Working Adults' Dental Caries Experience and Oral Health-Related Quality of Life

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Abstract

Background

To assess how dental caries experience and untreated dental deterioration affect working people' oral health-related quality of life (OHRQoL).

Methods

160 patients' clinical records were examined. Dental health indicators, such as the number of decayed surfaces (D), the number of decayed missing filled surfaces (DMFS), and the significant caries (SiC) indices, were developed using individual tooth- and surface-level data. A survey was used to confirm demographic information and OHRQoL. In-person interviews were used to deliver the questionnaire to hospital patients, and telephone interviews were used to administer it to patients who were unable to complete it in-person. In order to predict total OHIP-14 scores and investigate the concurrent connection of independent and outcome factors, models utilising multivariable linear regression were created. Age, gender, and nationality were taken into account in the model.

Results

Physical limitation and psychological distress, which affected 17.1% and 7.5% of individuals, respectively, were the most frequently afflicted domains. The most common thing to have any effect was painful aching, impacting 64.4% of the respondents. The findings of the multivariable analysis showed that the Oral Health Impact Profile (OHIP) score could be statistically substantially predicted by the SiC score, P=0.0003. In the linear regression model, participants' OHIP scores were, on average, about 10 points higher for those whose DMFS was equal to or greater than the SiC than for those whose DMFS was below the SiC.

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Conclusion

The influence on OHRQoL increases as tooth deterioration progresses. OHRQoL can be used as a need assessment tool for dental public health, together with dental clinical indicators, to assist design and focus public health initiatives for adult groups that are in the greatest need.

Clinical Relevance

According to this study, people who have severe dental caries report having worse OHRQoL. Clinicians need to be aware of how tooth decay might affect OHRQoL in terms of physical discomfort, psychological issues, and pain.

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Introduction

3.47 billion individuals worldwide are expected to be affected by oral disorders such tooth decay, periodontitis, and gingivitis, which are also the most frequent non-fatal cause of disability (Charlson et al., 2018). The patient's subjective appraisal of his or her treatment needs and clinical outcome is just as significant as the dentist's objective ways of assessing oral health (Allen, 2003, Sischo and Broder, 2011). In order to measure the effect of oral health on everyday activities in terms of a patient's social, psychological, and functional well-being, the theory of oral health-related quality of life (OHRQoL) utilises patient-centered outcome measures (Locker and Allen, 2007). Historically, a number of psychometric instruments have been developed to assess OHRQoL. In order to measure OHRQoL, the Oral Health Impact Profile (OHIP) is frequently utilised (Allen, 2003). 14 items make up the OHIP-14, which is based on Locker's theoretical framework for assessing oral health (Allen, 2003, Locker, 1988, Slade, 1997). These elements stand in for the effects of oral illnesses and the negative impact they have on OHRQoL. Numerous studies have demonstrated the OHIP-14's validity and reliability, and it has been translated into a number of languages, including Russian (Al Habashneh et al., 2012).

Despite the fact that oral disorders become more common as people age, researchers found that young persons have lower OHRQoL than older adults (Dahl et al., 2011, Sanders et al., 2009, Slade and Sanders, 2011). It has been indicated that oral illnesses have a detrimental influence on self-reported oral health, and that this impact is worse at younger ages. However, the mechanisms that affect self-reported oral health are not fully understood (Slade and Sanders, 2011). In Australia (Brennan and Spencer, 2009), Tanzania (Masalu and Astrm, 2002), Japan (Yamane-Takeuchi et al., 2016), Malaysia (Masood et al., 2013), Sweden (Oscarson et al., 2007), Korea (Choi et al., 2015), and Saudi Arabia (Brennan and Spencer, 2009), several researchers evaluated OHRQoL in young adult subjects (Bahammam and Fareed, 2019). In conclusion, education (Masalu and Astrm, 2002; Masood et al., 2013); negative life experiences (Brennan and Spencer, 2009); pain (Yamane-Takeuchi et al., 2016); and self-reported oral health (Masalu and Astrm, 2002; Yamane-Takeuchi et al., 2016) were all associated with lower OHRQoL in young adults. The relationship between clinical conditions (such as dental decay, edentulism, and periodontitis) and OHRQoL is ambiguous; some researchers (Lu et al., 2014; Oscarson et al., 2007) report no association while others (Choi et al., 2015; Masalu and Astrm, 2002; Yamane-Takeuchi et al., 2016) report a negative relationship.

Numerous studies were conducted in Saudi Arabia to determine the effects of various factors on OHRQoL in children and parents of autistic children, including malocclusion, general anaesthesia, periodontitis, complete dentures, full mouth rehabilitation, prior dental experience, and fear (AlBaker, 2013, Alghamdi et al., 2017, Baghdadi and Muhajarine, 2015, Baghdadi, 2014, Bahammam and Fareed, 2019, Dawoodbhoy

A high quality of life, which includes dental health, allows people to engage in all activities, boosts productivity in the workplace, and expands their capacity for learning. The purpose of this study was to assess how dental caries experience and untreated dental deterioration affect working individuals' OHRQoL.

Methods

This cross-sectional study involved clinical evaluation of the participants to determine their dental caries experience and OHIP-14 questionnaire completion to measure OHRQoL. In XXXX a dentistry teaching hospital was used to perform this study. The research was done from November 2021 to April 2022.

This was a convenience sample of people who went to the teaching hospital for dentistry. Patients were only chosen, though, if they had at least 20 teeth and were between the ages of 18 and 60.

For participants, the English OHIP-14 version was used to measure the OHRQoL (the outcome). The severity of the influence on OHRQoL was measured using the OHIP-14, which was derived by adding responses to all 14 items, with scores ranging from 0 to 56. The lower the score, the less severe the impact, was.

From individual tooth- and surface-level data, dental health indicators (predictors) were constructed, allowing for the calculation of the number of decayed surfaces (D), number of decayed missing filled surfaces (DMFS), and severe caries (SiC) indices.

Sources and methods of measurement

A survey was sent out to measure OHRQoL and confirm demographic information (such as age, gender, and nationality). Patients who could not complete the questionnaire during their visit to the hospital were given the option of a telephone interview in lieu of a face-to-face interview. Responses were classified as "never = 0," "hardly ever = 1," "sometimes = 2," "pretty often = 3," and "very often = 4" for each of the 14 questions in the OHIP-14. An interview script created for the study was used for both the telephone and in-person interviews. The examining dentist conducted the in-person interviews, while the lead investigator conducted the telephone interviews.

Each patient at the dental teaching hospital receives a thorough comprehensive dental examination by a professional dentist utilising a dental mirror, explorer, and orthopantomogram (OPG) radiographs as part of the registration procedure. When necessary, bitewing radiographs are done to eliminate any doubts. In a full-mouth examination, all teeth and their surfaces are checked for decay, missing or filled teeth, or pulpal involvement. The tests also included a determination of oral pathology, discomfort, edoema, and abscesses. To determine SiC, DMFS, and D, the lead investigator went over the dental clinical data of 160 individuals. By choosing the third of the sample with the highest caries score, the SiC, the study's main predictor, was determined. The mean DMFS for this subgroup subsequently served as the SiC index value (Bratthall, 2000).

DMF indices have a drawback that is directly connected to the index's "M" factor. It's possible that subjects won't be able to recall whether the lost teeth or tooth fragments

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were caused by dental disease or by something else, such a fractured filling. Recall bias is what causes this, and it can skew the results (Broadbent and Thomson, 2005). Sub-analyses were performed using the DMFS's decayed (D) component, and the SiC was calculated solely using D scores to account for this potential bias. Then, in two different linear regression models, these additional variables were utilised as the main predictors.

An interview script was created, and all interviewers adhered to it throughout the interviews in order to eliminate information bias.

An F test with a significance level (alpha) of 0.05 and a sample size of 85 people has 90% power to detect an R-squared value of 0.08 ascribed to one independent variable. With an R-squared value of 0.29, the variables under test are modified for an additional six independent variables (Cohen, 1988).

Statistical techniques

Using descriptive data, the OHRQoL profiles and demographic traits were compiled. A model was created using multivariable linear regression for inferential statistics in order to forecast total OHIP-14 scores and look at the concurrent connection of independent and outcome factors. The model was modified to account for nationality, gender, and age. The deliberate selection approach was used to choose which extra factors needed to be taken into account (Bursac et al., 2008). STATA software was used to calculate all statistics (version14.1; Stata, College Station, TX). The 0.05 threshold of significance was used to interpret all two-tailed statistical tests.

Considerations for ethics

The institutional review board gave their approval to the study protocol (IRB). During the registration process, each patient consented to the use of their unidentified information for study. In order to provide unnamed and untraceable data, the patients' national ID, name, dental record number, and date of birth were subtracted.

3. Results

146 of the 160 records examined were used in the final analysis, while 14 were left out because of insufficient data. 85 percent of these records fell below the SiC. The average participant age was 31.7 (SD 14.3) years; the average age for participants in the SiC group below was 29.3 years, while it was 46 years for participants in the SiC group equal to or above. 51% of the participants were female, and 42% were Saudis (Table 1).

Table 1

Participant characteristics.

Categorical Variables	**OHIP score**		**Age**	
	Mean	**SD**	**Mean**	**SD**
Significant Caries Index (SiC)				
Below SiC (85%)	11.24	10.07	29.27	12.8
Equal or above SiC (14%)	21.06	9.12	46	14.8
Gender				
Female (51%)	12.88	10.46	29.66	12.8
Male (48%)	12.45	10.3	33.8	15.4
Nationality				
Not Indian (57%)	11.5	9.2	31	12.8
Indian (42%)	14.2	11.7	32.6	16.0

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Chief Complaint				
Pain (35%)	15.2	11.5	30.7	12.3
Restorative or Prosthetic (54%)	12.3	9.5	33.4	15.6
Other (9%)	4.4	6.1	24.8	12.1
Past Extraction				
No (43%)	9.7	8.8	25.4	9.8
Yes (56%)	14.8	11.2	36.7	15.3
Total (100%)	12.6	10.4	31.6	14.2

The average OHIP score was 12.7 points (SD: 10.5); the mean OHIP score for the SiC group below was 11.3 points, while the SiC group equal to or above had an OHIP score of 21.1 points. The average OHIP score for individuals who had a prior history of extraction was 14.9 points (SD: 11.1). The mean OHIP score for patients whose primary complaint was pain was 15.3 points (SD: 11.6). The average OHIP score for people whose primary complaint was to get their teeth restored was 12.4 points (SD: 9.6). (Table 1).

A total of 0 to 50 points made up the OHIP score (s). Physical restriction and psychological distress, which affected 17.1% and 7.5% of individuals, respectively, were the most commonly afflicted domains. Inability to conduct everyday duties was the least common factor to have any influence, impacting just 21.9% of the participants, while painful hurting was the most common factor to have any impact, affecting 64.4% of the subjects (Table 2).

Table 2

Oral health impact profile of sample.

Dimension	**Item**	**Never**		**Hardly ever**		**Occasionally**		**Fairly often**		**Very often**	
		n	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
Functional Limitation	Speaking Problems	88	60.3	27	18.5	13	8.9	15	10.2	3	2.1
	Taste Problems	82	56.2	26	17.8	19	13	12	8.2	7	4.8
Physical Limitation	Painful Aching	52	35.6	21	14.4	39	26.7	27	18.5	7	4.8
	Discomfort when Eating	54	37	22	15.1	26	17.8	26	17.8	18	12.3
Psychological Discomfort	Anxious	67	45.8	27	18.5	29	19.9	16	11	7	4.8
	Tense	68	46.7	30	20.5	34	23.3	10	6.8	4	2.7
Physical Disability	Unsatisfactory Diet	87	59.6	26	17.8	17	11.6	14	9.6	2	1.4
	Interrupted Meals	92	63	20	13.7	20	13.7	12	8.2	2	1.4
Psychological Disability	Difficult to Relax	63	43.2	35	23.9	32	21.9	14	9.6	2	1.4
	Embarrassed	63	43.2	30	20.5	29	19.9	19	13	5	3.4
Social Disability	Irritable with People	76	52.1	40	27.4	16	11	10	6.8	4	2.7
	Difficulty in	95	65.1	28	19.1	14	9.6	7	4.8	2	1.4

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	Daily Activities										
Handicap	Less Satisfying Life	101	69.2	18	12.3	15	10.3	10	6.8	2	1.4
	Unable to Function	114	78.08	17	11.64	7	4.8	7	4.8	1	0.68

Table 3 summarises the findings of a multivariable analysis that examined the concurrent association between the OHIP score (as a dependent variable) and SiC index (as a primary predictor) while controlling for age, gender, nationality, the nature of the chief complaint, the past history of extractions, and the past orthodontic treatment. It was determined that the SiC score may statistically substantially predict the OHIP score in this linear regression model, P = 0.0003.

Table 3

Results from multivariable linear regression with SiC as dependent variable.

Predictor	**Coefficient**	**SE**	**P-value**	**95% C.I.**
Significant Caries index				
Below SiC (reference)				
Equal or higher than SiC	9.96	3.24	0.001	(3.49–16.45)
Chief Complaint				
Cosmetic (reference)				
Pain	9.55	4.33	0.030	(0.9–18.23)
Restorative or prosthesis	10.53	4.11	0.016	(2.33–18.7)

Results are adjusted for age, gender, nationality, history of previous extraction, and history of orthodontic treatment.

After adjusting for age, gender, nationality, type of chief complaint, history of prior extraction, and history of orthodontic treatment, participants with DMFS equal to or higher than the SiC index had, on average, OHIP scores that were nearly 10 points higher than participants with a DMFS that was less than the SiC index (Table 3).

Discussion

Those with DMFS equal to or more than the SiC index value received, on average, approximately 10 points better OHIP scores than participants with DMFS less than the SiC value. Physical restriction and psychological distress, which affected 17.1% and 7.5% of individuals, respectively, were the most commonly afflicted domains. The most common thing to have any effect was painful aching, impacting 64.4% of the respondents.

The average OHIP-14 score for low OHRQoL in the individuals of the current research (12.7) is comparable to the severity of low OHRQoL reported in Spanish adults (11) and in an Indian study (13.4) (Acharya and Sangam, 2008). (Montero-Martin et al., 2009). In contrast, a Greek research (Papagiannopoulou et al., 2012) discovered that adults had a mean OHIP-14 score of 15, while a Hong Kong study revealed that young adults had a mean OHIP-14 score of 6.3. (Lu et al., 2014). Care must be used when comparing the results of this study directly to those indicated above.

The subject's prospects and experiences, which vary depending on socioeconomic, social, demographic, psychological, and other cultural aspects, are a key component of OHRQoL assessment (Carr et al., 2001). Because of this, a person with poor oral health and low expectations could not perceive themselves to have poor OHRQoL and might instead report feeling content. Subjects with great oral health and high expectations, on the other hand, can report poor OHRQoL and perceive themselves as dissatisfied (Carr et al., 2001, Locker and Gibson, 2005). For instance, nationality and OHIP-14 score were substantially correlated in this study. Comparing Saudi participants to non-Saudi participants, Saudi participants often reported higher OHIP ratings.

However, the OHIP-14 dimension of physical pain was the main cause of low OHRQoL in the current research, which is consistent with all the studies described above and others (Acharya and Sangam, 2008, Batista et al., 2014, Dahl et al., 2011, Lu et al., 2014, Montero-Martin et al., 2009, Papagiannopoulou et al., 2012). As a result, it may be hypothesised that people in many countries exhibit a consistent pattern of OHRQoL.

It was discovered that respondents with high DMFT/DMFS scores felt they actually had poor OHRQoL with regard to the primary predictor, clinical caries experience. A Swedish research (Oscarson et al., 2007) and a Chinese study (Lu et al., 2014) both found no correlation between dental caries (DMFT) and OHRQoL. However, these results were consistent with previous research (Batista et al., 2014; Masalu and Astrm, 2002; Yamane-Takeuchi et al., 2016). At this time, it is unclear how dental caries experience and OHRQoL are related (Yamane-Takeuchi et al., 2016). However, it may be reasonable to presume that dental caries in this study was likely related to oral/dental pain given that physical pain was the most often reported dimension of the OHIO-14 and the mean DMFT of 12.4. To reduce dental/oral pain, DMFT, and enhance OHRQoL, dental health practitioners and public health organisations should concentrate on prevention.

SiC can produce superior findings when combined with skewed caries distribution, but when employed exclusively, it can result in knowledge gaps for a sizeable portion of the population (Campus et al., 2003). Numerous sub-analyses were carried out to test the results' resilience to potential underrepresentation of the examined sample in an effort to allay this worry. The DMFS scores were used as the key predictor in a separate regression to re-fit the linear regression model (model 1 in Table 4). The interpretation of the effect of tooth decay on OHRQoL was not influenced by any variation in the data, though.

Table 4

Sensitivity Analyses, all models adjusted for age, gender, and nationality.

Model No.	**Primary**	**1**	**2**	**3**	**4**
Outcome	Mean OHIP	Mean OHIP	Mean OHIP	Mean OHIP	Categorical OHIP
Predictor	DMFS_SiC	DMFS	D	D_SiC	DMFS_SiC
Coefficient	9.92	0.14	0.11	7.74	4.1*
P-value	0.03	0.00	0.05	0.05	0.09

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OHRQoL was reported to be considerably impacted by tooth loss in multiple studies, including a systematic review (Gerritsen et al., 2010, Sanders et al., 2009, Steele et al., 2004). Additionally, the 'M' component of the index utilised in DMF indices has an intrinsic flaw. Recall bias refers to the possibility that participants may not be able to identify whether a lost tooth or part of a tooth was caused by dental disease or by another factor, such as a significant shattered filling (Broadbent and Thomson, 2005). Therefore, sub-analyses were performed using the decayed (D) component of DMFS (model 2 in Table 4), and the SiC was derived from D scores exclusively, in order to address these possible biases (model 3 in Table 4). In two different linear regression models, these additional variables served as the main predictors. However, the results from these models did not change how this study's earlier models were interpreted (Table 4).

This study discovered that tooth deterioration has an impact on OHRQoL. On the contrary, Dahl and her coworkers found that tooth decay had no effect on OHRQoL. (Dahl et al., 2011). There are three potential causes for this. First off, the sample in Dahl's study had a mean age of 72.1 years as opposed to this study's mean age of 31.7 years. Second, over half (45%) of the Dahl research group had fewer than 20 teeth. Third, the bulk of the sample in Dahl's study had a high school education or less (83%), which may have limited the variety in dental caries experience, resulting in having no influence on OHRQoL in Dahl's study because dental decay is associated with low education. However, the results of this investigation support those of Batista and her colleagues (Batista et al., 2014).

A number of tools have been created and validated to assess the impact of oral disease on OHRQoL. One of the most widely used tools for assessing OHRQoL is the Oral Health Impact Profile (OHIP) (Locker, 1995, Slade and Spencer, 1994). Both OHIP-49 and OHIP-14 are verified versions of the OHIP. The OHIP-14 was created to measure how much individuals believe oral disorders have on their social well-being (Slade, 1997).

There is a claim that using mean scores to gauge quality of life is inadequate since they are useless and challenging to understand in the absence of a relevant baseline. Tsakos et al. advised employing many methods to assess patient-based outcome measures in order to standardise reporting and interpreting patient-based outcome measures, including quality of life indicators (Tsakos et al., 2012). Following this advice, a categorical result was produced in the current study. The result was a yes/no indicator with the following coding: pretty and very frequently = yes; else = no. While accounting for age, gender, and nationality, a logistic regression model was constructed using the categorical outcome and SiC as the key predictor. Added variables were added with the use of deliberate selection (Bursac et al., 2008). When age, gender, and nationality were adjusted for, the results were consistent with the linear regression model for participants with DMFS on average equal to or higher than the SiC index, and the odds of having a severe impact on OHIP scores were four times higher than for participants with DMFS less than the SiC index.

Limitations of the study (4.3)

Causal linkages in the correlation between the examined factors and OHRQoL cannot be established due to the cross-sectional study design. The study's convenience sample was restricted to patients at the dental teaching hospital, which reduces the generalizability of its conclusions. Since the dental teaching hospital provides free dental care, the prevalence of dental caries may be underestimated because the majority of the patients come from poor socioeconomic backgrounds.

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5. Conclusion

Adults who have dental decay have lower quality of life. The influence on OHRQoL increases as tooth deterioration progresses. From the standpoint of dental public health, employing OHRQoL as an evaluation tool in conjunction with a dental clinical indicator might be useful in planning and directing public health initiatives toward the adult population that is in the greatest need. This can have a significant impact on research as well as oral health care policy. To reduce dental/oral pain, DMFT, and enhance OHRQoL, dental health practitioners and public health organisations should concentrate on prevention.

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