Original Research Article

Assessment of oral health related quality of life (OHRQL) in patients with periodontitis: A cross sectional survey

Greeshma Sivadas T[1,*], Bindu R Nayar[1]

[1]Dept. of Periodontology, Government Dental College, Thiruvananthapuram, Kerala, India

A B S T R A C T

Background: Health related quality of life is attaining more attention and is considered as an important marker of patients' perception of disease. The impact of oral diseases on the oral health related quality of life (OHRQL) is of immense importance, but very few studies exist on the impact of periodontitis on quality of life.

Aim: This study was aimed to find out the relationship between periodontitis and OHRQL.

Setting and Design: A cross sectional survey was conducted at the outpatient Department of Periodontics, Government Dental College, Thiruvananthapuram, Kerala among 158 patients presented with periodontitis who satisfied the inclusion criteria.

Materials and Methods: Data collection was done by using a proforma for recording age, gender and socioeconomic status. Clinical periodontal parameters such as clinical attachment loss (CAL), probing pocket depth (PPD), simplified oral hygiene index (OHI-S), gingival index (GI) using UNC 15 probe were examined. OHRQL was assessed using the Malayalam version of OHIP-14.

Statistical analysis: Descriptive statistics were used to describe quantitative and qualitative variables. Association between periodontitis and OHRQL was analysed using Spearman's correlation coefficient. Severity of periodontitis and OHRQL and each domains of quality of life and was determined using Kruskal-Wallis test.

Results: There is statistically significant association of OHRQL with CAL (r=0.16; p= 0.04). Other periodontal parameters (PPD, OHIS and GI) depicted a very weak positive correlation with OHRQL but none was statistically significant (r=0.15, p=0.07; r=0.13, p=0.10 and r=0.14, p=0.08 respectively). There is no statistically significant association between severity of periodontitis and OHRQL (p=0.24). The maximum affected domains are physical pain, psychologic discomfort and physical disability among the seven domains.

Conclusion: Periodontitis have a definite impact on the OHRQL of this selected population. The perception of OHRQL can vary with difference in cultural background and between individuals. Further long term studies with a larger sample size and comparison with a healthy periodontium is necessary to validate the results.

1. Introduction

Health-related quality of life (HRQL) is a complex and multidimensional construct composed of a set of concepts. It refers to an individual's perception of their own physical and mental health, and their ability to react to factors in the physical and social environment.[1] This is now

* Corresponding author.
E-mail address: drgreeshmaperio@gmail.com
(Greeshma Sivadas T).

recognized as a valid parameter in patient assessment in nearly every area of physical and mental healthcare, including oral health. Any disease that could interfere with the activities of daily life may have an adverse effect on the general quality of life.[2] The extent to which oral conditions disrupt normal social role functioning, leading to major behavioural changes are known as socio dental indicators or oral health-related quality of life (OHRQL) measures. Specifically, it includes how oral health affects a person's functioning, such as chewing, biting, and speaking; experiences of pain/discomfort; and psychologic and social well-being. A very few studies had incorporated social indicators to account for the consequences of oral diseases which led Cohen and Jago to propose the use of socio-dental indicators.[3] Any measure of health should assess not just the presence or absence of disease, but also the social and emotional aspects of health from the perspective of patient. A paradigm shift from a treatment-centric approach to a patient-centric approach is desired to provide a more holistic model of care for the patients.[4] To date, there is no universal agreement on the definition of oral health-related quality of life (OHRQL); however, consensus maintains that OHRQL is a subjective construct and best reported from the patient's perspective. A range of measures have been developed and validated to measure the OHRQL in the recent years and one of the most widely used is the Oral Health Impact Profile (OHIP).[5] OHIP intends to assess the 'social impact' of oral disorders, that is, the dysfunction, discomfort and disability caused by these conditions. The original, long form instrument measures how oral health affects individuals' quality of life using 49 questions. The short form, consisting of 14 questions (OHIP-14), has emerged as a powerful tool in the assessment of oral health–related quality of life.[6] The dental patient-reported outcomes measures (dPROM) with the most available validated language versions is OHIP with its several versions[7] and is a better instrument to reach its target audience. Periodontal disease produces a wide range of clinical signs and symptoms through inflammation and destruction of the periodontium. The prevalence of periodontitis in India is more than 50%[8] and that of Kerala is 63.5%.[9] As age increases the prevalence of periodontitis becomes greater than 70%. The mild to moderate form of chronic periodontitis is the most common, with prevalence estimates ranging from 13% to 57%.[10–12] Severe periodontitis affects 5% to 15% of the general population[13] and is considered to be a major oral health problem.[14] The impact of periodontitis on quality of life has received relatively little attention. This may be due to the few symptoms experienced by periodontal patients in the early stages of the disease, in contrast to other oral diseases and conditions.[15] Studies showed that periodontal disease has an effect on OHRQL in adults which is a negative impact.[16–18] A correlation between extent and/or severity of periodontal disease and poorer OHRQL has been demonstrated in various studies.[19,20] Tooth loss, which is the likely endpoint of untreated periodontal disease, has also conclusively been reported to impair OHRQL.[21] In recent times, the importance of periodontal care has also focused on associations between periodontal health and general health, such as cardiovascular disease, respiratory diseases and diabetes. In 2013, LS- Al Harthi et al. in a systematic review stated that six of the seven studies reported a negative impact of periodontitis on OHRQL.[22] Among these seven studies the study by Marino et al. in 2008 showed no direct association between periodontal status and mean OHIP score.[23] Haag et al.[24] in 2017 in a systematic review observed mixed and inconclusive findings regarding the direction of association between periodontal disease and health-related quality of life. In 2020 Fuller et al.[25] stated that patients with periodontitis have worse OHRQL outcomes when compared to periodontally healthy patients, and these differences were large and clinically meaningful. These studies help to recognize unmet needs regarding periodontal disease and the need to raise the awareness of periodontal disease among the general public.[26] Such studies are not reported to date in this population of Kerala. Hence, this study was conducted to assess the effect of periodontitis and gingivitis on OHRQL using OHIP-14.

2. Materials and Methods

2.1. Study Subjects

A descriptive study was conducted among patients aged above 18 years attending the Out Patient Department of the Periodontics, Government Dental College, Thiruvananthapuram, Kerala. The duration of the study was one year (November 2016- October 2017). All participants gave written informed consent and the study protocol was reviewed and approved by the Institutional Ethics Committee, Government Dental college, Thiruvananthapuram, IEC certificate number IEC/R/07/2015/DCT/dtd 1/12/2015 dated 01/12/2015.

Inclusion criteria were individuals above 18 years of age with periodontitis who are willing to participate in this study and individuals with at least 6 natural teeth. Exclusion criteria were pregnant and lactating individuals and patients with uncontrolled systemic diseases, who need emergency care and antibiotic coverage before probing.

The Sample size was estimated using the formula $n = \frac{Z\alpha^2 S^2}{d^2}$ with a precision of one unit and obtained a value of 149.10 which is rounded to be 150.[27]

2.2. Data Collection

It was done using a proforma. The proforma was having three components. First part contains sociodemographic variables. The second part is the clinical examination and the third part is the measurement of OHRQL.

2.3. Patient Characteristics

The sociodemographic variables included age, gender, education, occupation and monthly income. Socioeconomic status is recorded based on Kuppuswamy scale 1972 updated with 2015 Consumer Price Index for Industrial Workers (CPI-IW). It is the total score obtained by adding the scores of education, occupation and income. It has five classes- lower, upper lower, lower middle, upper middle and upper.

2.4. Clinical Examination

This contains the periodontal status (simplified oral hygiene index, gingival index, mean periodontal probing depth and mean clinical attachment loss) and complete periodontal examination under proper illumination. Patients with attachment loss are considered as periodontitis cases and those without attachment loss but with bleeding on probing were considered as gingivitis. Clinical measurements were made to record the following parameters such as Simplified oral hygiene index (OHIS)- Greene & Vermillion, 1964; Gingival Index (GI)- Loe and Silness, 1963; Clinical attachment loss and Mean Periodontal Probing Depth. The probe was inserted parallel to the long axis of the tooth and 'walked' circumferentially around each tooth to detect the areas of deepest penetration. As the resistance to further penetration was noted, readings were recorded to the nearest millimetre.

2.5. Oral health-related quality of life

The third part contains the questionnaire consisting of OHIP-14 (Table 1) for measuring the OHRQL. Both English and Malayalam version (Figure 1) was made available. Questions were answered on a Likert scale, 0=Never; 1= Hardly Ever; 2= Occasionally; 3= Fairly often; 4= Very Often. It consists of 7 domains with 2 questions in each domain. Each question carries a minimum score of 0 and a maximum score of 4 and has a total score of 56.

The Malayalam version of OHIP-14 was derived. The translation and back translation of OHIP-14 were done by experts well versed in Malayalam and English. The questionnaire was then subjected to face and content validation. Based on the changes proposed by the experts during content validation, the wording was changed slightly to improve the level of understanding. Then Pilot testing was done on 20 patients above 18 years in OPD of Department of Periodontics, GDC Thiruvananthapuram. The questionnaires were administered as a face-to-face interview.

2.6. Statistical analysis

Data were analysed using statistical package for social sciences (SPSS version 16). Descriptive statistics were used to describe quantitative and qualitative variables association between periodontitis and OHRQL was analysed using Spearman's correlation coefficient. Severity of periodontitis and OHRQL and each domains of quality of life and was determined using Kruskal-Wallis test.

3. Results

A total of 158 patients were enrolled in this study. Patients with attachment loss are considered as periodontitis cases and those without attachment loss but with bleeding on probing were considered as gingivitis. The reliability of the pilot tested questionnaire was assessed and obtained a good result since its value is more than 0.7. ICC was statistically significant.

The mean age of 158 patients is 42.4 ± 10.6 with the lowest age 18 and highest 70. The socioeconomic status in this study which was recorded according to Kuppuswamy Scale1972 updated with 2015 CPI (IW) had four classes- upper lower, lower middle, upper middle and upper. There were no patients who belong to lower class.
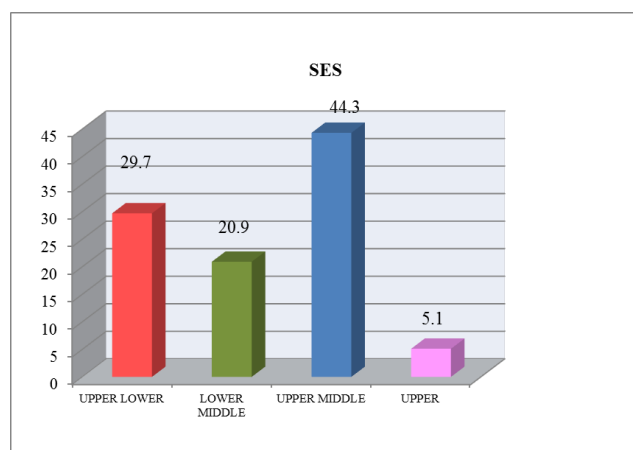
Graph 1: Bar chart of SES distribution

Patients with chronic periodontitis were 153 and the rest 5 of them were having aggressive periodontitis according to the 1999 Consensus Classification.[28] According to AAP guidelines,[29] subjects were categorized into mild periodontitis (1-2mm CAL), moderate periodontitis (3-4 mm CAL), severe periodontitis (≥5mm CAL) based on severity.

The OHRQL was measured using OHIP-14 questionnaire which consists of 7 domains with 2 questions in each domain (Table 1). Each question carries a minimum score of 0 and a maximum score of 4 and has a total score of 56.

In the present study the domains 2, 3 and 4 were the most affected which implies that periodontitis has caused physical pain, psychologic discomfort and physical disability. The least affected domain is domain 1; Functional

ചോദ്യാവലി

ക്രമ നം.	ചോദ്യം	സ്കോർ
1	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം, സംസാരിക്കുമ്പോൾ ഏതെങ്കിലും വാക്കുകൾ ഉച്ചരിക്കാൻ വിഷമം അനുഭവപ്പെട്ടിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
2	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം ആഹാരത്തിന്റെ സ്വാദ് അറിയാനുള്ള കഴിവ് കുറഞ്ഞതായി അനുഭവപ്പെട്ടിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
3	നിങ്ങൾക്ക് എപ്പോഴെങ്കിലും വായിൽ വേദനയുണ്ടായിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
4	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം ഏതെങ്കിലും തരത്തിലുള്ള ഭക്ഷണങ്ങൾ കഴിക്കുമ്പോൾ അസ്വസ്ഥത അനുഭവപ്പെട്ടിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
5	നിങ്ങളുടെ പല്ല്, വായ എന്നിവയുടെ ഏതെങ്കിലും പ്രശ്നങ്ങൾ നിങ്ങളെ അലട്ടുന്നുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
6	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾമൂലം നിങ്ങൾക്ക് മാനസിക പിരിമുറുക്കം (ടെൻഷൻ) ഉണ്ടായിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
7	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം നിത്യാഹാരത്തിൽ അതൃപ്തി അനുഭവപ്പെടാറുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
8	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം ഭക്ഷണം കഴിക്കുന്നത് തടസ്സപ്പെട്ടിട്ടുണ്ടായിരുന്നോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
9	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം നിങ്ങൾക്ക് ശാന്തമായിരിക്കുന്നതിൽ ബുദ്ധിമുട്ടുണ്ടായിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
10	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം നിങ്ങൾക്ക് അല്പം നാണക്കേട് അനുഭവപ്പെടാറുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
11	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നങ്ങൾ മൂലം മറ്റുള്ളവരെ അഭിമുഖീകരിക്കേണ്ടി വരുമ്പോൾ അല്പം അസ്വസ്ഥരാകാറുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
12	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നത്താൽ നിങ്ങൾ നിത്യേന ചെയ്യുന്ന ജോലികളിൽ ബുദ്ധിമുട്ട് (പ്രയാസം) അനുഭവപ്പെട്ടിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
13	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നത്താൽ ജീവിതം പൊതുവെ വിരസമായി അനുഭവപ്പെട്ടിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും
14	നിങ്ങളുടെ പല്ലിന്റെയോ വായയുടെയോ പ്രശ്നത്താൽ നിങ്ങൾ പൂർണ്ണമായും (തികച്ചും) പ്രവർത്തനരഹിതരായിരുന്നിട്ടുണ്ടോ?	0 – ഒരിക്കലുമില്ല 1 – വളരെ അപൂർവ്വമായി 2 – വല്ലപ്പോഴും/ചിലപ്പോൾ 3 – മിക്കപ്പോഴും 4 – എല്ലായ്പ്പോഴും

Fig. 1: Malayalam Version of OHIP-14 Questionnaire

Table 1: OHIP-14 Questionnaire

Domain	Sl.No	Question	Score
Functional limitation	1	Have you had trouble pronouncing any words because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4=Very Often)
	2	Have you felt that your sense of taste has worsened because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
Physical pain	3	Have you had painful aching in your mouth?	(0=Never; 1= Hardly Ever, 2= Occasionally, 3= Fairly often 4= Very Often)
	4	Have you found it uncomfortable to eat any foods because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
Psychologic discomfort	5	Have you been self-conscious became of your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
	6	Have you felt tense because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
Physical disability	7	Has been your diet been unsatisfactory because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
	S	Have you had to interrupt meals because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
Psychologic disability	9	Have you found it difficult to relax because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
	10	Have you been a bit embarrassed because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
Social disability	11	Have you been a bit irritable with other people because of problems with your teeth or mouth?	(0=Never; 1= Hardly ever; 2= Occasionally, 3= Fairly often; 4= Very Often)
	12	Have you bad difficulty doing your usual jobs because of problems with your teeth or mouth?	(0=Never; 1= Hardly Ever, 2= Occasionally, 3= Fairly often; 4= Very Often)
Handicap	13	Have you felt that life in general was less satisfying because of problem with your teeth or mouth?	(0=Never; 1= Hardly Ewer, 2= Occasionally, 3= Fairly often 4= Very Often)
	14	Have you been totally unable to function because of problem with your teeth or mouth?	(0=Never; 1= Hardly Ever, 2= Occasionally, 3= Fairly often 4= Very Often)

Table 2: Mean of different variables.

Variables	Mean±SD
Age	42.4±10.6
CAL	3.16±0.89
PPD	2.86±0.73
Oral hygiene status	2.3±0.9
Gingival status	1.5±0.3

Table 3: Distribution of severity.

	Frequency	Percent
Mild	44	27.85
Moderate	100	63.29
Severe	14	8.86
Total	158	100

Table 4: Distribution of mean and median of each domain.

| Domains	Mean ± SD	Median
1	0.81 ±1.49	0
2	5.11±1.63	5
3	4.46±1.98	5
4	4.41±2.22	5
5	2.99±2.30	3
6	3.50±2.24	3
7	1.81±1.75	1.5

Table 5: Distribution of mean, median and mode of OHRQL score obtained in mild, moderate and severe groups.

Severity	N	Mean ± SD	Median	Mode	Minimum	Maximum
Mild	44	21.45±9.74	21	21	0	45
Moderate	100	23.26±9.77	22	21	2	47
Severe	14	26.93±11.76	27	27	8	51
Total	158	23.08±9.98	22	21	0	51

Table 6: Correlation of OHRQL and periodontitis using different variables

	Variables	Correlation coefficient	p value
OHRQL	CAL	0.16	0.04*
	Mean Probing Pocket Depth	0.15	0.08
	Gingival status	0.14	0.08
	Oral hygiene status	0.13	0.1
	Age	0.03	0.7
	Gender	0.04	0.58
	SES	-0.13	0.11

*p value<0.05 is statistically significant
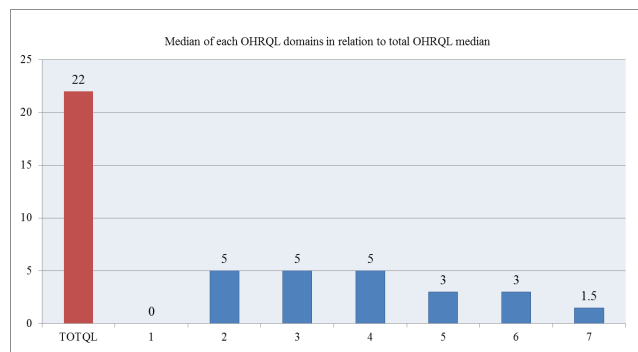
Graph 2: The median of domains in relation to the total OHRQL scores

limitation.

Correlations were computed using the Spearman rank correlation to assess the relationship between OHRQL scores and periodontitis in terms of variables such as clinical attachment loss (CAL), mean probing pocket depth (mean PPD), oral hygiene status, gingival status and sociodemographic variables. CAL depicted a very weak correlation which is statistically significant. All other variables except SES showed a very weak positive correlation whereas SES showed a very weak negative correlation. No statistical significance was seen in any of these variables except CAL when compared with OHRQL. The association between OHRQL and severity of periodontitis was analyzed using Kruskal Wallis test and no statistically significant difference was obtained (p=0.24). The Kruskal-Wallis test was used to compare each domains of OHRQL and the severity of periodontitis and no statistically significant differences were obtained.

4. Discussion

Oral health related quality of life is a rapidly growing notion akin the health related quality of life in the medical health care but in a lesser pace. This has an obvious role in dentistry since they treat human beings and not merely teeth and gums. OHRQL flourished since 1980s with the development of a number of tools for measuring the patient perception of disease or the "patient based outcomes".[5,30,31] It gains support for health policies and legislation, help to allocate resources based on the unmet needs and guides in the development of strategic plans.[2,32,33] Integration of self-perception and periodontal treatment should lead professionals to design health strategies that prevent decreases in quality of life. Patient-centered assessments are particularly important in periodontal treatment in which their concerns may differ from the traditional clinical

Table 7: Kruskal-Wallis Test of Significance between OHRQL and severity of Periodontitis

	Severity	N	Mean Rank	X^2	df	p value
OHRQL	1	44	72.22			
	2	100	80.46	2.88	2	0.24
	3	14	95.54			
	Total	158				

Table 8: Kruskal-Wallis test comparing each OHRQL domain with severity of periodontitis

	Domainl	Domain2	Domain3	Domain4	Domain5	Domain6	Domain7
X^2	2.96	1.1	3.6	0.48	1.8	2.17	0.22
p value	0.23	0.58	0.17	0.79	0.41	0.34	0.9

endpoints. Research focusing on the impact of periodontitis on OHRQL came increasing in the recent decades and has been reported to have an impact on the OHRQL. [33–35] The present descriptive survey is the first study in Kerala, conducted to know whether periodontitis will influence the Oral Health Related Quality of Life.

In this study the questionnaires were administered at the time of the patient visit as a face-to-face interview which had an advantage of 100% response. Self-assessment measures were used in studies of Saito et al.[36] and Jansson et al.[27] (which had a low response rate of 46%) while it was a mailed questionnaire in that of Cunha-Cruz et al.[19] The observation from this study shows that the most of the periodontitis patients belongs to upper middle class. Eltas et al.[37] and Bernabe et al.[20] have recorded the educational status and income as separate variables in that the latter had most of them belonging to below graduate level.

The median of the total OHIP-14 score is 22 among patients with periodontitis. The maximum score obtained is 51 and the minimum was 0. [Graph 2,Table 3]. The OHIP-14 scores in this study did not display the "floor effect" (a majority of scores accumulate at the bottom of the scale which was considered as a weakness of OHIP tool).[38] In Jansson et al.[27] the mean total OHIP-14 score was 4.38±6.23 and in each of the three groups were 3.91±5.39, 3.81±5.29 and 8.47±10.38 respectively showing the display of "floor effect".

In the current study median values of total OHIP-14 scores were 21 for mild periodontitis group, 22 for moderate periodontitis and 27 for severe periodontitis group [Table 3]. This depicts that the patients with severe periodontitis are more affected in their OHRQL due to the disease which is in agreement with the studies of Meusel et al.[39] using the OHIP-14Br and showed that patients with severe periodontitis had worse OHRQL than those with mild/moderate periodontitis. The domains social disability and handicap were less affected in the current study. The domains 2, 3 and 4 were the most affected which implies that periodontitis had high impacts on their OHRQL in the physical pain, psychologic discomfort and physical disability while functional limitation (domain 1)

is the least affected. [Graph 2]. The findings of the current study is in agreement with most of the reported previous studies; Jansson et al.,[27] Ng & Leung,[17] Cunha-Cruz et al.,[19] Saito et al.[36] Fuller et al.[25] which proved that the domains physical pain, psychologic discomfort and physical disability (domains 2, 3 and 4) may be compromised in patients with periodontitis. The impacts on these three domains itself suggest that periodontitis have a considerable effect on OHRQL of this selected population of this state. This substantiates that periodontitis may not be considered as a silent disease.

The current study depicts a very weak positive correlation between CAL and OHRQL which is statistically significant (r=0.16; p=0.04) [Table 6]. There is a very weak correlation between OHRQL and mean PPD but it is not statistically significant in the present study (r = 0.15, p=0.08). Similar results was obtained regarding GI (r = 0.14, p = 0.08) and OHI (r = 0.13, p = 0.10). Marino et al.[23] reported that there was no direct association between PPD>5 mm and mean OHIP scores in line with the current study. Eltas et al.[37] found no statistically significant association between OHIP-14 and mean CAL (r= 0.104) but poor OHRQL was significantly associated with attachment loss, that is the percent of sites in which CAL ≥ 4mm (r= 0.345, p<0.001). The percentage of deep PD sites (PD ≥ 4mm) was significantly associated with oral health impact (r=0.164, p<0.05) but there was no statistically significant association of mean PD with OHIP-14 score (r=0.087) in the same study. They emphasized that the percentage of deep PD sites was significantly associated with oral health impact. They also obtained a statistically significant correlation between bleeding on probing and OHIP-14 scores (r=0.45, p<0.001). The association between OHIP-14 scores and severity of periodontitis was analyzed using Kruskal Wallis test and no statistically significant difference was obtained (p=0.24) [Table 7]. Similar result was observed between the periodontal condition and OHIP scores in a study by Biazevic et al.[40] (p=0.05).

But the small sample size and lack of a control group limits the generalization. The result of the present study may be due to the smaller number of subjects in the severe group.

Moreover, the patients presenting for an initial periodontal examination have frequent problems related to teeth, gums and denture that may affect OHRQL measurements. Statistically significant association was found between the severity of periodontal disease and OHIP-14 scores (p<0.05) in the study by Habashneh et al.[41] There was a statistically significant association between the severity of periodontal disease and OHRQL scores (p < 0.05) in a study by Vaziri et al.[42]

The numbers of missing teeth is a significant parameter for evaluating periodontitis and it can have significant impact on the OHRQL as reported in studies such as Jansson et al.,[27] Ng & Leung,[17] and Cunha-Cruz et al.[19] Since tooth loss is the only true end point of periodontitis whereas the rest (missing teeth, mobility of teeth, pathologic migration, food impaction, interference with eating or chewing and radiographic measurement of bone loss) are only surrogate. There is a very weak statistically significant correlation of CAL with OHRQL depicted in this study. The lack of a standard definition for periodontitis may have affected the outcome of this research and also relatively small sample size. The failure of the study to demonstrate any statistically significant association between OHRQL and severity of periodontitis is probably due to lack of a healthy comparative group. Also, quality of life measures includes subjective assessments, and patients may be inconsistent in expressing their personal views. Therefore, the major limitation of this study is that a single instrument to assess oral health related quality of life may not be culturally acceptable.

The findings of the study is that it shows that periodontitis had high impacts on their OHRQL in the physical pain, psychologic discomfort and physical disability and these may be compromised in patients with periodontitis. But functional limaitation (domain 1) is the least affected domain. [Graph 2],. These findings is in agreement with most of the reported previous studies; Jansson et al.,[27] Ng & Leung,[17] Cunha-Cruz et al.,[19] Saito et al.[36] Physical pain is the most affected domain in the current study which is in accordance with Eltas et al.[37] and Habashneh et al.[41] The association between OHIP-14 scores and severity of periodontitis depicted no statistically significant difference (p=0.24) [Table 7] which is similar to the results by Biazevic et al.[40] (p=0.05).

The instrument OHIP-14 indicated discriminative validity in recognizing self-reported symptoms and clinical evidence of periodontitis. Thus, it wouldn't seem to be the stronger candidate for a short and easily applicable OHRQL measure for periodontitis from this survey. It may be necessary to develop a condition specific version of the OHRQL instrument. In 2020, Wong et al.[43] in an umbrella review of systematic reviews strongly recommended the development of a general and oral health-related quality of life instrument specific for periodontal disease.

However, since the study participants were chosen from patients referred to our Department of Periodontology, they had more oral health complaints compared to a normal population. In addition, the peoples' perceptions of quality of life may change over time and an information bias may exist in this type of study. This may be the most important reason for the result obtained. It can also be due to the difference in cultural background of the sample. Social desirability bias may also have influenced the result; i.e. some people may be reluctant or inconsistent in disclosing their perception of OHRQL when self-reports are used.

Population characteristics such as disease severity, socio-economic status (SES) and oral health concern are all likely to affect the perception of oral disease since differences in the literacy level, cultural & socioeconomic background and even between individuals can cause variations. The research was conducted in a tertiary center which might have impacted on the perceptions of significance of their condition and so the inclusion of subjects at the community level may be included in future surveys. Also research on this particular terrain requires a large sample size with an analytic comparative group with normal periodontium to assess changes in the periodontal status over time as well as at the individual level.

5. Conclusion

The study concluded that periodontitis had an impact on quality of life in terms of CAL but not in different grades of severity of chronic periodontitis. The study also highlights that periodontitis impacts maximum on Physical pain, Psychologic discomfort and Physical disability domains and lack of knowledge and awareness on dental treatment and maintenance care. The relatively small size and lack of a healthy control group limits its generalizability. Differences in culture and even at the individual level also influence the result. Long term prospective studies with a large sample size and analytic comparative studies with the healthy periodontium as control at the community level are necessary to substantiate and validate the results and to contrive more on the influence of periodontitis on Oral Health Related Quality Of Life.

A longitudinal study design is recommended to explore more on the impact of periodontitis on OHRQL. This data can be further used as an evidential basis for increasing the oral health awareness as well as the need for improved health care access and also as baseline information for future research in OHRQL of periodontitis patients. Better understanding of the effects of periodontal disease from the individual's point of view is needed for the planning and evaluation of public health interventions as well as allocation of resources for better health care access. This data can also help in the field of dental education, better treatment planning with the patient participation and implementing health policies as these patient-based

outcomes are more subjective reflecting the true end points when combined with the traditional surrogate measures.

6. Acknowledgements

7. Conflict of Interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

8. Source of Funding

References

1. Dept US. Healthy People. Washington D C; 2000.
2. and MAS. Oral health-related quality of life: a broader perspective. *East Mediterr Health J*. 2006;12(6):894–901.
3. Cohen LK, Jago JD. Toward the formulation of sociodental indicators. *Int J Health Serv*. 1976;6(4):681–98.
4. Allen PF. Assessment of oral health related quality of life. *Health Qual Life Outcomes*. 2003;40:1–8. doi:10.1186/1477-7525-1-40.
5. Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. *Community Dent Heal*. 1994;11(1):3–11.
6. Slade GD. Derivation and validation of a short-form oral health impact profile. *Community Dent Oral Epidemiol*. 1997;25(4):284–90.
7. Macentee MI, Brondani M. Cross-cultural equivalence in translations of the Oral Health Impact Profile. *Community Dent Oral Epidemiol*;44(2):109–18.
8. Agarwal V, Khatri M, Singh G, Gupta G. CM Marya VK. Prevalence of Periodontal Diseases in India. *J Oral Heal Comm Dent*. 2010;4(7):7–16.
9. Jayakrishnan R, Sarma PS, Thankappan KR. Prevalence of Periodontal Disease among Adults in Trivandrum District. *Malays Dent J*. 2005;26(2):97–104.
10. Sheiham A, Netuveli GS. Periodontal diseases in Europe. *Periodontol*. 2000;29:104–21. doi:10.1034/j.1600-0757.2002.290106.x.
11. Albandar JM, Brunelle JA, Kingman A. Destructive periodontal disease in adults 30 years of age and older in the United States, 1988-1994. *J Periodontol*. 1999;70(1):13–29.
12. Corbet EF, Zee KY, Lo EC. Periodontal diseases in Asia and Oceania. *Periodontol*. 2000;29:122–52. doi:10.1034/j.1600-0757.2002.290107.x.
13. Burt B. Position paper: epidemiology of periodontal diseases. *J Periodontol*. 2005;76(8):1406–19. doi:10.1902/jop.2005.76.8.1406.
14. Petersen PE. World Health Organization global policy for improvement of oral health-World Health Assembly. *Int Dent J*. 2007;58:115–136.
15. Thomon WM. Oral health and oral health-related quality of life. *J Dent Health*. 2011;61:142–8.
16. Patel RR, Richards PS, Inglehart MR. Periodontal health, quality of life, and smiling patterns–an exploration. *J Periodontol*. 2008;79(2):224–31.
17. Ng SK, Leung WK. Oral health-related quality of life and periodontal status. *Community Dent Oral Epidemiol*. 2006;34(2):114–22.
18. Aslund M, Pjetursson BE, Lang NP. Measuring oral health-related qualityof- life using OHQoL-GE in periodontal patients presenting at the University of Berne, Switzerland. *Oral Heal Prev Dent*. 2008;6(3):191–8.
19. Cunha-Cruz J, Hujoel PP, Kressin NR. Oral health-related quality of life of periodontal patients. *J Periodontal Res*. 2007;42(2):169–76.
20. Bernabé E, Marcenes W. Periodontal disease and quality of life in British adults. *J Clin Periodontol*. 2010;37(11):968–72.
21. Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NH. Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. *Health Qual Life Outcomes*. 2010;8:126.
22. Al-Harthi LS, Cullinan MP, Leichter JW, Thomson WM. The impact of periodontitis on oral health-related quality of life: a review of the evidence from observational studies. *Aust Dent J*. 2013;58(3):274–7.
23. Mariño R, Schofield M, Wright C, Calache H, Minichiello V. Self-reported and clinically determined oral health status predictors for quality of life in dentate older migrant adults. *Community Dent Oral Epidemiol*. 2008;36(1):85–94.
24. Haag DG, Peres KG, Balasubramanian M, Brennan DS. Oral Conditions and Health-Related Quality of Life: A Systematic Review. *J Dent Res*. 2017;96(8):864–74.
25. Fuller J, Donos N, Suvan J, Tsakos G, Nibali L. Association of oral health-related quality of life measures with aggressive and chronic periodontitis. *J Periodontal Res*. 2020;55(4):574–80.
26. Pyo J, Lee M, Ock M, Lee J. Quality of Life and Health in Patients with Chronic Periodontitis: A Qualitative Study. *Int J Environ Res Public Health*. 2020;17(13):4895.
27. Jansson H, Wahlin Å, Johansson V, Åkerman S, Lundegren N, Isberg PE, et al. Impact of periodontal disease experience on oral health-related quality of life. *J Periodontol*. 2014;85(3):438–45.
28. Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol*. 1999;4(1):1–6.
29. Page RC, Eke PI. Case definitions for use in population-based surveillance of periodontitis. *J Periodontol*. 2007;78(7):1387–99.
30. Broder HL. Using psychological assessment and therapeutic strategies to enhance well-being. *Cleft Palate-Craniofac J*. 2001;38:248–54.
31. Mcgrath C, Bedi R. Measuring the impact of oral health on quality of life in Britain using OHQoL-UK(W). *J Public Health Dent*. 2003;63(2):73–80.
32. Sischo L, Broder HL. Oral Health-related Quality of Life: What, Why, How, and Future Implications. *J Dent Res*. 2011;90(11):1264–70.
33. Nagarajan S, Chandra RV. Perception of oral health related quality of life (OHQoL-UK) among periodontal risk patients before and after periodontal therapy. *Community Dent Health*. 2012;29(1):90–4.
34. Acharya S, Pentapati KC. Work stress and oral health-related quality of life among Indian information technology workers: an exploratory study. *Int Dent J*. 2012;62(3):132–6.
35. Grover V, Malhotra R, Dhawan S, Kaur G. Comparative Assessment of Oral Health Related Quality of Life in Chronic Periodontitis Patients of Rural and Urban Populations in Punjab. *Oral Health Prev Dent*. 2016;14(3):235–40.
36. Saito A, Hosaka Y, Kikuchi M, Akamatsu M, Fukaya C, Matsumoto S, et al. Effect of initial periodontal therapy on oral health-related quality of life in patients with periodontitis in Japan. *J Periodontol*. 2010;81(7):1001–9.
37. Eltas A, Uslu MO, Eltas SD. Association of Oral Health-related Quality of Life with Periodontal Status and Treatment Needs. *Oral Health Prev Dent*. 2016;14(4):339–47.
38. Locker D, Allen PF. Developing short-form measures of oral health-related quality of life. *J Public Health Dent*. 2002;62(1):13–20.
39. Meusel DR, Ramacciato JC, Motta RH, Júnior RBB, Flório FM. Impact of the severity of chronic periodontal disease on quality of life. *J Oral Sci*. 2015;57(2):87–94.
40. Biazevic MG, Rissotto RR, Michel-Crosato E, Mendes LA, Mendes MO. Relationship between oral health and its impact on quality of life among adolescents. *Braz Oral Res*. 2008;22(1):36–42.
41. Habashneh RA, Khader YS, and SS. Use of the Arabic version of Oral Health Impact Profile-14 to evaluate the impact of periodontal disease on oral health-related quality of life among Jordanian adults. *J Oral Sci*. 2012;54(1):113–20.
42. Vaziri F, Haerian A, Morowati MA, Amirian E, Gholamin P. Oral health-related quality of life and severity of periodontal disease. *J Int Oral Health*. 2016;8(4):440–4.

43. Wong LB, Yap AU, Allen PF. Periodontal disease and quality of life: Umbrella review of systematic reviews. *J Periodontal Res*. 2021;56(1):1–17.

Author biography

Greeshma Sivadas T, Junior Resident

Bindu R Nayar, Professor and Head