

Oral Health Literacy: Findings of A Scoping Review

Navdeep Kaur^{1*}, Daniel Kandelman², Laura Nimmon³ and Louise Potvin⁴

¹Department of Biomedical Sciences, University of Montreal, Canada

²International Centre for Prevention of Oral health diseases for specific needs populations, University of Montreal, Canada

³Department of Occupational Science and Occupational Therapy, University of British Columbia, Canada

⁴Institute for Research on Public Health and the Research Centre, University of Montreal, Canada

***Corresponding Author:** Navdeep Kaur, Department of biomedical sciences, Faculty of medicine, University of Montreal, Canada.

Received: July 21, 2015; **Published:** September 04, 2015

Abstract

The specific objective of this paper is to report on a scoping review conducted to identify and synthesize the current evidence and knowledge gaps on the topic of oral health literacy. It was guided by three key questions: 1) how is oral health literacy assessed? 2) What is the relationship between oral health literacy and (i) oral health knowledge (ii) oral health outcomes (iii) access and satisfaction with dental care services? 3) What interventions are developed for vulnerable populations having low oral health literacy?

We used the scoping review methodology introduced by Arksey and O'Malley and searched electronic databases on the OVID (MEDLINE and EMBASE), Google scholar and conducted manual searches identifying oral health literacy related literature published in English from the years 2002 to 2014.

From a preliminary pool of 97 screened articles, a final set of 31 relevant research articles was selected. Our scoping review affirmed a need to develop precise oral health literacy assessment tools capturing its full complexity and that low oral health literacy is associated with poor oral health knowledge, poor oral health outcomes and inadequate satisfaction with dental care services. Furthermore, there is no clinically tested cut-off point representing what adequate oral health literacy level is required to navigate in today's complex oral health care system. In addition, we found that there is scarcity of oral health literacy interventions among low oral health literate populations with diverse socio-cultural context.

This scoping review concludes that there is a need to i) to develop precise assessment tools capturing full dimensions of oral health literacy, ii) to establish what adequate oral health literacy level is required to effectively navigate in today's oral health care system and iii) to develop and implement tailored interventions among low oral health literate populations with diverse socio-cultural context.

Keywords: *Oral health literacy; oral health knowledge; oral health literacy measurement instruments; oral health literacy intervention; oral health disparities*

Introduction

Health literacy is the "degree to which individuals have the capacity to obtain, process, and understand the basic health information and services needed to make health related decisions" [1]. Health literacy refers not only to the abilities of individuals, but also to the communication practices of health information providers within health-related systems [2]. The United Nations considers health literacy as a critical determinant that ensures significant health outcomes [3]. Research indicates that people with limited health literacy use less preventive services, have poorer treatment adherence and have higher rates of hospitalization [4]. Furthermore, limited health literacy hinders people's ability to navigate effectively through today's complex health systems and to make informed health related decisions [5]. Consequently, poor health literacy is associated with poor health status extorting economic costs both for individuals and for health care

Citation: Navdeep Kaur, et al. "Oral Health Literacy: Findings of A Scoping Review". *EC Dental Science* 2.3 (2015): 293-306.

systems [6]. Recent research reported that limited health literacy is a significant factor contributing in health disparities [7]. All the above mentioned health literacy issues are potentially relevant to the oral health field as well [8-11].

During last decade there has been growing interest among oral health researchers and practitioners to study the relationship between health literacy and oral health, leading to emergence of the concept of Oral Health Literacy (OHL). The conceptualization of oral health literacy is marked by a report prepared by a workforce sponsored by the National Institute of Dental and Craniofacial Research [12]. This report underscored several research questions including oral health literacy measurement tools, potential association between health literacy and oral health outcomes and emphasized a need to develop and test efficacy of oral health literacy interventions [12]. Additionally reports released by the US Institute of Medicine and American Dental Association's health dentistry action plan underpinned the importance of oral health literacy [13-15].

Healthy people 2010 (a US document of health related national objectives) has defined oral health literacy as the "degree to which individuals have the capacity to obtain, process, and understand the basic health information and services needed to make oral health related decisions" [16]. The American Dental Association asserts that, "limited oral health literacy is a barrier to prevent, diagnose and treat oral diseases effectively" and has developed a strategic action plan to improve oral health literacy [15]. Furthermore, recent research affirmed that an improvement in limited oral health literacy is an essential element for better oral health outcomes and to reduce oral health disparities [17-19].

The specific objective of the present paper is to conduct a scoping review in order to identify and synthesize the current evidence and knowledge gaps on the topic of oral health literacy. The key questions that we aim to answer in this paper are: 1) how is oral health literacy assessed? 2) What is the relationship between oral health literacy and (i) oral health knowledge, (ii) oral health outcomes, (iii) access and satisfaction with dental care services? 3) What interventions are developed for vulnerable populations having low oral health literacy?

Methods

We used the scoping review methodology introduced by Arksey and O'Malley [20] to develop a mapping of the literature on oral health literacy. We diligently followed the five steps of the Arksey and O'Malley's scoping review methodology as described below: 1) Identify the research questions, 2) identify all relevant studies, 3) select the studies for detailed analysis, 4) chart the data identifying the key themes and concepts and 5) to collate and summarize the findings of selected studies.

Step 1: Identify the research question

We identified following three research questions:

1) How is oral health literacy assessed? 2) What is the relationship between oral health literacy and (i) oral health knowledge, (ii) oral health outcomes, (iii) access and satisfaction with dental care services? 3) What interventions are developed for populations having low oral health literacy?

Step 2: Identify all relevant studies

The first author Navdeep Kaur (NK) conducted rigorous literature search of the electronic databases on the OVID (MEDLINE and EMBASE) and Google scholar identifying the relevant publications on oral health literacy from years 2002-2014. For an extensive scoping of the oral health literacy field, NK conducted manual searches of the publications listed in the reference lists of the articles that resulted from the search. In brief, we limited our search string to the research studies that i) met our pre-established inclusion and exclusion criteria (as listed in table 1) ii) offered relevant content with regard to our research questions and iii) measured oral health literacy with a validated instrument.

We defined a validated instrument as the one that previously had psychometric evaluations (reliability and validity) and had been used to measure oral health literacy in peer-reviewed research studies. Keywords used to search the literature were; oral health literacy, oral health knowledge, oral health literacy measurement instruments, oral health literacy interventions and oral health disparities. All

the searched citations were stored in the Endnote software to track and screen out the abstracts and to select studies for the inclusion in our scoping review.

Table 1: Inclusion and exclusion criteria.

Inclusion criteria
Identified through electronic databases on OVID (MEDLINE and EMBASE) and Google Scholar
Selected using keywords; oral health literacy, oral health knowledge, oral health literacy measurement instruments, interventions and oral health disparities
Research studies that measured oral health literacy with a validated instrument
Time period (from 2002-2014) in order to be current with the most recent research
Exclusion criteria
Article did not include oral health literacy and oral health outcome, measurement tool or oral health literacy intervention
Commentary articles/conference reports/theses/workshop summaries
Unavailable in English

Step 3: Select the studies for detailed analysis

In total we identified through database 591 publications. After vigilant screening, at first stage we retrieved a preliminary pool of 97 publications specifically on oral health literacy including empirical studies, commentaries, conceptual articles, workshop summaries, theses etc. A large proportion of the identified documents were conceptual articles or commentaries advocating for the importance of oral health literacy. There were also a significant number of publications that employed either qualitative or quantitative research methods to measure oral health literacy. Thus, after carefully reviewing the titles and abstracts of the 97 publications (excluding the duplications), 50 citations were screened out since they did not meet the inclusion criteria of our scoping review.

In all, full texts articles of the 47 selected abstracts were retrieved and printed out for in depth analysis. During further rigorous screening and content analysis, 16 publications were excluded since they did not report outcomes of interest to our research questions. Finally, based on our inclusion and exclusion criteria, 31 research papers that explicitly addressed our research questions were deemed relevant for inclusion in our scoping review.

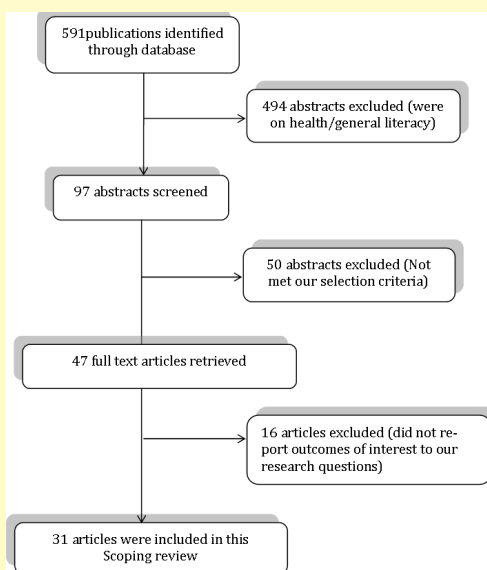


Figure 1: Studies selection process.

Step 4: Charting the data

The fourth phase of the scoping review involves reading each article in detail to identify and chart key emerging themes. After reading each article in detail, we developed a standard data extraction sheet and included the descriptive characteristics such as author’s name, year of publication etc. Of the included studies as shown in the tables 2, 3 and 4.

Table 2: Research studies (n = 13) on Oral Health Literacy (OHL) measurement tools.

Author and year	Name of the measure	Modified version of	Brief description of the tool	Psychometric properties (Reliability and validity)	Advantages	Dis advantages
I) Modified versions of Rapid Estimate of Adult Literacy in Medicine (REALM) tools						
Lee., et al. [21]	REALD-30 (Rapid Estimate of Adult Literacy in Dentistry)	REALM	REALD-30 consists of 30 dental words taken from the American dental association’s glossary and is used to measure OHL.	<i>Reliability:</i> Cronbach’s α = 0.87 (REALM) <i>Validity:</i> Convergent validity (Pearson’s correlations coefficients were 0.86-REALM and 0.64-TOFHLA)	REALD-30 is completed in 5-10 minutes.	REALD-30 does not test comprehension of words.
Richman., et al. [22]	REALD-99 (Rapid Estimate of Adult Literacy in Dentistry)	REALM	REALD-99 added 69 more dental words into the existing tool REALD 30 to measure OHL.	Reliability Cronbach’s α = 0.86 (REALM) Validity Convergent validity (Pearson’s Correlation coefficient were 0.80 with REALM	REALD-99 is completed in short time(5-10 minutes	REALD-99 relies only on the word recognition.
Atchison., et al. [23]	REALM-D (Rapid Estimate of Adult Literacy in Medicine and Dentistry)	REALM	REALM-D is a modified version of REALM i.e. health literacy measure that had 66 words. Eighteen more dental words were added to in REALM to form 84 words of REALM-D.	<i>Reliability:</i> Cronbach’s α = 0.958 (REALM) <i>Validity:</i> Criterion validity was assessed with (REALM 66) (Pearson correlation coefficient = 0.95)	REALM-D is a screening tool that identifies incorrect medical/dental word recognition. It is short and quick.	REALM-D does not assess the patient’s ability to understand the meaning of dental/medical term. It is completed in two visits.
Stucky., et al. [24]	TS-REALD (Two Stage-Rapid Estimate of Adult Literacy in Dentistry)	REALM	TS-REALD is improved version of REALD-30, which uses only one third items of REALD-30 and it is two stage routing test	<i>Reliability:</i> Cronbach’s α > 0.85 (REALM) <i>Convergent validity:</i> (Correlation between Newest vital sign – NVS instrument & TS-REALD = 0.51)	TS-REALD is tailored according to respondent’s dental health literacy level. It takes less than 2 minutes.	TS-REALD does not test comprehension of words
Gironda., et al. [25]	REALMD-20 (Rapid Estimate of Adult Literacy in Medicine and Dentistry)	REALM	REALMD-20 is a screening tool that quickly detects inadequate dental /medical word recognition using 20 screening terms.	<i>Reliability:</i> Cronbach’s α = 0.95 (REALM) <i>Concurrent validity:</i> Spearman’s rho (0.32) <i>Convergent validity</i> Spearman’s rho REALM=0.93 REALM D=0.93	REALMD-20 is completed in 2-3 minutes only.	It includes terms used in multi-disciplinary clinical settings. REALMD-20 does not assess patient’s ability to understand the meaning of the dental/medical terms.

Lee, <i>et al.</i> [26]	OHLA-S (Oral Health Literacy Assessment in Spanish)	REALM	OHLA-S is designed to measure the OHL in Spanish speaking population.	<i>Reliability:</i> Cronbach's $\alpha=0.70-0.80$ (REALM) Predictive validity (OHLAS-OHIP)	OHLA-S Contains the dental words as REALD-30 but in Spanish language (testing both pronunciation and comprehension).	OHLA-S is designed for Spanish population only
Wong, <i>et al.</i> [27]	HKREALD-30 (Hong Kong Rapid Estimate of Adult Literacy in Dentistry)	REALM	HKREALD-30 was developed by using the REALD-99 as template. It consists of 30 basic dental terms used in Cantonese speaking population of Hong Kong.	<i>Reliability:</i> Cronbach's $\alpha=0.84$ Convergent validity Spearman's rho = 0.69	HKREALD-30 Provides a rapid method to screen basic health literacy of Chinese adults.	HKREALD-30 Assesses OHL of Cantonese speaking population only
II) Modified versions of Test of Functional Health Literacy in Adults (TOFHLA) tools						
Gong, <i>et al.</i> [29]	TOFHLiD (Test Of Functional Health Literacy in Dentistry)	TOFHLA	TOFHLiD consists of 68-item reading comprehension section (three passages such as instructions about fluoride varnish application) and 12-items numerical ability test.	<i>Reliability:</i> Cronbach's $\alpha=0.63-0.86$ <i>Validity:</i> Convergent validity (with REALD-99 $r = 0.82$)	TOFHLiD includes additional testing of a consent form and Medicaid form.	TOFHLiD has lengthy administration and is completed in 30 minutes. Certain contents of this tool e.g. Medicaid rights are not feasible in developing countries.
Sabbahi, <i>et al.</i> [30]	OHLI (Oral Health Literacy Instrument)	TOFHLA	OHLI consists of 38-item reading comprehension with words e.g. dental caries and periodontal disease. Numeracy section consists of 19 items to comprehend dental prescription directions.	<i>Reliability:</i> Cronbach's $\alpha = >0.70$ for oral health knowledge and OHLI Convergent validity ; moderate to strong correlation between OHLI and TOFLA scores(Spearman's rho = 0.613)	OHLI tests one's ability to read and understand texts related to dentistry.	OHLI is lengthy and is completed in 45 minutes.
Macek, <i>et al.</i> [31]	CMOHK (Comprehensive Measure of Oral Health Knowledge)	REALM + Short-TOFHLA	CMOHK was a survey instrument developed to determine conceptual oral health knowledge. It was categorized into three levels of knowledge (Poor, fair and good).	<i>Reliability:</i> Cronbach's $\alpha = >0.74$ Criterion validity- REALM	CMOHK measures the conceptual knowledge of the ability to interpret numbers.	CMOHK does not measure the conceptual knowledge of words and measures the ability to interpret numbers only.

Wong, <i>et al.</i> [32]	HKOHLAT-P Hong Kong Oral Health Literacy As- sessment Task for Paediatric dentistry	TOFHLiD + OHLI	HKOHLAT-P Examines Chinese parents or caregiver's OHL levels in paediatric dentistry. It provides an estimate of one's ability to read and understand text related to dentistry and tests numerical ability.	<i>Reliability:</i> Cronbach's α = 0.71 <i>Validity:</i> Convergent and predictive validity	HKOHLAT-P is a potential model for developing valid and reliable OHL measurement tools for other non speaking populations	It captures the oral health literacy skills of Chinese popula- tion only.
Devi, <i>et al.</i> [34]	Questionnaire	Question- naire-e	This is a self admin- istered questionnaire having 15 closed end- ed questions framed on various dental as- pects and four options out of which one was correct.	<i>Reliability:</i> Cronbach's α = 0.69 <i>Validity:</i> Convergent when compared with OHLI instrument(Correlation coefficient; r = 0.613)	It is a self administered questionnaire.	The predictive validity of this instrument was measured using subjective crite- ria only.
Jones, <i>et al.</i> [35]	Health Literacy in Dentistry (HeLD) scale for rural Australian aboriginals	Modified version of Health literacy Mana- gem-ent scale (HeLM)	It is a 29 item scale and scores seven domains of oral health literacy; communica- tion, access, receptiv- ity, understanding, utilization, support and economic barriers. Scores are coded from 0-4 with higher scores means high oral health literacy	<i>Reliability:</i> Cronbach's α = 0.91 <i>Validity:</i> Convergent and predictive validity were associated with few variables only	It is predicted that this tool may be useful in measuring oral health literacy among indigenous and other vulner- able popula- tions.	The external reliability of this tool was tested in regional indig- enous popula- tion only and needs further testing in other indigenous and non indigenous populations that limits the pre- dicted potential of this tool

Table 3: Research studies (n = 15) on relationship between Oral Health Literacy (OHL) and (i) oral health knowledge, (ii) oral health outcomes, (iii) access and satisfaction with oral health care services.

Author	Study design	OHL assessment tools	Indicator assessed	Relationship of assessed indicator with OHL
(i) Oral Health Knowledge				
Hom., et al. [9]	Prospective cohort	REALD-30	Oral health knowledge	Higher levels of oral health knowledge are significantly associated with higher levels of OHL (p < 0.01)
Jones., et al. [39]	Cross-sectional	REALD-30	Oral health knowledge	Lower OHL is associated with lower oral health knowledge (p < 0.01).
Vann., et al. [40]	Prospective cohort	REALD-30	Oral health knowledge	Caregivers lower OHL is associated with poor oral health status and poor oral health knowledge of their children.
(ii) Oral Health Outcomes				
Miller., et al. [41]	Cross-sectional	REALD-30	Oral health outcomes	Low oral health literacy of caregiver was significantly associated with poor child oral health status (p < 0.5)
Parker., et al. [42]	Cross-sectional	REALD-30	Oral health knowledge	Poor OHL is significantly associated with poor oral health knowledge and deleterious oral health behaviors.(p < 0.05)
Lee., et al. [10]	Prospective cohort	REALD-30	Oral health outcomes	Independent of age, race and education higher OHL is associated with improved oral health status (p < 0.1).
Wehmeyer., et al. [43]	Cross-sectional	REALD-30	Oral health outcomes	Lower OHL is associated with severe periodontal disease. One decreased unit of OHL increases the chances of having worse periodontal disease to 1.19 times (p < 0.002).
Ueno., et al. [45]	Cross-sectional	Questionnaire	Oral health outcomes	OHL is significantly associated with poor oral health behaviors and poor clinical oral health status (p < 0.001).
Sistani., et al. [46]	Cross-sectional	OHL-AQ Oral Health Literacy- Adult Questionnaire	Oral health outcomes	Low OHL is significant indicator of poor self reported health. (p < 0.001)
Bridges., et al. [47]	Cross-sectional	HKREALD-30 and HKOHLAT-P	Oral health outcomes	Caregivers low OHL level was significantly associated with dental caries status of children they take care of.(p < 0.05)
Sanzone., et al. [48]	Cross-sectional	REALD 30	Oral health outcomes	Caregivers low OHL is associated with deleterious oral health behaviors and oral hygiene practices. (p < 0.03)
(iii) Access And Satisfaction With Oral Health Care Services				
Divaris., et al. [49]	Prospective cohort	REALD-30	Access and satisfaction with oral health care services	Subjects in the low OHL group reported more adverse oral health related quality of life impacts verses those with higher literacy. (p < 0.05)
Holtzman., et al. [50]	Cross sectional	REALM-D	Access and satisfaction with oral health care services	Low OHL is significantly associated with failed dental appointments.83.3% failure rate was reported for low OHL scores as compared to 24.2% failure for high OHL scores.
Shin., et al. [51]	Cross sectional	REALD 30	Access and satisfaction with oral health care services	Low OHL is significantly associated with dental anxiety that hinders oral health care services utilization. (p < 0.003)
Arora., et al. [52]	Qualitative study	REALD-30	Access and satisfaction with oral health care services	Participants favored health information that is culturally sensitive and written in plain language with the use of illustrations.

Author	Study design	OHL assessment tool	Interventions in brief
Mills, <i>et al.</i> [59]	An intervention study design with incorporated qualitative and quantitative components	TS-REALD	On a sample of 15 aboriginal adults, data were collected through pre and post questionnaires and oral health literacy was measured using the TS- REALD tool. Series of educational sessions were provided to improve oral health literacy related outcome measures i) oral health knowledge, ii) self efficacy and iii) sense of fatalism The results of this study reported that program was effective in improving oral health knowledge and self efficacy among aboriginal adults.
Hjertstedt, <i>et al.</i> [44]	A pre-post study design	REALD-30	The intervention consists of five 2-hour long visits at the apartment of the participant. Participants received patient education pertaining to oral health and importance and methods of oral hygiene, benefits of fluoride, side effects of medication, role of saliva in oral health and aspects of nutrition. Oral health literacy was assessed using the REALD 30 and plaque index was measured using O’Leary, Drake and Naylor at the baseline and at endpoint. This study concluded that community based educational intervention involving multiple interactions can significantly and positively impact oral health literacy and oral hygiene of older adults.
Parker, <i>et al.</i> [54]	Randomized controlled trial	HeLD	Intervention consists of series of five culturally sensitive oral health education workshops delivered over a 12 month period to aboriginal adults(n = 400). The intervention group will receive the intervention from outset of the study. The control group will be offered 12 months following their enrolment in the study. Data will be collected through self reported questionnaires at baseline, at 12 months and at 24 months. Primary outcome: oral health literacy. Secondary outcomes: oral health knowledge, oral health self care, use of dental services, oral health related self efficacy.

Table 4: Research studies (n = 3) on Oral Health Literacy (OHL) interventions.

Step 5: Collate, summarize and report the findings of the studies

The selected set of studies was critically analyzed and the key findings are summarized in the following results section of our scoping review:

Results

Characteristics of the selected studies

Majority of the 31 selected publications included in our scoping review were from the United States and their years of publication ranged from 2007-2014. Furthermore, the included publications used diverse study designs and assessment tools to measure oral health literacy. Out of the total 31 publications, 13 reported on oral health literacy instruments, 15 addressed the relationship between oral health literacy and i) oral health knowledge, ii) oral health outcomes and iii) access and satisfaction with dental care and 3 were on oral health literacy interventions. Following is the description of all selected studies starting from studies on oral health literacy assessment tools:

1) How is oral health literacy assessed?

Amongst the 13 publications on oral health literacy measurement tools, 7 studies presented tools (REALD-30, REALD-99, REALM-D, TS-REALD, REALMD-20, OHLA-S and HKREALD-30) [21-27] that were modified versions of health literacy tool known as the Rapid Estimate of Adult Literacy in Medicine (REALM) [28]. The REALD-30 was the first oral health literacy assessment tool that uses 30 words from the ADA’s glossary of dental terminology arranged in a specific order of increasing difficulty based on number of syllables, word length and combination of sounds. Each correct word recognized and pronounced scores one point with 0 as lowest and 30 as highest scores [22]. Low REALD-30 (< 13 out of 30) scores mean poor oral health related quality of life [8].

Four other assessment tools (TOFHLiD, OHLI, CMOHK and HKOHLAT-P) [29-32] were modeled after the Test of Functional Health Literacy in Adults (TOFHLA) [33]. They consist of i) reading passages employed to test understanding of given instructions ii) numerical ability test to evaluate understanding of prescriptions details associated with dental treatments. It was unclear whether the tools modelled after TOFHLA were designed to be used in any particular health care settings. Additionally, one publication [34] reported on the development and validation of an original questionnaire used to measure oral health literacy. Recently, a new tool called Health literacy in dentistry (HeLD) is developed to measure oral health literacy among rural Australian aboriginals. It is a 29 items scale and is modified version of health literacy management (HeLM) scale [35]. In all, 10 studies reported assessment tools developed for English speaking adult populations, predominantly North Americans, 3 studies [26,27,32] reported tools for Spanish and Cantonese populations. Further details about the current oral health literacy measurement tools are presented in the Table 2.

In general, current oral health literacy measurement tools have focused on word recognition, pronunciation, computational tasks (e.g. tests patient's ability to know numerical instructions on appointment slips or prescription vials), with the purpose of assessing reading ability of the common dental words [30-34]. In addition, no study has established what adequate threshold level of oral health literacy is required to effectively navigate through today's complex oral health care system [36]. Furthermore, despite of their potential to assess word recognition and basic reading skills current tools have failed to capture the full complexity of one's oral health literacy level [37,38].

2) Correlations between oral health literacy and (i) oral health knowledge, (ii) oral health outcomes and (iii) access and satisfaction with dental care services

Fifteen publications examined the relationship between oral health literacy and selected correlates. Out of these, 3 studies addressed the association between oral health literacy and oral health knowledge, 8 between oral health literacy and oral health outcomes and 4 between oral health literacy and access to dental services. Most publications used REALD-30 tool [21] to measure oral health literacy level. Ten were cross-sectional studies, four were prospective cohort studies and one was a qualitative study. We have tabularized and summarized the details of all 15 included studies with respect to outcomes based on our second research question in the table 3.

Below is the description of the correlations between oral health literacy and (i) oral health knowledge, (ii) oral health outcomes and (iii) access and satisfaction with dental care services:

(i) Oral health literacy and oral health knowledge

Three studies [9,39,40] have examined the relationship between limited oral health literacy and oral health knowledge. Hom., *et al.* administered six item knowledge survey to low income pregnant women assessing their oral health related knowledge (score ranged from 0-6) and measured their oral health literacy level by using the REALD-30 tool. They reported a positive and significant relationship between REALD-30 scores and oral health knowledge scores [9]. Vann., *et al.* reported that poor oral health literacy among female caregivers was significantly associated with poor oral health knowledge and poor oral health status among their children [40]. Similarly, Jones., *et al.* reported that those with limited oral health knowledge were more likely to have lower oral health literacy levels. All three studies found a positive and significant relationship between oral health literacy and oral health knowledge this relationship pervaded regardless of the socio-demographic characteristics.

(ii) Oral health literacy and oral health outcomes

Eight studies [10,41-48] examined the relationship between oral health literacy and oral health outcomes. Miller., *et al.* evaluated caregiver's oral health literacy and preschool children's oral health status and oral health behaviors. They found a significant association between caregiver's oral health literacy score and children's clinical oral health status [41]. Caregivers of children with mild to moderate treatment needs had higher scores on REALD-30 than children in severe treatment need. Likewise, a study by Bridges., *et al.* showed that caregivers low oral health literacy was associated with poor oral health status of their children [47].

Parker, *et al.* reported that REALD 30 scores were lower amongst those who believed teeth should be brushed irregularly [42]. Lee, *et al.* and Ueno *et al.* studies were conclusive in linking higher oral health literacy with higher oral health status [10,45]. Wehmeyer, *et al.* found that lower oral health literacy was associated with severe periodontal disease [43]. Similarly, Sistani and Sanzone, *et al.* provided evidence of an association between low oral health literacy with poor dental health [46,48]. In summary, all examined studies have demonstrated an association between low oral health literacy and poor oral health outcomes.

(iii) Oral health literacy and access and satisfaction with dental care services

The relationship between oral health literacy and access and satisfaction with oral health care services was less clear. Among the four studies identified through our search, Divaris, *et al.* concluded that respondents in the low oral health literacy category reported more negative impacts of oral health related quality of life compared to those with higher oral literacy [49]. Two studies reported that low oral health literacy was associated with less dental services utilization and a higher number of failed dental appointments [50,51]. Arora, *et al.*'s study reported that diverse ethno-cultural groups prefer and retain knowledge when oral health information is culturally sensitive, written in plain language, with simple illustrations and without dental jargons [52].

3) What interventions are developed for vulnerable populations having low oral health literacy?

We retrieved only 3 studies on oral health literacy interventions that are briefly described below:

i) Helen Mills developed oral health literacy intervention for aboriginal adults [53]. Her study's purpose was to determine if series of educational sessions can improve oral health literacy related outcome measures i) oral health knowledge, ii) self efficacy and iii) sense of fatalism. An intervention study design with incorporated qualitative and quantitative components was used on a sample of 15 aboriginal adults. Data were collected through pre and post questionnaires and oral health literacy was measured using the TS- REALD tool. Their results reported that program was effective in improving oral health knowledge and self efficacy but since this study had a very small sample size, therefore their results cannot be generalized [53].

ii) Hjertstedt, *et al.* investigated the impact of community based educational intervention on oral health literacy and oral hygiene of older adults [44]. This study used pre-post study design among 67 older primarily Caucasian adults. The intervention consists of five 2-hour long visits at the apartment of the participant. Participants received patient education pertaining to oral health and importance and methods of oral hygiene, benefits of fluoride, side-effects of medications, role of saliva in oral health and aspects of nutrition. Oral health literacy was assessed using the REALD 30 and plaque index was measured using O'Leary, Drake and Naylor at the baseline and at endpoint. This study concluded that community based educational intervention involving multiple interactions can significantly and positively impact oral health literacy and oral hygiene status among older adults [44].

iii) Parker, *et al.* has published a study protocol of a randomized control trial among Australian aboriginals [54]. They hypothesized that it is possible to enhance oral health literacy through interventions attuned to socio-cultural context of the communities [54]. They plan to use clustered randomized control (N = 400) trial having a delayed intervention study design. Forty clusters will be formed based on family and social groups. Clusters will be randomized into immediate intervention (n = 20 clusters) or control (n = 20 clusters) delayed intervention group by using a computer generated permuted block randomization sequence. The intervention group will receive intervention at the onset of trial and the control intervention group will receive after 12 months. Their intervention consists of five oral health educational workshops and data will be collected through a self-report questionnaire at baseline, at 12 months and at 24 months. The primary outcome measure will be oral health literacy and secondary outcome measures include oral health knowledge, oral health self-care, use of dental services, oral health-related self-efficacy and oral health-related fatalism [54]

Discussion

In this paper we set out to identify and synthesize published evidence on the topic of oral health literacy. Our principal findings have affirmed that limited oral health literacy is positively and significantly related to poorer oral health knowledge and poorer oral health outcomes. Evidence related to the association between limited oral health literacy and access and satisfaction with dental health care services was insufficient due in part to the paucity of studies. In addition, although current oral health literacy assessment tools may have some applicability in a clinical setting yet they fail to capture all dimensions of oral health literacy such as oral health knowledge

and comprehension, cultural and conceptual knowledge, critical thinking skills, etc. This finding supports results from a previous studies that current tools do not offer accurate assessment of oral health literacy level [30,34,37,38,55] as they cannot differentiate between (a) lack of background knowledge in oral health related domains, (b) lack of familiarity with language and types of materials used, or (c) cultural differences in approaches to oral health care [56].

In this review we also found that no gold standard of what threshold level of oral health literacy is required to navigate through today's complex oral health system exists. Furthermore, we observed a trend of using the REALD-30 assessment tool whereas the tools such as the TOFHLiD that measure functional oral health literacy had been relatively used less. One reason for this could be that REALD-30 takes only 5-10 minutes to administer whereas the TOFHLiD takes 30 minutes and some of the contents of the latter such as Medicaid rights are not applicable in countries other than the US. However, we cannot determine which one between REALD-30 and TOFHLiD is a better tool since they measure different capacities and have different threshold levels to determine limited oral health literacy.

Interestingly, we noticed that even studies that used the same tool i.e. REALD-30 have reported varied cut-off points of low oral health literacy. For example, Jones., *et al.* reported a clinical threshold of 21 valid responses out of 30 items [39] and Vann., *et al.* and Divaris., *et al.* reported a threshold of 13 valid responses out of 30 items [40]. Furthermore, no study has established what adequate threshold level of oral health literacy is required to effectively navigate through the oral health care system [36]. We believe that in order to conduct a comparative analysis of the current assessment tools, it is imperative to establish a gold standard of what particular cut-off point represents adequate oral health literacy level required to effectively navigate in today's oral health care system.

We found scarce number of studies on interventions among vulnerable populations having low oral health literacy. Noteworthy, the existing studies on oral health literacy interventions were potentially successful in improving oral health related knowledge among vulnerable populations but evidence lacks if these interventions were successful in bringing sustainable oral health behavioural change. Moreover, the theoretical underpinning of all the above mentioned oral health literacy interventions was not clear.

In addition to our research questions, our scoping review also highlighted the existence of a gap between limited oral health literacy skills of patients and the communication practices embedded in context of medicine of the oral health care providers [39,52]. In other words, those who cannot comprehend the information provided by the oral health professional are unable to implement oral health promoting and preventive actions. Therefore, in order to enhance effective communication practices of oral health care providers, Maybury., *et al.* proposed incorporating communication approaches courses in dental school curriculum [57]. Furthermore, it is proposed that oral information and educational materials should be provided i) in plain language with no jargons and ii) should be linguistically sensitive to the socio-cultural practices of the diverse population groups [52,58].

The primary strength of the present scoping review is that it offers a breadth of overview of current evidence on the topic of oral health literacy. Previous two reviews on oral health literacy [37,38] have solely focussed on the measurement tools whereas our scoping review has identified and synthesized the current evidence and knowledge gaps on oral health literacy on the whole. Although we conducted a rigorous scoping review yet it has few limitations. First, due to our narrow search string, we may have missed out few publications in this review. However, the publications that we read during the later stage of our scoping review did not add any significant insight. Second, we acknowledge that the scoping review methodology that we used, does not systematically conduct quality assessment and critical appraisal of the research studies. Third, heterogeneity in study designs and approaches intrinsically limited our potential to categorise publications based on their similarities or differences. Finally, given that the majority of the studies were conducted in the United States, the findings cannot be generalised to health systems of other under developed countries.

Despite of few limitations, we believe that present scoping review offers substantial evidence on measurement tools, trends, directions and priority issues related to oral health literacy. Specifically, in addition to emphasizing a need for precise oral health literacy measurement tools it outlines a need of tailored oral health literacy interventions among low oral health literate populations.

Conclusions and Recommendations

Oral health literacy is a multidimensional concept, its precise measurement is crucial to design effective health educational materials and in order to develop interventions aimed to improve limited oral health literacy [45]. Based on our scoping review we emphasize the need to develop comprehensive assessment tools to capture all dimensions of oral health literacy. In addition, future research should also investigate what oral health literacy interventions could bring sustainable oral health related behavioural changes among low oral health literate populations with diverse socio-cultural context. Also, future assessments are required to determine whether public or private dental health organizations and services are providing understandable and locally relevant information and services. Additional research work exploring whether there is pathway between limited oral health literacy and poor oral health outcomes and the wider socio-cultural context that shape this process would be beneficial. In brief, improvement of limited oral health literacy through collaborative efforts of researchers, stakeholders, community partners, and oral health care providers can empower individuals and communities to make informed and appropriate oral health promoting decisions that could bring positive oral health outcomes and thereby reducing oral health disparities.

Bibliography

1. Ratzan SC PR. In: Selden CR, Zorn M, Ratzan SC, Parker RM, eds. National Library of Medicine Current Bibliographies in Medicine: Health Literacy. Bethesda, MD: National Institutes of Health, US Department of Health and Human Services. 2000.
2. Mitic Wayne RI. "An intersectoral approach for improving health literacy for Canadians". *A Discussion Paper published by Public Health Association of BC*. 2012.
3. http://www.un.org/en/ecosoc/julyhls/pdf09/ministerial_declaration-2009.pdf Geneva.
4. Baker DW., et al. "Functional health literacy and the risk of hospital admission among Medicare managed care enrollees". *American Journal of Public Health* 92.8 (2002): 1278-1283.
5. Ilona Kickbusch JMP, et al. "Health literacy The solid facts". *World Health Organization Regional Office for Europe*. 2013.
6. Parker RM., et al. "Health literacy: a policy challenge for advancing high-quality health care". *Health Affairs (Millwood)* 22.4 (2003): 147-53.
7. Rootman I and Gordon-El-Bihbety, "A vision for a health literate Canada". *Report of the expert panel on health literacy*. 2008.
8. Divaris K., et al. "The relationship of oral health literacy with oral health-related quality of life in a multi-racial sample of low-income female caregivers". *Health Qual Life Outcomes* 9.108 (2011).
9. Hom JM., et al. "Oral health literacy and knowledge among patients who are pregnant for the first time". *Journal of the American Dental Association* 143.9 (2012): 972-980.
10. Lee JY., et al. "The relationship of oral health literacy and self-efficacy with oral health status and dental neglect". *American Journal of Public Health* 102.5 (2012): 923-929.
11. Naghibi Sistani MM., et al. "Determinants of oral health: does oral health literacy matter?" *ISRN Dental* 2013 (2013): 249591.
12. National Institute of Dental and Craniofacial Research NIOH, U.S. Public Health Service, Department of Health and Human Services. The invisible barrier: literacy and its relationship with oral health. *Journal of Public Health Dentistry* 65.3 (2005): 174-182.
13. Committee on an Oral Health Initiative BoHCS. Advancing oral health in America. Washington DC: Institute Of Medicine (IOM) (2011).
14. Committee on Oral Health Access to Services BoC, Youth, and Families, Board on Health Care Services. Improving access to oral health care for vulnerable and underserved populations. Washington DC: Institute of Medicine (IOM) (2011).
15. (ADA) ADA. Health Literacy in dentistry action plan 2010-2015. Chicago, IL (2009).
16. Healthy people 2010. 2nd ed., Vol. II : Oral Health. Washington, DC: US Government Printing Office (2000).
17. Horowitz AM and Kleinman DV. "Oral health literacy: the new imperative to better oral health". *Dental Clinical of North America* 52.2 (2008): 333-344.
18. Horowitz AM and Kleinman DV. "Oral health literacy: a pathway to reducing oral health disparities in Maryland". *Journal Public Health Dentistry* 72 suppl1 (2012): S26-S30.

19. Rudd R and Horowitz AM. "The role of health literacy in achieving oral health for elders". *Journal of Dental Education* 69.9 (2005): 1018-1021.
20. Arksey HaOM L. "Scoping studies: towards a methodological framework". *International Journal of Social Research Methodology* 8.1 (2005): 19-32.
21. Lee JY, et al. "Development of a word recognition instrument to test health literacy in dentistry: the REALD-30--a brief communication". *Journal of Public Health Dentistry* 67.2 (2007): 94-98.
22. Richman JA, et al. "Evaluation of a word recognition instrument to test health literacy in dentistry: the REALD-99". *Journal of Public Health Dentistry* 67.2 (2007): 99-104.
23. Atchison KA, et al. "Screening for oral health literacy in an urban dental clinic". *Journal of Public Health Dentistry* 70.4 (2010): 269-275.
24. Stucky BD, et al. "Development of the two-stage rapid estimate of adult literacy in dentistry". *Community Dentistry and Oral Epidemiology* 39.5 (2011): 474-480.
25. Girona M, et al. "A brief 20-item dental/medical health literacy screen (REALMD-20)". *Journal of Public Health Dentistry* 73.1 (2013): 50-55.
26. Lee J, et al. "Oral Health Literacy Assessment: development of an oral health literacy instrument for Spanish speakers". *Journal of Public Health Dentistry* 73.1 (2013): 1-8.
27. Wong HM, et al. "Development and validation of Hong Kong Rapid Estimate of Adult Literacy in Dentistry". *Journal of Investigative and Clinical Dentistry* 3.2 (2012): 118-127.
28. Davis TC, et al. "Rapid assessment of literacy levels of adult primary care patients". *Family Medicine* 23.6 (1991): 433-435.
29. Gong DA, et al. "Development and testing of the Test of Functional Health Literacy in Dentistry (TOFHLiD)". *Journal of Public Health Dentistry* 67.2 (2007): 105-112.
30. Sabbahi DA, et al. "Development and evaluation of an oral health literacy instrument for adults". *Community Dentistry and Oral Epidemiology* 37.5 (2009): 451-462.
31. Macek MD, et al. "Measuring conceptual health knowledge in the context of oral health literacy: preliminary results". *Journal of Public Health Dentistry* 70.3 (2010): 197-204.
32. Wong HM, et al. "Validation of the Hong Kong Oral Health Literacy Assessment Task for paediatric dentistry (HKOHLAT-P)". *International Journal of Paediatric Dentistry* 23.5 (2013): 366-375.
33. Parker RM, et al. "The test of functional health literacy in adults: a new instrument for measuring patients' literacy skills". *Journal of General Internal Medicine* 10.10 (1995): 537-541.
34. Devi M Aruna. "Reliability and Validity of a Questionnaire to assess Oral Health Literacy among College Students in Bangalore City". *International Journal of Contemporary Dentistry* 2.2 (2011): 43-47.
35. Jones K, et al. "Development and psychometric validation of a Health Literacy in Dentistry scale (HeLD)". *Community Dental Health* 31.1(2014): 37-43.
36. Lee JY, et al. "Oral health literacy levels among a low-income WIC population". *Journal of Public Health Dentistry* 71.2 (2011): 152-60.
37. Parthasarathy DS, et al. "Efficacy of instruments measuring oral health literacy: a systematic review". *Oral health & preventive dentistry* 12.3 (2014): 201-207.
38. Virginia Dickson-Swift AK, et al. "Measuring oral health literacy: a scoping review of existing tools". *BMC Oral Health* 14.148 (2014).
39. Jones M, et al. "Oral health literacy among adult patients seeking dental care". *The Journal of the American Dental Association* 138.9 (2007): 1199-1208.
40. Vann WF, et al. "Oral health literacy among female caregivers: impact on oral health outcomes in early childhood". *Journal of Dental Research* 89.12(2010): 1395-1400.
41. Miller E, et al. "Impact of caregiver literacy on children's oral health outcomes". *Pediatrics* 126.1(2010): 107-114.

42. Parker EJ and Jamieson LM. "Associations between indigenous Australian oral health literacy and self-reported oral health outcomes". *BMC Oral Health* 10.3 (2010).
43. Wehmeyer MM., et al. "The impact of oral health literacy on periodontal health status". *Journal of Public Health Dentistry* 74.1 (2012): 80-87.
44. Hjertstedt J., et al. "Investigating the impact of a community-based geriatric dentistry rotation on oral health literacy and oral hygiene of older adults". *Gerodontology* 31.4 (2014): 296-307.
45. Ueno M., et al. "Relationship between oral health literacy and oral health behaviors and clinical status in Japanese adults". *Journal of Dental Sciences* 8.2 (2012): 170-176.
46. Sistani MM., et al. "Oral health literacy and information sources among adults in Tehran, Iran". *Community Dental Health* 30.3 (2013): 178-182.
47. Bridges SM., et al. "The relationship between caregiver functional oral health literacy and child oral health status". *Patient Education and Counseling* 94.3 (2014): 411-416.
48. Sanzone LA., et al. "A cross sectional study examining social desirability bias in caregiver reporting of children's oral health behaviors". *BMC Oral Health* 13.24 (2013).
49. Divaris K., et al. "Caregivers' oral health literacy and their young children's oral health-related quality-of-life". *Acta Odontol Scand* 70.5 (2012): 390-397.
50. Holtzman JS., et al. "The association between oral health literacy and failed appointments in adults attending a university-based general dental clinic". *Community Dent Oral Epidemiol* 42.3 (2013): 263-270.
51. Shin WK., et al. "Parents' dental anxiety and oral health literacy: effects on parents' and children's oral health-related experiences". *Journal of Public Health Dentistry* 74.3 (2013): 195-201.
52. Arora A., et al. "English leaflets are not meant for me': a qualitative approach to explore oral health literacy in Chinese mothers in Southwestern Sydney, Australia". *Community Dentistry and Oral Epidemiology* 40.6 (2012): 532-541.
53. Mills H. "Developing an oral health literacy intervention for Aboriginal adults in a regional community". *University of South Australia* (2011).
54. Parker EJ., et al. "An oral health literacy intervention for Indigenous adults in a rural setting in Australia". *BMC Public Health* 12 (2012): 461.
55. Schiavo JH. "Oral health literacy in the dental office: the unrecognized patient risk factor". *Journal of Dental Hygiene* 85.4 (2011): 248-255.
56. Lynn Nielsen-Bohlman AMP and David AK. Editors "Health Literacy: A prescription to end confusion". *Institute of Medicine of the National Academies* (2005).
57. Maybury C., et al. "Use of communication techniques by Maryland dentists". *Journal of the American Dental Association* 144.12 (2013): 1386-1396.
58. Poursalami I., et al. "Effectiveness of educational interventions on asthma self-management in Punjabi and Chinese asthma patients: a randomized controlled trial". *Journal of Asthma* 49.5 (2012): 542-551.
59. Helen M. "Developing an oral health literacy intervention for Aboriginal adults in a regional community". *University of South Australia* (2011).

Volume 2 Issue 3 September 2015

© All rights are reserved by Navdeep Kaur., et al.