



Christine Zürcher¹, Kristian Vukoje², Vera Wiesmüller¹, Ines Kapferer-Seebacher¹

The Effect of Oil Pulling on Oral Health-Related Quality of Life: A Pilot Study

Učinak ispiranja usne šupljine uljem na kvalitetu života povezanu s oralnim zdravljem: pilot-studija

¹ University Hospital for Conservative Dentistry and Periodontology, Medical University of Innsbruck, Innsbruck, Austria
Medicinsko sveučilište, Sveučilišna bolnica za konzervativnu dentalnu medicinu i parodontologiju u Innsbrucku, Austrija
² University Hospital for Dental Prosthetics, Medical University of Innsbruck, Innsbruck, Austria
Medicinsko sveučilište, Sveučilišna bolnica za dentalnu protetiku u Innsbrucku

Abstract

Objectives: The objective of this randomized-controlled, examiner-blinded parallel-group study was to evaluate the impact of daily oil pulling compared to distilled water on oral health-related quality of life (OHRQoL). **Material and Methods:** Eighty participants from the University Hospital for Conservative Dentistry and Periodontology diagnosed with gingivitis were randomly assigned to either the test group (oil) or the control group (distilled water). Within the test group, participants received either pure sesame oil or sesame-based tooth oil. They were instructed to perform daily oil pulling in the morning for 15 minutes over a period of eight weeks using their assigned fluid, in addition to their daily oral hygiene routine. Oral Health Impact Profile (OHIP-14) scores were recorded at baseline, and after four and eight weeks. **Results:** The test group (oil) demonstrated a statistically significant reduction in total OHIP-14 scores from baseline to week four ($p < 0.001$) and week eight ($p = 0.002$). Similarly, the control group (distilled water) showed a statistically significant decrease in total OHIP-14 scores from baseline to week four ($p = 0.005$) and week eight ($p = 0.003$). No statistically significant differences were observed in total OHIP-14 scores between test and control groups at baseline ($p = 0.178$), week four ($p = 0.384$) and week eight ($p = 0.250$). **Conclusion:** Daily oil pulling can have a positive impact on OHRQoL, regardless of whether oil or distilled water is used. **Clinical relevance:** Oil pulling may be considered a supportive measure alongside mechanical oral hygiene to improve oral health-related quality of life.

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Address for correspondence

Ines Kapferer-Seebacher
University Hospital for Conservative
Dentistry and Periodontology
Medical University of Innsbruck
6020 Innsbruck, Austria
Phone: +43 512 504 27242
ines.kapferer@i-med.ac.at

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Christine Zürcher 0009-0006-0843-7970
Vera Wiesmüller 0009-0008-4222-3938

Ines Kapferer-Seebacher 0000-0001-6169-6812

Introduction

Oil pulling, an ancient Ayurvedic practice, has seen a resurgence in popularity on social media platforms, particularly TikTok. The hashtag #oilpulling has garnered over 163 million views, with numerous influencers touting benefits such as whiter teeth, improved gum health, fresher breath, and even full-body detoxification. Oil pulling involves swishing a tablespoon of oil in the mouth, pulling it between the teeth for about 15 minutes. Afterward, the oil is spat out, the mouth is thoroughly rinsed with warm saline or tap water, and the teeth are brushed as usual (1, 2).

Sesame oil is among the most traditionally used oils due to its antioxidant content (e.g. sesamin, sesamol) and may be supplemented with essential oils such as turmeric, myrrh and peppermint oil to provide additional anti-inflammatory, antiseptic, and analgesic properties. Mechanical tooth cleaning remains the foundation of oral hygiene and is critical for

Uvod

Ispiranje usta uljem (*oil pulling*) – drevna ajurvedska praksa – ponovno je stekla popularnost zahvaljujući društvenim mrežama, osobito platformi TikTok. Oznaka #oilpulling prikupila je više od 163 milijuna pregleda, pri čemu mnogobrojni influenceri ističu koristi poput bjeljih zuba, poboljšano zdravlje gingive, svježijeg daha, pa čak i detoksikacije cijelog tijela. Za mučkanje uljem potrebno je uzeti jednu žlicu ulja u usta, pri čemu se ulje provlači između zuba približno 15 minuta. Nakon toga se ispljune, usta se temeljito isperu toplom slanom vodom ili vodom iz slavine i zubi se operu na uobičajeni način (1, 2).

Sezamovo ulje ubraja se među najtradicionalnije korištene ulja zbog sadržaja antioksidansa (npr., sesamin, sesamol), a može se obogatiti eteričnim uljima poput kurkumina, smirnova i ulja paprene metvice kako bi se osigurala dodatna protuupalna, antiseptička i analgetska svojstva. Mehani-

the prevention of biofilm-associated diseases such as caries, gingivitis, and periodontitis. Nevertheless, recent systematic reviews and meta-analyses have reported statistically significant reductions in both microbiological (3, 4) and clinical parameters, such as plaque index (4) and gingival index scores (5), following oil pulling — in some cases demonstrating effects comparable to those of chlorhexidine.

Measuring oral health-related quality of life (OHRQoL) provides insight into the patient's perspective on dental treatments (6, 7, 8). In areas such as oil pulling, where the clinical evidence of benefit remains inconclusive, OHRQoL assessments can offer valuable guidance for patient-centered recommendations. OHRQoL is a multidimensional construct that reflects the extent to which oral health impacts an individual's daily life and general well-being. It encompasses physical abilities such as eating and speaking, as well as psychosocial aspects like appearance, self-esteem, and social interaction (9). A decade ago, a group of researchers demonstrated that the OHIP questionnaire comprises four dimensions: Oral Function, Orofacial Pain, Orofacial Appearance, and Psychosocial Impact (10, 11, 12). As a subjective measure, OHRQoL complements clinical indicators by capturing the patient's personal experience and perceptions of their oral health status (13). Several questionnaires have been created to assess OHRQoL, including the Oral Health Impact Profile (OHIP) (1). OHIP-14 is a shortened version of the original OHIP-49 based on Locker's (1988) OHRQoL model (9), and captures the social, psychological, and functional consequences of oral health problems using 14 items in seven conceptual dimensions to evaluate oral function, pain, psychological dis-/comfort, and social functioning (14). However, the four dimensional model has been accepted in contemporary research (10, 11, 12, 15).

To date, no studies have assessed the impact of mouth rinses on OHRQoL in individuals with gingivitis. Therefore, the aim of the study was to evaluate the effect of oil pulling on the OHRQoL using the 14-item OHIP questionnaire (OHIP-14). The null hypothesis stated that there would be no significant difference in OHIP-14 scores between individuals with gingivitis performing oil pulling (test group) and those using distilled water (control group) over an eight-week period. Furthermore, an exploratory analysis assessed whether outcomes on OHIP-14 scores differ between pure sesame oil and sesame-based tooth oil within the test group.

Methodology

The Ethics Committee of the Medical University of Innsbruck, Austria, approved the study (ID EK 1117/2022). The study was conducted in accordance with the 1964 Helsinki Declaration and its later amendments. All subjects signed an informed written consent prior to the study enrollment.

Study subjects

Eighty volunteers were recruited at the Department of Dental and Oral Medicine and Cranio-maxillofacial and Oral Surgery of the Medical University of Innsbruck (Aus-

ko čišćenje zuba ostaje temelj oralne higijene i ključno je za prevenciju bolesti povezanih s biofilmom, kao što su karijes, gingivitis i parodontitis. Ipak, u novijim sustavnim pregledima i metaanalizama ističu se statistički značajna smanjenja mikrobioloških (3, 4) i kliničkih parametara, poput indeksa plaka (4) i indeksa gingive (5) nakon ispiranja uljem, pri čemu su u nekim slučajevima zabilježeni učinci usporedivi s onima klorheksidina.

Mjerenje kvalitete života povezane s oralnim zdravljem (OHRQoL) omogućuje uvid u perspektivu pacijenta o dentalnim terapijama (6, 7, 8). U područjima kao što je ispiranje uljem, gdje su klinički dokazi o koristi nedovoljno jasni, procjena OHRQoL-a može dati vrijedne smjernice za preporuke usmjerene na pacijenta. OHRQoL je višedimenzijski konstrukt koji pokazuje u kojoj mjeri oralno zdravlje utječe na svakodnevni život i opće blagostanje pojedinca. Obuhvaća tjelesne sposobnosti poput jedenja i govora te psihosocijalne aspekte kao što su izgled, samopouzdanje i socijalna interakcija (9). Prije deset godina skupina istraživača pokazala je da upitnik OHIP-a obuhvaća četiri dimenzije: oralnu funkciju, orofacijalnu bol, orofacijalni izgled i psihosocijalni utjecaj (10, 11, 12). Kao subjektivna mjera, OHRQoL nadopunjuje kliničke pokazatelje obuhvaćajući osobna iskustva i percepciju pacijenta o vlastitu oralnom zdravlju (13). Razvijeno je nekoliko upitnika za procjenu OHRQoL-a, uključujući Oral Health Impact Profile (OHIP) (1). OHIP-14 skraćena je verzija izvornoga OHIP-a 49 temeljenoga na Lockerovu (1988.) modelu OHRQoL-a (9), a obuhvaća socijalne, psihološke i funkcionalne posljedice oralno-zdravstvenih problema na temelju 14 čestica raspoređenih u sedam konceptualnih dimenzija za procjenu oralne funkcije, boli, psihološke nelagode i socijalnog funkcioniranja (14). No u suvremenim istraživanjima prihvaćen je četverodimenzijski model (10, 11, 12, 15).

Do danas ni u jednom istraživanju autori nisu procijenili utjecaj otopina za ispiranje usta na OHRQoL kod osoba s gingivitisom. Zato je cilj ovog istraživanja bio procijeniti učinak ispiranja uljem na OHRQoL koristeći se upitnikom OHIP-14. Null hipoteza glasila je da tijekom osam tjedana neće biti statistički značajne razlike u rezultatima OHIP-a 14 između osoba s gingivitisom koje ispiru usta uljem (ispitna skupina) i onih koje se koriste destiliranom vodom (kontrolna skupina). Nadalje, provedena je i eksploratorna analiza da bi se unutar ispitne skupine ispitalo razlikuju li se ishodi rezultata OHIP-a 14 nakon uporabe čistoga sezamova ulja i zubnog ulja na bazi sezama.

Metodologija

Etičko povjerenstvo Medicinskog sveučilišta u Innsbrucku (Austrija) odobrilo je istraživanje (ID EK 1117/2022) te je provedeno u skladu s Helsinškom deklaracijom iz 1964. godine i njezinim kasnijim izmjenama. Prije uključivanja u istraživanje svi ispitanici potpisali su informirani pristanak.

Ispitanici

Osamdeset dobrovoljaca izabrano je u Zavodu za dentalnu i oralnu medicinu te kranio-maksilofacijalnu i oralnu kirurgiju Medicinskog sveučilišta u Innsbrucku (Austrija).

tria). Inclusion criteria were: age ≥ 18 years, contractual capability, the presence of ≥ 10 teeth, and community periodontal index of treatment needs (CPITN) grade 1 or 2 (17). Exclusion criteria were: missing consent, CPITN grade 0, 3 or 4, pregnancy or breastfeeding, systemic diseases or conditions that are associated with an increased risk of infection or necessitate concomitant antibiotic therapy with dental treatment, mental and behavioral disorders that impede (verbal) communication, allergy against sesame (oil), intake of antibiotics 6 months prior to or during study duration, intake of medication potentially influencing gingival inflammation or bleeding (e.g. anticoagulants, cortisone), infectious diseases (e.g. HIV, hepatitis B or C), fixed orthodontic appliances, ongoing oil pulling or mouth rinsing, adult guardianship, and insufficient nasal breathing.

Oil pulling

At baseline, the participants were instructed to perform daily oil pulling in the morning, immediately after waking up, on an empty stomach, and before taking any medication, brushing their teeth, or having breakfast. They were asked to rinse with their assigned liquid for a period of eight weeks. A volume of 15 ml was measured using cups (Sensoplast Packmitteltechnik GmbH, Oberhonnefeld, Germany). The liquid was swished around the mouth and pulled through the interdental spaces without swallowing. After 15 minutes of swishing-moving the liquid throughout the mouth from left to right, front to back, and vice versa, while sucking and pulling it through the interdental spaces - it was spat into a waste oil container or onto a paper towel and discarded in the trash. Following this, participants rinsed their mouths gently with warm tap water to remove the taste of the oil and then proceeded with their regular oral hygiene routine (2, 3).

All individuals were clearly instructed not to change their oral hygiene behaviors during the study period. As a control, daily oral hygiene measures were documented at baseline and at follow-up.

Oral health-related quality of life

Oral health-related quality of life was assessed using the Oral Health Impact Profile-14 (OHIP-14) at baseline, and after 28 and 56 days of oil pulling, yielding scores ranging from 0 to 56 (13). The OHIP-14 evaluates the impact of oral health on quality of life across four dimensions: Oral Function, Orofacial Pain, Orofacial Appearance, and Psychosocial Impact. Each of the 14 items is rated on a 5-point Likert scale, ranging from 0 (never) to 4 (very often). A total score of zero reflects the best possible oral health-related quality of life, while a score of 56 indicates the poorest. The validated German version of the questionnaire was used (17).

Clinical investigation

The Rustogi Modified NavyPlaque Index (RMNPI) and the gingival bleeding index (GBI) were assessed, and further supragingival plaque samples were collected for microbiological analysis. All details regarding the clinical investigation are presented elsewhere (18, 19).

Kriteriji za uključivanje bili su dob ≥ 18 godina, poslovna sposobnost, ≥ 10 zuba u čeljusti te Community Periodontal Index of Treatment Needs (CPITN) stupanj 1 ili 2 (17). Kriteriji za isključivanje bili su nepristajanje na sudjelovanje, stupanj CPITN-a 0, 3 ili 4, trudnoća ili dojenje, sistemske bolesti ili stanja povezana s povećanim rizikom od infekcije ili ona koja zahtijevaju istodobnu antibiotsku terapiju uz dentalno liječenje, mentalni i bihevioralni poremećaji koji onemogućuju (verbalnu) komunikaciju, alergija na sezam (ulje), uzimanje antibiotika šest mjeseci prije istraživanja ili tijekom njegova trajanja, uzimanje lijekova koji mogu utjecati na upalu desni ili krvarenje (npr., antikoagulansi, kortizon), zarazne bolesti (npr., HIV, hepatitis B ili C), fiksne ortodontske naprave, već postojeće izvlačenje uljem ili ispiranje usta, skrbništvo nad odraslom osobom te nedovoljno dišanje na nos.

Ispiranje usta uljem

Na početku istraživanja ispitanici su dobili uputu da svakodnevno ujutro obavljaju ispiranje uljem, odmah nakon buđenja, natašte te prije uzimanja bilo kakvih lijekova, pranja zuba ili doručka. Zamoljeni su da osam tjedana ispiru usta dodijeljenom tekućinom. Volumen od 15 mL mjeren je s pomoću čašica (Sensoplast Packmitteltechnik GmbH, Oberhonnefeld, Njemačka). Tekućina se mučkala u ustima i provlačila kroz interdentalne prostore bez gutanja. Poslije 15 minuta mučkanja, odnosno pomicanja tekućine kroz usnu šupljinu slijeva nadesno, sprijeda prema natrag i obrnuto, uz usisavanje i provlačenje kroz interdentalne prostore, tekućina se ispljunula u spremnik za otpadno ulje ili na papirnati ubrus te odložila u otpad. Nakon toga ispitanici su nježno ispirali usta toplom vodom iz slavine kako bi uklonili okus ulja te nastavili sa svojom uobičajenom oralnom higijenom (2, 3).

Svim ispitanicima jasno je rečeno da ne mijenjaju svoje oralno-higijenske navike tijekom istraživanja. Kao kontrola, svakodnevne mjere oralne higijene bilježene su na početku istraživanja i tijekom kontrolnih pregleda.

Kvaliteta života povezana s oralnim zdravljem

Kvaliteta života povezana s oralnim zdravljem procijenjena je upitnikom Oral Health Impact Profile-14 (OHIP-14) na početku istraživanja te poslije 28 i 56 dana ispiranja uljem, pri čemu su dobiveni rezultati u rasponu od 0 do 56 (13). OHIP-om 14 procjenjuje se utjecaj oralnoga zdravlja na kvalitetu života na temelju četiriju dimenzija: oralne funkcije, orofacijalne boli, orofacijalnog izgleda i psihosocijalnog utjecaja. Svaka od 14 čestica ocjenjuje se na Likertovoj ljestvici od 5 stupnjeva, u rasponu od 0 (nikada) do 4 (vrlo često). Ukupni rezultat od nula označava najbolju moguću kvalitetu života povezanu s oralnim zdravljem, a rezultat 56 najlošiju. Korištena je validirana njemačka verzija upitnika (17).

Kliničko ispitivanje

Procijenjeni su Rustogijev modificirani Navy indeks plaka (RMNPI) i indeks gingivnoga krvarenja (GBI), a dodatno su prikupljeni i uzorci supragingivalnoga plaka za mikrobiološku analizu. Svi detalji o kliničkom ispitivanju opisani su u prethodnim radovima (18, 19).

Statistical methods

As this was a pilot study and preliminary data were unavailable, a pragmatic sample size of 40 participants per group was chosen, resulting in a total of 80 subjects. Data were analyzed for normality of distribution using the Shapiro–Wilk test. The Mann–Whitney U test was used to determine differences between the independent test and control groups. Between-group comparisons (test vs control) were performed at each time point for total OHIP-14 and dimension scores. Within-group changes were tested for baseline vs week 4 and baseline vs week 8. Comparisons of pre- and post-values within the same group were done using the Wilcoxon signed-rank test and Kruskal–Wallis test with Dunn’s multiple comparisons test. P-values < 0.05 were considered as the level of significance. All tests were two-tailed. Unless otherwise indicated, data are given as median (interquartile range) and range. Data analysis was performed using SPSS software for Windows, Version 29.0.0.0 (241) (SPSS Inc, Chicago).

Results

Study population

Eighty individuals (54 females and 26 males; 77 Caucasians, two Arabians, one Asian) with a mean age of 37 years (range 23 – 79 years) were randomly allocated either to a control group (22 females, 18 males) or a test group (32 females, eight males). There was a drop-out rate of 8.75 % (five individuals in the control and two in the test group) due to mucosal irritation (one person after four weeks), incompletion (two persons after four weeks), antibiotics intake (one individual within the first four weeks) or vacation (two individuals at week eight). Dropouts were documented; analyses were performed based on available OHIP-14 data at each time point.

Oil versus distilled water

The Shapiro–Wilk test did not show a normal distribution. At baseline, there were no statistically significant differences between the total OHIP-14 scores of the test (median 4; range 0 – 32) and the control group (2; 0 – 21) ($p = 0.178$). Both groups showed a statistically significant reduction of total OHIP-14 scores after four and eight weeks of intervention (see Figure 1). In the test group, the total OHIP-14 score declined to median 1 (0 – 19) after four weeks and 1 (0 – 14) after eight weeks ($p < 0.001$, $z = -3.80$ and $p = 0.002$, $z = -3.06$ respectively). Also in the control group, the score significantly declined to 1 (0 – 12) after four weeks ($p = 0.005$, $z = -2.83$) and 0 (0 – 12) after eight weeks ($p = 0.003$, $z = -2.98$) of intervention. There were no statistically significant differences between the test and control group at any time for total OHIP-14 scores ($p = 0.384$ after four weeks, and $p = 0.250$ after eight weeks). Thus, the null hypothesis was not rejected.

The test group showed a statistically significant reduction in total OHIP-14 scores from baseline to week four ($p < 0.001$, $z = -3.80$) and week eight ($p = 0.002$, $z = -3.06$). The same was found for the control group with a statistically sig-

Statističke metode

Budući da se radilo o pilot-istraživanju i preliminarni podaci nisu bili dostupni, odabran je pragmatični uzorak od 40 ispitanika po skupini, što ukupno čini 80 ispitanika. Normalnost raspodjele podataka analizirana je Shapiro–Wilkovim testom. Mann–Whitneyjev U-test korišten je za utvrđivanje razlika između neovisnih ispitnih skupina i kontrolne skupine. Usporedbe između skupina (ispitna u odnosu prema kontrolnoj) provedene su u svakoj vremenskoj točki za ukupne rezultate OHIP-a 14 i rezultate po dimenzijama. Promjene unutar skupina analizirane su za početno stanje u odnosu prema 4. i 8. tjednu. Usporedbe vrijednosti prije i poslije intervencije unutar iste skupine provedene su Wilcoxonovim testom i Kruskal–Wallisovim testom, uz Dunnov test višestrukih usporedbi. Vrijednosti $p < 0,05$ smatrane su razinom statističke značajnosti. Svi testovi bili su dvostrani. Ako nije drukčije naznačeno, podatci su prikazani kao medijan (interkvartilni raspon) i raspon. Analiza podataka obavljena je u softveru SPSS za Windows, verzija 29.0.0.0 (SPSS Inc., Chicago).

Rezultati

Ispitivana populacija

Osamdeset ispitanika [54 žene i 26 muškaraca – od kojih 77 osoba europskoga podrijetla, dva Arapa, jedan Azijac prosječne dobi od 37 godina (raspon 23 – 79 godina)] nasumično je raspoređeno u kontrolnu skupinu (22 žene, 18 muškaraca) ili ispitnu skupinu (32 žene, 8 muškaraca). Stopa odustajanja iznosila je 8,75 % (5 ispitanika u kontrolnoj i 2 u ispitnoj skupini) zbog iritacije sluznice (jedna osoba poslije 4 tjedna), nepoštovanja protokola (2 osobe poslije 4 tjedna), uzimanja antibiotika (jedan ispitanik unutar prva 4 tjedna) ili godišnjeg odmora (dvije osobe u 8. tjednu). Odustajanja su dokumentirana – analize su obavljene na temelju dostupnih podataka iz OHIP-a 14 u svakoj vremenskoj točki.

Ulje u usporedbi s destiliranom vodom

Shapiro–Wilkov test nije pokazao normalnu raspodjelu. Na početku istraživanja nisu ustanovljene statistički značajne razlike između ukupnih rezultata OHIP-a 14 u ispitnoj skupini (medijan 4; raspon 0 – 32) i kontrolnoj (2; 0 – 21) ($p = 0,178$). U objema skupinama zabilježeno je statistički značajno smanjenje ukupnih rezultata OHIP-a 14 poslije četiri i osam tjedana intervencije (slika 1.). U ispitnoj skupini ukupni rezultat OHIP-a 14 smanjio se na medijan 1 (0 – 19) poslije četiri tjedna i na 1 (0 – 14) poslije osam tjedana ($p < 0,001$, $z = -3,80$ i $p = 0,002$, $z = -3,06$). U kontrolnoj skupini rezultat je također značajno smanjen na 1 (0 – 12) poslije četiri tjedna ($p = 0,005$, $z = -2,83$) i na 0 (0 – 12) poslije osam tjedana ($p = 0,003$, $z = -2,98$) intervencije. Nisu ustanovljene statistički značajne razlike između ispitne i kontrolne skupine ni u jednoj vremenskoj točki za ukupne rezultate OHIP-a 14 ($p = 0,384$ poslije četiri tjedna i $p = 0,250$ poslije osam tjedana). Zato nulta hipoteza nije odbačena.

Ispitna skupina pokazala je statistički značajno smanjenje ukupnih rezultata OHIP-a 14 od početne vrijednosti do četvrtoga tjedna ($p < 0,001$, $z = -3,80$) i osmoga tjedna ($p =$

Table 1 Demographic data. Eighty participants from the University Hospital for Conservative Dentistry and Periodontology diagnosed with gingivitis were randomly assigned to either the test group (oil pulling; pure sesame oil or sesame-based tooth oil) or the control group (distilled water). Distribution of age (years), sex, and ethnicity are given.

Tablica 1. Demografski podatci; osamdeset ispitanika iz Sveučilišne bolnice za konzervativnu dentalnu medicinu i parodontologiju s dijagnostificiranim gingivitisom nasumično je raspoređeno u ispitnu skupinu (izvlačenje uljem, čisto sezamovo ulje ili zubno ulje na bazi sezama) ili kontrolnu skupinu (destilirana voda); prikazana je raspodjela prema dobi (godine), spolu i etničkoj pripadnosti

	Test group n = 40	Control group n = 40	Total n = 80
Age, median (range)	35 (23-62)	30 (23-79)	33 (23 – 79)
Sex, n (%)			
Female	32	22	54 (67.5)
Male	8	18	26 (32.5)
Ethnicity, n (%)			
Caucasian	39	38	77 (96.25)
Arabian	1	1	2 (2.5)
Asian	0	1	1 (1.25)

Table 2 OHIP-14 dimension scores at baseline and after 4 and 8 weeks of pulling with oil (test group) or distilled water (control group). Significant reductions in OHIP scores within each group after four and eight weeks of intervention, compared to baseline, are marked with an asterisk. A statistically significant difference between the test and control group was detected in the dimension oral function after 4 weeks of intervention (marked bold).

Tablica 2. Rezultati OHIP-14 po dimenzijama na početku istraživanja te poslije 4 i 8 tjedana izvlačenja uljem (ispitna skupina) ili ispiranja destiliranom vodom (kontrolna skupina); statistički značajna smanjenja rezultata OHIP-a unutar svake skupine poslije četiri i osam tjedana intervencije, u odnosu prema početnim vrijednostima, označena su zvjezdicom; statistički značajna razlika između ispitne i kontrolne skupine utvrđena je u dimenziji oralne funkcije poslije 4 tjedna intervencije (označeno podebljano)

Dimensions	Oil pulling	Control group	p-value
Oral Function			
Baseline	0 (0 – 8)	0 (0 – 5)	0.169
Week 4	0 (0 – 3)*	0 (0 – 3)	0.041
Week 8	0 (0 – 4)	0 (0 – 3)	0.082
Orofacial Pain			
Baseline	0 (0 – 4)	1 (0 – 3)	0.932
Week 4	0 (0 – 5)*	0 (0 – 2)*	0.942
Week 8	0 (0 – 3)*	0 (0 – 3)*	0.879
Orofacial Appearance			
Baseline	0 (0 – 4)	0 (0 – 5)	0.839
Week 4	0 (0 – 4)	0 (0 – 4)*	0.983
Week 8	0 (0 – 4)	0 (0 – 3)*	0.511
Psychosocial Impact			
Baseline	1 (0 – 17)	0 (0 – 8)	0.243
Week 4	0 (0 – 10)*	0 (0 – 5)*	0.427
Week 8	0 (0 – 8)*	0 (0 – 5)*	0.316

nificant reduction of total OHIP-14 scores from baseline to week four ($p = 0.005$, $z = -2.83$) and week eight ($p = 0.003$, $z = -2.98$). There were no statistically significant differences regarding total OHIP-14 scores between the test and control group, neither baseline ($p = 0.178$), nor after four ($p = 0.384$) and eight weeks ($p = 0.250$) of oil pulling. Statistically significant differences are marked with an asterisk.

The overall findings are mirrored in the dimension-specific analysis, with several dimensions showing significant reductions (see Table 2). In the dimension oral function, scores in the test group after eight weeks were significantly higher with a median of 0 (0–3) compared to the control group with a median of 0 (0–3) ($p = 0.041$, $z = -2.05$), although both reached at a low level. No other differences between the groups were identified (see Table 2).

0,002, $z = -3,06$). Isto je ustanovljeno i za kontrolnu skupinu, uz statistički značajno smanjenje ukupnih rezultata OHIP-a 14 od početne vrijednosti do četvrtoga tjedna ($p = 0,005$, $z = -2,83$) i osmoga tjedna ($p = 0,003$, $z = -2,98$). Nisu utvrđene statistički značajne razlike u ukupnim rezultatima OHIP-a 14 između ispitne i kontrolne skupine, ni na početku istraživanja ($p = 0,178$), ni poslije četiri tjedna ($p = 0,384$), a ni poslije osam tjedana ($p = 0,250$) ispiranja uljem. Statistički značajne razlike označene su zvjezdicom.

Ukupni nalazi jednaki su i u analizi po dimenzijama, pri čemu je nekoliko dimenzija pokazalo značajna smanjenja (tablica 2.). U dimenziji oralne funkcije rezultati u ispitnoj skupini poslije osam tjedana bili su statistički značajno viši, s medijanom 0 (0 – 3), u usporedbi s kontrolnom skupinom koja je također imala medijan 0 (0 – 3) ($p = 0,041$, $z = -2,05$), iako su obje skupine dosegnule nisku razinu. Nisu utvrđene druge razlike između skupina (tablica 2.).

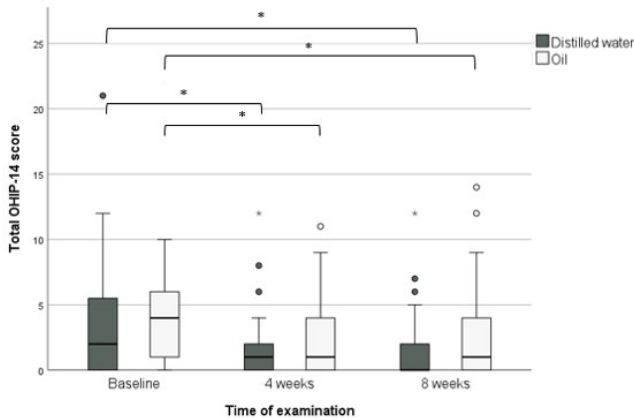


Figure 1 Total OHIP-14 scores at baseline and after 4 and 8 weeks of pulling with oil (test group – white) or distilled water (control group – grey).

Slika 1. Ukupni rezultati OHIP-a 14 na početku istraživanja te poslije 4 i 8 tjedana izvlačenja uljem (ispitna skupina – bijelo) ili ispiranja destiliranom vodom (kontrolna skupina – sivo)

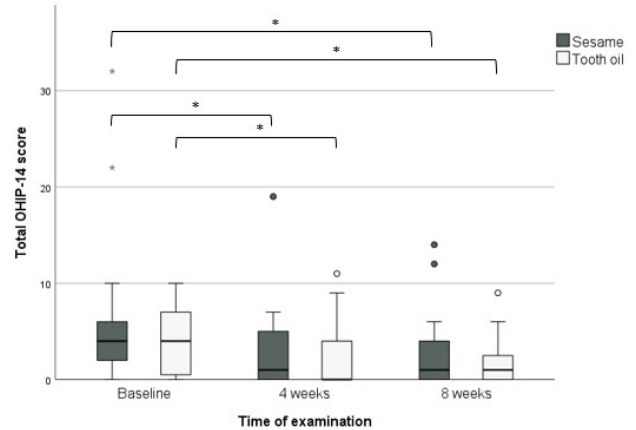


Figure 2 Total OHIP-14 scores at baseline, and after 4 and 8 weeks of pulling sesame oil (grey) or tooth oil (white).

Slika 2. Ukupni rezultati OHIP-a 14 na početku istraživanja te poslije 4 i 8 tjedana mučkanja uljem s pomoću sezamova ulja (sivo) ili zubnoga ulja (bijelo)

Sesame oil versus tooth oil

There were no statistically significant differences between the two subgroups native “sesame oil” and “sesame-based tooth oil” (supplemented with essential oils) at any time, neither for total OHIP-14 scores nor for dimensions (see Fig. 2), but both groups showed a statistically significant reduction of the total OHIP-14 scores within the group. Pulling with native sesame oil reduced the total OHIP-14 score from baseline 4 (0 – 32) to 1 (0 – 19) after four weeks ($p < 0.003$, $z = -2.94$), and 1 (0 – 14) after eight weeks ($p = 0.054$, $z = -1.93$) of intervention. Pulling with tooth oil reduced the OHIP-14 scores from 4 (0 – 10) baseline to 1 (0 – 11) after four weeks ($p = 0.015$, $z = -2.43$) and 1 (0 – 9) after eight weeks ($p = 0.012$, $z = -2.51$) of intervention.

The sesame oil group showed a statistically significant reduction in total OHIP-14 scores from baseline to week four ($p < 0.003$, $z = -2.94$), but not after week eight ($p = 0.054$). The tooth oil group showed a statistically significant reduction of total OHIP-14 scores from baseline to week four ($p = 0.015$, $z = -2.43$) and week eight ($p = 0.012$, $z = -2.51$). There was no statistically significant difference regarding total OHIP-14 scores between sesame oil and tooth oil group, neither baseline ($p = 0.620$), nor after four ($p = 0.452$) and eight weeks ($p = 0.684$) of oil pulling. Statistically significant differences are marked with an asterisk.

Discussion

Influencers and wellness enthusiasts across various social media platforms, including Instagram, Facebook, and TikTok promote oil pulling as a natural method for achieving whiter teeth, fresher breath, improved gum health, and even full-body detoxification. On Instagram, for instance, users share reels demonstrating their oil pulling routines, often highlighting personal benefits and preferred oil blends.

Sezamovo ulje u odnosu na zubno ulje

Nisu ustanovljene statistički značajne razlike između dviju podskupina – one koja se koristila čistim sezamovim uljem i one koja je upotrebljavala zubno ulje na bazi sezama (obogaćeno eteričnim uljima) – ni u jednoj vremenskoj točki, ni za ukupne rezultate OHIP-a 14, ni za pojedine dimenzije (slika 2.). No obje skupine pokazale su statistički značajno smanjenje ukupnih rezultata OHIP-a 14 unutar skupine. Izvlačenje uljem s pomoću čistoga sezamova ulja smanjilo je ukupni rezultat OHIP-a 14 s početnih 4 (0 – 32) na 1 (0 – 19) poslije četiri tjedna ($p < 0,003$, $z = -2,94$) te na 1 (0 – 14) poslije osam tjedana ($p = 0,054$, $z = -1,93$) intervencije. Ispiranje uljem s pomoću zubnog ulja smanjilo je rezultate OHIP-a 14 s 4 (0 – 10) na početku na 1 (0 – 11) poslije četiri tjedna ($p = 0,015$, $z = -2,43$) te na 1 (0 – 9) poslije osam tjedana ($p = 0,012$, $z = -2,51$) intervencije.

Skupina sa sezamovim uljem pokazala je statistički značajno smanjenje ukupnih rezultata OHIP-a 14 od početne vrijednosti do četvrtoga tjedna ($p < 0,003$, $z = -2,94$), ali ne i poslije osmoga tjedna ($p = 0,054$). Skupina sa zubnim uljem pokazala je statistički značajno smanjenje ukupnih rezultata OHIP-a 14 od početne vrijednosti do četvrtoga tjedna ($p = 0,015$, $z = -2,43$) i osmoga tjedna ($p = 0,012$, $z = -2,51$). Nije ustanovljena statistički značajna razlika u ukupnim rezultatima OHIP-a 14 između skupine sa sezamovim uljem i one sa zubnim uljem, ni na početku istraživanja ($p = 0,620$), ni poslije četiri ($p = 0,452$), ni poslije osam tjedana ($p = 0,684$) izvlačenja uljem. Statistički značajne razlike označene su zvjezdicom.

Rasprava

Influenceri i entuzijasti wellnesa na različitim platformama društvenih mreža, uključujući Instagram, Facebook i TikTok, promiču ispiranje uljem kao prirodnu metodu za postizanje bjeljih zuba, svježijega daha, poboljšanoga zdravlja gingive, pa čak i detoksikaciju cijeloga tijela. Na Instagramu, primjerice, korisnici dijele kratke videozapise u kojima pokazuju svoju rutinu izvlačenja uljem, te često ističu osobnu

This is probably the reason why more and more patients engage in oil pulling on their own initiative and consult their dentists regarding its effects and potential benefits. We wondered whether oil pulling actually improves oral well-being, or whether the hype on social media could be based on a placebo effect.

The assessment of OHRQoL has become an important outcome in dental research, as patients' perceptions of treatment success may differ from clinical findings. Several validated instruments are available to assess oral health-related quality of life, including the OHIP-EDENT (for edentulous individuals; (20)), GOHAI (Geriatric Oral Health Assessment Index; (20)), and OIDP (Oral impacts on daily performances; (21)), which differ in their target populations and conceptual frameworks. In the present study, the OHIP-14 was used, as it represents a widely applied short questionnaire suitable for assessing OHRQoL in general dental populations (22).

Sesame oil was selected for the test procedure in this study because of its traditional use in Ayurvedic medicine and its ease of dosing. In addition, commercially available sesame-based tooth oil supplemented with essential oils was included to reflect common products; comparisons between oil formulations were predefined as exploratory. The choice of control intervention was carefully considered by the authors. A double-blind study design would have required the use of another oil as a control, which - because of emulsification and saponification (23) - might have produced similar health effects, thereby not being a true placebo measure. To emphasize the effects of oil pulling, the control group was designed to replicate the mechanical action of oil pulling using a substance without therapeutic or chemical properties. Distilled water was therefore chosen as negative control.

The baseline OHIP-14 scores in this study with a median of 4 (range 0 – 32) in the test group and a median of 2 (range 0 – 21) in the control group were clearly higher than that reported in a German study from 2004 (24), which aimed to establish OHIP-14 norms. In that study, the mean OHIP scores for participants without dentures was 0, with the 90th percentile at 11. This difference may be attributed to the inclusion criteria of the present study, focusing on individuals with CPITN scores of 1 or 2 reflecting gingivitis. Age is unlikely to explain the difference, as it was comparable between the two studies (23-79 versus 16-79 years), and none of our participants wore prostheses. The statistically significant difference between the test and control group in the domain oral function after four weeks could be due to the number of tested domains.

After eight weeks of oil pulling, the OHIP-14 scores in both the test group (median 1; range 0-14) and the control group (median 0; range 0-12) were only marginally higher than or comparable to established OHIP-14 normative values (22), indicating an improvement in oral health-related quality of life (OHRQoL) compared to baseline. Clinical relevance was assessed using the minimal important difference (MID), defined as a two-point change in the OHIP-14 score according to a study published in 2021 (25). Based on this threshold, the intervention successfully reduced elevated OHIP-14 scores to within the range of clinical normality.

korist i preferirane mješavine ulja. To je vjerojatno razlog zašto se sve više pacijenata samoinicijativno odlučuje na ispiranje uljem i savjetuje se sa svojim liječnicima dentalne medicine o njegovim učincima i potencijalnim koristima. Postavlja se pitanje poboljšava li ispiranje uljem doista oralno blagostanje ili se popularnost na društvenim mrežama može objasniti placebo učinkom.

Procjena kvalitete života povezane s oralnim zdravljem (OHRQoL) postala je važan ishod u dentalnim istraživanjima jer se pacijentova percepcija uspjeha terapije može razlikovati od kliničkih nalaza. Dostupno je nekoliko validiranih instrumenata za procjenu OHRQoL-a, uključujući OHIP-EDENT [za bezube osobe; (20)], GOHAI (Geriatric Oral Health Assessment Index; (20)) i OIDP [Oral Impacts on Daily Performances; (21)] koji se razlikuju prema ciljanim populacijama i konceptualnim okvirima. U ovom istraživanju korišten je OHIP-14 zato što je taj široko primjenjivani kratki upitnik prikladan za procjenu OHRQoL-a u općoj dentalnoj populaciji (22).

Sezamovo ulje odabrano je za ispitni postupak u ovom istraživanju zbog tradicionalne primjene u ajurvedskoj medicini i jednostavnog doziranja. Uz to, uključen je komercijalno dostupni proizvod na bazi sezamova ulja obogaćen eteričnim uljima kako bi se usporedili uobičajeni proizvodi; usporedbe između različitih formulacija ulja unaprijed su definirane kao eksploratorne. Odabir kontrolne intervencije pozorno je razmotren. Dvostruko slijepi dizajn istraživanja zahtijevao bi korištenje drugoga ulja kao kontrole što bi, zbog procesa emulgacije i saponifikacije (23), moglo potaknuti slične zdravstvene učinke te zato ne bi bio pravi placebo. Kako bi se istaknuo učinak ispiranja uljem, kontrolna skupina osmišljena je tako da replicira mehanički učinak postupka korištenjem tvari bez terapijskih ili kemijskih svojstava. Zato je kao negativna kontrola odabrana destilirana voda.

Početne vrijednosti OHIP-a 14 u ovom istraživanju, s medijanom 4 (raspon 0 – 32) u ispitnoj skupini i medijanom 2 (raspon 0 – 21) u kontrolnoj, bile su jasno više od onih prijavljenih u njemačkom istraživanju iz 2004. godine (24) čiji je cilj bio utvrditi normativne vrijednosti OHIP-a 14. U tom istraživanju prosječni rezultat OHIP-a za ispitanike bez proteza iznosio je 0, a 90. percentil bio je 11. Ta se razlika može pripisati kriterijima za uključivanje u ovo istraživanje koji su bili usmjereni na osobe s vrijednostima CPITN-a 1 ili 2, što označava gingivitis. Dob vjerojatno ne objašnjava razliku jer je bila usporediva između dvaju istraživanja (23 – 79 prema 16 – 79 godina), a ni jedan od naših ispitanika nije nosio protezu. Statistički značajna razlika između ispitne i kontrolne skupine u domeni oralne funkcije nakon četiri tjedna mogla bi biti posljedica broja analiziranih domena.

Poslije osam tjedana ispiranja uljem, rezultati OHIP-a 14 i u ispitnoj skupini (medijan 1; raspon 0 – 14) i kontrolnoj (medijan 0; raspon 0 – 12) bili su tek neznatno viši ili usporedivi s utvrđenim normativnim vrijednostima OHIP-a 14 (22), što upućuje na poboljšanje kvalitete života povezane s oralnim zdravljem (OHRQoL) u odnosu prema početnom stanju. Klinička relevantnost procijenjena je korištenjem minimalno važne razlike (MID) definirane kao promjena od dva boda u rezultatu OHIP-a 14 prema istraživanju objavljenom 2021. godine (25). Na temelju toga praga intervencija

This finding suggests that oil pulling may confer a clinically meaningful benefit in improving OHRQoL; however, its effect appears to be comparable to that observed with distilled water pulling.

A cross-sectional study investigated the impact of mouth rinsing with on OHRQoL (26). In this trial, 607 children aged 12 to 14 answered a questionnaire regarding their oral health behavior (dental attendance, frequency of brushing, use of oral rinses, consumption of sugars, presence of toothache, etc.) and completed a Child Perceptions Questionnaire (assessing oral symptoms, functional limitations, emotional well-being, and social well-being). The relationship between children's oral health behaviors and OHRQoL found no significant difference in the overall OHRQoL impact score associated with the use of mouth rinse (26). While it is possible to consider factors such as the long rinsing duration of 15 minutes in our trial or the potentially limited motor skills of children in the other study, the fundamentally different study designs make a direct comparison of the results inappropriate.

The increasing number of clinical studies and systematic reviews on oil pulling published in the last recent years underscored the relevance and the timeliness of this topic. Patients appreciate supplementary oral hygiene measures that offer potential health benefits. Limitations of the present study include a relatively small sample size for OHIP assessments, as well as an uneven gender distribution (approx. two-thirds women, $p = 0.03$). While it would have been meaningful to further adjust the data for age, gender, and ethnicity, the small sample size would not have allowed for reliable or meaningful results. Notwithstanding these limitations, the intervention demonstrated a statistically significant effect. Nevertheless, with a very small sample size, a significant p -value does not necessarily reflect a true effect, nor does a non-significant p -value rule one out. Further research with larger study populations, comprehensive effect size measures, and a wider range of dental conditions is needed to confirm these preliminary findings.

Conclusion

Daily oil pulling may positively affect oral health-related quality of life, irrespective of whether oil or distilled water is used.

Ethics approval: This randomized, controlled, examiner-blinded parallel group study involving human participants was conducted in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments. The study was approved by the Ethics Committee of the Medical University of Innsbruck, Austria (ID EK 1117/2022) on 7th June 2022. Prior to the study enrollment, all participants signed an informed written consent including consent to participate and consent to publish.

Availability of data and materials: The datasets used and /or analyzed during the current study are available from the corresponding author on reasonable request.

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Conflicts of Interest: The authors declare no competing interests.

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je uspješno smanjila povišene rezultate OHIP-a 14 u raspon kliničke normalnosti. Taj nalaz upućuje na to da ispiranje uljem može klinički znatno poboljšati OHRQoL, no čini se da je njegov učinak usporediv s onim dobivenim ispiranjem destiliranom vodom.

U jednom presječnom istraživanju autori su ispitali utjecaj ispiranja usta na OHRQoL (26). Sudjelovalo je 607 djece u dobi od 12 do 14 godina koja su i ispunila upitnik o oralno-zdravstvenom ponašanju (posjeti stomatologu, učestalost četkanja, uporaba otopina za ispiranje usta, konzumacija šećera, zubobolja itd.) te upitnik o percepciji djece (oralni simptomi, funkcionalna ograničenja, emocionalno i socijalno blagostanje). Odnos između oralno-zdravstvenog ponašanja djece i OHRQoL-s nije pokazao statistički značajnu razliku u ukupnom rezultatu OHRQoL-a povezanom s uporabom otopina za ispiranje usta (26). Iako se mogu razmotriti čimbenici poput dugog ispiranja od 15 minuta u ovom istraživanju ili potencijalno ograničenih motoričkih sposobnosti djece u drugom istraživanju, temeljno različiti dizajni istraživanja čine izravnu usporedbu rezultata neprikladnom.

U sve više kliničkih istraživanja i sustavnih pregleda o ispiranju uljem objavljenih posljednjih godina ističe se relevantnost i aktualnost ove teme. Pacijenti cijene dodatne mjere oralne higijene koje nude potencijalnu zdravstvenu korist. Ograničenje ovog istraživanja jest razmjerno mali uzorak za procjenu OHIP-a i neravnomjerna spolna raspodjela, pri čemu su približno dvije trećine ispitanika bile žene ($p = 0,03$). Iako bi bilo korisno dodatno prilagoditi podatke prema dobi, spolu i etničkoj pripadnosti, mali uzorak ne bi omogućio pouzdane ili smisljenije rezultate. Unatoč tim ograničenjima, intervencija je pokazala statistički značajan učinak. Ipak, kod vrlo malog uzorka statistički značajna p -vrijednost ne mora nužno odražavati stvarni učinak, niti neznajna p -vrijednost ne isključuje njegovo postojanje. Potrebna su daljnja istraživanja s većim uzorcima, sveobuhvatnim mjerama veličine učinka i širim rasponom dentalnih stanja kako bi se potvrdili ti preliminarni nalazi.

Zaključak

Svakodnevno mučkanje uljem može pozitivno utjecati na kvalitetu života povezanu s oralnim zdravljem, neovisno o tomu rabi li se ulje ili destilirana voda.

Etičko odobrenje: Ovo randomizirano, kontrolirano ispitivanje s paralelnim skupinama i zaslijepljenim ispitivačem, koje je uključivalo ljudske ispitanike, provedeno je u skladu s etičkim načelima Helsinške deklaracije iz 1964. godine i njezinim kasnijim izmjenama. Istraživanje je 7. lipnja 2022. godine odobrilo Etičko povjerenstvo Medicinskog sveučilišta u Innsbrucku, Austrija (ID EK 1117/2022). Prije uključivanja u istraživanje svi su ispitanici potpisali informirani pristanak, uključujući pristanak za sudjelovanje i pristanak za objavu.

Dostupnost podataka i materijala: Skupovi podataka korišteni i/ili analizirani tijekom ovog istraživanja mogu se dobiti na zahtjev od odgovornog autora.

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Authors' contribution: IK and CZ contributed to the study conception and design. Material preparation, data collection and analysis were performed by KV, VW and CZ. Statistical analysis was done by VW. The first draft of the manuscript was written by IK and CZ. All authors read and approved the final manuscript.

Doprinosi autora: I. K., C. Z. – osmišljavanje i dizajn istraživanja; K. V., V. W., C. Z. – priprema materijal, prikupljanje podataka i analiza; V. W. – statistička analiza; I. K., C. Z. – prva verzija teksta. Svi autori pročitali su i odobrili konačnu verziju teksta.

Sažetak

Ciljevi: Cilj ove randomizirane kontrolirane studije s paralelnim skupinama i zaslijepljenim ispiti-vačem bio je procijeniti učinak na kvalitetu života povezanu s oralnim zdravljem (OHRQoL) poslije svakodnevnog ispiranja uljem (*oil pulling*) u usporedbi s destiliranom vodom. **Materijali i metode:** Osamdeset ispitanika iz Sveučilišne bolnice za konzervativnu dentalnu medicinu i parodontologiju s dijagnostičanim gingivitisom nasumično je raspoređeno u ispitnu skupinu (ulje) ili u kontrolnu (destilirana voda). U ispitnoj skupini sudionici su dobili ili čisto sezamovo ulje ili zubno ulje na bazi se-zama. Rečeno im je da svakodnevno ujutro 15 minuta ispiru usta uljem tijekom osam tjedana kori-steći se dodijeljenom tekućinom, uz svoju uobičajenu oralnu higijenu. Rezultati dobiveni upitnikom Oral Health Impact Profile (OHIP-14) zabilježeni su na početku istraživanja te poslije četiri i osam tje-dana. **Rezultati:** U ispitnoj skupini (ulje) statistički je značajno smanjen ukupni rezultat OHIP-a 14 od početne vrijednosti do četvrtoga ($p < 0,001$) i osmoga tjedna ($p = 0,002$). Slično tomu, u kontrolnoj skupini (destilirana voda) zabilježen je statistički značajno manji ukupni rezultat OHIP-a 14 od počet-ne vrijednosti do četvrtoga ($p = 0,005$) i osmoga tjedna ($p = 0,003$). Nisu uočene statistički značajne razlike u ukupnim rezultatima OHIP-a 14 između ispitne i kontrolne skupine na početku istraživanja ($p = 0,178$) te poslije četiri ($p = 0,384$) i poslije osam tjedana ($p = 0,250$). **Zaključak:** Svakodnevno ispiranje uljem može pozitivno utjecati na kvalitetu života povezanu s oralnim zdravljem (OHRQoL), neovisno o tome rabi li se ulje ili destilirana voda. **Klinička važnost:** Mućkanje uljem može se razmo-triti kao potporna mjera uz mehaničku oralnu higijenu kako bi se poboljšala kvaliteta života poveza-na s oralnim zdravljem.

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Adresa za dopisivanje

Ines Kapferer-Seebacher
Sveučilišna bolnica za konzervativnu
stomatologiju i parodontologiju
Medicinski fakultet u Innsbrucku
6020 Innsbruck, Austrija
tel.: +43 512 504 27242
ines.kapferer@i-med.ac.at

MeSH pojmovi: gingivitis; otopine za ispiranje usta; sezamovo ulje
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