Association between Oral Health Literacy, Gingival Health and Oral Hygiene among Dental Patients

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ABSTRACT

Objective: To determine the association between oral health literacy, oral hygiene and gingival health status.

Methods: This cross-sectional study was conducted among patients attending University of Benin Teaching Hospital, Benin City. Data were collected through interviewer-administered questionnaires. Index used in this study for estimating oral health literacy levels was Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30). The participant's oral hygiene status was assessed using the Simplified Oral Hygiene Index while gingival health was assessed using the Gingival Index.

Results: Two hundred and eight participants with 130 (62.5%) males and 78 (37.5%) females formed the population of the study and their mean age was 28.32 ± 10.5 years. The prevalence of low oral health literacy was 86 (41.3%). The oral hygiene status of most of the participants 100 (48.1) was fair. The prevalence of gingivitis was 58.2%. Oral health literacy had significant statistical negative correlation with age, oral hygiene and gingival health status. Oral health literacy consistently emerged as a predictor of oral hygiene and gingival health status.

Conclusion: Majority of the participants with low oral health literacy had fair/poor oral hygiene status (p = 0.000, OR= 17.870, 95% CI = 7.320-43.627) and gingivitis (p = 0.000, OR= 7.054, 95% CI = 3.514-14.164).

Keywords: Oral health literacy, Gingivitis, Oral hygiene

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INTRODUCTION

Simmonds in 1974 first used the word health literacy in his paper "Health education as social policy". The paper described how knowledge of health information is shaped by the educational system, health care system and mass communication.[1] The use of "health literacy" suggests a relationship between the level of health literacy and health education, which means that failure in health education can contribute to poor health literacy.

Because oral health is necessary for general wellbeing, it is important that individuals have an adequate degree of oral health literacy. *Oral Health Literacy* has been defined as "the degree to which individuals have the capacity to obtain, process and understand basic oral health information and services needed to make appropriate health decisions".[2] Oral health literacy encompasses knowledge as well as the ability to use that knowledge in making appropriate decisions related to oral health.

Oral health literacy varies by race, ethnicity, level of education, and poverty level.[3] The lower the literacy, the more likely the individual will have poor oral health, use fewer preventive procedures and use costly services and they are less likely to manage chronic health problems.[4] Oral health literacy is dependent on the culture and society, educational

system, healthcare, and public health systems which in turn will have an influence on oral health outcome and costs.[5]

Low oral health literacy, which is one's inability to obtain, comprehend and act on health information, is described as a silent health epidemic.[6] The overall major consequence of low oral health literacy is the financial burden on the patient as he or she uses fewer preventive services (fluoride toothpaste, pits and fissure sealants etc), report poorer oral health, and use costly services.[7]

There is dearth of literatures in Nigeria, causing a gap in the knowledge of the association between oral health literacy, oral hygiene and gingival health status in adult patients using the Simplified oral hygiene index and gingival index respectively. The variation of oral health literacy by race, ethnicity, educational system, poverty level, healthcare, and public health systems, further justified the need for this study in this study population.[3] This study tried to find the relationship between oral health literacy levels on oral hygiene and gingival health status. Results of this study have the potential to assist public health efforts to reduce the prevalence of dental diseases. This work could expose the significance of oral health literacy and its ability to affect patient's oral health outcomes. Public health efforts could be harnessed into implementing programs that can help to increase the oral health literacy levels among persons in the community.

MATERIAL AND METHODS
Study setting/ design
This cross-sectional study was carried out among new patients attending the outpatient dental clinic of University of Benin Teaching Hospital, Benin City in Nigeria. Benin City is a city found in Edo, Nigeria. It is located 6.34 latitude and 5.63 longitude and it is situated at elevation 88 meters above sea level. Benin City has a population of 1,125,058 making it the biggest city in Edo State.[8]

Sample size/Sampling
Systematic sampling technique was used and a total of 208 patients were recruited. The minimum sample size calculated using Cochran's formula for epidemiological studies. $n = z^2 \ p \ (1-P) \ / \ d^2$ was 137. Where n = sample size , z = statistics for a level of confidence (set at 1.96 corresponding to 95.0% confidence level), p = prevalence = 89.7%, being the prevalence of adult literacy in English Language in Edo State, Nigeria[9], q = 1-P and d = degree of

accuracy desired (error margin) = 5% (0.05). To make provisions for unreturned questionnaires, a non-response of 10% was incorporated.

Selection criteria
Patients aged 16 to 60 years who consented were included in this study while those with hearing or vision impairment, uncooperative patients and those that self-reported inability to speak, read and understand English well were excluded

Data collection tools/techniques
Participants were first approached in the waiting area of the oral diagnosis clinic at the University of Benin Teaching Hospital. All participants who agreed to participate in the study signed a written consent form. The data collection was done using interviewer-administered questionnaires and clinical examination. The questionnaires elicited the demographic characteristics (age, gender and marital status) and socio-economic characteristics (occupation) which were the independent variables. The other tools employed which were the dependent variables were Rapid Estimate of Adult Literacy in Dentistry -30 (REALD-30), Simplified Oral Hygiene Index and Gingival Index.

Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30)
The REALD-30 is a word recognition test, which consisted of 30 dental health-related words arranged according to degree of difficulty. The REALD-30 test was designed to be read aloud by participants to the interviewer. For scoring, one point was assigned for each word pronounced correctly and summed up to get the overall score. The minimum score was 0 while the maximum score was 30. The higher the scores, the higher the oral health literacy while the lower the scores, the lower the oral health literacy.[10] The predetermined cut-off points for oral health literacy level was 22.4 which was the obtained pilot study mean. The oral health literacy was therefore categorized as low when the score was less than or equal to 22.4 and high when it was greater than 22.4.

Clinical Assessment
Clinical examination was done to ascertain oral hygiene status and gingival health status. Oral hygiene status was assessed using the Simplified Oral Hygiene Index developed by Greene and Vermillon in 1964.[11] The index has two components, the debris index and the calculus index. Each of these

indices, in turn, is based on numerical determinations representing the amount of debris or calculus found on the preselected tooth surfaces.

Gingival health status was assessed using Gingival Index developed by Loe and Silness in which a numerical score is assigned to designate the degree of gingival inflammation.[12]

Data analysis

Data was analyzed using the IBM SPSS version 21.0. Pearson correlation test was used to analyze the association between the different variables (age, oral health literacy, oral hygiene and gingival health). Socioeconomic status was broken into three levels (high, middle, and low) using any or all of the three variables (income, education, and occupation).

Binary logistic regression was done with independent variables as age, gender, marital status, income earning group, oral health literacy and dependent variables as oral hygiene and gingival health to determine the predictors. Statistical significance was set at P<0.05.

Ethical approval

Prior to the study, ethical clearance was sought and approved by Ethics and Research Committee of the University of Benin Teaching Hospital, Benin City with protocol number ADM/E 22/A/VOL. VII/14747. Participants were assured of confidentiality in the handling of volunteered information and written informed consent obtained from participants or parents in cases where the participant is below 18 years of age.

RESULTS

A total of two hundred and eight (208) patients visiting the dental complex of University of Benin Teaching Hospital formed the study population. The age of the participants ranged from 16 to 60 years of age with those between the ages of 25 – 60 years forming majority and accounting for 105 (50.5%) of the respondents and those between the ages of 16 – 24 forming 103 (49.5%) of the study population. The mean age of the participants was of 28.32 ±10.5years. Most of the respondents 130 (62.5%) were males while 78 (37.5%) are females giving a ratio of 1.6:1. Greater than 70% of the respondents were single with only 56 (26.9%) married. The number of participants in the lower income earning class was

slightly lower than the medium incoming earning class by 2 (1%). Less than half (41.3%) of the participants had low oral health literacy level. Majority of the participants 128 (61.5%) had fair/poor oral hygiene. More than half of the participants (58.2%) had gingivitis (Table 1).

Among all the participants, 54 (51.4%) of the older participants (25-60years) and 32 (31.1%) of the younger participants (16-24 years) had low oral health literacy. Age was significantly associated with oral health literacy (P=0.003). More male participants 53 (40.8%) than female participants 33 (42.3%) had low oral health literacy. Married participants had 32 (57.1%) low oral health literacy while single participants had 54 (35.5%) low oral health literacy. Marital status was significantly associated with oral health literacy (P=0.005). More low income earning participants 52 (34.2%) had low oral health literacy than middle/high income earning participants 34 (60.7%). Income earning status was significantly associated with oral health literacy (P=0.001) (Table 2).

Regarding oral hygiene status 80 participants (38.5%) had good oral hygiene out of which 23 (11.1%) were females. In 100 individuals (48.1%), the oral hygiene was fair and 45 of these were females (21.6%). Twenty-eight participants (19.1%) had poor oral hygiene and 18 (8.7%) of these were males (Table 3). Oral health literacy had significant statistical negative correlation with age (r = -0.026, p=0.000), oral hygiene (r = -0.561, p=0.000) and gingival health (r = -0.409, p=0.000) (Table 4). Older respondents aged between 25 – 60 years had more of fair to poor oral hygiene 69 (65.7%) than younger respondents 59 (57.3). More males 73 (56.2%) had more of fair to poor oral hygiene status than the females 55 (70.5%). Participants that were single had more of fair to poor oral hygiene 88 (57.9%) compared to married respondents 40 (71.4%). More of the respondents from the low income earning group had fair to poor oral hygiene 84 (55.3%) when compared to the respondents from the high income earning class 44 (78.6%). Majority of the participants 79 (91.9%) with low oral health literacy had fair/poor oral hygiene as compared to those with high oral health literacy 49 (40.2%) (p = 0.000; OR = 17.870, 95% CI = 7.320 – 43.627) (Table 5).

Table 1: Demographic characteristics, oral health literacy, dental and periodontal health of the participants

Variable	n (%)
Age (years)	
16-24	103 (49.5)
25-60	105 (50.5)
Gender	
Male	130 (62.5)
Female	78 (37.5)
Marital status	
Single	152 (73.1)
Married	56 (26.9)
Level of Income	
Low Income Earners	103 (49.5)
Medium/High Income Earners	105 (50.5)
Oral health literacy	
High	122 (58.7)
Low	86 (41.3)
Oral Hygiene	
Good	80 (38.5)
Fair/Poor	128 (61.5)
Gingival Health	
No gingivitis	87 (41.8)
Gingivitis	121 (58.2)
Total	208 (100.0)

Table 2: Association between oral health literacy and demographic characteristics of the participants with logistic regression model (N = 208)

Characteristics	Oral Health Literacy				Binary logistic regression	
	High	**Low**	**Total**	**P-value**	**Odds Ratio (95% C. I)**	**P-value**
Age (years)				**0.003**		
16-24	71 (68.9)	32 (31.1)	103 (100.0)			
25-60	51 (48.6)	54 (51.4)	105 (100.0)		1.456 (0.696 – 3.044)	0.376
Gender				0.827		
Male	77 (59.2)	53 (40.8)	130 (100.0)			
Female	45 (57.7)	33 (42.3)	78 (100.0)		1.004 (0.552 – 1.828)	0.306
Marital status				**0.005**		
Single	98 (64.5)	54 (35.5)	152 (100.0)			
Married	24 (42.9)	32 (57.1)	56 (100.0)		1.261 (0.548 – 2.903)	0.425
Income earning status				**0.001**		
Low	100 (65.8)	52 (34.2)	152 (100.0)			
Middle/high	22 (39.3)	34 (60.7)	56 (100.0)		2.004 (0.831 – 4.833)	0.122
Total	122 (58.7)	86 (41.3)	208 (100.0)			

Table 4: Correlation of oral health literacy with age, oral hygiene and gingival health status of the participants

Variables	Rho	P-value
Age	-0.026	0.000
OHI-S	-0.561	0.000
GI	-0.409	0.000

Table 5: Association between demographic characteristics, oral health literacy and oral hygiene status of the study participants with logistic regression

Characteristics	Oral Hygiene Status			Binary logistic regression	
	Good	Fair/Poor	P-value	Odds Ratio (95% C.I)	P-value
Age (years)			0.211		
16-24	44 (42.7)	59 (57.3)			
25-60	36 (34.3)	69 (65.7)		0.636 (0.265– 1.525)	0.311
Gender			**0.039**		
Male	57 (43.8)	73 (56.2)			
Female	23 (29.5)	55 (70.5)		2.126 (1.040 – 4.349)	**0.039**
Marital status			0.075		
Single	64 (42.1)	88 (57.9)			
Married	16 (28.6)	40 (71.4)		0.671 (0.218 – 2.069)	0.487
Income earning status			**0.002**		
Low	68 (44.7)	84 (55.3)			
Medium/High	12 (21.4)	44 (78.6)		3.505 (1.042 – 11.789)	**0.043**
Oral health literacy			**0.000**		
High	73 (59.8)	49 (40.2)			
Low	7 (8.1)	79 (91.9)		17.870 (7.320 – 43.627)	**0.000**
Total	80 (38.5)	128 (61.5)			

Table 6: Association between demographic characteristics, oral health literacy and gingival health status of the study participants with logistic regression

Characteristics	Gingivitis			Binary logistic regression	
	No gingivitis	Gingivitis present	P-value	Odds ratio (95% C.I)	P-value
Age (years)			**0.012**		
16-24	52 (50.5)	51 (49.5)			
25-60	35 (33.3)	70 (66.7)		1.189 (0.536 – 2.638)	0.669
Gender			0.102		
Male	60 (46.2)	70 (53.8)			
Female	27 (34.6)	51 (65.4)		1.741 (0.896 – 3.384)	0.102
Marital status			**0.003**		
Single	73 (48.0)	79 (52.0)			
Married	14 (25.0)	42 (75.0)		1.697 (0.627 – 4.591)	0.297
Income earning status			**0.003**		
Low	73 (48.0)	79 (52.0)			
Medium/High	14 (25.0)	42 (75.0)		1.202 (0.416 – 3.470)	0.734
Oral health literacy			**0.000**		
High	73 (59.8)	49 (40.2)			
Low	14 (16.3)	72 (83.7)		7.054 (3.514 – 14.164)	**0.000**
Total	87 (41.8)	121 (58.2)			

More males 70 (53.8%) had more gingivitis than the females 51 (65.4%). Participants that were single had more gingivitis 79 (52.0%) compared to married respondents 42 (75.0%). More of the respondents from low income earning group 79 (52.0%) had gingivitis when compared to the respondents in the high income earning class 42 (75.0%). Majority of the participants with low oral health literacy had gingivitis 72 (83.7%) when compared to those with high oral health literacy 49 (40.2%) (p = 0.000; OR = 7.054, 95% CI = 3.514 – 14.164) (Table 6).

DISCUSSION

In this study, oral health literacy consistently emerged as a predictor of oral hygiene and gingival health. Participants with low oral health literacy had 17.870 odds to have poor oral hygiene and 7.054 odds to have gingivitis than those with high oral health literacy implying that low oral health literacy levels directly affect oral health status. This confirms that low health literacy is a risk factor for poor oral health. Oral health literacy should therefore be recognized as an important predictor of oral health.

Numerous previously conducted epidemiological studies revealed that the prevalence of gingivitis in adults varies around 50 – 100% for dentulous patients.[13-18] In this study, the prevalence of gingivitis was 58.2%. The obtained prevalence of gingivitis was lower than 75.4% reported among adult male population in Benin City, and farther lower than the prevalence of 95.7%, 97.9% and 100% seen among American adults, Chinese adults both with age ranging 18 – 90 years and Saudi adult population in Riyadh region respectively.[16,17,19,20]

In this study, the prevalence of gingivitis was higher among the older age group, reflecting periodontal disease as a disease commoner among the older age group. The decline in immune and healing potential seen among the older age group which impairs host response to disease may be the reason for this finding.[21] The difference in the prevalence of periodontal disease noted in this study between the older and younger age groups can also be explained by the difference in tooth cleaning frequency and oral health awareness among older participants than younger participants. This finding is in line with the study by Umoh and Azodo.[19]

More than 60% of the participants had fair/poor oral hygiene and this is quite worrisome considering the pivotal role of plaque in the aetiopathology of dental caries and periodontal diseases. The prevalence of fair and poor oral hygiene in this study is 48.1% and 13.5% respectively as against 68.4% and 19.1% recorded in a community-based outreach program in Port Harcourt, Nigeria by Olabisi and colleagues.[22] John et al recorded a slightly higher prevalence of 25% poor oral hygiene among visually impaired individuals in India.[23]

The prevalence of low oral health literacy rate in this study was found to be 41.3% which was higher than 29% reported among dental patients in North Carolina, America.[24] It is also higher than 26% reported among a low-income women, infant and children population in America.[25]

The limitation of this study is the fact that a single centre was used however, it has added to the existing body of literature and will serve as a baseline for future studies.

CONCLUSION

Poor oral health literacy was a significant risk indicator for poor oral health. Oral health literacy consistently emerged as a predictor of oral hygiene and gingival health status among the participants implying that low oral health literacy levels directly affect the oral health status. Oral health literacy should therefore be recognized as an important determinant of oral health in the study area.

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