

ORIGINAL ARTICLE**ASSOCIATION BETWEEN HEALTH LITERACY AND ORAL HEALTH LITERACY AMONG UNDERGRADUATE STUDENTS IN TRICITY, INDIA – A CROSS-SECTIONAL STUDY**Karandeep Singh Sandhu¹, Nidhi Gupta², Mohit Bansal³, Vikram Arora⁴, Preety Gupta⁴, Sahil Thakar⁴¹Postgraduate Student, ²Professor and Head, ³Reader, ⁴Senior Lecturer, Department of Public Health Dentistry, Swami Devi Dyal Hospital and Dental College, Barwala, Panchkula, Haryana.**ABSTRACT:**

Background: Health Literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate decisions. As with general health; achieving and maintaining oral health requires one to be able to understand, interpret and act on various types of health information. The present study was conducted to determine the association between health literacy and oral health literacy among undergraduate students in tricity (Chandigarh, Mohali, Panchkula), India. **Materials and method:** A cross-sectional study was conducted among 490 undergraduate students studying in tricity, from randomly selected 10 colleges. The data was collected by a single trained examiner, using a structured proforma. The questionnaire consisted of two parts, REALM-66 and REALD-30. The subject was given a copy of list of words to be pronounced and score one was given for each word pronounced correctly. **Results:** REALM-66 scores showed that subjects with health literacy level equivalent to fourth- sixth grade is 1%, seventh- eighth grade was 64.4% and 29.6% for ninth grade and above. REALD-30 scores showed that 37.6% subjects had low level of literacy, 33.1% had moderate and 29.3% had high level of literacy. REALM and REALD scores were found to be positively correlated for qualification and genders. **Conclusion:** To our knowledge, this is the first study reporting association between health and oral health literacy. As the correlations were not strong, thus the results should be regarded as a first step to provide evidence.

Keywords: Health Literacy, Oral Health Literacy, REALM, REALD, Tricity.

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INTRODUCTION:
 Literacy has recently emerged as a key item on the research agenda in Public health. The growth in information technology and the rapid advances in scientific knowledge require that the public have an ever-increasing understanding of diseases to make good decisions about their health.¹ Poor literacy can delay one's ability not only to seek out the needed health information but also to process, understand and use it to make appropriate health care decisions.²

Health Literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate decisions”.³ Nutbeam⁴ proposed that

health literacy could be divided into 3 aspects; 1) “basic/functional literacy” which is the ability to read and understand health information such as consent forms and medical labels, 2) “communicative/interactive literacy” which is the ability to use the health knowledge to communicate and participate in order to take care one's self, and 3) “critical literacy” which is the ability to analyze the validity and reliability of the received information.

As with general health, achieving and maintaining oral health requires one to be able to understand, interpret and act on various types of health information.⁵ Oral health literacy can be considered as the skills necessary for people to understand the causes of poor oral health; to learn and adopt fundamental aspects of positive oral self care behaviors; to communicate with oral health care providers;

to place their names on dental treatment waiting lists or organize appointments; to find their way to the dental clinic; to fill out the necessary forms and to comply with prescribed medicines.⁶

India has a distinct advantage in a population profile concentrated in the younger age groups.⁷ The assessment of Health Literacy in this age group could be helpful to health professionals to know how to provide health information. A survey is needed to determine the level of health literacy among them and its effect on their ability to make good decisions about Health. Therefore, the present study was conducted with the aim to determine the association between health literacy and oral health literacy among undergraduate students in tricity (Chandigarh, Mohali, Panchkula), India.

MATERIALS AND METHOD: A cross-sectional study was conducted among 490 undergraduate students studying in tricity (Chandigarh, Mohali, Panchkula), India. The study was conducted from April to July 2015. The protocol of the study was approved by the institutional ethical and review board. Informed consent was obtained from the participants after obtaining the necessary permission from the college authorities. List of colleges in tricity was obtained from the education department of concerned city.⁸ These colleges were marked on the tricity map, divided into north and south zone; and 10 colleges were selected randomly i.e, 5 from each North and South zone. A pilot study was conducted on 50 study participants to test the feasibility of the study. The questionnaire was pre-tested for validity, reliability. The reliability of the questionnaire was analyzed using Cronbach's alpha which was found to be acceptable (0.84).

English speaking undergraduate students in the tricity were included in the study. Students with known history of cognitive impairment, vision or hearing problems were excluded from the study.

The data was collected by a single trained examiner. A structured proforma was used for data collection. The socio demographic variables recorded were age, gender and course of study. The questionnaire consisted of two parts. Part 1 consisted of 66 medical terms known as Rapid Estimate of Adult Literacy in Medicine (REALM-66)⁹, a word recognition test for testing the health literacy in Medicine. Part 2 consisted of 30 dental terms known as Rapid Estimate of Adult Literacy in Dentistry (REALD-30)², a word recognition test for testing health literacy in Dentistry. The subject was given a copy of list of words to be pronounced and instructed to read aloud as many words as he or she can, without any difficulty. If the subject takes longer than five seconds to read a word, then he or she was asked to move to next word. Score one was given for each word pronounced correctly.

The REALM-66 was interpreted as, 0-18 (\leq third grade), 19-44 (fourth- sixth grade), 45-60 (seventh- eighth grade), 61-66 (\geq ninth grade).¹⁰ The REALD-30 score was categorized as, low (≤ 21), moderate (22 to 25), or high (≥ 26).¹

The data was analyzed and descriptive statistical analysis was done using statistical package for social sciences, IBM Corporation, SPSS Inc., Chicago, IL, USA version 20.0 software package. In scoring REALD-66 and REALD-30, one point was assigned for each word pronounced correctly and summed to get the overall score. Analysis of variance (ANOVA) was used to test the significance of study parameters among students pursuing different courses. Pearson's correlation tests were used to assess the correlation between REALD-66 and REALD-30 scores. Significance was assessed at 5% level of significance.

RESULTS: A total of 490 subjects above 18 years of age participated in the study. The age of the subjects ranged between 18-25 years with 20.74 as the mean age. Among them, 352 (71.8%) were males and 138 (28.2%) were females [Table 1]. Educational qualification distribution showed that 177 (36.2%) of the study subjects were from the Engineering stream, 103 (21%) from Nursing, 82 (16.7%) from Law and 128 (26.1%) from Pharmacy streams [Table 1]. Results from Rapid Estimate of Adult Literacy in Medicine (REALM-66) scores showed that only 5 (1%) of the subjects had health literacy level equivalent to fourth- sixth grade, 340 (64.4%) subjects had health literacy level equivalent to seventh- eighth grade and 145 (29.6%) subjects had health literacy level equivalent to ninth grade and above. Rapid Estimate of Adult Literacy in Dentistry (REALD-30) scores showed that about 184 (37.6%) subjects had low level of literacy, 162 (33.1%) had moderate level of literacy and 144 (29.3%) had high level of literacy [Table 2].

Scores were recorded for undergraduates for various streams. Students of Bsc Nursing showed maximum REALM score (60.46), followed by Pharmacy (59.73), law (59.26) and engineering (55.21) students. REALD scores were again maximum for nursing students (24.57), followed by Pharmacy (24.50), law (24.03) and engineering (20.70) students. REALM and REALD score was found to be positively correlated ($r= 0.717$). Further it was revealed that REALD and REALM showed positive correlation for Engineering ($r=0.708$), Nursing ($r=0.619$), Law ($r=0.814$) and Pharmacy ($r=0.483$) students, which was found to be statistically significant. Based on gender, also positive correlation (male $r=0.719$; female $r=0.614$) was observed between REALM and REALD Scores [Table 3].

Table 1- Descriptive Statistics based on Age, Gender and Qualification

Age (in years)	Male (%)	Female (%)	Total
18-21	284 (78.9)	76 (21.1)	360
22-25	68 (52.4)	62 (47.6)	130
Qualification	Male (%)	Female (%)	Total
Engineering	162(46.0)	15(10.9)	177 (36.2)
Nursing	20(5.7)	83(60.1)	103 (21.0)
Law	54(15.3)	28(20.3)	82 (16.7)
Pharmacy	116(33.0)	12(8.7)	128 (26.1)
Total	352(71.8)	138(28.2)	490 (100)

Table 2: Categorization of REALM and REALD Score

REALM Scores	Frequency	Percentage
Fourth-six grade	5	1.00
Seventh-eighth grade	340	69.4
Greater than or equivalent to ninth grade	145	29.6
Total	490	100.0
REALD Scores	Frequency	Percentage
Low level of literacy	184	37.6
Moderate level of literacy	162	33.1
High level of literacy	144	29.3
Total	490	100.0

Table 3: Association of REALM and REALD Scores with Age, Gender and Qualification

	Based on Age	N	Mean	P- value
REALM Score	18-20 year	360	58.80	0.063*
	21-25 year	130	57.74	
REALD Score	18-20 year	360	23.69	0.010**
	21-25 year	130	22.55	
Based on Gender				
REALM Score	Male	352	57.62	0.000***
	Female	138	59.94	
REALD Score	Male	352	22.69	0.001***
	Female	138	24.26	
Based on Qualification				
REALM Score	Engineering	177	55.21	0.000***
	Nursing	103	60.46	
	Law	82	59.26	
	Pharmacy	128	59.73	
REALD Score	Engineering	177	20.70	0.000***
	Nursing	103	24.57	
	Law	82	24.03	
	Pharmacy	128	24.50	

*p-value > 0.05 is insignificant; **p-value < 0.05 is significant; ***p-value < 0.01 is highly significant.

DISCUSSION: The results of this study support the hypothesis that Health Literacy was associated with Oral Health Literacy. To the best of our knowledge, this was the first study to evaluate the association between Health Literacy and Oral Health Literacy. Comparison with other health literacy findings elsewhere is complicated by the

different instruments used, different socio-economic and cultural backgrounds. Many US studies employed the REALM-66 and REALD-30 word recognition instruments.¹ Overall, these studies revealed that about one quarter to half of participants had limited health literacy.^{1,11,12} The results of the study done by D’Cruz and

Shankar¹³ showed that about 40% of the patients had problem getting to the hospital at the right appointment time because of the difficulty in reading appointment slips, 52% of subjects agree that they had difficulty in learning about their general/ oral health conditions because of difficulty in understanding written information. Around 63% of the patients feel that they are not confident in taking the medication correctly because of problems in understanding written instructions on labels and 64% of the subjects agreed that they required help to read hospital materials. Studies have linked low health literacy with worse health outcomes.¹³

In the present study, mean age of the participants was 20.74±1.65 years studying in various streams. Whereas, studies conducted by Richman JA et al¹⁴, Vann et al¹⁵ and Lee et al¹⁶ had study participants that were recruited from hospitals or field settings.

Considering gender distribution, 71.8% were males and 28.2% were females. Most of the studies regarding health literacy were done on female population,¹⁵⁻¹⁶ whereas a study by Atchison et al¹⁷ included both males and females (males 57%, females 43%) in their study. In the present study, REALM and REALD scores were higher in females as compared to males. Similar results were reported from the studies done by Atchison et al¹⁷ and Naghibi et al.¹⁸ As women are more likely to encounter health problems than males, especially during pregnancy and child-rearing, thus more exposed to medical terminology.¹⁹

The REALM and REALD scores were highest for Nursing students, followed by pharmacology, law and engineering students. This might be due to close relation of nursing and pharmacology students with medical and dental fields, as compared to law and engineering students. The effect of education on oral health literacy is well documented, most clearly between engineering and medical students. Health literacy is a topic discussed throughout the entire medical curriculum and stressed in each clinical rotation.²⁰

There are certain limitations of the present study. Firstly, this study involved undergraduate students pursuing their education in various streams. Further studies are recommended in a cross section of the population represented by all sections of the society. Secondly, using REALD instruments, we only tested a person's reading ability and could not capture comprehension.^{2,21} English fluency was also a limiting factor in this study as some participants could not be able to pronounce words clearly though they might have knowledge about it. The distribution is not uniform across the streams as students present on the day were included in the study.

CONCLUSION: To our knowledge, this is the first study reporting association between health literacy and oral health literacy. Positive correlation between REALM-66 and REALD-30 was observed for Engineering, Nursing, Law and Pharmacy students. However, the correlations are not strong, and the results should be regarded as a first step

to provide evidence. This relationship varied with streams and correlation was observed among them. It is important to make interventions towards improving Health Literacy among general population to achieve better understanding of health information. REALD-66 and REALD-30 are simple, less time consuming and may be used in dental practice on a regular basis, to determine its ability in classifying patients based on health literacy levels and designing appropriate patient-centered communication approach to improve their oral health. There is a need to look at the health literacy in the context of large systems-social, cultural, education and public health systems.

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