

Assessment of oral health literacy: A systematic review of validated worldwide versus Persian measures

Nader Navabi PhD¹, Fatemeh Najminouri DDS², Morteza Tavallaie PhD³

Review Article

Abstract

BACKGROUND AND AIM: In today's world, oral health literacy (OHL) plays a considerable role in the improvement of quality of life and decrease of health inequalities as one of the most important components of public health. Special attention to the measurement tools of this index is crucial to increase OHL level in the society. This study aimed to systematically review the existing validated tools used to measure OHL level in the world.

METHODS: To meet the study objectives, we searched five important electronic databases [PubMed, Web of Science (ISI), Scopus, Embase, and Google Scholar] using the keywords extracted from Medical Subject Headings (MeSH), which was completed by manual search. Afterwards, studies were screened based on the systematic review protocol and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram. Following that, the selected suitable articles were assessed to extract related information.

RESULTS: 7 main tools and 19 secondary measures as subgroups have been validated to assess OHL. Some of these tools have been translated into different languages and validated based on the nationality and culture of each region. Currently, there are different tools for measuring OHL worldwide in 13 languages, classified into three categories based on their structure. In addition, we realized that just two OHL measurement tools have been validated in Persian, so far.

CONCLUSION: The present study clearly demonstrates the need for a comprehensive and effective tool for measuring OHL. In addition, more studies must be carried out in this field. Given the gap between valid English and Persian tools, it is recommended that a standard tool be established in Persian. Efforts to address these gaps can be a prelude to further research.

KEYWORDS: Oral Health; Health Literacy; Questionnaire Design; Systematic Review

Citation: Navabi N, Najminouri F, Tavallaie M. **Assessment of oral health literacy: A systematic review of validated worldwide versus Persian measures.** J Oral Health Oral Epidemiol 2020; 9(1): 7-15.

Currently, use of novel approaches to oral health is considered necessary since oral hygiene care can have much more effects on health promotion. In this respect, oral health literacy (OHL) has been introduced as one of the most important approaches in this domain. OHL is thus assumed as a sub-group of health literacy skills.¹

In accordance with the rules of procedure released by the World Health Organization (WHO), health literacy has been defined as the ability to obtain, process, and understand

basic information about health and necessary services to gain access to complete health.² Thus, the most widely-used definition of OHL is the ability of individuals to obtain, process, and understand information related to oral health.³

Promoting OHL can be effective in improving health-related behaviors, increasing quality of life, reducing social inequalities, avoiding waste of economic resources, enhancing general health due to mutual relationships between oral health and general health, as well as facilitating decision-making,

1- Associate Professor, Social Determinants on Oral Health Research Center AND Department of Oral Medicine, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

2- PhD Student, Department of Community Dentistry, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

3- Assistant Professor, Department of Community Dentistry, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran
Address for correspondence: Fatemeh Najminouri DDS; PhD Student, Department of Community Dentistry, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran; Email: f.najminouri@gmail.com

implementation, and provision of services by policy-makers in the field of oral health.⁴

OHL is comprised of different dimensions, so developing and evaluating an appropriate assessment tool is of special importance to incorporate all features. To achieve these goals, different assessment tools have been so far introduced to scientific communities.⁴ The most commonly-used ones in the domain of OHL have originated from the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA), extensively applied to assess general health literacy.⁵

The main assessment tools in OHL in dentistry are the Rapid Estimate of Adult Literacy in Dentistry (REALD) and the Test of Functional Health Literacy in Dentistry (TOFHLiD). The REALD is known as a tool developed on the basis of word recognition and TOFHLiD is one of the assessment tools to reflect on the ability of respondents in terms of understanding and applying information.⁶ The Comprehensive Measure of Oral Health Knowledge (CMOHK) is also being used to assess communication skills as well as non-numerical conceptual knowledge for OHL.⁷

Due to the large quantity of assessment tools for OHL in various languages and highlighting the importance of assessing OHL in individuals and populations, the main purpose of the present study was to collect, summarize, and classify assessment tools available for OHL in the form of a systematic review.

Methods

The present study was a systematic review designed based on Cochrane's guidelines.⁸ The first step in applying evidence-based medicine (EBM) is to design a Problem/Patient/Population, Intervention/Indicator, Comparison, Outcome (PICO) framework or to address an appropriate research question that is clear, specific, and answerable,⁹ which was as follows to conform to the subject of the present study:

P = Problem/Patient/Population: All OHL assessment tools across the world

I = Intervention/Indicator: Translations and validations of health literacy assessment tools

C = Control/Comparison: Standardized versions in Persian compared with those in other languages

O = Outcome: Ratio of standardized Persian assessment tools to all those existing in the world

A comprehensive and systematic search was also fulfilled to identify and access all published articles in this field. To this end, the databases of PubMed, Web of Science (ISI), Scopus, Embase, and Google Scholar were checked with no time limits to enhance the sensitivity of the study. Besides, systematic search and categorization of the retrieved articles was performed by two researchers. Additionally, manual search was utilized in order to obtain missed references from reference links in existing articles. Likewise, references in two different specialized theses related to the subject of the study were reviewed, and finally two new references were added.

Moreover, an extensive search strategy was accomplished using a wide range of related keywords. Then, numerous combinations of keywords were used in search queries to access published articles to the utmost possible extent. The keywords in this search strategy were extracted from Medical Subject Headings (MeSH) as a controlled vocabulary thesaurus used for indexing articles for PubMed. The keywords used in search strategy are listed in table 1. To increase the sensitivity, synonyms of the words were also searched. After searching for keywords related to the independent variable, they were combined with "OR".

A similar search was performed for keywords related to the dependent variable; the result of these searches was then combined with "AND". After doing advanced and extensive search via various combinations of keywords, based on titles

and abstracts, the obtained records were imported into the EndNote software (version X7).

Table 1. Keywords used in search strategy

| Oral health | Literacy | Measure |
|----------------|-------------|---------------|
| Oral health | Literacy | Measure |
| Oral status | Education | Questionnaire |
| Dental health* | Information | Scale |
| Dental status | | Instrument |
| Tooth health | | |
| Tooth status | | |

Then, articles in the EndNote library were reviewed. Initially, duplicated ones were removed. After that, titles and abstracts of the articles were assessed based on inclusion and exclusion criteria. In case of researchers' differences of opinions, the full texts of the articles were comprehensively reviewed until a consensus was reached.

The inclusion criteria were all epidemiological studies assessing OHL as an outcome with using a validated assessment tool and all studies focusing on validation, development, or translation of tools associated with assessment of OHL. On the other hand, the exclusion criteria included published articles in languages other than English and Persian as well as no access to full texts of articles (n = 1) or no access to abstracts of unpublished ones (n = 3). All studies including letter-to-editor, systematic review, and scoping review were excluded but cross-sectional, case-control, cohort, and clinical ones remained in this study.

In the process of data collection, tools originated from major OHL assessment tools were extracted and introduced as sub-groups of the main parenting tool. Moreover, the language of the extracted tools as well as their year of validation and first authors' names were categorized and recorded to achieve comprehensive dominance.

Results

Figure 1 illustrates the process of selecting articles for present systematic review. As it is

seen, from the first 6731 articles searched, finally, 42 articles were reviewed.

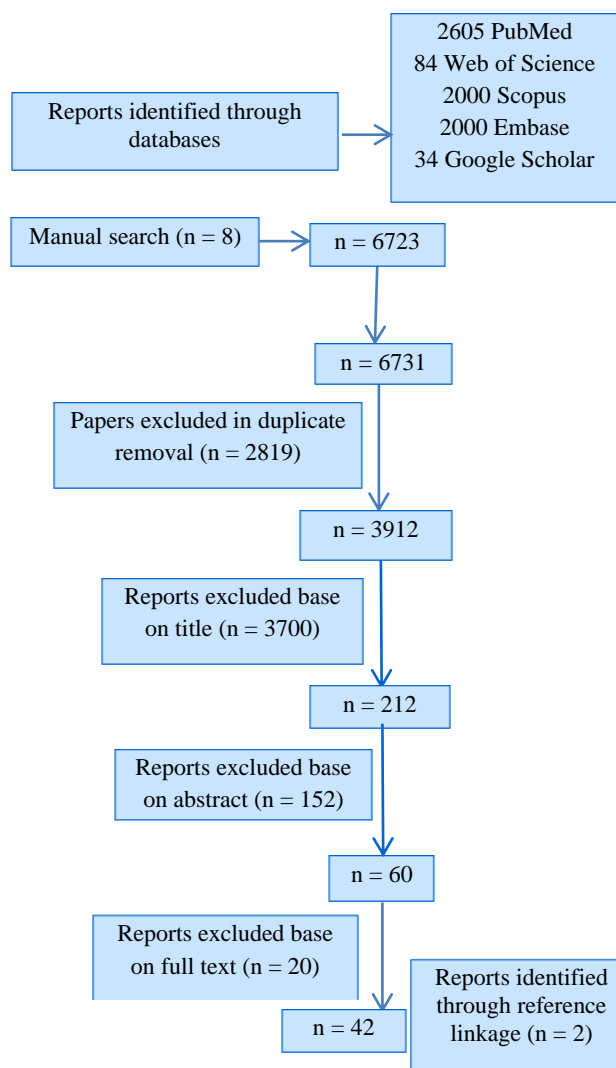


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram

Table 2 illustrates that OHL assessment tools are generally divided into three main categories based on structure. First category which focuses on word recognition contains 7 tools, the second category which focuses on comprehension, word recognition, and numeracy contains 12 tools, and the third one which focuses on communication skills and non-numerical conceptual knowledge contains 2 tools. The name and abbreviation of each of the tools are given in table 2.

Table 2. Categorization of oral health literacy (OHL) assessment tools based on structure

| Structure | Tool | Abbreviation | |
|---|--|--|---------|
| Word recognition | Rapid Estimate of Adult Literacy in Dentistry (99 items) | REALD-99 | |
| | Rapid Estimate of Adult Literacy in Dentistry (30 items) | REALD-30 | |
| | Rapid Estimate of Adult Literacy in Medicine and Dentistry | REALM-D | |
| | Hong Kong Rapid Estimate of Adult Literacy in Dentistry (30 items) | HKREALD-30 | |
| | Rapid Estimate of Adult Literacy in Medicine and Dentistry (20 items) | REALMD-20 | |
| | Rapid Estimate of Adult Literacy in Dentistry (30 items) | AREALD-30 | |
| | Two-Stage Rapid Estimate of Adult Literacy in Dentistry | TS-REALD | |
| Functional OHL: reading comprehension, word recognition, and numeracy | Test of Functional Health Literacy in Dentistry | ToFHLiD | |
| | Oral Health Literacy Instrument | OHLI | |
| | Oral Health Literacy Scale | OHLS | |
| | Oral Health Literacy Assessment | OHLA | |
| | Oral Health Literacy Questionnaire | OHLQ | |
| | Oral Health Literacy Inventory for Parents | OHLIP | |
| | Oral Health Literacy Assessment in Spain | OHLA-S | |
| | Oral Health Literacy Assessment in English | OHLA-E | |
| | Oral Health Literacy Adult Questionnaire | OHL-AQ | |
| | Health Literacy in Dentistry Scale (29 items) | HeLD-29 | |
| | Health Literacy in Dentistry Scale (14 items) | HeLD-14 | |
| | Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry | HKOHLAT-P | |
| | Communication skills and non-numerical conceptual knowledge | Comprehensive Measure of Oral Health Knowledge | CMOHK |
| | | Baltimore Health Literacy and Oral Health Knowledge Project Survey | BHLOHKP |

OHL: Oral health literacy

Table 3 illustrates for qualitative analysis, 42 articles remained. Articles that measured OHL in a specific population were not reviewed. Only articles that focused on validation of OHL measurement tools were investigated. Validated OHL assessment tools were divided into 7 main groups. Other OHL assessment tools originated from these 7 main tools. Then, tools were categorized by author-year and tool language. Some main assessment tools have a number of derivatives: both REALD and OHL have 6 derivatives and both Health Literacy in Dentistry (HLiD) and Health Literacy in Dentistry Scale (HeLD) have 2 derivatives. CMOHK, Perceived Oral Health Literacy Scale (OHLS), and Visual Oral Health Literacy Instrument (OHLI) do not have derivative tools. As the table shows, the two instruments of REALD-99 and Oral Health Literacy Adult Questionnaire (OHL-AQ) have been validated in Persian.

Discussion

The excessive growth of dental scientific

knowledge requires the increasing understanding of importance of oral health by people in order to make proper decisions about their oral health and benefit from technological advancements.³⁹ Therefore, it is crucial to focus on OHL measurement tools as a new component affecting the general oral health. This study aimed to collect, summarize, and classify validated OHL measurement tools in the form of a systematic review.

According to the results of the present study, OHL articles have three structures: A) studies that developed and validated OHL measurement tools, including the studies by Pakpour et al.¹¹ and Naghibi Sistani et al.,²⁹ B) studies that assessed OHL in different populations using the existing tools, including the research by Mohammadi et al.⁴⁰ that evaluated OHL in adults in Southeast of Iran, and C) interventional studies that evaluated changes in OHL after the application of an intervention, such as an educational program. In this regard, we can refer to the research by Farokhi et al.⁴¹ who

Table 3. Existing validated oral health literacy (OHL) tools

| Literacy tools | Derivative tools | Author | Tool language |
|----------------|-------------------------------|--|-------------------------------|
| REALD | REALD-99 | Richman et al. ¹⁰ | English |
| | | Pakpour et al. ¹¹ | Persian |
| | | Lee et al. ¹² | English |
| | REALD-30 | Wong et al. ¹³ | Chinese (HKREALD-30) |
| | | Peker et al. ¹⁴ | Turkish (TREALD-30) |
| | | Junkes et al. ¹⁵ | Brazilian (BREALD-30) |
| | REALMD-20 | Girona et al. ¹⁶ | English |
| | | Cruvinel et al. ¹⁷ | Brazilian |
| | AREALD-30 | Tadakamadla et al. ¹⁸ | Arabic |
| | TS-REALD | Cartes-Velasquez and Luengo-Machucaa ¹⁹ | Chilean |
| REALMD-84 | Stucky et al. ²⁰ | English | |
| | Atchison et al. ²¹ | English | |
| OHL | OHLI | Sabbahi et al. ²² | English |
| | | Blizniuk et al. ²³ | Russian (OHLI-R) |
| | | Cartes-Velasquez and Luengo ²⁴ | Chilean |
| | OHLA | Rahardjo et al. ²⁵ | Indonesian |
| | | Lee et al. ²⁶ | Spanish (OHLA-S) |
| | | Bado et al. ⁶ | English (OHLA-E) |
| | OHLQ | Flynn et al. ⁴ | Brazilian Portuguese (OHLA-B) |
| | | Villanueva Vilchis et al. ²⁷ | Spanish (OHLQ-S) |
| | OHL-AQ | Devi et al. ²⁸ | English (OHLQ-E) |
| | | Naghibi Sistani ²⁹ | Persian |
| HLID | OHLIP | Flynn et al. ³⁰ | English |
| | | Vyas et al. ³¹ | Hindi |
| | AHLID | Richman et al. ³² | English |
| | TOFHliD | Stein et al. ³³ | Norwegian |
| HeLD | HeLD-29 | Gong et al. ³⁴ | English |
| | | Jones et al. ³⁵ | English |
| | HeLD-14 | Ju et al. ³ | Australian |
| CMOHK | - | Rahardjo et al. ²⁵ | Indonesian |
| Perceived OHLs | - | Jones et al. ³⁶ | English |
| Visual OHLI | - | Macek et al. ⁷ | English |
| | | LaBelle ³⁷ | English |
| | | Ueno et al. ³⁸ | Japanese |

REALD: Rapid Estimate of Adult Literacy in Dentistry; OHL: Oral health literacy; OHLI: Oral Health Literacy Instrument; OHLA: Oral Health Literacy Assessment; OHLs: Oral Health Literacy Scale; OHLQ: Oral Health Literacy Questionnaire; OHL-AQ: Oral Health Literacy Adult Questionnaire; OHLIP: Oral Health Literacy Inventory for Parents; HLID: Health Literacy in Dentistry; AHLID: Adult Health Literacy in Dentistry; TOFHliD: Test of Functional Health Literacy in Dentistry; HeLD: Health Literacy in Dentistry; CMOHK: Comprehensive Measure of Oral Health Knowledge; HKREALD: Hong Kong Rapid Estimate of Adult Literacy in Dentistry; TS-REALD: Two-Stage Rapid Estimate of Adult Literacy in Dentistry; REALMD: Rapid Estimate of Adult Literacy in Medicine and Dentistry; AREALD: Arabic Rapid Estimate of Adult Literacy in Dentistry

showed the effects of an educational intervention on improvement of OHL in students. Finally, systematic review studies are a comprehensive group that can cover any of these areas, such as the systematic review conducted by Firmino et al.⁴² on OHL and associated oral conditions.

By reviewing of the literature, it seems that questionnaires' structure is a suitable and reasonable criterion for their classification into three categories. First

group: tools are based on word recognition; for instance, we can refer to REALD measure family. These words are retrieved from the American Dental Association (ADA) glossary of common dental terminology.⁵ While these tools' advantage is short study time, their weaknesses are lack of comprehensiveness of questions and lack of involving all aspects of OHL assessment. In a study, Firmino et al.⁹ used Brazilian-REALD-30 to evaluate the impact of OHL on

information loss in epidemiological studies. The second group is tools that evaluate the ability of a responder to comprehend and use information in the form of comprehension, word recognition, and numeracy reading questions. In this regard, we can refer to ToFHLiD and OHL family measures.^{5,34} This type of tools was assessed in studies by Khodadadi et al.,⁴³ Naghibi Sistani et al.,⁴⁴ and Naghibi Sistani et al.⁴⁵ to evaluate OHL in a specific population. While this group of tools evaluates functional literacy with better strength, they have the disadvantage of longer study time. The third group is tools that focus on communication skills and non-numerical conceptual knowledge. Macek et al. introduced the CMOHK from this category. Despite the different and new view of this tool to OHL, more verification processes must be carried out in this area.⁷ Jagan et al. proposed an example of CMOHK tool to assess OHL.⁴⁶ It seems that researchers selected the type of questionnaire based on their research goals.

Most measures used for OHL assessment have been derived from medical tools. For instance, the TOFHLA is designed to assess functional health literacy in adults. The specialized questionnaire of TOFHLiD was extracted from the mentioned tool with the title of functional health literacy test in dentistry to assess OHL. Moreover, the OHLI was created by Sabbahi et al. based on the TOFHLA model.²²

One of the most applicable tools is the REALM, which is developed to measure general health literacy in medicine. The REALD-90, REALD-30, and REALM-D are derived from the mentioned tool and are applicable for rapid estimation of adults' literacy in dentistry.^{5,42} Atchison et al. introduced the REALM-D, which involves the psychosocial, dental, medical, and behavioral terms and evaluates medical and dental health literacy in an integrated manner.²¹ Therefore, it offers a wide range of different aspects of health and a broad range

of health experiences of dental clinic patients.

It seems that independent medicine-related tools are required since oral and dental sciences have a wide range and special specificity at the same time. OHL assessment tools have been established as customized tools in a way that they could evaluate and solve issues in a more focused manner. This shows the differences between medical tools and those focusing on oral health.

The majority of measures used to assess OHL in dental studies are derived from the OHL and REALD tools. In addition, the REALD-30, OHLI, and Oral Health Literacy Assessment (OHLA) are tools that are translated into most different languages and their reliability and validity have been confirmed.^{12,22,26} Acceptance of these tools might be due to their compatibility to more and different cultures.

In studies by Wong et al.¹³ and Richman et al.,³² Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry (HKOHLAT-P) and Oral Health Literacy Inventory for Parents (OHLIP) were used to assess OHL with an emphasis on pediatric dentistry. However, performing such studies in Iran is not possible due to lack of validated Persian measures.

REALD-99 and OHL-AQ measures are the only tools translated to Persian and validated in Iran by Pakpour et al.¹¹ and Naghibi Sistani et al.,²⁹ respectively. It seems that the REALD-99 and OHL-AQ have been used in most epidemiological studies.

Of the 19 standard OHL measurement tools in the world, the reliability and validity of 15 and only two measures have been confirmed for English and Persian languages, respectively. The majority of widely-used questionnaires are validated in English; even so, none of the three most used measures of REALD-30, OHLI, and OHLA that are translated into most languages, have validated Persian version.

Internet access restriction was one of the restrictions of this systematic review. Since such studies are so important, it is

recommended that researchers conducting such studies be given more access to electronic resources. Another limitation of the present study was that the data collected could not be pooled due to the variety of tools used and therefore not meta-analyzed.

Conclusion

Evaluation of OHL in different target groups and populations and presence of a multitude of different tools and approaches have complicated comparing the results and reaching an accurate conclusion for researchers and decision-makers. Simplicity, shortness, and comprehensiveness as well as involving all dimensions of OHL are characteristics that can make a tool applicable. Attention to Persian OHL

measurement tools indicates a measure gap between authentic English tools and valid Persian tools. With regard to the extreme diversity of OHL assessment tools in the world and their impact on oral health, it seems necessary to increase the number of standardized Persian tools. In addition, there is a clear need for more research in this area.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

This study was financially supported by Kerman University of Medical Sciences, Kerman, Iran (Research No.: 97/502). The authors wish to thank sincere cooperation of this center.

References

- Holtzman JS, Atchison KA, Gironde MW, Radbod R, Gornbein J. The association between oral health literacy and failed appointments in adults attending a university-based general dental clinic. *Community Dent Oral Epidemiol* 2014; 42(3): 263-70.
- Barasul JC, da Silva Assuncao LR, Fraiz FC, Menezes JVNB. Oral health literacy as a predictor of dental anxiety in parents of children undergoing dental treatment. *J Dent Child (Chic)* 2017; 84(3): 125-31.
- Ju X, Brennan DS, Parker E, Chrisopoulos S, Jamieson L. Confirmatory factor analysis of the health literacy in dentistry scale (HeLD) in the Australian population. *Community Dent Health* 2018; 35(3): 140-7.
- Flynn PM, John MT, Sistani MMN. Confirmation of the unidimensional structure of the Oral Health Literacy Adults Questionnaire. *Int Dent J* 2019; 69(3): 207-13.
- Dickson-Swift V, Kenny A, Farmer J, Gussy M, Larkins S. Measuring oral health literacy: A scoping review of existing tools. *BMC Oral Health* 2014; 14: 148.
- Bado FMR, Rebutini F, Jamieson L, Cortellazzi KL, Mialhe FL. Evaluation of the psychometric properties of the Brazilian version of the Oral Health Literacy Assessment in Spanish and development of a shortened form of the instrument. *PLoS One* 2018; 13(11): e0207989.
- Macek MD, Haynes D, Wells W, Bauer-Leffler S, Cotten PA, Parker RM. Measuring conceptual health knowledge in the context of oral health literacy: Preliminary results. *J Public Health Dent* 2010; 70(3): 197-204.
- Page MJ, Moher D. Evaluations of the uptake and impact of the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) Statement and extensions: A scoping review. *Syst Rev* 2017; 6(1): 263.
- Firmino RT, Martins CC, Faria LDS, Martins PS, Granville-Garcia AF, Fraiz FC, et al. Association of oral health literacy with oral health behaviors, perception, knowledge, and dental treatment related outcomes: a systematic review and meta-analysis. *J Public Health Dent* 2018; 78(3): 231-45.
- Richman JA, Lee JY, Rozier RG, Gong DA, Pahel BT, Vann WF. Evaluation of a word recognition instrument to test health literacy in dentistry: The REALD-99. *J Public Health Dent* 2007; 67(2): 99-104.
- Pakpour AH, Lawson DM, Tadakamadla SK, Fridlund B. Validation of Persian rapid estimate of adult literacy in dentistry. *J Investig Clin Dent* 2016; 7(2): 198-206.
- Lee JY, Rozier RG, Lee SY, Bender D, Ruiz RE. Development of a word recognition instrument to test health literacy in dentistry: The REALD-30--a brief communication. *J Public Health Dent* 2007; 67(2): 94-8.
- Wong HM, Bridges SM, Yiu CK, McGrath CP, Au TK, Parthasarathy DS. Development and validation of Hong Kong Rapid Estimate of Adult Literacy in Dentistry. *J Investig Clin Dent* 2012; 3(2): 118-27.
- Peker K, Kose TE, Guray B, Uysal O, Erdem TL. Reliability and validity of the Turkish version of the Rapid Estimate of Adult Literacy in Dentistry (TREALD-30). *Acta Odontol Scand* 2017; 75(3): 198-207.
- Junkes MC, Fraiz FC, Sardenberg F, Lee JY, Paiva SM, Ferreira FM. Validity and reliability of the Brazilian version of

- the Rapid Estimate of Adult Literacy in Dentistry--BREALD-30. *PLoS One* 2015; 10(7): e0131600.
16. Gironda M, Der-Martirosian C, Messadi D, Holtzman J, Atchison K. A brief 20-item dental/medical health literacy screen (REALMD-20). *J Public Health Dent* 2013; 73(1): 50-5.
 17. Cruvinel AFP, Mendez DAC, Oliveira JG, Gutierrez E, Lotto M, Machado MAAM, et al. The Brazilian version of the 20-item rapid estimate of adult literacy in medicine and dentistry. *PeerJ* 2017; 5: e3744.
 18. Tadakamadla SK, Quadri MF, Pakpour AH, Zailai AM, Sayed ME, Mashyakhly M, et al. Reliability and validity of Arabic Rapid Estimate of Adult Literacy in Dentistry (AREALD-30) in Saudi Arabia. *BMC Oral Health* 2014; 14: 120.
 19. Cartes-Velasquez R, Luengo-Machucaa L. Adaptation and validation of the Rapid Estimate of Adult Literacy in Dentistry for Chilean population. *P R Health Sci J* 2018; 37(1): 52-4.
 20. Stucky BD, Lee JY, Lee SY, Rozier RG. Development of the two-stage rapid estimate of adult literacy in dentistry. *Community Dent Oral Epidemiol* 2011; 39(5): 474-80.
 21. Atchison KA, Gironda MW, Messadi D, Der-Martirosian C. Screening for oral health literacy in an urban dental clinic. *J Public Health Dent* 2010; 70(4): 269-75.
 22. Sabbahi DA, Lawrence HP, Limeback H, Rootman I. Development and evaluation of an oral health literacy instrument for adults. *Community Dent Oral Epidemiol* 2009; 37(5): 451-62.
 23. Blizniuk A, Ueno M, Furukawa S, Kawaguchi Y. Evaluation of a Russian version of the oral health literacy instrument (OHLI). *BMC Oral Health* 2014; 14: 141.
 24. Cartes-Velasquez RA, Luengo ML. Adaptation and validation of the oral health literacy instrument for the Chilean population. *Int Dent J* 2017; 67(4): 215-20.
 25. Rahardjo A, Adinda S, Nasia A, Adiatman M, Setiawati F, Wimardhani Y, et al. Oral health literacy in Indonesian adolescent. *Journal of International Dental and Medical Research* 2015; 8(3): 123-7.
 26. Lee J, Stucky B, Rozier G, Lee SY, Zeldin LP. Oral Health Literacy Assessment: development of an oral health literacy instrument for Spanish speakers. *J Public Health Dent* 2013; 73(1): 1-8.
 27. Villanueva Vilchis MC, Wintergerst A, Borges Yanez SA. Toward a Comprehensive Instrument of Oral Health Literacy in Spanish. *J Health Commun* 2015; 20(8): 930-7.
 28. Devi MA, Soni S, Radha G, Kadanakuppe S, Nagashree SR, Pallavi SK. Reliability and validity of a questionnaire to assess oral health literacy among college students in Bangalore City. *J Contemp Dent* 2011; 2(2): 43-7.
 29. Naghibi Sistani MM, Montazeri A, Yazdani R, Murtomaa H. New oral health literacy instrument for public health: Development and pilot testing. *J Investig Clin Dent* 2014; 5(4): 313-21.
 30. Flynn PM, John MT, Naik A, Kohli N, VanWormer JJ, Self K. Psychometric properties of the English version of the Oral Health Literacy Adults Questionnaire - OHL-AQ. *Community Dent Health* 2016; 33(4): 274-80.
 31. Vyas S, Nagarajappa S, Dasar PL, Mishra P. Linguistic adaptation and psychometric evaluation of original Oral Health Literacy-Adult Questionnaire (OHL-AQ). *J Adv Med Educ Prof* 2016; 4(4): 163-9.
 32. Richman JA, Huebner CE, Leggott PJ, Mouradian WE, Mancl LA. Beyond word recognition: Understanding pediatric oral health literacy. *Pediatr Dent* 2011; 33(5): 420-5.
 33. Stein L, Pettersen KS, Bergdahl M, Bergdahl J. Development and validation of an instrument to assess oral health literacy in Norwegian adult dental patients. *Acta Odontol Scand* 2015; 73(7): 530-8.
 34. Gong DA, Lee JY, Rozier RG, Pahel BT, Richman JA, Vann WF. Development and testing of the Test of Functional Health Literacy in Dentistry (TOFHLiD). *J Public Health Dent* 2007; 67(2): 105-12.
 35. Jones K, Parker E, Mills H, Brennan D, Jamieson LM. Development and psychometric validation of a Health Literacy in Dentistry scale (HeLD). *Community Dent Health* 2014; 31(1): 37-43.
 36. Jones K, Brennan D, Parker E, Jamieson L. Development of a short-form Health Literacy Dental Scale (HeLD-14). *Community Dent Oral Epidemiol* 2015; 43(2): 143-51.
 37. LaBelle S. Addressing the role of health literacy in social science: The revision and validation of the Perceived Oral Health Literacy Scale [PhD Thesis]. Morgantown, WV: West Virginia University; 2014.
 38. Ueno M, Zaitsu T, Ohnuki M, Takayama A, Adiatman M, Kawaguchi Y. Association of a visual oral health literacy instrument with perceived and clinical oral health status in Japanese adolescents. *International Journal of Health Promotion and Education* 2015; 53(6): 303-14.
 39. Jones M, Lee JY, Rozier RG. Oral health literacy among adult patients seeking dental care. *J Am Dent Assoc* 2007; 138(9): 1199-208.
 40. Mohammadi TM, Malekmohammadi M, Hajizamani HR, Mahani SA. Oral health literacy and its determinants among adults in Southeast Iran. *Eur J Dent* 2018; 12(3): 439-42.
 41. Farokhi MR, Muck A, Lozano-Pineda J, Boone SL, Worabo H. Using interprofessional education to promote oral health literacy in a faculty-student collaborative practice. *J Dent Educ* 2018; 82(10): 1091-7.
 42. Firmino RT, Ferreira FM, Paiva SM, Granville-Garcia AF, Fraiz FC, Martins CC. Oral health literacy and associated oral conditions: A systematic review. *J Am Dent Assoc* 2017; 148(8): 604-13.
 43. Khodadadi E, Niknahad A, Sistani MM, Motallebnejad M. Parents' oral health literacy and its impact on their children's

- dental health status. *Electron Physician* 2016; 8(12): 3421-5.
44. Naghibi Sistani MM, Yazdani R, Virtanen J, Pakdaman A, Murtomaa H. Oral health literacy and information sources among adults in Tehran, Iran. *Community Dent Health* 2013; 30(3): 178-82.
 45. Naghibi Sistani MM, Virtanen J, Yazdani R, Murtomaa H. Association of oral health behavior and the use of dental services with oral health literacy among adults in Tehran, Iran. *Eur J Dent* 2017; 11(2): 162-7.
 46. Jagan P, Fareed N, Battur H, Khanagar S, Manohar B. Conceptual knowledge of oral health among school teachers in South India, India. *Eur J Dent* 2018; 12(1): 43-8.