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Original Research

Association between Oral Health Status and Quality Of Life in Kerala: a population based cross-sectional study

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ABSTRACT:

Background: Oral diseases are often called a neglected epidemic, because they affect virtually the entire population and often not identified as a priority. The aim of this study was to estimate the oral health status and disease burden among adults aged between 18-70 years and to assess the oral health related quality of life (OHRQoL) of these subjects using oral health impact profile (OHIP-14) **Methods:** A descriptive cross-sectional survey with convenience sampling was executed to study the native Kerala population in the selected locations. A total of 1714 people participated in the study out of which 1552 were taken for data analysis. Variables collected as per the WHO proforma for adults. The OHRQoL of these subjects were recorded using the OHIP 14 questionnaire, Malayalam version. Bivariate analysis of OHIP scores was done and multi variate analysis using binary logistic regression for determining factors responsible for poor OHRQoL. **Results:** The model showed that presence of caries experience was the most important factor associated with a poor OHRQoL. Presence of oral mucosal lesions was not significantly associated with development of poor OHRQoL. The goodness of fit for the model verified using Hosmer and Lemeshow Test ($p < 0.05$) indicated that the goodness of fit of the model was acceptable with a Nagelkerke R Square value of 0.127. **Conclusion:** We recommend that a population based study be carried out to exactly assess the oral health burden in the state and an effective oral health policy be formulated accordingly.

Keywords: quality of life; oral health; OHIP-14; OHRQoL; patient reported; outcome.

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INTRODUCTION

Oral diseases are often called a neglected epidemic, because they affect virtually the entire population and often not identified as a priority.¹ considering the high prevalence, significant psychosocial impact on individuals and society and the high expense incurred for treatment, oral diseases especially dental caries and periodontal diseases are regarded as a major public health problem. WHO defines oral health as “a state of

being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual’s capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing”(1971).² In addition to objective methods of oral health evaluation performed by dental professionals, patient perception of oral disease is also important in the assessment of treatment needs and

clinical outcome.^{3,4} The concept of oral health related quality of life (OHRQoL) uses patient-centered outcome measures to identify the impact of oral health on aspects of everyday life in terms of a person's functional, social, and psychological well-being.⁵ The Oral Health Impact Profile (OHIP) is widely used to measure OHRQoL in adults and dentate elderly people.⁶ The short version of the OHIP includes 14 items (OHIP-14), which are based on Locker's conceptual model for measuring OH.^{6,7,8} These items represent the consequences of oral diseases and the negative impact they have on OHRQoL. Through the assessment of the impact of oral problems on health-related quality of life, we can make a vital contribution to improve the prevention and dental intervention strategies, promoting a better quality of life for individuals.

To our knowledge, there has been little research on OHRQoL in Kerala population. Thus, we performed this study in order to estimate the oral health status and disease burden among adults aged between 18-70 years and to assess the oral health related quality of life (OHRQoL) of these subjects which may be the first report of its kind from Kerala.

METHODS

Study design and method of data collection

A cross-sectional descriptive survey was conducted among Kerala population chosen by convenience sampling. Sample size was calculated based on the prevalence of dental caries and periodontal disease⁹ separately and a larger one according to the calculation was selected for the study. The investigators visited each house/family planned to include the study on a prior day and obtained preliminary verbal willingness of participation. After obtaining informed consent, examination was performed at a convenient place using natural light and if needed using additional illumination according to WHO criteria. A sterile mouth mirror and WHO probe was used for clinical examination. Similar examinations were performed for all the available members of the family of the age group included for the study and willing to participate. Bed ridden subjects were excluded from the study. Other demographic information and questionnaire administration were done separately from the subjects.

Survey proforma and structure of the questionnaire

The survey proforma was prepared using OHIP-14 questionnaire to assess OHRQoL. WHO oral health assessment form (2013) was used to assess the oral health status of the population. It included recording of demographic data like name, age, sex, occupation, income, education and clinical parameters like dental caries, gingivitis, loss of attachment, mucosal lesions and dentition status.

The OHIP-14 measures the frequency of occurrence oral impacts in seven conceptual domains, two questions for each dimension namely; functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap.⁸ Ratings are made on a 5-point Likert scale: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = fairly often; 4 = very often/every day. Summary OHIP-14 scores were calculated by summing ordinal values for 14 items. Higher OHIP-14 scores indicate worse and lower scores indicate better oral health-related quality of life. Translational validity of OHIP M 14 was ensured by a systematic qualitative process of translation and back translation. Internal consistency reliability of the Malayalam scale was assessed using Cronbach's alpha and it was found to be 0.903 ($\alpha \geq 0.903$).

Statistical analysis

The data collected was analyzed by Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 16) for windows. Descriptive statistics such as mean, proportions were used to describe the baseline variables, prevalence of dental diseases and distribution of OHIP-14 scores. Inferential statistics using hypothesis testing (independent t tests, ANOVA) were performed to determine *p* values. Tukey's post hoc tests were used for sub group analysis of ANOVA. *P* values < 0.05 were considered statistically significant for all tests. 95% confidence intervals were estimated whenever found appropriate. Bivariate analysis of OHIP scores was done and multi variate analysis using binary logistic regression for determining factors responsible for poor OHRQoL. The dichotomized OHRQoL variable was used as the outcome variable. Age, gender, socioeconomic status (SES), oral hygiene status, tooth loss, caries experience, presence of periodontal pockets, oral mucosal lesions, history of alcohol and tobacco use were the independent variables used to develop the model. All the independent variables were introduced simultaneously in the model using an enter method. The goodness of fit of the model was determined using a Hosmer Lemeshow test. Adjusted Odds ratios and 95 % CI were determined for all the independent variables.

RESULTS

A total of 1714 people participated in the study out of which 1552 were taken for data analysis. The rest were discarded due to incomplete data. Variables collected as per the WHO proforma for adults (2013). (Table 1) Among the study population, 551 out of 688 males (80.1%) and 833 out of 864 females (96.4%) have not used any forms of tobacco. The use of tobacco among males is significantly higher than in females. The prevalence of smoking is much higher than that of tobacco chewing.

Table 2 summarizes the prevalence of dental disease in the study population. The highest prevalence of dental caries was seen in 45-64 year age group (249 out of 565) and the least among 65-74 year group (23 out of 169) followed by 18-34 (48 out of 351). Subjects having at least one site with clinical attachment loss (CAL) 6 mm or more were categorized as severe periodontitis. The severe periodontitis was more among 45-64 year age group (30.9). The presences of oral mucosal lesions were categorized as per the WHO criteria. 14.3% people showed presence of mucosal lesions of which oral lichen planus was the most common with prevalence of 3.2%.

The use of maxillary and mandibular denture in the study population was recorded. 94.7% had no dentures. But 3.2% of them required placement of denture, complete or partial. We came across only 4 persons who were totally edentulous and not wearing dentures. The rest of them needed partial dentures or were partially edentulous with no dentures. 2.9% had complete dentures.

Oral health related quality of life (OHRQoL)

The OHIP of these subjects were recorded using the OHIP 14 questionnaire, Malayalam version. Mean OHIP-14 (±SD) score of the surveyed population was 8.51 (±7.4). The scoring distribution according to the Likert’s Scale with respect to each question is given in the table 3. The physical pain and psychological discomfort subscales were showing relatively high score compared to other domains.

There was a statistically significant difference (p<0.05) in the OHIP total scores between the different age groups as a whole as determined by one-way ANOVA (F=5.514, p=.001) (Table 5). A Tukey post hoc test revealed significant reduction in quality of life due to oral health problems in older age groups compared to the youngest age group (18-34 yrs). There was no statistically significant difference between rests of the age groups.(Table 4) The OHIP scores of males and females were compared using an independent t test. Females had a significantly higher OHIP score with Mean (±SD) of 9.4(±7.8) against that of males with mean score 7.2±6.8. The difference was statistically significant with P value <0.001. There is significant difference in the mean OHIP scores between groups with caries experience and those without previous caries experience and clinical attachment loss. Thus

there is significant reduction in the quality of life in people affected with both these conditions. In contrast, the distribution of total scores of OHIP is same across groups with and without gingival bleeding and periodontal pockets thus having no significant effect on OHRQoL. (Table 5)

Assessment of Oral Health Related Quality of Life (OHRQoL)

The dichotomized independent variables selected for Multivariate analysis were Age, Gender, SES, oral hygiene status, tooth loss, caries experience, presence of Periodontal pockets, oral mucosal lesions, history of alcohol and tobacco use. Among the independent variables used, caries experience, presence of periodontal pockets, female gender and poor oral hygiene were statistically significant (Table 6)

Table 1: Baseline characteristics of the study population

VARIABLE	n (%)	
Gender	Male	688 (44.3%)
	Female	864 (55.7%)
Age-Groups	18-34 Yrs	351 (22.6%)
	35-44 Yrs	467 (30.1%)
	45-64 Yrs	565 (36.4%)
	65-74 Yrs	169 (10.8%)
Socio Economic Status	APL	875 (56.3%)
	BPL	677 (43.6%)
Education Status	Primary Level Or Less	8(.005%)
	Secondary	138 (8.9%)
	Higher Secondary	420 (27.1%)
	Graduate	516 (33.3%)
	Postgraduate	346 (22.3%)
	Professionals	119 (7.7%)
OH Method	Brushing	1442 (92.9%)
	Alternatives	51 (3.19%)
	Both	59 (3.8%)
OH Frequency	Once	900 (58%)
	Twice	620 (40%)
	More Than Twice	32 (2%)

*APL- Above Poverty Line, BPL- Below Poverty Line, OH- Oral Hygiene

Table 2: Prevalence of dental diseases in the study population

	Present (%)	Absent (%)
Dental caries experience	1068 (68.8)	484 (31.2)
Gingival bleeding	1164(75)	388 (25)
Periodontal pockets	1037(66.8)	515 (33.2)
Clinical attachment loss	964 (62.1)	588 (37.9)
Mucosal lesions	222(14.3)	1330 (85.7)

Table 3: The scoring distribution of question 1 to question 14 of the questionnaire OHIP-14

Sl No.	OHIP Variable	Never	Hardly Ever	Occasionally	Fairly Often	Very Often
Functional limitation						
1.	Trouble pronouncing words	1229(79.2)	150(9.7)	105(6.8)	51(3.3)	17(1.1)
2.	Sense of taste worse	1092(70.4)	285(18.4)	109(7.0)	66(4.3)	0(0.0)
Physical pain						
3.	Painful aching in mouth	409(26.4)	261(16.8)	548(35.3)	278(17.9)	56(3.6)
4.	Uncomfortable to eat foods	548(35.3)	302(19.5)	390(25.1)	266(17.1)	46(3.0)
Psychological discomfort						
5.	Been self-conscious	580(37.4)	347(22.4)	429(27.6)	155(10.0)	41(2.6)
6.	Felt tense	1016(65.5)	160(10.3)	212(13.7)	164(10.6)	0(0.0)
Physical disability						
7.	Difficult to relax	1017(65.5)	236(15.2)	230(14.8)	69(4.4)	0(0.0)
8.	Been embarrassed	1112(71.6)	225(14.5)	150(9.7)	65(4.2)	0(0.0)
Psychological disability						
9.	Felt life is less satisfying	1112(71.6)	294(18.9)	107(6.9)	39(2.5)	0(0.0)
10.	Diet has been unsatisfactory	1232(79.4)	141(9.1)	153(9.9)	26(1.7)	0(0.0)
Social disability						
11.	Had to interrupt meals	1411(55.6)	102(31.5)	25(12.1)	14(0.8)	0(0.0)
12.	Been irritable with others	1127(72.6)	276(17.8)	119(7.7)	30(1.9)	0(0.0)
Handicap						
13.	Difficulty doing usual jobs	1162(74.9)	222(14.3)	168(10.8)	0(0.0)	0(0.0)
14.	Totally unable to function	1263(81.4)	197(12.7)	66(4.3)	26(1.7)	0(0.0)

Table 4: Overall comparison of OHIP-14 SCORE among different age groups

	N	Mean	Std. Deviation	F statistic	p value*
18-34 yrs	170	6.50	6.87		
35-44 yrs	226	9.06	7.54	5.51	<0.01
45-64 yrs	274	8.88	7.72		
65-74 yrs	82	9.65	6.65		
Total	752	8.48	7.44		

* one-way ANOVA test

Table 5: Overall comparison of OHIP-14 scores in dental diseases

Variable	Mean±SD	p value
Caries experience		
Absent	3.84±4.04	< 0.001
Present	9.09±7.6	
Gingival bleeding		
Absent	8.64±8.6	0.762
Present	8.43±7.0	
Pocket status		
Absent	7.8±8.6	0.098
Present	8.8±6.8	
CAL Status		
Absent	7.6±8.1	0.012
present	9.0±6.9	

Table 6: Multi variate logistic regression model for predictors of poor OHR QoL

Independent Variable	p value	Adjusted Odds ratio	95% CI	
			Lower	Upper
Older Age	.073	1.251	.980	1.597
Female Gender	.000	1.613	1.289	2.018
Poor Socioeconomic status	.720	1.045	.820	1.333
Poor Oral hygiene status	.000	1.895	1.480	2.425
Presence of Tooth loss	.538	0.933	.748	1.164
Presence of caries experience	.000	2.072	1.434	2.995
Presence of periodontal pockets	.000	1.947	1.526	2.484
Presence of oral mucosal lesions	.663	0.947	.742	1.209
Alcohol use	.000	0.305	.158	.588
Tobacco use	.937	1.014	.721	1.425

The model showed that presence of caries experience was the most important factor associated with a poor OHRQoL. Subjects with caries experience had poorer OHRQoL with an odds ratio of 2.072 whereas subjects with periodontal pockets had higher odds of developing poor OHRQoL. Presence of oral mucosal lesions was not significantly associated with development of poor OHRQoL. However, alcohol consumption had a positive influence on the oral health related quality of life. The goodness of fit for the model verified using Hosmer and Lemeshow Test ($p < 0.05$) indicated that the goodness of fit of the model was acceptable with a Nagelkerke R Square value of 0.127.

DISCUSSION

The present study was a population-based study using the short form of the OHIP with 14 standardized questions that has previously been translated into the Malayalam Language with a an internal consistency scale, Cronbach α of 0.90, greatly exceeding the minimum recommended level for this instrument. The sample was chosen to be representative of Kerala population and we believe that this is the first study to examine this section of the population concerning oral health quality of life. Kerala is considered to have the best health care system in India.

Our study signifies the disturbing status of oral health status in the state, with dental caries and periodontal disease still contributing the major oral health concerns. Almost 69% of sample population is affected by dental caries and about 75% with gingival bleeding or manifestations of periodontitis.

The high incidence of dental caries and severe periodontitis in the 45-64 year age group may reflect the lack of priority to oral health care due to socio economic burden carried out by the working age population. Our results demonstrated that the prevalence of dental diseases was significantly lower in the higher age group which may be due to the lower sample size of the particular group compared to others. Alternatively, this can reflect the positive correlation

between oral health and longevity, as well as the role of oral health in promoting general health and QoL.

In India, most of the contributors to oral disease burden is because of behavioral risk factors like poor or cariogenic diet, lack of oral hygiene care and tobacco use are major contributors to oral disease burden across age groups.¹⁰ In our study also the study also tobacco consumption was found to be similar to that of national statistics.¹¹

The mean OHIP score in our study was 8.51 which are comparatively low compared to other national and regional studies reporting the impact of various oral diseases/conditions with OHRQoL ranging from 10.12 ± 1.4 to 25.46 ± 8.4 .^{12, 13} This could be because of comparatively better health facility available in Kerala compared to rest of India. The difference may also be attributed to the perception differences in subjective impact depending on the specific characteristics of the diseases.

Older populations are reported to have relatively a higher percentage of oral lesions and dental diseases than that of younger populations.¹⁴ In the present study also age of the patient was found to influence the severity of the oral manifestation ultimately affecting the quality of life. In accordance with previous reports, it was found that females were significantly affected with poor oral health related quality of life and weigh their oral health more when they evaluate their quality of life.^{15, 16}

Presence of oral mucosal lesions was not significantly associated with development of poor OHRQoL which may be due to inadequate sample population with active mucosal complaints. In the present study these patients had major complaints of functional limitation and pain. This may be because of the synergistic effects of the number of lesions at a time and the symptoms that they produce and the findings are in agreement with previous reports.¹⁷

In our study, when predictors were evaluated separately in the univariate model, predictors of periodontal diseases, like gingival bleeding and periodontal pocket were not significantly affecting the oral health related

quality of life where as CAL showed significant effect on OHIP scores. However, when the multinomial logistic regression model was analyzed, subjects with periodontal pockets had higher odds of developing poor OHRQoL. The results of our study indicate that periodontal disease may exert an impact on the QoL of individuals, with a greater severity of disease related to a greater impact. This suggests that the provision of periodontal treatment to the population can greatly improve their QoL. Goel et al. had a similar finding and concluded that periodontal disease is directly associated with OHRQoL and that treatment of the disease may enhance QoL from a patient's perspective.¹⁸

It was found that subjects with high caries experience scores had poor OHRQoL in contrast to a Chinese study.¹⁹ Nevertheless, these findings were in line with those of other studies especially those among Indian population.^{20, 21} All OHRQoL domains were affected by untreated dental caries. The multivariate analysis demonstrated that the subjects with caries experience had poorer OHRQoL with an odds ratio of 2.072 and QoL measurements can play a key role by helping in the evaluation of the subjective dimensions of the disease and its treatment.

OHIP 14 is a generic tool which may not be enough to tap the subtle changes in certain OHRQoL brought about by oral diseases. Malayalam version of OHIP 14 was not available, so the translation validation and cultural adaptation was done. To our knowledge, there are only very few studies conducted in India stating the impact of oral diseases on OHRQoL. Our study is an addition to this limited literature assessing the impact of various factors of OHRQoL. However future longitudinal studies with more number of patients are needed to confirm this effect.

CONCLUSION

An individual's health status is determined by numerous factors among which oral health is an important contributor. The present study denoted the high prevalence of oral diseases especially, dental caries and periodontal diseases in Kerala population. The impact of oral health status on QoL is definitely disturbing and highlights the need for awareness of oral healthcare among population. We recommend that a population based study be carried out to exactly assess the oral health burden in the state and an effective oral health policy be formulated accordingly.

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