ORIGINAL ARTICLE

Dental Health Literacy among Highly Skilled Professionals in India: A Pilot Study

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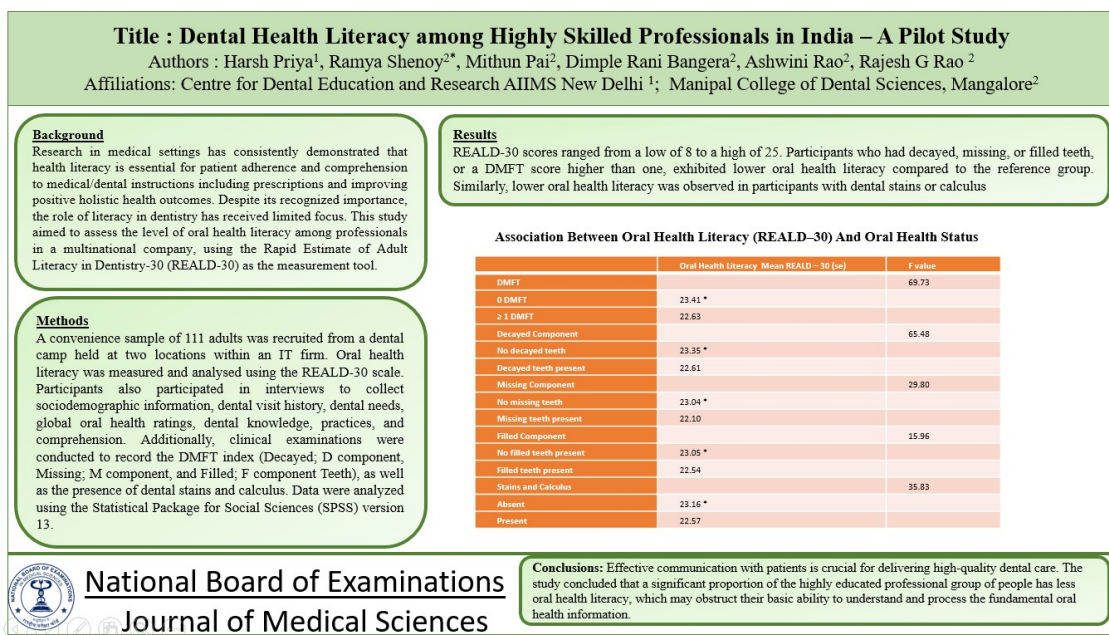
Abstract
Purpose: Research in medical settings has consistently demonstrated that health literacy is essential for patient adherence and comprehension to medical/dental instructions including prescriptions and improving positive holistic health outcomes. Despite its recognized importance, the role of literacy in dentistry has received limited focus. This study aimed to assess the level of oral health literacy among professionals in a multinational company, using the Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30) as the measurement tool. **Methods**: A convenience sample of 111 adults was recruited from a dental camp held at two locations within an IT firm. Oral health literacy was measured and analysed using the REALD-30 scale. Participants also participated in interviews to collect sociodemographic information, dental visit history, dental needs, global oral health ratings, dental knowledge, practices, and comprehension. Additionally, clinical examinations were conducted to record the DMFT index (Decayed; D component, Missing; M component, and Filled; F component Teeth), as well as the presence of dental stains and calculus. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 13. **Results:** REALD-30 scores ranged from a low of 8 to a high of 25. Participants who had decayed, missing, or filled teeth, or a DMFT score higher than one, exhibited lower oral health literacy compared to the reference group. Similarly, lower oral health literacy was observed in participants with dental stains or calculus. **Conclusions:** Effective communication with patients is crucial for delivering high-quality dental care. The study concluded that a significant proportion of the highly educated professional group of people has less oral health literacy, which may obstruct their basic ability to understand and process the fundamental oral health information.

Keywords: REALD-30, Oral Health Literacy, Oral Health Outcome, Health Literacy, Communication

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Graphical Abstract

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Background

Research in medical settings has consistently demonstrated that health literacy is essential for patient adherence and comprehension to medical/dental instructions including prescriptions and improving positive holistic health outcomes. Despite its recognized importance, the role of literacy in dentistry has received limited focus. This study aimed to assess the level of oral health literacy among professionals in a multinational company, using the Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30) as the measurement tool.

Methods

A convenience sample of 111 adults was recruited from a dental camp held at two locations within an IT firm. Oral health literacy was measured and analysed using the REALD-30 scale. Participants also participated in interviews to collect sociodemographic information, dental visit history, dental needs, global oral health ratings, dental knowledge, practices, and comprehension. Additionally, clinical examinations were conducted to record the DMFT index (Decayed; D component, Missing; M component, and Filled; F component Teeth), as well as the presence of dental stains and calculus. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 13.

Results

REALD-30 scores ranged from a low of 8 to a high of 25. Participants who had decayed, missing, or filled teeth, or a DMFT score higher than one, exhibited lower oral health literacy compared to the reference group. Similarly, lower oral health literacy was observed in participants with dental stains or calculus

Association Between Oral Health Literacy (REALD–30) And Oral Health Status

	Oral Health Literacy Mean REALD – 30 (se)	F value
DMFT		69.73
0 DMFT	23.41 *	
≥ 1 DMFT	22.63	
Decayed Component		65.48
No decayed teeth	23.35 *	
Decayed teeth present	22.61	
Missing Component		29.80
No missing teeth	23.04 *	
Missing teeth present	22.10	
Filled Component		15.96
No filled teeth present	23.05 *	
Filled teeth present	22.54	
Stains and Calculus		35.83
Absent	23.16 *	
Present	22.57	

National Board of Examinations
Journal of Medical Sciences

Conclusions: Effective communication with patients is crucial for delivering high-quality dental care. The study concluded that a significant proportion of the highly educated professional group of people has less oral health literacy, which may obstruct their basic ability to understand and process the fundamental oral health information.

Introduction

Clear and effective communication with patients—through clear information presentation and active listening—is vital for delivering quality dental care and achieving positive oral health outcomes. Oral health outcomes result from various factors that promote oral health and prevent disease. Individual self-maintenance and professional dental care are important alongside community oral health efforts like fluoridation of water, salt, sugar etc. program and dental sealant program in school setting. A patient would require awareness of the current services, and knowledge to access and use them judiciously for availing the benefits of various preventive care and navigation into the complex healthcare system. While patients gather information from many sources, the care and guidance provided by their dentists and dental teams are key in helping them maintain optimal oral health and make informed decisions about their overall health. A visit to the dentist or dental hygienist offers patients the chance to understand essential guidance and develop self-care skills, as well as learn a few extra health services they might need. The communication and soft skills of a professional from dental fraternity significantly enhances a patient's health literacy, ultimately leading to improved and positive health outcomes [1].

Health literacy is vital in preventing and managing non-communicable diseases (NCDs) like diabetes and heart disease too. Individuals with better health literacy can understand risk factors, make informed lifestyle choices, and adhere to treatments. Enhancing health literacy is key to reducing NCD prevalence and improving overall public health outcomes [2].

What is health literacy?

There are multiple ways and organizations to define health literacy. They all emphasize the ability to acquire, comprehend, and apply health information

effectively. The World Health Organization was among the pioneers in defining health literacy, paving the way for subsequent refinements [3]. Healthy People 2010 was the first document to discuss, define and align with the general concept of health literacy: the extent to which individuals can obtain, process, and understand basic health information and services to make appropriate oral health decisions. The crux and central to all definitions are the fundamental idea that better and positive health outcomes can be achieved by improving access to health information and knowledge and the ability to use it effectively and judiciously. Thus, health literacy concept and skills are essential for empowering individuals to enhance their own health [4].

In dental settings, terms like periodontal disease, oral potentially malignant lesions, dental caries, and malocclusion can create hindrances to understanding for many people visiting dental health infrastructure. The language and materials being used to communicate scientific findings, patient information, and health education are vital tools for productive and effective communication [1]. This includes a wide range of materials, such as brochures, newsletters, dental health manuals, consent forms, insurance documents, health histories, information booklets and home care instructions sheets following dental procedures.

Health literacy involves more than just reading skills; it includes writing, listening, numeracy, and oral communication abilities. It also requires navigating a complex healthcare system, influenced by education, culture, and situational context. The emphasis on

health literacy is timely, as our nation's demographics change and self-care and healthcare demands increase. Poor or low health literacy is a significant issue, contributing to disease and imposing substantial financial costs on both individuals and the nation. Recent estimates suggest that low health literacy costs between $106 billion and $238 billion annually, accounting for 7% to 17% [1] of all personal healthcare expenses. Individuals with low health literacy are more likely to use emergency services, struggle with diabetes management, and are less likely to engage in preventive care and screenings. Furthermore, health literacy is now recognized as a key determinant of health. These skills vary across different health areas, such as diabetes, cancer, heart disease, and oral health. Understanding health information and knowing how to access services are essential for effective personal health management.

Studies [5,6] have shown that literacy, particularly health literacy, is connected to various aspects of health, including knowledge, health status, outcomes, and the use of services, especially preventive and health-promoting behaviors that impact both medical and dental health. While not yet fully confirmed, this is believed to apply to oral health as well. Low literacy may contribute to health disparities.

Behavioral scientists conducted a study involving 126 men, women, and children from a typical Midwestern community [7], leading to the identification of certain social classes and their attitudes toward dental care. The upper middle class was characterized as professionals and business executives,

well-educated and residing in well-maintained, spacious homes in desirable areas. This group seeks expert advice and, in matters they deem important, follows it diligently. They take a long-term approach to life, focusing on preventing or delaying aging, disease, decay, and death. They highly value their teeth, show interest in preventive dentistry, and actively seek various types of dental care. For them, the dentist is seen not only as someone who repairs teeth and alleviates pain but also as a professional who prevents decay and tooth loss while enhancing the appearance and function of teeth. Members of this class, including those in the present study, are particularly committed to keeping their natural teeth for as long as possible.

While research in medical settings has consistently highlighted the significance of health literacy in patient adherence to medical instructions and improved health outcomes, literacy has received less attention in the field of dentistry [8].

Therefore, the present study aimed to assess oral health literacy among well-educated professionals with B Tech degrees working in a multinational company. The study utilized the REALD-30 instrument, known for its reliability and validity [9], to measure participants' understanding of oral health and their awareness of the importance of maintaining natural teeth.

Materials and Methods
Study design

A cross sectional design was used to collect information about oral health literacy in a sample of highly skilled professionals attending dental camp at their workplace. A dental camp was organized in two branches in an IT company situated in the city of Mangalore, India. The human resources department had requested for the dental camp from the Department of Public Health Dentistry through the proper channel. Every Monday, for a period of two months were designated for the dental camp. All the professionals enrolled in the company were informed via e mail regarding the date, duration and venue of the dental camp and were requested to register before hand to ensure smooth functioning. A mobile dental van was used to deliver dental services and was parked at a convenient location outside the main building. The dental check up was done at the health centre inside the main building. A physiotherapist and a physician were regularly present at the health centre. These appointed health personnel's helped regarding the maintenance of record of registered patients. A single interviewer enrolled the participant, conducted the interviews and administered the REALD-30 in a room inside the health centre. A time duration of approximately 10 minutes was required to fill the dental health literacy assessment in privacy of the dental operatory before the patient was examined by the examiner. 15 pretest interviews were completed to refine the data collection methods, calibrate interview and examination protocol and feasibility of the survey. The dental check up was done by the examiner later and the patients were referred for dental treatment as and when required in the mobile dental van.

Survey Instrument

Oral health literacy was evaluated using the Rapid Estimate of Adult Literacy in Dentistry (REALD-30). This is a word

recognition test tailored to gauge oral health literacy. The REALD-30, works principally similar to the Rapid Estimate of Adult Literacy in Medicine (REALM) structure, and is widely used in health set up to pinpoint patients with lesser literacy regarding health [7]. Word-recognition tests like REALD-30 are strongly correlated with general ability to read and comprehend health sector including navigation and instructions. Studies [10,11] have indicated that difficulty pronouncing medical or dental terms, reflecting basic reading skills, often correlates with poorer comprehension and health outcomes. Such tests help clinicians identify patients who might struggle with written and oral communication. The REALD-30 comprises 30 words representing various dental conditions, their ways of prevention, and line of treatment. Participants are asked to read the words aloud, and points are assigned for each correct pronunciation, yielding a score from 0 to 30. In addition to the REALD-30, participants answered a series of questions on socio-demographics, dental visits, dental needs, overall oral health ratings, dental knowledge, practices, comprehension, and self-reported oral health outcomes.

In clinical examination DMFT [12] was recorded for the participants and also presence or absence of stains and calculus was checked. The training and calibration of examiner was done under the guidance and supervision of the senior faculty.

Data Analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 13. Oral health literacy was described using mean scores and frequency distributions of REALD-30 results. For categorical analysis, REALD-30 scores were divided into three groups based on tertiles [12]: high literacy (≥25), moderate literacy (23–24), and low literacy (≤22). The relationship between each covariate and oral health literacy was analyzed using Pearson's χ^2 test for categorical REALD-30 scores and analysis of variance (ANOVA) for mean scores.

Results

Table 1 presents characteristics distribution table of the study population (n = 111). The mean age group was 25.28 years and (standard deviation [3.78]). The minimum REALD – 30 score of 8 and maximum of 25 was reported among the study population. The mean REALD – 30 score for one person was 22.7 ± 2.48. However, when the tertiles were calculated, little less than half of the study population had low literacy level. The percentage distribution of REALD – 30 scores was skewed towards higher scores, but close to 45 percent of the study population scored below 23, defined as low literacy level for purposes of this study. (Figure 1)

Table 1. Association Between Oral Health Literacy (REALD–30) And Oral Health Literacy Related Outcome

	Oral Health Literacy Mean REALD – 30 (se)	p value
Dental Visit		0.431
Yes	22.76 (0.28)	
No	22.59 (0.44)	
Oral Health Knowledge		
F Toothpaste		0.297
Correct	22.93 (0.45)	
Incorrect	22.62 (0.29)	
Brushing Time		
Correct	22.35 (0.46)	0.038
Incorrect	22.80 (0.27)	
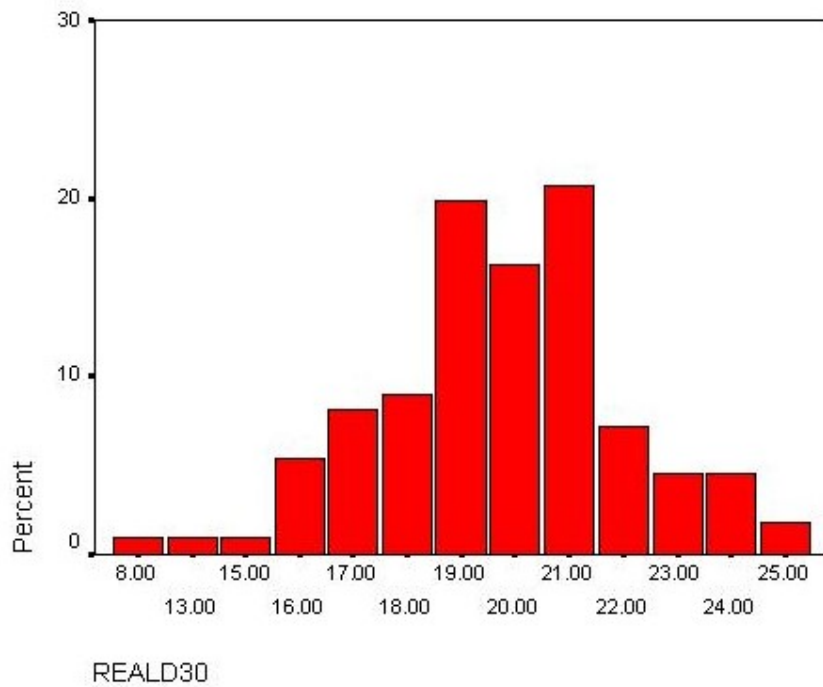
Figure 1. The percentage distribution of REALD – 30 scores

Table 2 presents the bivariate analysis of the mean scores revealed that no significant difference existed in the REALD – 30 scores among any group (p > 0.05). However, participants who thought had a gum problem scored higher on the REALD – 30 than did their reference group. This group showed mean scores with a p-value ranging between 0.05 and 0.10. Similarly, the bivariate analysis of the association between REALD-30 categories and covariates indicated comparable relationships, though the statistical significance remained weak. Oral health literacy as assessed by REALD – 30, was lower among participants who had decayed; missing and filled teeth present or an overall DMFT was greater than one as compared to their reference group (Table 3). Also, oral health literacy was lower in participants in who stains or calculus was present.

Table 2. Association Between Oral Health Literacy (REALD–30) and Self Reported Oral Health Outcome

	Oral Health Literacy Mean REALD – 30 (se)	p value
Think need extraction		0.41
Yes	21.80 (1.7)	
No	22.75 (0.24)	
Think need filling		0.88
Yes	22.77 (0.50)	
No	22.69 (0.27)	
Think have gum problem		0.06
Yes	23.50 (0.4)	
No	22.46 (0.28)	
Concerned about appearance		0.48
Yes	22.35 (0.42)	
No	22.78 (0.27)	
Self rating oral health		0.50
Good , Very Good and Excellent	22.80 (0.29)	
Fair and poor	22.45 (0.42)	

Table 3. Association Between Oral Health Literacy (REALD–30) And Oral Health Status

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*p< 0.01

Discussion

The scientific knowledge of oral health literacy is primarily based on a limited number of studies. These studies emphasize a discrepancy between the reading levels needed to understand dental health education materials and the actual reading skills of the users. This area remains under-researched in dentistry, indicating a need for further exploration. Research in medical care highlights the importance of health literacy in influencing health outcomes. Further studies reveal that people with lower education levels tend to exhibit poorer dental habits and overall oral health [14,15]. Just as with general health, maintaining oral health requires the ability to understand, interpret, and act on health information, whether it is presented orally or in writing [16]. This study aims to evaluate the level of oral health literacy, as measured by REALD-30, among professionals working in a multinational company who are attending a dental camp.

All the participants involved completed the interview fully and agreed for the dental check up demonstrating that

the survey was embraced by the community. Present study aimed at measuring the oral health literacy of the professionals and tertiles were calculated of the REALD – 30 scores. The ranges were high literacy level, ≥25; moderate literacy level, 23 – 24 and low literacy level, ≤ 22. However, in another study [13] among adult patients seeking dental care the low literacy level was defined as ≤ 21. This may be attributed to the highly educated participants in the present study. But as far as the overall dental knowledge and reading ability is concerned none of the participant scored cent percent in REALD – 30 scoring. Scores dropped at a low of score 8 on the 30 – point scale, with about 19.8 percent and 20.7 percent of patients being able to correctly pronounce fewer than 19 and 21 words, respectively.

The analytical results suggested that there was no significant association between oral health literacy and the factors that were considered as consequences of poor health literacy. The interpretation cannot be totally negative as other factors might have an influence on oral health literacy which was not considered in this study. Also desirability bias can pave way in this study because of the highly educated and professional study population. The association between oral health literacy and oral health of the study participants was intuitive and supported by literature in the general health realm. Oral health literacy as assessed by REALD – 30, was lower among participants who had decayed; missing and filled teeth present as compared to their reference group. This can be positively interpreted as higher oral health literacy leads to better oral health outcomes. Also, oral health literacy was lower in participants in whom stains or

calculus was present. Low health literacy has been linked to increased emergency hospital visits, limited understanding of chronic conditions and their causes, and suboptimal self-care behaviors. Once again, evidence supports the notion that literacy is a crucial factor enabling individuals to process and act on information to enhance their health outcomes and healthcare behaviors [17].

mHealth (mobile health) and health literacy are also interconnected in improving healthcare delivery. mHealth involves the use of mobile devices and apps to enhance health services, from monitoring to communication with healthcare providers. Effective mHealth solutions must consider users' health literacy levels to ensure that information is understandable and actionable. By bridging the gap between technology and comprehension, mHealth can enhance patient engagement, adherence to treatments, and overall health outcomes [18].

Several limitations of our study should be noted. First, the sample was small and convenience-based, which means the findings may not be representative of all highly skilled professionals in multinational companies. Consequently, the study may be underpowered, increasing the risk of a Type II error. Although all participants who attended the dental camp were included, with no refusals, this limitation still applies. Second, the cross-sectional design limits the ability to infer causality. Third, the REALD-30 might not entirely represent oral health literacy in our study population, as it only measures word recognition without evaluating comprehension or functional skills. While

the REALD-30's limitations are acknowledged, including the absence of a comprehension component, few other validated instruments were available. The Test of Functional Health Literacy in Dentistry (TOFHLiD) [19], which assesses broader aspects of oral health literacy such as reading comprehension and numerical ability, was not used due to its potential for a longer administration time.

Conclusion

Effective communication with patients is essential for delivering quality dental care. The study's results indicate that many individuals in the highly educated and professional group exhibit low oral health literacy, which could hinder their ability to comprehend, analyze and process fundamental oral health information. Also, lower the oral health literacy poorer the oral health of the study population. It is the responsibility of the health care provider's team to spot patients who are having difficulty understanding, interpreting and using dental health information and corrective steps should be taken to address their challenges and build strong compliance to their needs. There is dearth of appropriate and up to date knowledge of literacy regarding oro-dental health and urge more relevant and expansive research on this topic. REALD has proved to be a promising instrument or tool for calculating the reading ability dimension of oral health literacy. The concept of a fast estimation for adult literacy in dentistry should be revisited and looked in detail. The goal is to maintain and increase its utility as a measure of oral health literacy. Hence, REALD need to be tested in a more diverse cohorts and population.

Ethical approval

Ethical clearance was obtained from the institutional ethics committee of MCODS Mangalore. Informed consent regarding the interview of study proforma and REALD-30 was obtained verbally.

Conflicts of interest

The authors declares that they do not have conflict of interest.

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