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Oral Health Literacy and its Association with Periodontal Status Among the Sub-Urban Population in India: A Cross-Sectional Study

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ABSTRACT

Background: Oral health literacy (OHL) is defined as the degree to which individuals have the capacity to obtain, process, and understand basic or oral health related information and services needed to make appropriate health decisions. OHL has been identified as a key in promoting oral health behaviors and preventing oral health diseases including periodontal diseases, this study aims to examine OHL levels among the Indian sub-urban population and to correlate its association with periodontal health status which was assessed with the help of different periodontal parameters, this cross-sectional study included 400 new patients reporting to Department of Periodontics, OHL was measured by REALD-30 (Rapid estimation of adult literacy in dentistry) score and personal oral health related practice and knowledge was assessed with the help of basic oral health related questionnaire , results revealed that_maximum number of patients having severe & moderate forms of periodontitis displayed low oral health literacy, Only 62% (between age group 18-35) and 38% (between age group 36-50) of the subjects came up with a score of high oral health literacy , a statistically significant association ($p<0.001$) was found between low OHL, low education levels and poor Periodontal/dental health, thereby concluding that lower OHL level is associated with low oral hygiene maintenance and a greater severity of Periodontal Diseases among the suburban population of India and undertaking measures in improving oral health literacy can further results in improvement in oral health related quality of life, better gingival and Periodontal health status and eventually better overall health.

Keywords: Health literacy, Oral health literacy, oral health, Periodontitis, Gingivitis, oral hygiene.

INTRODUCTION

Periodontal disease is a widespread chronic inflammatory dental disease which effects hard and soft tissue structures in oral cavity with potential for systemic health implications. Patients may present with a reversible condition: gingivitis, or an irreversible condition: periodontitis. This study focuses on patients with periodontitis as defined by the Centers for Disease Control and Prevention (CDC)[19] .Research indicates that complex relationships exist between periodontal disease and cardiovascular disease, pulmonary disease, diabetes, stroke, and preterm low birth weight [17.] Management of this disease requires detailed understanding of complex self-care regimens as well as strict adherence to recall intervals, aspects of care which are likely related to oral health literacy (figure-1). Health literacy levels tells the ability of an individual to understand instructions on, appointment slips, prescription drug bottles medical education brochures, doctor's directions ,

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consent forms, and the ability to negotiate complex health-care systems. Limited literacy skills among adults are widespread and are hypothesized to have a profound effect on the disparities that exist in personal health care. Similar to HL, OHL also indicates knowledge of the processes responsible for initiation and progression for dental diseases, the ability to apply that understanding, and the motivation required to incorporate self-care behaviours and practice[14].

As per population census of india 2011, the literacy rate of india is 74.04%[7] showing improvement of almost 9% as compared to previous census , due to lack of studies about OHL among Indian population this study is of prime importance in this field as Low health literacy is said to be associated with worse oral and later on general health mainly due to less understanding of prevention, maintenance, and self-care instruction and advice [20].

These skills are particularly critical in the management of chronic diseases, until recently oral health literacy has been largely ignored[13,8]. Preferably because it is assumed that people with low health literacy may struggle to comprehend and use information in written materials that contain new ideas or unfamiliar terminology. In contrast, people who exhibit a good understanding of the information provided in the health care setting adhere to instructions for self-care, postoperative precautions, medications, and follow-up schedule.

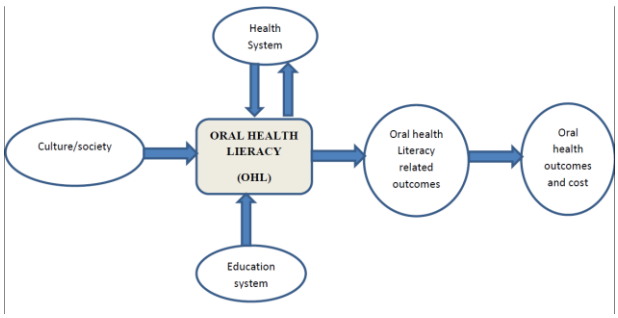

Fig 1: Association between Oral Health Literacy and Oral health outcomes.

Many health instructions and brochures have a level of difficulty beyond the average patient's reading ability and comprehension[2,5,24]., few studies have been conducted regarding the impact of oral health literacy on oral health behaviors and actual oral health status but due to a possible link between oral and systemic health it has gained utmost importance. One report by Parker EJ, et al[18] (2010) has indicated that oral health literacy related outcomes were risk indicators for each of the poor self-reported oral health domains among this marginalized population.

MATERIALS AND METHODS

Study Population

The participants included 400 new patients between the age group of 18-50 years, reporting to the Department of Periodontics, ITS Dental College, Greater Noida , Socio demographic status was recorded and an informed consent was taken from them , Patients with education level of high school or above and who can understand basic English language were included in the study, all the assessments were done by the single examiner to avoid any kind of biasing.

Assessment of oral health literacy (OHL)

Five dichotomous questions were asked to assess dental knowledge and oral health awareness and the respondents were given one point for each correct response to create a knowledge score:

a) It is normal to have bleeding of the gums while brushing or flossing your teeth-yes/no
b) Plaque causes gum disease if not cleaned from the teeth and gums –yes/no
c) Having persistent bad breath is a symptom of gum disease- yes/no
d) Pus between the gum and a tooth is common in healthy gums-yes/no
e) Teeth can become loose and move if you have gum disease.-yes/no

The oral health behavior component consisted of six categorical questions on oral hygiene and dental habits including: smoking habits, brushing frequency, flossing frequency, rinse frequency, and toothpaste use. Along with this, assessment of Oral health Literacy was also done with the help of previously validated instrument called REALD-30[14] (Rapid Estimation of Adult Literacy in Dentistry) which includes 30 dental-related words arranged in order of increasing difficulty. Words were read aloud by the subject to the interviewer, Because REALD-30 is a word recognition test, participants were asked not to try to phonetically deduce the words, but rather to skip a word if they did not

Table 1: Socio-demographic characteristics of the participants (N=400)

	AGE	Frequency N	Percent
	18-35 years	248	62.0
	36-50 years	152	38.0
	Total	400	100.0
	GENDER	Frequency N	Percent
	Male	238	59.5
	Female	162	40.5
	Total	400	100.0

Table 2: Co-relation between OHL scores with Age. (N=400)

			AGE		
			18-35 years	36-50 years	p-value
OHL-SCORE	Low	Count	132	88	0.670(NS)
		%	60.0%	40.0%	
	Moderate	Count	66	32	
		%	67.3%	32.7%	
	High	Count	50	32	
		%	61.0%	39.0%	
Total		Count	124	76	

Chi-square test NS-not significant S-significant

Table 3: Co-relation between OHL-scores and Education levels(N=400).

			EDUCATION			
			< 12th	Graduate	PG & Above	p-value
OHL-SCORE	Low	Count	148	52	20	0.001 (S)
		%	67.3%	23.6%	9.1%	
	Moderate	Count	42	40	16	
		%	42.9%	40.8%	16.3%	
	High	Count	6	34	42	
		%	7.3%	41.5%	51.2%	
Total		Count	196	126	78	
		%	49.0%	31.5%	19.5%	

			EDUCATION			
			< 12th	Graduate	PG & Above	p-value
OHL-SCORE	Low	Count	148	52	20	0.001 (S)
		%	67.3%	23.6%	9.1%	
	Moderate	Count	42	40	16	
		%	42.9%	40.8%	16.3%	
	High	Count	6	34	42	
		%	7.3%	41.5%	51.2%	
Total		Count	196	126	78	
Chi-square test- NS-not significant S-significant						

Table 4: Co-relation between OHL scores & periodontal parameters (N=400).

			OHL SCORE			
			LOW N(%)	MODERATE N(%)	HIGH N(%)	p-value
OHI-S	GOOD		32(14.5)	24(24.5)	72(87.8)	0.001 (S)
	FAIR		82(37.3)	66(67.3)	10(12.2)	
	POOR		106(48.2.3)	8(8.2)	0	
BLEEDING SCORES		MAX. NEGATIVE	86(39.1)	46(46.9)	70(85.4)	0.001 (S)
		MAX. POSITIVE	134(60.9)	52(53.1)	12(14.6)	
POCKET PROBING DEPTH (PPD)		MILD	30(13.6)	38(38.8)	74(90.2)	0.001 (S)
		MODERATE	86(39.1)	42(42.9)	8(9.8)	
		ADVANCED	104(47.3)	18(18.4)	0	
CLINICAL ATTACHMENT LEVEL (CAL)		MILD	42(19.1)	42(42.9)	78(95.1)	0.001 (S)
		MODERATE	70(31.8)	30(30.6)	4(4.9)	
		ADVANCED	108(49.1)	26(26.5)	0	
TOTAL			220	98	82	

know it. One point is given to each word pronounced correctly and an overall score between 0 (lowest literacy) to 30 (highest literacy) is generated.

The REALD-30 score was interpretated as low (≤21),moderate (22 to 25), or high (≥26).

Word recognition tests may demonstrate a strong correlation between general reading ability and reading comprehension[6], like many countries most of the oral health or general health related information/instructions are given in English language, with evidence suggesting that if a person has difficulty in reading/pronouncing dental-related words , then that person may additionally have difficulty with understanding and comprehension; a higher order skill require further for a healthy lifestyle[24]

Periodontal examination

Clinical examination was done with help of UNC-15 Periodontal probe , oral hygiene status was measured with the help of OHI-(S)[11] (Oral hygiene index-Simplified), other parameters to assess general gingival and periodontal health status was done by recording Gingival bleeding score (Ainamo and Bay)[1], CAL[9](clinical attachment level), PPD[3] (pocket probing depth)

Periodontal health status was determined based on extent and severity of periodontal disease using the CDC case definition of periodontal disease [10] that defines disease as following: Severe Periodontitis: ≥2 interproximal sites with CAL ≥6 mm (on more than one tooth) and ≥1 interproximal site with PD ≥5 mm; Moderate Periodontitis: ≥2 interproximal sites with CAL ≥4 mm (on more than one tooth) or ≥2 interproximal sites with PD ≥5 mm (on more than one tooth); Health or Mild Periodontitis: neither “moderate” nor “severe” periodontitis.

Statistics

Chi-square test was used to test REALD-30 scores and its association with patient characteristics (age, gender, education) and distribution of REALD-30 scores among different variables (OHI, PPD, CAL) to check for its association with Periodontal disease status.

All the statistical analyses were conducted with the statistical program SPSS version 16.0 and the significance level was set up at $p<0.5$ for all analysis.

RESULTS

Demographics and oral health Literacy scores among the 400 individuals included for the analysis, 62% (n=248) of the participants were of age group 18-35 years , and 38% (n=152) were between 36-50 years. out of which 59.5 %were male patient and 40.5% were female (Table-1).

Oral Health Literacy assessment

Literacy levels were measured cumulatively with the help of REALD-30 word recognition test and the questionnaire asked to assess oral health related quality of life ,Only 78 (19.5%) out of 400 participants revealed to have an education of P.G. (Post- graduation) & above out of which only 42 were identified as having high OHL scores and total 196 participants identified with education level of less than or equal to 12th grade out of which 148(67.3%) participants scored low on OHL scale (Table-3)

overall association between OHL scores and education level of the subjects revealed that majority of the participants showed low oral health literacy level , which is also attributed to the low education level among participants, on the contrary our results also showed that even some of the subjects with high level of education (that is graduate and above graduate) also counted low on oral health literacy scale.(Table-3).

53% of the participants who were interpreted as poor in Oral hygiene index-simplified (OHI-S) index were shown to have low oral health literacy scores,(Table-4) furthermore, when the relationship between low oral health literacy and periodontal health status were compared among subjects, 39.1 percent (n = 43) were of moderate periodontitis and 47.3 percent(n=52) of advanced disease, while among subjects with high oral health literacy, majority of the participants had mild periodontitis , similar results were obtained with bleeding scores and clinical attachment loss (Table-4) which makes this co-relation statistically highly significant, thus suggesting that a maximum amount of periodontal destruction is more prevalent among the subjects with low oral health literacy levels hence, our

results clearly reflects the impact of the oral health literacy levels in oral health status .

DISCUSSION

Using National Health and Nutrition Examination Survey (NHANES) III data, Borrell et al.in 2006[4] found that compared with those with more than a high school education, those with less than a high school education were twice (1.48 to 2.89) as likely to have periodontitis. Interestingly, despite the high level of education among some of the participants in our study, low levels of oral health literacy were found in one-third of the study population. The findings of the present study reinforce the need for effective communication between dental health-care providers and patients regarding their periodontal disease condition, thereby insuring good oral health which is an integral part for good overall health.

Similar results were shown in another study by Jones et al. [12] who found that about one-third of the subjects fell into the low literacy category (REALD-30 score <22). In an another study on indigenous Australian population it was found that lower oral health literacy was significantly associated with decreased dental knowledge and more harmful oral-health-related behavior. [18]

A 2005 report on the role of literacy in oral health notes that many health practitioners are not adequately prepared to address literacy needs of their patients [16]. Furthermore, they point out that patients may not be aware of their own low literacy. Education level may not necessarily be related to oral health literacy level. Among adults who score in the lowest literacy category, 71 percent describe themselves as having no difficulty with reading or writing. [13]

Several instruments have been developed to measure a person's health literacy level.[20,23] Assessment of health literacy skills has generally been divided into two types: word recognition tests and comprehension tests. Word recognition tests, in which participants read aloud a list of common medical words, test the ability to recognize, or read and pronounce individual words. Word recognition tests are simple, quick, and easy to administer, but do not measure reading comprehension or interpretation.[2] Comprehension tests, on the other hand, assess a person's ability to understand written texts. Compared with word recognition tests comprehension tests require more time and skill to administer.

In the dental field, five kinds of oral health literacy instruments have been developed: the Rapid Estimate of Adult Literacy in Dentistry (REALD-30),[14]REALD-99,[21] the Test of Functional Health Literacy in Dentistry,[10] Oral Health Literacy Instrument,[22] and Comprehensive Measure of Oral Health Knowledge.[15]

However in the present study the disparity between the high educational status of the patients and having low oral health literacy may also be attributed to the difference in understanding the English language in which REALD-30 scale is available which is the main limitation of our study as we refrained using regional language because the data suggested that maximum oral health related information is available in English dialect but inclusion of the regional language of the patient may provided us with a slight difference in the results.

As described earlier these instruments are all intended for English speaking participants, and may not be directly applicable to hindi or any regional language-speaking participants, which could be a limitation of this study, Different linguistic modalities (i.e., hindi: ideograms, English: phonograms) complicate the adaptation of an existing English measure into a version suitable for any other language. For this reason, there is a need for developing a oral health literacy test in languages other than English which aids in individuals' ability to recognize basic terms and knowledge specifically related to dentistry. The given instrument (REALD-30) provides estimates of oral health literacy but does not measure all proposed domains of a health literacy construct. Another shortcoming of this instrument is its inability to determine if participants correctly understand the meaning of a term, they were only asked if they knew the words. Furthermore, the current study used a convenience sample of adults taking part in the survey, and our results may not be representative of all adult population of India.

Henceforth, our conclusions should be considered in light of the study's limitations. Despite these limitations, this study has several strengths. This

study is among the pioneer studies which have reported to use a clinical examination as an outcome measure to assess the association of oral health literacy with periodontal outcomes and oral health status in suburban population of greater Noida, plus a prominent association was reflected in our results between diseased patients and their low oral helath literacy levels and vice versa.

This is an important first step in paving ways for the development of more sophisticated oral health literacy research for the Indian population. Periodontal disease is a multifactorial disease with variable factors playing a role in its pathogenesis, increasing oral health literacy status among the population in such urban and suburban areas in the country may contribute tremendously in combating not only Periodontal and oral diseases but also general health and well being of any individual, thus further research is needed to construct an index with a full array of oral health literacy domains, including reading, writing, speaking, listening, and basic numeration, as well as further longitudinal investigations can precisely help us in exploring way to overcome its limitations and various measures which could be taken to increase in number of oral health literacy related programs which can be conducted by the government and non government organisations ,in such ways expanding OHL may act as an eminent source for preventing oral/overall health diseases, cognizance and welfare of the mankind.

CONCLUSION

This study reveals a highly significant association between low oral healthy literacy levels and severity of Periodontal diseases among the sub-urban population in India and the effect of OHL on the oral health behavior and oral health related quality of life, further assessing low OHL as a risk factor in developing gingival/periodontal diseases and thus suggesting a need to develop methods which can assist a clinician in providing tailor made approaches to educate patients on how to prevent and manage chronic dental/periodontal diseases.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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