ORIGINAL ARTICLE

Oral Health Literacy – Adult Questionnaire: Psychometric Properties and its Influence on Oral Health Status of School Teachers in Bhubaneswar, India

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ABSTRACT

Objective: To translate Oral Health Literacy – Adult Questionnaire from English to Odia language and test its psychometric properties and assess its influence on oral health status of school teachers. **Material and Methods:** A cross-sectional survey was performed among 400; 116 (29%) males and 284 (71%) female school teachers of Bhubaneswar. OHL-AQ questionnaire subsequent to being translated to Odia language utilizing World Health Organization recommended translation back translation protocol was then tested for the establishment of its psychometric properties with assistance from the selected expert panel of academicians. The oral health status of participants was assessed using the WHO oral health assessment form-2013. Chi-square, t-tests, one-way ANOVA, and linear regression were used for statistical analysis. **Results:** Internal consistency of OHL-AQ-O was acceptable with an alpha value of 0.70. Test-retest reliability showed almost perfect agreement (ICC=0.90, CI=0.85-0.93) indicating highly reliable translated scale (p=0.001). Overall mean oral health literacy scores were 13.02±1.86, with about 80% belonging to the high oral health literacy level group. Caries prevalence was 78%, with a mean DMFT of 3.04±2.55. Shallow pockets were absent majorly in teachers belonging to the high oral health literacy group (p=0.01). The multiple linear regression model depicted that only the teaching experience variable added significantly to the prediction (p=0.008). **Conclusion:** OHL-AQ-O questionnaire was found valid and reliable to measure OHL. Further application of the instrument in other communities and populations will support establishing the external validity of the OHL-AQ-O.

Keywords: Literacy; Oral Health; Surveys and Questionnaires; School Teachers.

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Introduction

At the 7th Global Conference on Health Promotion of the World Health Organization (WHO), Health literacy was identified as one of the five key tracks of strategy for health promotion [1]. People with low health literacy were observed with restricted ability to obtain, understand and act on health information; thereby, it was often described as "The Silent Health Epidemic". The word Oral Health Literacy emerged in the late 90's and was defined as "degree to which individuals have the capacity to obtain, process and understand basic oral health information and services needed to make appropriate health decisions" [2].

Oral health literacy is a mixture between the health system, education system, culture and society and oral health outcomes signifying that it may be a new determinant of oral health and hence requires more intensive recognition in oral health research [3]. To promote good oral health outcomes, different tools have been developed to first measure oral health literacy and then deliberately organize prevention and promotion plans. Tools like Rapid Estimate of Adult Literacy in Dentistry, REALD-30, Oral Health Literacy Instrument (OHIL), Test of Functional Health Literacy in Dentistry (TOFHLiD), Comprehensive Measure of Oral Health Knowledge (CMOHK), Oral Health Literacy Assessment-Spanish, and Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry were some of the most commonly used oral health literacy instruments [4]. As a result, awareness regarding the significance of literacy in dentistry has expanded over the recent years, and implementation has been done for adapting the concept of health literacy in dental practice and research [5].

To date, the few existing oral health literacy instruments are mostly based upon Word Recognition, Comprehension, Numeracy, Listening, Decision Making or a combination of these. These existing OHL instruments are limited in their objectives, while some are very long and some include items, which are not relevant to all societies. Considering the comprehension of general population, the recently developed 17 items oral health literacy – adult questionnaire (OHL-AQ) stands amidst the pre-existing tools as a more stable and comprehensive assessment instrument.

Despite the presence of certain modified tools to assess oral health literacy, the need to configure a reliable, valid and comprehensive instrument for Odia speaking individuals still persists [6]. Hence, the present study was planned to translate Oral Health Literacy – Adult Questionnaire from English to Odia language and test its psychometric properties, and also assess its influence on oral health status of school teachers.

Material and Methods

Study Design and Ethical Clearance

A cross-sectional study was conducted among school teachers in Bhubaneswar city of Odisha, India, from October 2019 to February 2020. All procedures performed were in accordance with the ethical standards of institutional ethical committee and with 1964 Helsinki declaration and its later amendments. Ethical clearance was granted by the Institutional review board (Ref. No/DMR/IMSSH/SOA/180315 dated 27th sept' 2019). A certified list of all the schools (public and private) of Bhubaneswar city was attained from the District Education Office (DEO), Bhubaneswar. An official authorization was taken from the respective Principals/ Headmasters / Headmistress of the selected schools. Informed consent was taken from all the teachers prior to study being conducted.

Sample

Based on the earlier reported prevalence of dental caries in Odisha (54%), 5% allowable error and 95% confidence level, the sample size was considered to be 400 using the following formula, $n=z^2pq/d^2$. A two-stage stratified cluster sampling procedure was used to accomplish the required sample size. In the first stage, Bhubaneswar city was randomly alienated into four topographical areas, and five schools from each area were arbitrarily chosen. Out of the total number of Government (65) and private schools (119), eight Government and twelve private schools were randomly picked. In the second stage, eligible school teachers were stratified by age and gender and randomly selected in proportion to the aggregate number of teachers registered in each school for accomplishing the sample of about 400.

Only those teachers who were permanent residents of Bhubaneswar city, present at schools on the day of examination, and provided consent were included. Medically compromised teachers or with physical limitations and those undergoing orthodontic treatment were not considered.

Odia Translation of Oral Health Literacy Adult Questionnaire (OHL-AQ)

The translation of OHL-AQ was done as per four sequential stages of translation back translation as recommended by World Health Organization [7]. First, the forward translation into Odia language was done by a single health professional familiar with terminologies covered by the instrument. In the second step, experts with experience in translation and professionals of public health jointly developed the questionnaire and also assessed the content validity of the translated questionnaire. In the third step, back translation of the OHL-AQ-O questionnaire into English was done and it was cross-matched with the original (English) OHL-AQ questionnaire. Apparent discrepancies were discussed and eventually resolved with the translator. The last step was pre-testing of the questionnaire in a sample of 10 teachers who were not considered to be a part of the main study; face-to-face interview sessions with participants were carried out by the primary investigator. The answers obtained from this session were matched with the actual responses marked by respondents in the questionnaire. The respondents were also interviewed regarding ease of understanding and content of questionnaire. The final version of the questionnaire (OHL-AQ-O) was a collaborative compilation of all iterations made throughout the process and was now ready for main evaluation.

Psychometric Assessment of OHL – AQ – O

The content, face and construct validity assessment of the questionnaire was done with assistance from a selected expert panel of academicians. Discriminant validity was assessed by negative/insignificant association of OHL-AQ-O scores with socio-demographic variables like gender, age, and teaching experience. Concurrent validity was being established by a significant association between poor self-rated oral health and oral health literacy level. For assessment of reliability, test-retest reliability measure was computed using Intra-class correlation coefficient (ICC), whereas the internal consistency of the translated scale was evaluated through Cronbach's alpha coefficient.

Measurement of OHL

The examiner made an individual visit to each chosen school and requested the respective school authorities to issue a notice in advance for teachers' active participation. An efficient monthly systematic schedule with an average number of 20 to 25 school teachers to be examined every day was prepared in agreement with the authorities of respective schools. On the day of the interview, the participants were made aware of the purpose of the study, method of questionnaire filling, privacy and confidentiality of the study. The

participants were asked to fill up the 17 items OHL-AQ-O questionnaire along with socio-demographic details in either classrooms or staff-room at their convenience.

Measurement of Oral Health Status

With the help of WHO oral health assessment form-2013, ADA Type III oral examination was carried out under natural light and illumination using mouth mirror, explorer and CPI probe to assess the oral health status. Prior training and intra-examiner calibration were carried out by a senior faculty member on 20 school teachers in the Department of Public Health Dentistry, Institute of Dental Sciences. Kappa statistics revealed intra-examiner reliability to be 90%.

Statistical Analysis

The data collected were entered into a Microsoft Excel datasheet and analyzed using Statistical Package for Social Sciences (SPSS, IBM Version 20.0). Chi-square, Independent t-test and One-way ANOVA were used for statistical analysis. Correlation and regression models were also used to determine any association and prediction of independent variables with oral health literacy, respectively. For all tests, confidence interval and p-value were set at 95% and ≤ 0.05, respectively.

Results

The mean age of school teachers of Bhubaneswar was 37.24±8.51 years. The highest proportion of participants was in the age group of 31-40 years 185 (46.3%) followed by 21-30 years 90 (22.5%), 41-50 years 79 (19.8%) and above 50 years 46 (11.5%). Male to female representation was 116 (29%) and 284 (71%), respectively, with an obvious female preponderance. More than half of the study population, 217 (54.3%), had a teaching experience of less than 10 years. It was relatively noticeable that the majority, 320 (80%) of the study subjects, belonged to the high oral health literacy level group.

Internal consistency of the OHL-AQ-O was acceptable, with an alpha value of 0.70. The "test-retest reliability" assessment, using bivariate correlation analysis, showed significant results with an almost perfect agreement (ICC=0.90, CI=0.85-0.93), indicating a highly reliable translated scale (p=0.001).

The overall mean oral health literacy scores were 13.02 ± 1.86 (Table 1). The younger age group was followed by 41-50 years (13.13±1.63), 31-40 years (12.75±1.24) and >50 years (12.35±1.85) age groups. The results are suggestive of the fact that the younger age group (21-30 years) had a higher mean OHL score (13.32±1.27), which was statistically significant (p=0.04). Post hoc Tukey then revealed a statistically significant difference between 21-30 years and >50 years age group (p=0.03). Females were reported to have a higher mean literacy score (13.10±1.63) than males (12.83±2.33), and it was found to be statistically significant (p=0.01).

Table 1. Comparison of the independent variables with mean oral health literacy scores.

Variables	OHL Score (Mean±SD)	p-value
Age Groups (in Years)		
21-30	13.32±1.27[a]	0.04*
31-40	12.75±1.24	
41-50	13.13±1.63	
>50	12.35±1.85[a]	
Gender		
Male	12.83±2.33	0.01*

Female	13.10±1.63
Teaching Experience (in Years)	
<10	12.84±1.99 0.14
>10	12.99±1.66

[a]Post hoc Tukey test reveals statistically significant difference between 21-30 years and >50 years age group (p<0.05).

The demographic variables of age, gender and teaching experience were compared with the three levels of OHL (low, moderate, and high). A significant association was observed between age groups and gender with OHL levels (p=0.01 and 0.006, respectively). At the same time, no significant difference was observed with respect to teaching experience. Both the aforementioned results suggested partial fulfillment of discriminant validity for OHL-AQ-O. Self-rated oral health was also found to be significantly associated with OHL levels. Participants having high OHL reported good self-rated oral health, indicating OHL-AQ-O to have good concurrent validity.

The mean number of teeth present in the population was 30.15±1.35 with the distribution of decayed teeth as 2.19±1.65, while the mean missing and filled teeth scores were 0.37±0.93 and 0.42±1.02, respectively. The mean DMFT score was 3.04±2.55 that increased with an increase in age from 2.32±2.05 in the younger age group to 4.39±1.89 in the elderly and it was found to be statistically significant (p=0.001). Gender wise mean DMFT was almost similar, and it was not significant (p>0.05). However, according to teaching experience, higher DMFT was seen among those having more experience (3.41±3.01), which was significant (p=0.008) (Table 2).

Table 2. Comparison of dentition status with the independent variables.

Variables	N (%)	Teeth Present (N=12378) Mean±SD	Dentition Status			
			D Mean±SD	M Mean±SD	F Mean±SD	DMFT Score Mean±SD
Age Groups						
21-30 Years	90 (22.5)	2784 (30.93±1.20)	1.86±1.71	0.01±0.10	0.46±1.08	2.32±2.05[a]
31-40 Years	185 (46.3)	5758 (31.12±1.17)	2.25±1.67	0.25±0.61	0.43±1.04	2.93±2.05[b]
41-50 Years	79 (19.8)	2445 (30.95±1.48)	2.09±1.64	0.54±1.07	0.42±0.91	3.35±3.83[a]
>50 Years	46 (11.5)	1391 (30.24±1.84)	2.78±1.26	1.28±1.73	0.33±1.01	4.39±1.89[ab]
	p-value (ANOVA)		0.017	0.001	0.91	0.001
Gender						
Males	116 (29)	3581 (30.87±1.22)	2.28±1.66	0.42±0.94	0.34±0.83	3.03±2.06
Females	284 (71)	8797 (30.98±1.41)	2.15±1.64	0.35±0.93	0.46±1.09	3.05±2.73
	p-value (t-test)		0.46	0.49	0.28	0.92
Teaching Experience						
<10 Years	217 (54.3)	6722 (30.98±1.16)	2.10±1.66	0.15±0.44	0.49±1.11	2.74±2.04
>10 Years	183 (45.8)	5656 (30.91±1.56)	2.30±1.65	0.63±1.25	0.34±0.90	3.41±3.01
	p-value (t-test)		0.22	0.001	0.15	0.008

[a]Post hoc Tukey test reveals statistically significant difference between 21-30 years and 41-50 years, >50 years age group (p<0.05); [b]Post hoc Tukey test reveals statistically significant difference between 21-30 years and >50 years age group (p<0.05).

Intra-oral examination of the participants revealed that 8 (2%) of the teachers suffered from a very mild form of fluorosis. None of the study participants showed any signs of dental erosion. Around 16 (4%) of the population had enamel fracture due to past history of trauma and the rest (n=384; 96%) did not have any such condition. Majority had healthy mucosal condition (n=386; 96.5%) while others had leukoplakia (n=8; 2%) and ulcerations (n=6; 1.5%). Only 8 (2%) of the teachers were reported to wear partial dentures and none of them were reported to wear complete dentures.

The clinical parameters of dentition and periodontal status were compared with the OHL groups in Table 3. Teachers with high oral health literacy were found to have higher values of DMFT score in both <5

(79.6%) and >5 (82.7%) categories. However, this association was not statistically significant (p=0.61). Furthermore, good gingival and periodontal status was observed among the high oral health literacy groups as there were no signs of gingival bleeding (n=251; 80.7%) and also the absence of shallow (n=270; 82.8%) and deep periodontal pockets (n=303; 79.7%). Nevertheless, the differences found were statistically significant only in relation to the presence or absence of shallow pockets (p=0.01).

Table 3. Comparison of OHL with oral health status of the participants.

Clinical Parameters	N	OHL-AQ-O			p-value
		Low OHL (0-9) N (%)	Moderate OHL (10-11) N (%)	High OHL (12-17) N (%)	
Dentition Status					
DMFT < 5	348	3 (0.9)	68 (19.5)	277 (79.6)	0.61
DMFT > 5	52	1 (1.9)	8 (15.4)	43 (82.7)	
Periodontal Status					
Gingival Bleeding					
Present	89	0 (0.0)	20 (22.5)	69 (77.5)	0.37
Absent	311	4 (1.3)	56 (18.0)	251 (80.7)	
Shallow Pockets					
Present	74	1 (1.4)	23 (31.1)	50 (67.6)	0.01
Absent	326	3 (0.9)	53 (16.3)	270 (82.8)	
Deep Pockets					
Present	20	0 (0.0)	3 (15)	17 (85.0)	0.79
Absent	380	4 (1.1)	73 (19.2)	303 (79.7)	

Multiple linear regression was run to predict oral health literacy scores from age group, gender and teaching experience (Table 4). These variables statistically significantly predicted oral health literacy scores, $F_{(3, 396)} = 3.014$, p=0.030. The r^2 value of 0.022 shows that our linear model explains only 2% of the variance in oral health literacy scores. Only the teaching experience variable added significantly to the prediction, p=0.008.

Table 4. Multiple linear regression to predict the variable influencing OHL.

Model	Beta	p-value	R	R Square	Adjusted R Square	Std. Error of the Estimate
OHL Score[a]						
Gender[b]	0.064	0.20				
Age Group[b]	0.121	0.09	.149[a]	.022	.015	1.848
Teaching Experience[b]	0.194	0.008*				

[a]Dependent Variable: Oral health literacy score; [b]Predictors: (Constant), teaching experience, gender, age group; *Statistically significant at p<0.05

Discussion

The main objective of the study was to translate the Odia version of the English OHL-AQ questionnaire and test its psychometric properties. The reason behind leading the current study on school teachers was to re-examine the idea of "Dental socialization" and "significant others" in commitment to better OHL [8].

The OHL-AQ-O was found to have an acceptable internal consistency (0.70), which was comparable to pre-validated OHL-AQ (0.72) and OHLI (>0.70) [5,9]. Higher test-retest reliability (ICC-0.90) was comparable to similar oral health literacy scales, which suggest better understandable and reproducible responses [3-5,10,11]. Therefore, a high ICC value could indicate that the face validity and content validity of

the Odia translated questionnaire are quite acceptable. Among the advantages of the study, one was computation of test-retest reproducibility and the other was that the participants found the questionnaire less time-consuming and easy to respond to due to a limited number of questions.

The comparison of sociodemographic variables highlighted an insignificant association with teaching experience but revealed significant results for age and gender categories. The results partially favored the evidence to support the divergent validity of our study. The study findings agreed with the NAAL (National Assessment of Adult Literacy) instrument survey conducted by Bennett et al. [12]. The significant association between poor self-rated oral health and OHL levels was similar to similar studies, representing acceptable concurrent validity [3,6,13].

The mean age of the teachers in the present study was 37.24±8.51 years, which was similar with the study by Simon et al. [14] (39±10.42 years) among teachers in Mangalore, Karnataka and Das et al. [15] (43.9±14.36 years) among adult population of Ghaziabad. In addition, the present study reported almost 78% caries prevalence, which was almost similar with the one reported by Simon et al. (79.2%) [14], but contrary to the findings of caries level for India for the next 10 years (50-60%) as reported by Shah [16].

The prevalence of shallow pockets (4-5mm) in our study was 18.5%, which was nearly similar with the studies by Mary et al. [17] (15.8%), Jagan et al. [18] (22.3%) and Sunitha et al. [19] (24.1%). While in our study, 5% prevalence of deep pockets was found, it was 9.3% among the teachers in Davangere [19]. The LOA prevalence in our population was 18.3%; these findings can be similarly compared with the studies by Simon et al. [14] (23.3%), Das et al. [15] (21%), and Mary et al. [17] (14.3%).

The frequency of participants wearing partial dentures in our study was 2%, while none wore complete dentures. These findings were similar with the situation among school teachers of Davangere (partial denture -2.3%, complete denture − 0%) [19].

In the current study, age groups and gender were found to be significantly different within the OHL groups (p=0.01 and p=0.006 respectively). But this was not similar with the ones by Ramandeep et al. [6], where both age groups and gender were non-significant with OHL (p=0.06 and 0.07, respectively). This difference can also be explained by the difference in the study population chosen in both studies.

When compared within age groups, the younger age group below 30 years had the highest mean OHL score of 13.32±1.27 than others and it was found to be significant (p<0.04). Hence, indicating that younger adults have higher literacy scores. Contrary to the findings of Jones et al., who reported higher literacy scores (REALD-30) in >40 years age group but the difference was non-significant [20]. The study by Jones et al. [20] was specifically on adults seeking dental care. Moreover, the literacy instrument used was REALD-30, while the current study used OHL-AQ-O, which could have led to the variation in results.

Among the periodontal status, OHL was significantly associated with the presence or absence of shallow pockets (p=0.01). Moreover, a significant negative correlation was also found between shallow pockets and OHL score (p=0.003) and age (p=0.001). Hence, it can be declared that those with higher OHL had a smaller number of shallow pockets. It can also be explained that people with high OHL had better periodontal health.

Our literature review suggests more than ten tools to measure OHL [4]. However, most of these tools were lengthy, time-consuming and lacked generalizability across populations. Even if these instruments do give valuable evaluations of reading ability, they do not catch the full supplement of literacy skills needed in various health contexts. For example, simply inquiring if the patients are able to read or understand dental terms [21] isn't an adequate method by which researchers can screen oral health literacy in various

populations or study the determinants and outcomes of oral health literacy. To overcome these limitations, the recent OHL-AQ questionnaire was developed, which is proved to be valid and reliable [5]. Furthermore, to conquer the language barrier and keeping in mind the limited use of the OHL-AQ questionnaire in India, our primary objective was to translate the OHL-AQ into OHL-AQ-O and establish its validity and reliability.

The strength of the current study was the sampling technique used. Under the stratified sampling technique, maximum participants from each zone of Bhubaneswar were approached for their participation in the study. Thereby, giving us a better generalizability of the results in the present study setting. In addition, selection bias was avoided in the study by not recruiting participants from a clinical environment, making our study unique from others.

The study's limitations could be the cross-sectional design of the study, which can lead to variations in results if a different time frame was chosen. Nevertheless, this epidemiological survey provided us with baseline information about the current scenario about oral health awareness among the school teachers. Hence, paving us a way towards the execution of future oral health education and promotion programs amongst the study population, considering teachers as the direct connecting link to children.

Conclusion

The translated version of Oral Health Literacy Adult Questionnaire - Odia (OHL-AQ-O) in its initial testing process was established as a valid and reliable instrument to assess oral health literacy levels among school teachers. However, with the advantage of easy administration and usage of OHL-AQ-O, the questionnaire needs to be tested among local, tribal and rural communities to ascertain its external validity.

Authors' Contributions

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IM		https://orcid.org/0000-0002-0120-289X	Conceptualization, Methodology, Formal Analysis, Data Curation and Writing - Review and Editing.
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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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References

[1] Petersen PE, Kwan S. The 7th WHO Global conference on health promotion - towards integration of oral health. Community Dent Health 2010; 27(Suppl. 1):129-36. https://doi.org/10.1922/CDH_2643Petersen08.

[2] National Institute of Dental and Craniofacial Research, National Institute of Health, U.S. Public Health Service, Department of Health and Human Services. The invisible barrier: literacy and its relationship with oral health. A

report of a workgroup sponsored by the National Institute of Dental and Craniofacial Research, National Institute of Health, U.S. Public Health Service, Department of Health and Human Services. J Public Health Dent 2005; 65(3):174-82. https://doi.org/10.1111/j.1752-7325.2005.tb02808.x

[3] 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. https://doi.org/10.1111/j.1600-0528.2009.00490.x

[4] Swift VD, Kenny A, Farmer J, Gussy M, Larkins S. Measuring oral health literacy: a scoping review of existing tools. BMC Oral Health 2014; 14:148-54. https://doi.org/10.1186/1472-6831-14-148

[5] Sistani MMN, Montazeri A, Yazdani R, Murtomaa H. New oral health literacy instrument for public health: development and pilot testing. J Investig Clin Dent 2013; 5(4):313-21. https://doi.org/10.1111/jicd.12042

[6] Ramandeep G, Arshdeep S, Vinod K, Parampreet P. Oral health literacy among clients visiting a rural dental college in north India: a cross-sectional study. Ethiop J Health Sci 2014; 24(3):261-8. https://doi.org/10.4314/ejhs.v24i3.10

[7] World Health Organization. Protocol for translation back-translation. Available from: http://www.who.int/substance_abuse/research_tools/translation/en/. [Accessed on May 15, 2019].

[8] Anthoine E, Moret L, Regnault A, Sbille V, Hardouin JB. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual Life Outcomes 2014; 12:176. https://doi.org/10.1186/s12955-014-0176-2

[9] Wong HM, Bridges SM, Yiu CYK, McGrath CPJ, 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. https://doi.org/10.1111/j.2041-1626.2012.00113.x

[10] Peterson PE, Pine CM. Evaluation of community-based oral health promotion and oral disease prevention– WHO recommendations for improved evidence in public health practice. Community Dent Health 2004; 21(Suppl 1):319-29.

[11] Jessica L, Brian S, Gary R, ShoouYih L, Leslie ZP. Oral health literacy assessment: development of an oral health literacy instrument for Spanish speakers. J Public Health Dent 2013; 73(1):1-8. https://doi.org/10.1111/jphd.12000

[12] Bennett IM, Chan J, Soroui JS. The contribution of health literacy to disparities in self-rated health status and preventive health behavior in older adults. Ann Fam Med 2009; 7(3):204-11. https://doi.org/10.1370/afm.940

[13] D'Cruz AM, Aradhya S. Health literacy among Indian adults seeking dental care. Dent Res J (Isfahan) 2013; 10(1):20-4. https://doi.org/10.4103/1735-3327.111760

[14] Simon AK, Rao A, Rajesh G, Shenoy R, Pai MB. Influence of oral health literacy on the oral health status of school teachers in Mangalore, India. J Indian Assoc Public Health Dent 2018; 16(2):127-32. https://doi.org/10.4103/jiaphd.jiaphd_40_18

[15] Das D, Menon I, Gupta R, Arora V, Ashraf A, Ahsan I. Oral health literacy: A practical strategy towards better oral health status among adult population of Ghaziabad district. J Family Med Prim Care 2020; 9(2):764-70. https://doi.org/10.4103/jfmpc.jfmpc_1049_19

[16] Shah N. Epidemiology of Oral and Dental Diseases. In: Oral and Dental Diseases: Causes, Prevention and Treatment Strategies. In Burden of Diseases in India. New Delhi: National Commission on Macroeconomics and Health; 2005. Pg: 286-291. Available from: https://screening.iarc.fr/doc/Commision_on_Macroeconomic_and_Health_Bg_P2_Oral_and_dental_diseases.pdf. [Accessed on September 12, 2020].

[17] Mary AV, Chaly PE, Reddy CV, Ingle NA, Ebenezar RAV, Kessavan R. Oral health status and treatment needs of school teachers in Chennai. J Indian Assoc Public Health Dent 2013; 11(4):42-7.

[18] 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. https://doi.org/10.4103/ejd.ejd_93_17

[19] Sunitha S, Mythri H, Vidya GD, Sushma R. Oral health status and treatment needs of primary and middle school teachers of Davangere City, Karnataka State, India. Res & Rev J Dent Sci 2017; 5(4):49-54.

[20] Jones M, Lee JY, Rozier RG. Oral health literacy among adult clients seeking dental care. J Am Dent Assoc 2007; 138(9):1199-1208. https://doi.org/10.14219/jada.archive.2007.0344

[21] Chew LD, Griffin JM, Partin MR, Noorbaloochi S, Grill JP, Snyder A, et al. Validation of screening questions for limited health literacy in a large VA outpatient population. J Gen Intern Med 2008; 23(5):561-6. https://doi.org/10.1007/s11606-008-0520-5