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Development of a Word Instrument to Test Dental Health Literacy: The DFLD-Determination of Functional Literacy in Dentistry

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Abstract

Aim: This study aims to develop and pilot test an instrument to measure dental health literacy (DFLD: Determination of Functional Literacy in dentistry).

Methodology: 320 patients attending a dental clinic were approached for the study with prior permission from concerned authorities. Each subject was administered the instrument DFLD along with Rapid Estimate of Adult Literacy in Dentistry (REALD-30) to measure oral health literacy. The subject's oral health related quality of life was also assessed using Oral Health Impact Profile (OHIP-14). Internal reliability for DFLD was checked using Cronbach's alpha and its validity by correlating the final score with the scores of REALD- 30 and OHIP-14.

Results: DFLD displayed good convergent and predictive validity when correlated with scores of REALD-30 and OHIP-14, respectively. Cronbach's alpha value for instrument reliability was found to be 0.84.

Conclusion: DFLD is an efficient instrument which can be used to assess health literacy in the dental arena.

Keywords: Health literacy; Dental health literacy; Dental health education; Health communication

Introduction

The oral health objectives of Healthy People 2000 have not been met. Poor communication is perceived as one of the reasons for this lack of success. It is a well-known fact that an individual's literacy is intricately tied to and significantly affects the physician-provider communication. Literacy rate in India has improved a lot over the last one decade. As per the data published by the 2011 census, India has managed to achieve an effective literacy rate of 74.04% in 2011 as compared to 64.8% in the 2001 census. Meanwhile, there is now a shift in focus to functional literacy, which is the ability to read basic text and write a simple statement on everyday life. It provides the individual with a sense of empowerment and a better control over life-socially and economically.

This holds true with respect to health as well. In 1999, American Medical Association conceptualized health literacy as "a constellation of skills, including the ability to perform basic reading and numerical tasks required to function in the health care environment" [1].

Dental health literacy is now perceived as a primary determinant of oral health which may incapacitate an individual's understanding of available oral health information and utilization of oral health services. The American Dental Association (ADA) affirms that limited health literacy is "a potential barrier to effective prevention, diagnosis and treatment of oral disease" [2] and "clear, accurate and effective communication is an essential skill for effective dental practice" [3].

Lack of understanding of oral health information and instructions along with failure to admit the same leads to lack of compliance to prescribed treatment, non-conformity to follow proper oral health regimen, and a less likely behaviour in seeking preventive alternatives.

However, evidence in dentistry cannot at present be examined owing to insufficient means of measuring oral health literacy.

Traditionally, researchers and clinicians used the patient's level of education as an indicator of those skills. Although education is highly correlated with reading level, educational level alone cannot predict functional health literacy [4]. Lee et al. developed REALD-30 [5] (Rapid Estimate of Adult Literacy in Dentistry), a dental word recognition instrument consisting of 30 dental terms arranged in increasing order of difficulty. Building on this measure, Richman et al. developed and evaluated a 99-item REALD [6].

However, these studies have been limited to those that assess the reading level of patient educational materials and postoperative instructions only. Oral health literacy is not only the individual's capacity to obtain but also to process and understand basic oral health information and services needed to make appropriate health decisions. In the pursuit of generating a suitable instrument to measure oral health literacy, to understand and relieve the patient of his hesitations and incapabilities, and to plan and implement relevant measures for the same, the present study was conducted with an aim to develop and pilot test an oral health literacy instrument, DFLD (Determination of Functional Literacy in Dentistry). Subsequently the following objectives were laid prior to commencing the study:

- To develop an instrument to measure oral health literacy.

- To pilot test the instrument on an English speaking population.
- To establish the validity and the reliability of the instrument.

Methodology

The development of the instrument is based on the Rapid Estimate of Adult Literacy in Dentistry (REALD-30), an efficient word recognition instrument used to assess health literacy in the dental arena.

DFLD assesses comprehension of common dental words in addition to measuring the reading capabilities of an individual.

Patients attending a randomly selected, health care facility in Gurgaon were approached for the study after prior permission from the concerned authorities. Ethical approval was obtained from the institutional review board at SGT Dental College, Hospital and Research Institute.

Those patients who knew English were included whereas those with speech or visual impairments were excluded. 320 subjects were administered the instrument consisting of 30 words and 30 sentences. Readability of these dental related words was assessed through correct pronunciation. Each single word was also utilized in a sentence commonly used by oral health professionals during regular communication with the patients.

The subject was asked to read the sentence (Table 1) and categorize the words marked into one of the following:-

- Anatomical/Structure related
- Etiological/Disease related
- Curative
- Preventive

Sugar is the prime cause for tooth decay.
Cigarette **smoking** is injurious to health.
Dental **floss** helps clean tooth surfaces where tooth brush cannot reach easily.
One should **brush** teeth twice daily.
Dental **braces** align teeth to improve smile and oral health.
Tooth decay involving the dental **pulp** requires endodontic treatment.
Dentures should be brushed on the inside and outside daily.
Acid attack from certain food and drinks, puts dental **enamel** at risk.
As soon as the molar teeth erupt, we should visit our dentist to get the dental **sealant** applied.
Toothpaste containing fluoride strengthens developing teeth in children.
Dental **caries** is found to be less among those who maintain good oral hygiene.
Composites are commonly used for tooth colored **restoration**.
Excess amounts of **fluorides** in drinking water may give rise to dental fluorosis.
Plaque is a sticky, colorless film that accumulates on the teeth which if not cleaned hardens into calculus.
The most common reason for tooth **extraction** is damage due to decay.
Scaling and root planing is the initial therapy to treat **periodontal pockets**.
In case of tooth trauma, every effort should be made to restore the **vitality** of the tooth.
Whitening toothpastes contain **bleaching** agents
If left untreated, tooth **abscess** may lead to serious health problems.
Root canal treatment helps treat **apical** infections.
Using a toothbrush with a tongue cleaner helps eliminate **halitosis**.
Early identification and correction of **malocclusion** may reduce risk of tooth decay.
Gingival overgrowth is a common side effect of certain medications.
Supervision during brushing is important for a healthy **dentition** in children.
Mouth guards should be used for the elimination of unwanted forces exerted by **bruxism**.
Deciduous teeth can affect the health of permanent teeth.
Hyperkeratosis is a common occurrence amongst tobacco chewers.
Dental **sensitivity** can be easily treated by simple in-office or at-home procedures.
Many people require regular dental **radiograph** to monitor their oral health.
Early recognition and elimination of orthodontic disorder is essential for healthy **temporomandibular** system.

Table 1: DFLD: Determination of Functional Literacy in dentistry.

Instructions were given to the participants prior to the study. A score of 1 was given to every correct answer and a score of 0 to unattempted or wrong answers. The final score of, ranging from 0-60, was the sum of the readability and the comprehensibility scores.

The subject was also administered a questionnaire to assess his oral health related quality of life using OHIP-14 (Oral Health Impact Profile).

The instruments were repeated on 10% of the sample to establish reliability.

Results

320 patients participated in the study. Participant's age ranged between 17 to 22 years. Majority of the participants were males (79%). Both graphical and statistical evaluations of the scores revealed normal distribution curve. The mean scores for the two instruments and the oral health related quality of life were 10.11 for REALD, 20.0053 for DFLD and 11.98 for OHRQoL (Table 2).

	REALD	OHRQoL	DFLD
Mean	10.11	11.98	20.0053
Standard deviation	3.72	7.66	4.8941

Mean-SD	6.39	4.32	15.1112
Mean+SD	13.83	19.64	24.8994
REALD: Rapid estimate of adult literacy in dentistry; OHRQoL: Oral health related quality of life; DFLD: Determination of functional literacy in dentistry; SD: Standard deviation			

Table 2: Mean scores of oral health literacy and oral health related quality of life.

The Cronbach's alpha values for REALD were high (0.76). The value was higher when comprehension scores were added which gave the Cronbach's alpha value for DFLD (0.84). This indicates that DFLD items could be well related to REALD which reflects the high internal reliability of the instrument.

Test re-test results for DFLD of the 32 students who were administered the instrument twice showed good agreement (0.69).

Face validity, which measures whether the instrument on its face seems like a good translation of the construct, was established as per the definition of Oral Health Literacy which defines it as "

Content validity, which is the extent to which the measurement incorporates the relevant content domain of the phenomenon under study, was enhanced by incorporating the aforementioned materials and texts often encountered by patients in a dental care setting.

Predictive validity of DFLD was established by correlating it with the scores of Oral Health related Quality of Life measured using OHIP-14 and Convergent validity was established by correlation with the scores of REALD using Pearson's correlation. Both the scores were significant at p<0.001 (Table 3).

	Pearson Correlation	P value
DFLD *vs.* OHIP	-0.349	<0.001**
DFLD *vs.* REALD	0.763	<0.001**
**highly significant		

Table 3: DFLD *vs.* OHIP and REALD.

The values observed by DFLD show less range as compared to REALD when observed through OHIP scores shown in graph (Figures 1 and 2).

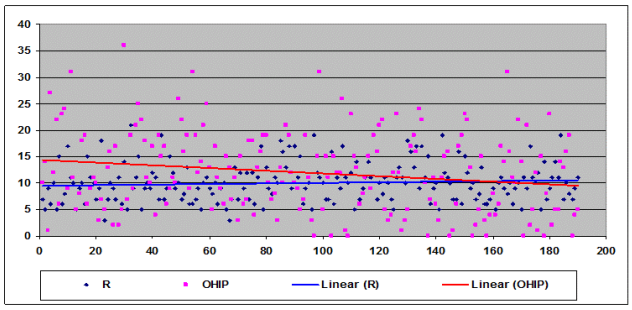

Figure 1: Scatter diagram showing REALD 30 scores (R) and oral health related quality of life scores (OHIP) of participants.

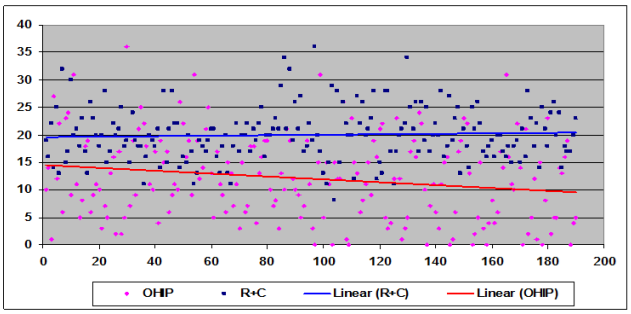

Figure 2: Scatter diagram showing DFLD scores (R+C) and Oral health related quality of life scores (OHIP) of participants.

Discussion

Maintaining good oral health requires an individual to understand and act on oral health information, whether communicated verbally or in written form. The communication skills of the dental team contribute to the patient's oral health literacy which in turn contributes to improved oral health outcomes. A mismatch between the oral health literacy levels and the demands of oral health services may erect an unnecessary barrier to preventive care and treatment [7]. Even though ample justification exists for pursuing research in this area, little research has been undertaken to examine OHL levels.

The purpose of this study was to develop and validate a new and improved test to evaluate the functional oral health literacy of adults. The instrument measures the patient's ability to perform oral health related tasks that require reading and comprehension skills.

It has been shown that a dental word recognition test (REALD-30) can provide a quick and easy assessment in patient care settings, but a reading comprehension test can serve a variety of research and intervention purposes, especially if tailored to the needs of specific patients. For this reason, DFLD was developed to assess the participant's ability to recognize basic terms that patients might encounter in a dental clinic or in oral health educational materials.

In other words, those with increased oral health-related vocabulary and conceptual knowledge about dental disease would find it easier to read and comprehend the materials than those with lower knowledge and literacy levels.

This instrument is one of the first reading comprehension tests developed to assess functional oral health literacy in a non-care seeking population.

The only other adult oral health literacy instruments are the REALD-30 and REALD-99, which is a word recognition test, and the

TOFHLiD [8] (Test of health and functional literacy in dentistry), which is also a reading comprehension test that targets parents of paediatric dental patients.

The oral health care context of TOFHLiD is specific to pediatric dentistry.

DFLD displayed high internal consistency and good test–retest reliability in the present study. Also the Cronbach's value increased when comprehension score was added to the reading scores which signified the increased performance of the DFLD instrument.

REALD was used to assess the predictive validity of the instrument whereas OHIP-14 was used to determine the convergent validity of the instrument. Results indicated significant association for the same. Face validity was appraised as per the definition of Oral health literacy by the American Dental Association. The use of English as the preferred language for the instrument was chosen since it is the official language in the country and most of the dental related words used by the dentist during health education activities are in English.

Currently, DFLD requires about 20 minutes to be completed, making it more appropriate as a research tool than a clinical tool.

The exact pathways between literacy and oral health outcomes have not yet been established through rigorous studies. Yet, when adults cannot access information related to important scientific findings or recommendations for preventive measures and self-care, when they are stymied by complicated forms related to payment, insurance, and history, and when they are prevented from offering true informed consent by legal and scientific jargon, words may well be getting in the way [7]. Additional work is needed to investigate the instrument in specific population groups to elucidate the mechanism by which oral health literacy influences oral health outcomes.

Conclusion

Initial testing of DFLD showed it to be a valid and reliable instrument to evaluate oral health literacy.

It may also be useful to dentists to detect patients with inadequate oral health literacy and to improve the level of communication between provider and patient. DFLD shows promise for use at the community level as well, in helping to assess the oral health literacy of whole communities.

The latter application is an important measure to appropriately design educational materials and community intervention programs that coincide with the literacy level of the target population.

The DFLD could also be used to conduct outcome-based oral health research. Such studies are necessary to improve our understanding of oral health literacy, its determinants, and its association with different oral health outcomes.

Additional work is needed to investigate the instrument's sensitivity to change using oral health outcomes with population groups known to be at greater risk of limited oral health literacy.

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