0.365 | p <0.001 |
| | number of filled teeth | r = –0.262 | p = 0.002 |

## Discussion

The most common oral disorders are: tooth decay, periodontal diseases and teeth loss [30]. All of them impair the OHRQoL and are a serious individual and public health burden [31–38].

The condition of the teeth significantly worsened the OHRQoL in patients with diagnosed periodontal diseases, of which the most often occurring one is chronic periodontitis. This relationship may be related to clinical symptoms of this inflammatory disease, proceeding with the alveolar bone loss which supports the teeth. It occurs mostly due to a heightened host immune inflammatory response and one of the adverse factors for its prevalence and progression is smoking [20, 39–43]. First-time visiting patients with untreated periodontitis may suffer from gingiva bleeding, halitosis, teeth mobility, leading to teeth drifting, worsening of white and red smile aesthetics, inability to eat (functional limitation, physical disability), fear to smile and express other emo-

tions (social and psychological disability), eventually worsening OHRQoL [20, 38, 44–46]. Causative periodontal treatment comprises nonsurgical treatment (supra- and subgingival scaling and root planing) [41] and improves OHRQoL in immediate [21] and long-term, through pain, psychological discomfort and physical disability reduction [20, 47]. However, the inevitable effect of the periodontal healing is tissue shrinkage, what may cause recessions of periodontium, impairment of aesthetics and temporary teeth hypersensitivity, leading to OHRQoL worsening [48, 49]. Putting emphasize on proper dentist-patient communication and informing patient about possible negative aesthetic effects of treatment may in some way avoid a decrease of OHRQoL.

The dental condition significantly affected OHRQoL also in first-time visiting patients, who accounted for 40% of the respondents in this study. OHIP questionnaire involves seven dimensions: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap [28]. Relating to teeth, these limitations may refer to: 1) caries and its complications, including cavities, pain (spontaneous or caused by stimulus, e.g. eating), teeth fracture, food impaction, halitosis, or 2) aesthetic concerns, including teeth discoloration, developmental opacities, teeth crowding, teeth displacement. Active caries, tooth pain and implications of untreated caries significantly worsen OHRQoL [50–52]. Coles *et al.* [53] show correlation between decayed and missing teeth and depression in Scottish homeless elderly. A proper treatment of caries and its complications improves OHRQoL in adults and children [54–56]. It is recommended to regularly visit the dentist as follow-up visits, avoiding the occurrence of pain in children and adults. According to Kheir *et al.* [57], the longer the time laps between dental visits, the bigger the dental anxiety. Hasmun *et al.* [58] confirm the improvement in OHRQoL after minimal invasive aesthetic treatment of incisal opacities in children. According to Kovacevic Pavic *et al.* [59], in young adults with healthy front teeth, without restorations, and with healthy gingiva, there is no correlation between OHRQoL and objective, measurable parameters of teeth color.

The condition of the teeth significantly adversely affected OHRQoL in patients without oral mucosal diseases. It may be related to the severity of the symptoms of oral mucosal diseases, which probably are much more serious for patients than dental problems. The range of experienced symptoms of oral mucosal problems may be very wide, including tingling, burning, itching in the mouth, taste disorders, halitosis, leading to problems while eating, speaking or swallowing [60]. Some of them, e.g. hyposalivation, may result in reduced tolerance to denture wearing (worse retention of removable dentures, pain, susceptibility to mechanical injuries) [60, 61]. Other problems, such as oral potentially malignant disorders, may cause fear in patients because of risk of potential malignant transformation [62]. Many studies confirm that oral mucosal diseases decrease OHRQoL [61–64]. The longer the duration of the symptoms [65, 66] and the more increased stage of the disease [62, 67], the worse OHRQoL. On the other hand, there

are studies which don't confirm correlation between severity of the disease and OHRQoL, e.g. in oral lichen planus (OLP) [64]. The incidence of general diseases and taken medications grow with age and intensify the symptoms of oral mucosal diseases, e.g. xerostomia, OLP [61]. Oral mucosal diseases are more likely to occur with age [68]. These aspects may account for correlation between age and subscale 2 of mOHIP-14-pl in this study.

Studies confirm that smoking has an adverse effect on OHRQoL [46, 69, 70] and its cessation improves OHRQoL [71]. The natural consequence of smoking is discoloration of the teeth [72] what may explain the statistical correlation between smoking and subscale 1 of mOHIP-14-pl in this study. According to Goulart *et al.* [73], smokers are more concerned with the color of their teeth than non-smokers.

Prosthetic treatment (including every reason of prosthetic dental visit) undergone in the preceding year significantly worsened OHRQoL within subscales 2 and 3. Patients could seek prosthetic treatment because of mucosa lesions, e.g. ulcers, or denture stomatitis caused by an old removable prosthesis or experienced painful mucosa lesions in the process of adaptation to the new one. Out of the patients using dental prostheses, in this study, majority of them were removable prostheses users (49.62%) or used removable and fixed prostheses (15.79%). Possible oral mucosa lesions and larger extension of removable prostheses (e.g. covering of the palate) may explain the better OHRQoL among subscale 3 in group of patients with fixed dental prostheses than in patients using removable or removable and fixed prostheses. Other authors confirm that prosthetic rehabilitation in edentulous and partially dentate patients improves OHRQoL [74, 75]. According to Gotfredsen *et al.* [76] and Winter *et al.* [75], in partially edentulous patients the improvement of OHRQoL was greater after treatment with the use of fixed dental prostheses than with removable dental prostheses in short term. The German researchers showed correlation between the usage of removable prostheses and impaired OHRQoL [77]. In 6 years after prosthetic treatment Kurosaki *et al.* [78] observed statistically significant improvement of OHRQoL only in patients treated with implant-supported fixed dentures. The more preserved (healthy or restored) teeth, the less extension of removable prosthesis and possibility to fill the missing teeth with fixed prostheses. That may be a reason of statistically significant negative correlation between DMFT index and number of missing teeth and OHRQoL within subscales 2 and 3 and significant positive correlation between number of filled teeth and OHRQoL within subscale 3. Other authors confirm that the less missing teeth, the better OHRQoL after prosthetic rehabilitation [79].

In this study OHRQoL in relation to oral mucosa was worse in women than in men. Some of the oral mucosal diseases, e.g. OLP, burning mouth syndrome, candidiasis, occur more often in women than men [65, 80, 81]. According to Fädler *et al.* [82], bullous/erosive mucosal diseases and OLP have the highest impact on OHRQoL and OHIP-14 score and observed gender differences may be caused by the nature of the oral mucosal diseases.

## Conclusions

Prevention of oral diseases, regular dental visits and examination remain the best strategy in dentistry with the benefit for patients. It may help to detect the disorders at initial stage, avoiding complications (such as pain), complex treatment and worsening of OHRQoL. Apart from clinical indicators, the dental treatment planning and its conducting should include patient's expectations and his well-being to become optimal.

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The study was not funded.

## Conflict of interest

None declared.

## Contribution statement

K.W. and M.Ch.-G. researched concept and designed the study. K.W. and D.H. collected data. K.W. analyzed data and wrote the article. All of the authors critically revised and finally approved the article.

## Abbreviations

| | |
|---|---|
| API | — Approximal Plaque Index |
| DMFT index | — a sum of Decayed, Missing and Filled Teeth |
| HRQoL | — Health Related Quality of Life |
| mOHIP-14-pl | — modified Oral Health Impact Profile form in Polish language version |
| mSBI | — modified Sulcus Bleeding Index |
| OHIP | — Oral Heath Impact Profile |
| OHRQoL | — Oral Health Related Quality of Life |
| OLP | — oral lichen planus |
| QoL | — quality of life |
| UDC | — University Dental Clinic |
| WHO | — World Health Organization |

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