

## Can dental treatments improve oral health-related quality of life? A systematic review

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### Review Article

#### Abstract

**BACKGROUND AND AIM:** Oral health-related quality of life (OHRQoL) is a practically new but rapidly growing approach. The concept of OHRQoL can become a tool to explain and shape the state of clinical practice. This study was aimed to do a systematic review about the impacts of different dental treatments on OHRQoL.

**METHODS:** We searched the databases of PubMed, Google Scholar, Science Direct, Scopus, Cochrane, and Thomson Reuters Web of Science up to January 2018 with the Medical Subject Headings (MeSH) keywords: “Intervention”, “Management”, “Improvement”, “Impact”, “Change” in combination with “Dentistry” AND “Oral health-related quality of life”. The reviewers screened the identified publications in three steps according to title, abstract, and full text; thereafter, they extracted all the related data in screened articles and finally classified it according to the field of dental treatment. Extracted data were saved in Excel software.

**RESULTS:** Finally, 22 articles were enrolled in the review and based on the type of dental treatment were categorized into three groups: implant and prosthesis, oral surgery, and periodontics and aesthetic; overall, in 72.7% of the studies, improvement of OHRQoL was considered.

**CONCLUSION:** The majority of used dental treatments have shown improvement of OHRQoL in studied patients.

**KEYWORDS:** Oral Health; Quality of Life; Dental Care; Systematic Review; Clinical Trial

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Oral health-related quality of life (OHRQoL) is a relatively new phenomenon and has rapidly grown over the last two decades.<sup>1</sup> Most studies on OHRQoL have based their theoretical foundations on the concept of oral health proposed by Locker.<sup>2</sup> According to Locker, the common clinical and epidemiological methods for the study of oral diseases cannot be indicative of individuals' experiences of illness and suffering. His framework examines the personal experiences of health and disease consistent with the World Health Organization (WHO) classification of impairment, disability, and

handicap.<sup>3,4</sup> Therefore, researchers began to develop alternative methods that assess the physical, mental, and social effects of oral conditions for the individual. These alternative criteria are in the form of standardized questionnaires.<sup>5,6</sup> OHRQoL is “a multidimensional standard questionnaire that reflects the comfort of people at eating, sleeping, and engaging in social interaction, self-esteem, and their satisfaction with their oral health”.<sup>6,7</sup>

In recent years, studies have evaluated the effectiveness of treatment aimed at improving care. In interventional studies, OHRQoL is used to measure changes in

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grades from the beginning to the post-treatment period. In these studies, researchers are looking at whether interventions have improved OHRQoL or not. Therefore, subjective evaluations, such as OHRQoL, are important to determine the effect of interventions and if it does, whether it changes over time or not.<sup>8-10</sup> In terms of evidence-based care, it is very important to better understand the effectiveness of treatment from the perspective of patients. Therefore, OHRQoL is used in studies to assess the effect of treatment on QoL and using this questionnaire as a measure to evaluate the outcome is in line with patient-centered care.<sup>8-10</sup>

A preliminary search shows that the volume of published documents related to the relationship between OHRQoL and dental treatments is significant and requires summarizing and synthesizing new data. The aim of the present study was to investigate the effects of dental therapeutic interventions on patients' OHRQoL.

### Methods

This systematic review study was approved by the Ethics Committee of Kerman University of Medical Sciences, Kerman, Iran (ethical code: IR.KMU. REC. 1395.464).

In the present investigation, we systematically reviewed all the published studies in English up to January 2018. The review question was defined by the PICO components: population (patients attending dental clinics), intervention (different dental treatments mentioned), comparison (other ordinary dental treatment modalities), and outcome (improvements in OHRQoL). The international electronic databases including PubMed, Google Scholar, Science Direct, Scopus, Cochrane, and ISI Web of Science were searched. Our search included Medical Subject Headings (MeSH), the keywords of "Intervention", "Dentistry", "Management", "Improvement", "Impact", "Change" (using OR term) in combination (using AND term) with "Oral health-related quality of life". Keywords also included different fields of

dental treatment as follows: "oral medicine", "oral surgery", "pediatric dentistry", "operative dentistry", "esthetic dentistry", "endodontics", "periodontics", "prosthodontics", and "implant dentistry". In the next step, to identify other related articles, we considered summaries of all the presentations at international congresses in the field of oral health. In addition, we used the references cited in the related papers in order to avoid missing any pertinent data or studies. All the obtained articles were imported into EndNote software. The software eliminated duplicate studies.<sup>11</sup>

The title and abstract of each article resulting from the literature search were independently reviewed by two investigators, and when the article was considered relevant, the full paper was ordered. Disagreement about eligibility was settled by a discussion between the two reviewers. The investigators screened the relevant publications in three steps based on the titles, abstracts, and body texts. Inclusion and exclusion criteria for the eligible studies were as follows: 1. pre- and post-operative assessment of OHRQoL, 2. randomized clinical trial (RCT) design, 3. using Oral Health Impact Profile-14 (OHIP-14) as a measurement questionnaire for OHRQoL, and 4. definition of exact follow-up period. Therefore, non-randomized prospective studies, cross-sectional, and retrospective studies or studies without any comparison with a control group were excluded.<sup>8,11</sup> In this study, adults (aged 18-60 years) were considered. Therefore, studies on the upper and lower extremities of this range were not included.

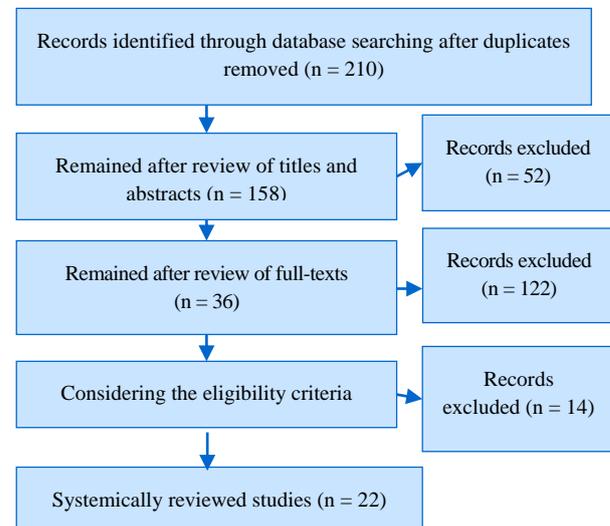
In the next step, in order to strengthen the reporting of RCTs, we used Consolidated Standards of Reporting Trials (CONSORT) checklist (2015) for critical appraisal.<sup>12</sup> Irrelevant articles based on title, abstract, and body text were excluded. At the end of these steps, for the remnant studies, data regarding the author(s), publication year, type of intervention, sample size, follow-up period, and the main result (significant or non-significant difference in OHRQoL

between before and after treatment or between two interventions) were extracted and saved separately for each article in a file in the Excel software.<sup>11</sup>

## Results

In the present study, 210 papers were collected after removing duplicate records. Figure 1 shows the process of selecting articles. Finally, 22 articles were included in the systematic review. The full texts of these 22 articles were evaluated, and the key data of each study were recorded. In tables 1 to 3, a description of all the extracted data is presented, which distinguishes these tables based on the treatment of three categories: implant and prosthesis (9 papers), oral surgery (6 papers), and periodontics and aesthetic (7 papers). The chief results of the studies showed that treatment in 16 articles (72.7%) improved OHRQoL. In other studies, either this

improvement was not observed or there was no significant difference in the effectiveness of OHRQoL between the two therapeutic interventions (Tables 1, 2, and 3).<sup>13-18</sup>



**Figure 1.** Flow diagram of studies considered for inclusion

**Table 1.** The characteristic of studies in the field of implant and prosthesis treatments

References	Type of dental intervention	Sample size	Follow-up period	Main finding	P
Nicolaisen et al. <sup>13</sup>	Metal ceramic vs. all ceramic posterior three unit fixed dental prosthesis	34 patients, 20 controls	2 weeks, 3 months, 1, 2, 3 years	Significant difference in OHIP-14 before and after intervention No important difference in OHIP-14 between two interventions	< 0.0500 > 0.0500
Awad et al. <sup>19</sup>	Mandibular implant overdentures vs. conventional dentures	60 patients	2 months	Mandibular implant overdentures provided better OHRQoL than conventional dentures	0.0010
Karbach et al. <sup>20</sup>	Mandibular overdentures retained with two or four locators	30 patients	6 months	Implant-retained overdenture had better OHRQoL than conventional dentures, four implants having a significant advantage over two implants	< 0.0500
McKenna et al. <sup>21</sup>	Functionally-oriented treatment according to SDA and conventional treatment using RPD	89 patients	1, 6, and 12 months	SDA concept achieved better result than RPDs based	< 0.0500
Bilhan et al. <sup>22</sup>	Self-aligning and ball attachment system for two implant-retained mandibular overdentures	25 patients	3 months	Self-aligning attachment system for 2 implant-retained mandibular overdentures was equal or superior to traditional ones	< 0.0500
Heydecke et al. <sup>23</sup>	Conventional and implant-supported prosthesis (overdentures)	100 patients	2 months	Mandibular overdentures provided greater improvement than new conventional mandibular dentures	< 0.0500
Awad et al. <sup>24</sup>	Mandibular implant-supported overdentures vs. conventional dentures	102 patients	2 months	Implant treatment provided significant short-term improvement over conventional treatment	0.0002
Allen et al. <sup>25</sup>	Implant-retained mandibular overdentures vs. conventional complete dentures	118 patients	3 months	Significantly greater for patients receiving implants than for those who refused them	< 0.0010
Fueki et al. <sup>26</sup>	NMCDs vs. conventional (MCDs)	24 patients	3 months	NMCDs allowed for better OHRQoL compared with MCDs	< 0.0500

OHIP-14: Oral health impact profile-14; SDA: Shortened dental arch; RPD: Removable partial denture; NMCD: Non-metal clasp denture; MCD: Metal clasp-retained denture; OHRQoL: Oral health-related quality of life

**Table 2.** The characteristic of studies in the field of oral surgery treatments

References	Type of dental intervention	Sample size	Follow-up period	Main finding	P
Brandao et al. <sup>27</sup>	Microvascular free fibula flap with intraoral and extraoral acrylic resin-based surgical guides for dental prosthetic rehabilitation	40 patients	One year	Surgical guide revealed a significant improvement in OHRQoL	0.020
Batinjan et al. <sup>28</sup>	LLLT after surgical removal of impacted lower third molars	40 patients	3 and 7 days	OHRQoL was better through the 7-day post-operative period in comparison to the placebo group	0.010
Ibikunle et al. <sup>29</sup>	Third molar surgery with either oral administration or submucosal injection of prednisolone	186 patients	Post-operative days 1, 3, 7	Administration of prednisolone was significantly associated with less deterioration in OHRQoL when compared with subjects who did not receive prednisolone	0.001
Ibikunle and Adeyemo <sup>30</sup>	Effect of ice pack therapy on OHRQoL following third molar surgery	128 patients	Everyone and half hours on post-operative 24 hours	OHRQoL after third molar surgery was significantly better in subjects who had cryotherapy	< 0.050
Andabak et al. <sup>17</sup>	LLLT after third molar removal	60 patients	2 and 7 days after surgery	No significant effect detected	> 0.050
Cassetta et al. <sup>16</sup>	PS vs. conventional RT for corticotomy-assisted orthodontic treatment	12 patients	3 and 7 days after surgery	Expected decrease in OHRQoL by using both PS or RT	0.350
				No significant difference in OHRQoL between PS and RT	

LLLT: Low-level laser therapy; PS: Piezoelectric surgery; RT: Rotatory osteotomy technique; OHRQoL: Oral health-related quality of life

The sample sizes of studies varied from 12 to 344. The duration of follow-up of patients varied from 24 hours to 3 years.

## Discussion

The current systematic review was based on 22 articles<sup>13-34</sup> and showed that most of the therapeutic interventions were performed to measure the effects of prosthesis implants and oral surgery on OHRQoL. Studies that have shown significant statistical results in relation to the impact of dental treatments on OHRQoL in patients have mostly been related to the two fields. In these studies, significant statistical differences are obtained either between OHRQoL in the intervention group with the control group or between OHRQoL in a number of patients before and after specific treatment. Sischo and Broder argue that these significant differences cannot always be in line with clinical significance and that OHRQoL

should be considered as patient-based, while clinical significance is mixed with disease-based criteria.<sup>8</sup> Therefore, the use of the results of such studies might be more likely to be found in population-based health policy.

One of the main causes of significant discrepancy in the investigated studies was sample size. The Cassetta et al.'s study, which had the smallest sample size among the reviewed studies and was conducted in the field of oral surgery, did not provide statistically significant outcomes.<sup>16</sup> The largest sample size among the articles in this review was for Broccoletti et al. study, which examined the interventions in laser therapy and cold knife excision for the treatment of non-dysplastic oral lesions.<sup>32</sup> It seems that although the treatment process is complicated and selection of eligible patients is more difficult, the feasibility of the study is limited in the form of a clinical trial.

**Table 3.** The characteristic of studies in the field of periodontics and aesthetic treatments

References	Type of dental intervention	Sample size	Follow-up period	Main finding	P
Bardellini et al. <sup>15</sup>	Fluoride toothpaste (Bioextra) vs. fluoride toothpaste without menthol on OHRQoL of children with oral mucositis receiving chemotherapy for ALL	64 patients	Days 1 and 8	Bioextra toothpaste did not affect OHRQoL of children undergoing chemotherapy	0.3300
Stone et al. <sup>31</sup>	Structural plaque control for patients with gingival manifestations of OLP	82 patients	20 weeks	Structural plaque control intervention was effective in improving OHRQoL	< 0.0500
Broccoletti et al. <sup>32</sup>	Er:YAG laser vs. cold knife excision in treatment of non-dysplastic oral lesions	344 patients	First week after surgery	Er:YAG was significantly better in the immediate post-operative surgical period	< 0.0500
Hegarty et al. <sup>33</sup>	Topical FP spray and BSP mouthrinse upon the signs and symptoms of OLP	48 patients	6 weeks	FP was more acceptable to patients than BSP, but there was not any significant difference between two drugs in OHIP and OHRQoL	> 0.0500
Ozcelik et al. <sup>34</sup>	Immediate post-operative effects of different periodontal treatment modalities [surgical vs. non-surgical (SG vs. NS)] plus EMD	60 patients	1 week	Both drugs significantly were effective in improving OHIP	< 0.0500
Andabak et al. <sup>17</sup>	NAVS naphthalan with topical betamethasone in the treatment of OLP and RAS	18 patients	28 days	On the immediate post-operative period, EMD and NS were significantly better when compared to SG group	0.0010
Bruhn et al. <sup>14</sup>	Vital tooth whitening in older adults	53 patients plus control group (without intervention)	3 weeks, 3 months	NAVS statistically was effective in improving OHIP-14	0.0002
				No significant difference in OHIP-14 between two drugs	0.3200
				Vital tooth whitening did not improve overall OHRQoL in older adults	> 0.0500

OLP: Oral lichen planus; ALL: Acute lymphoblastic leukaemia; FP: Fluticasone propionate; BSP: Betamethasone sodium phosphate; EMD: Enamel matrix derivative; NAVS: Non-aromatic very rich in steranes; RAS: Recurrent aphthous stomatitis; OHRQoL: Oral health-related quality of life; OHIP-14: Oral health impact profile-14

Similar to the sample size, the length of the follow-up period for patients was considered as the key indicator of the studies. Ibikunle and Adeyemo examined ice pack therapy in the first 24 hours after the molar surgical treatment,<sup>30</sup> while the follow-up period of the patients in the Nicolaisen et al. study, which related to fixed metal and ceramic prosthetic prostheses, was 3 years.<sup>13</sup> It seems that the nature of the treatments will

have a more important effect on the follow-up of the patients (as compared to the sample size). However, If the influential factors related to third molar surgery (such as edema and trismus) occur acutely on OHRQoL, but factors associated with the effects of therapies such as prosthesis (for example beauty) need a lot of time.

The final selected papers were RCTs that used OHIP-14 for measuring OHRQoL. In

these studies, OHRQoL was measured before and after dental treatments in adult patients. RCTs in terms of their approach have the highest credibility among studies,<sup>35</sup> and the most commonly-used instrument for measuring OHRQoL in world-level studies is OHIP-14.<sup>1-9</sup> A study by Oliveira et al. on the effect of low-level laser imaging on post-surgical inflammatory process after third molar surgery was presented as a double-blind clinical trial.<sup>18</sup> However, the definition of a double-blind clinical trial is a significant method; in this context, carrying out a double-blind clinical trial to measure health interventions such as dental treatment is often difficult and sometimes impossible.

The results of the researches that considered OHRQoL as an outcome measure were as follows:

1. Helping clinicians better understand the risks and benefits associated with their therapeutic options.<sup>8</sup> The results of the review revealed that, according to Bruhn et al., vital tooth whitening has been effective in improving OHRQoL in adults.<sup>14</sup> Today, this treatment is being carried out by dentists for patients who are looking for esthetic appearance and it seems that incentives for material gain are also involved.

2. Providing evidence to show how much the cost of treatment protocols is worth.<sup>8</sup> Nicolaisen et al. showed no significant difference between the effect of fixed metal ceramic and all-ceramic prostheses on OHRQoL,<sup>13</sup> while the cost difference between these two treatments is significant.

3. Analyses provide data that help patients

and their families in treatment decision-making.<sup>8</sup> Karbach et al. reported that the implant-retained overdenture as well as the number of implants (4 vs. 2) improved OHRQoL significantly compared to conventional denture.<sup>20</sup> However, the diversity of therapeutic options is sometimes confusing for the patient and his family, and this decision will be handed over to the clinician, and might be troublesome in the future.

4. No studies are available on some specialized dental treatments such as root canal treatment; therefore, it is recommended that the relevant researchers take action in the future. Similar studies can also be carried out to assess the effect of dental treatment on OHRQoL in children and the elderly. Studies should consider other tools such as OHIP-49 and OHIP-EDENT (Edentulous) to measure OHRQoL changes.

### Conclusion

The results of this study showed that the majority of RCTs undertaken to improve the level of OHRQoL have shown improvements in the effectiveness of treatments (prosthesis, implants, oral surgery, periodontal, and oral diseases) in adults. This shows the positive effects of these dental treatments on patients.

### Conflict of Interests

Authors have no conflict of interest.

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