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ORAL HEALTH LITERACY AMONG THE EMPLOYEES OF FACULTIES OF DENTISTRY AND ENGINEERING, ALEXANDRIA UNIVERSITY (Cross sectional study)

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ABSTRACT

INTRODUCTION: Oral health literacy (OHL) is defined as the skills required for people to obtain, process and understand basic health information needed to make appropriate oral health decisions. It is an important determinant of oral health. Employees of the Faculty of Dentistry spend their working hours surrounded by dental educational environment which may affect their dental awareness level.
OBJECTIVES: To assess the OHL level of the employees of the Faculty of Dentistry (FOD) and to compare the results with those of employees of Faculty of Engineering (FOE), Alexandria University.
MATERIALS AND METHODS: The sample comprised of 386 employees who were proportionally allocated into 78 FOD employees and 308 FOE employees approached in the different administrative departments of both faculties. Oral health literacy level was assessed using the Oral Health Literacy Adult Questionnaire (OHL-AQ). This study adopted a cross-sectional design, data were collected in February, March and April 2019. Person Chi square test was used to assess differences between members of FOD and FOE regarding the demographic variables, past dental experience, and OHL questions. Differences in OHL scores were analyzed using Mann Whitney U test and multivariable linear regression model was used to quantify the relationship between different predictor variables and OHL scores.
RESULTS: The mean OHL score for FOD employees was significantly higher than that of the FOE employees (11.49±3.00, 10.34±3.20, respectively). According to the regression model, females (p=0.002), older age group (p=0.011) and higher educational level (p=0.001) were significantly associated with higher OHL-AQ scores.
CONCLUSIONS: Oral health literacy level of the FOD employees was higher than that of the FOE employees which points to the positive effect of the dental educational environment on OHL of FOD participants.
KEYWORDS: Oral health, Oral health literacy, OHL-AQ, Employees.

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INTRODUCTION

In modern societies, almost all aspects of life are linked to questions and decisions concerning health, which makes people face a wide range of health- related decisions including nutrition, medications and treatments (1). At the same time, the growing information technology and the advances in scientific knowledge require that the public have an ever-increasing understanding of diseases to make good decisions about their health (2). Health literacy which is a major concern to public health authorities, demands a range of skills to be able to process health related information and take appropriate health decisions (3). Similar to general health literacy, oral health literacy is important for strengthening the individual's ability to obtain and process oral health information and to promote and maintain good oral health (4). Oral health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions" (5).

The ultimate goal of health literacy is the maintenance of health or the management of diseases in a variety of settings across the life-course (6). Health literacy is related to different aspects of health, such as knowledge, health outcomes, health status and the use of services (7). Thus, it is now considered as an important determinant of health and thought to be linked to health disparities between population groups (7).

Low oral health literacy was found to be one of the reasons why preventable diseases remain so common, why people do not adopt practices that were shown to be effective in maintaining health (4) and was found to be associated with poor oral health behaviors and clinical status (8).

Among the different causes of poor oral health literacy are complicated oral health instructions, lack of oral health information resources and a dentist who is unable to evaluate the literacy needs of the patient (2).
Oral health literacy is an interplay between society, culture, educational and health care systems and oral health (9).

Improving the public's oral health literacy is considered as one of the ways to reduce oral health disparities and improve the quality of dental care (4).

The way the information is delivered to patient is an indicator of quality, it was found that patients with lower levels of health literacy have worse communication with heath care providers (7). Concerns about patients with low level of health literacy have led investigators to search for practical methods for identifying such patients in clinical practice. Assessing patient's literacy level may help to avoid problems in clinical and health care research as well as in patient's education. Moreover, effective health communication requires the providers to understand the patients' reading limitations (7). The reason for measuring oral health literacy coincides with that for measuring general health literacy (10). Specific instruments for measurement of oral health literacy are needed because of the difference in the number of characteristics between the medical and the dental care systems. Another reason is that the amount and type of exposure of people to each health care system differ throughout their lives resulting in difference in medical and dental literacy (11).

Some oral health literacy tools include, the "Rapid Estimate of Adult Literacy in Dentistry (REALD)"-(30 items) (11), the "Rapid Estimate of Adult Literacy in Dentistry (REALD)"-99 items (12), The "Hong Kong REALD" (which is an adaptation of the REALD-99 translated to Chinese and shortened to the REALD-30) (13), the "Test of Functional Health Literacy in Dentistry" (TOFHLID) (14), the" Comprehensive Measure of Oral Health Knowledge "(COMHK) (15) and the "Oral Health Literacy Instrument "(OHLI) (16).

The Oral Health Literacy- Adult Questionnaire (OHL-AQ) is a short, easy- to- use instrument with proven validity and reliability for assessment of functional oral health literacy of adults in community or population based studies (17).

Assuming similarity in many characteristics between Faculty of Dentistry (FOD) and Faculty of Engineering (FOE) employees, we predict no significant difference in their OHL level. The aim of this study was to assess OHL level of employees in FOD and compare it with those of FOE, Alexandria University.

MATERIALS AND METHODS

This cross-sectional study used a modified version of the Oral Health Literacy Adult Questionnaire (OHL-AQ) (17) to assess OHL level among employees of the different administrative departments of FOD and compare it with that of FOE employees, Alexandria University. Faculty of Engineering was selected as a scientific non-medical counterpart of FOD because as it was convenient in terms of accessiblity and its dean was interested in the purpose of the study and willing to provide his support and cooperation. Data collection took about three months (February, March and April 2019). Any employee in any administrative department in both faculties was welcomed to participate in the study as he/she represented a literate adult.

The questionnaire was translated into Arabic and pilot tested on 40 employees to ensure appropriateness and clarity of questions. However, the questions were found to be clear and no modifications were introduced. The arabic version of the questionnaire was validated by assessing both face validity (five employees volunteered to review the questionnaire to assess clarity and readability of the items and to ensure that the instrument is appropriate to a group of untrained reviewers) and content validity (examined by a group of faculty staff members who reviewed the questionnaire by scoring relevance, clarity and importance of the items). The results of the pilot testing of the questionnaire were not included in the final analysis.

Data indicated that there were 166 and 650 employees working in the FOD and FOE, repectively at the time of the study. The minimal sample size was calculated based on a study aimed to develop a functional oral health literacy (OHL) instrument for adults, including new measures of literacy skills (OHL Adults Questionnaire: OHL-AQ) (17). It was estimated that a sample size of 386 would be representative of the whole employees population based on the following formula n=Z2 P(1-P)/d2, where n is the sample size, Z is the statistic corresponding to the level of confidence, P is the expected prevalence and d is precision (18). The total number was proportionally allocated into 78 FOD employees and 308 FOE employees. A convenience sample was taken from the various administrative departments of FOD and FOE. To ensure the participation of as many employees as possible, many of the offices were approached several times. As much as 516 questionnaires were distributed to reach the full sample size of 386 questionnaires, so the response rate of the present study was 75% which is considered adequate to ensure that the survey results represent the target population.

The Dental Research Ethics Committee at Faculty of Dentistry, Alexandria University approved the study (IRB NO: 00010556-IORG0008839). The objectives of the study were explained to the deans of FOD and FOE and their approval for conducting the study was obtained. Participants were informed of the goal of this research, participation being voluntary and they were assured of the confidentiality of the data.

The questionnaire comprised five sections containing 17 close ended questions (appendix 1):

Section I: personal and demographic information of participants such as age, gender, educational level, administrative department and previous dental experience.

Section II: a reading comprehension section consisting of three incomplete sentences on oral health knowledge. The respondents were asked to fill in the blanks with one of five offered possible choices, one of the choices was correct and one was "I don't know". This section evaluates reading and knowledge skills.

Section III: a numeracy section, consisting of four close-ended questions about Amoxicillin consumption prescription (two questions) and instructions on using sodium fluoride mouth rinse (two questions) which assess reading, writing and numeracy skills.

Section IV: a decision-making section in which respondents read five close-ended questions on common oral health problems and items chosen from medical history forms and select one of four possible choices for these questions. This section assesses reading, comprehension and decision making skills.

Section V:a listening section including two questions on post extraction instructions which were read by the interviewer twice. the participants listened to the interviewer and then wrote down the answers. (The prescription has been deleted from the participants' forms to be read by the interviewer to assess listening, reading, writing and communication skills of the participants)

Scoring

Correct answers were given a score of 1 and incorrect answers were given a score 0. The sum of all correct answers represented the total score which ranged from 0 to 17. Total OHL score was classified into inadequate from 0 to 9, marginal 10-11 or adequate from 12 to 17 (17).

Statistical analysis

Qualitative data were presented using frequencies and percentages while quantitative data were presented using Mean±SD. Pearson Chi square test was used to assess differences between members of Faculty of Dentistry and Faculty of Engineering regarding the demographic variables, past dental experience, and oral health literacy questions. Differences in oral health literacy scores were analyzed using Mann Whitney U test and multivariable linear regression model was used to quantify the relationship between different variables and oral health literacy score. Significance level was set at $p<0.05$. Data were analyzed using IBM SPSS statistical software (version 25).

RESULTS

Table (1) shows the distribution of the employees of FOD (n= 78) and FOE (n=308) in relation to sociodemographic variables (age, gender and educational level), presence of previous dental experience and its purose. The table shows that there were no significant differences between the two groups regarding age distribution or educational levels, whereas the FOD had a higher percentage of females (70.5%) than FOE (52.6%) (P=0.004). Regarding the previous dental experience, it was found that a significantly higher percentage of FOE employees (10.1%) have visited the dentist before compared to 2.6% in FOD (P= 0.029). There was also a significant difference regarding the purpose of the dental visits distribution between the two groups (P=0.014).

Table (2) demonstrates the percentages of correct answers to the different sections of the OHL-AQ for FOD and FOE groups. It shows that there were significant differences between the two groups regarding their answers to Q1, Q2.2 and Q3.2 in the reading comprehension section (P= 0.003, 0.003 and <0.001, respectively), Q7 in the numeracy section (P= 0.039) and Q10 in the decision making section (P= 0.014). Out of these five questions, the percentage of correct answer was significantly higher in FOE than FOD (14% and 12.8%, respectively) regarding Q1 only.

Table (3) demonstrates the mean overall oral health literacy scores and distribution of employees' scores in FOD and FOE scores according to OHL-AQ categories. The mean overall oral health literacy scores among FOD group (11.49±3.00) was significantly higher (p=0.003) than that of the FOE group (10.34±3.20). About 64.1% of FOD employees had adequate oral health literacy compared to 41.9% of FOE employees. There was a difference in the distribution of oral heath literacy categories between two faculties (P= 0.002).

The final multiple linear regression model assessing the association between oral health literacy and the study variables is presented in Table (4). Males had a significantly lower mean score than females by 0.98 points (P= 0.002, 95%CI= -1.61, -0.35). Scores of age group (20-29) were lower than that of age group (45-60) by 0.72 points (P= 0.167, 95%CI= -1.78-0.32) while scores of the age group (30-44) were significantly lower than age group (45-60) by 0.85 points (P= 0.011, 95%CI= -1.53, -0.18). Employees who had university degree had a 0.90 points (P=0.125, 95%CI= -2.11-0.31) lower OHL scores than those with postgraduate studies, while those with secondary school or equal to secondary school education had a significantly lower OHL scores than the postgraduate studies group by 2.21 points (P= 0.001, 95%CI= -3.45, -0.96). Finally, employees with previous dental experience had a 0.31 points (P=0.582, 95%CI= -0.80- 1.43) higher OHL scores than those who had never visited the dentist but no significant difference was detected.

Table (1): Distribution of the study participants according to the various sociodemographic variables and past dental experience.

Variable		FOD (n=78)		FOE (n=308)		P value$
		n	%	n	%	
Age group	20-29	11	14.1	34	11	0.611
	30-44	43	55.1	164	53.2	
	45-60	24	30.8	110	35.7	
Gender	Male	23	29.5	146	47.4	0.004*
	Female	55	70.5	162	52.6	
Educational level	Secondary school	35	44.9	125	40.6	0.870
	University degree	37	47.4	161	52.3	
	Post graduate studies	6	7.7	22	7.1	
Dental visits	Yes	76	97.4	277	89.9	0.029*
	No	2	2.6	31	10.1	
Purpose of visits	Periodic follow up	5	6.4	7	2.3	0.014*
	toothache	59	75.6	184	59.7	
	Gum swelling/ bleeding	1	1.3	17	5.5	
	Preventive treatment	3	3.8	24	7.8	
	Others	8	10.3	45	14.6	

* Significant at $P \leq 0.05$.

$ Test of significance: Chi Square test.

Table (2): Participants' percentages of correct answers to the different sections of the OHL-AQ.

Section name	Question	Correct answer	% of correct answer		P value$
			FOD	FOE	
Reading comprehension	Q1: link between oral diseases and other health problems:	Myocardial infarction	12.8	14	0.003*
	Q2.1:Brushing with toothpaste that Contains:	Fluoride	71.85	69.2	0.223
	Q2.2: at least twice a:	Day	80.8	76	0.003*
	Q2.3: avoid foods with lots of:	Sugar	61.5	69.2	0.394
	Q3.1: Every person has 32:	Permanent teeth	80.8	68.8	0.151
	Q3.2: which start erupting by the	First molar	24.4	9.1	< 0.001*
Numeracy	Q4: time for taking next capsule:	10 PM	74.4	72.7	0.822
	Q5: should you stop taking the medication	No	80.8	73.7	0.421
	Q6: can you swallow the mouthwash?	No	87.2	86.7	0.263
	Q7: time for eating or drinking	11.30 AM	82.1	69.2	0.039*
Decision making	Q8: little bleeding occurs after brushing or flossing	Continue brushing and flossing daily	62.8	48.1	0.048*
	Q9: pain and swelling occur in mouth and last for more than 2 weeks	Attend to the doctor or dentist	93.6	83.8	0.173
	Q10: best way to remove stain and calculus from teeth?	Getting a dental professional cleaning	74.4	54.5	0.014*
	Q11: meaning of "I exonerate my dentist from unintentional complications of treatment"	My dentist is not responsible for unintentional complications of treatment	26.9	35.7	0.119
	Q12: meaning of "I have a history of allergy to some drugs"	I feel inability to breath and redness in my skin after consumption of some drugs	71.8	54.9	0.064
listening	Q13: time to put the gauze out of mouth	8:30 AM	73.1	67.9	0.647
	Q14: If your tooth was extracted at 8 am, can you eat hot food at 2 P.M?	No	98.7	79.9	0.112

* Significant at P≤ 0.05 $ Test of significance: Chi square test.

Table (3): Mean overall oral health literacy scores and distribution of employees' scores in FOD and FOE scores according to OHL-AQ categories.

		Faculty of dentistry (n=78)	**Faculty of engineering (n=308)**	**P value**
OHL-AQ scores: Mean±SD		11.49±3.00	10.34±3.20	0.003*[a]
OHL-AQ scores' categories: n (%)	Inadequate (0-9)	19 (24.4%)	121 (39.3%)	0.002*[b]
	Marginal (10-11)	9 (11.5%)	58 (18.8%)	
	Adequate (12-17)	50 (64.1%)	129 (41.9%)	

a. Mann Whitney U test
b. Pearson Chi square test
*: Significant level at p value≤0.05

Table (4): Effect of socio-demographic factors and past dental experience on oral health literacy scores by regression model.

Factors		Unadjusted model		Adjusted model	
		B (95% CI)	P value	B (95% CI)	P value
Faculty	Dentistry	1.15 (.35-1.93)	0.004*	1.03 (0.26-1.81)	0.009*
	Engineering	Reference		Reference	
Age group	20-29	-0.52 (-1.59-0 .56)	0.342	-0.72 (-1.78-0.32)	0.167
	30-44	-0.49 (-1.18-0.21)	0.164	-0.85 (-1.53, -0.18)	0.011*
	45-60	Reference		Reference	
Gender	Male	-1.27 (-1.90, -0.63)	<0.001*	-0.98(-1.61, -0.35)	0.002*
	Female	Reference		Reference	
Educational level	Secondary school	-2.27 (-3.53, -1.01)	0.001*	-2.21 (-3.45,-0.96)	0.001*
	University degree	-1.01 (-2.25-0.22)	0.106	-0.90 (-2.11-0.31)	0.125
	Post graduate studies	Reference		Reference	
Dental visits	Yes	1.02 (-0.11-2.16)	0.072	0.31 (-0.80-1.43)	0.582
	No	Reference		Reference	

B: Regression coefficient
CI: Confidence interval
*: Significant difference p < 0.05
R^2=0.115, F=6.11, P value ≤ 0.001

DISCUSSION

The summery of FOD and FOE participants' percentages of correct answers of the different sections of OHL-AQ showed that FOD employees had a predominance of correct answers over the FOE employees in 14 out of the 17 questions of the questionnaire. This difference between the two groups could be referred to the dental environment surrounding FOD employees which made them more aware of these information and affected their OHL positively. Thus, the study findings support the rejection of the null hypothesis.

With respect to the influence of the various personal and demographic characteristics of the study on OHL, it can be recognized that the age group (45-60) had higher OHL than the (20-29) age group and significantly higher than the (30-44) age group, which may relate to the longer years of life through which they gained more experiences and information. The significant association between age and oral health literacy is consistent with what is reported by Divaris et al. who investigated the reltionship caregivers' OHL with their children's oral health related quality of life in Carolina, caregivers' OHL was measured using (REALD-30) (19). On the other hand, it disagrees with Sabbahi et al. who assessed OHL in a sample of patients attending the Faculty of Dentistry Clinics at the University of Toronto, Canada using the OHLI (16), Atchison et al. who conducted her study on a sample of adult patients seeking treatment for the first time at a clinic located in an urban medical center in LosAngeles,California to evaluate the (REALM-D) (20). Lee et al. who determined OHL levels of a sample of caregivers in seven countries in North Carolina using (REALD-30) (21), Wong et al. whose sample comprised of parents of pediatric dental patients attending the Pediatric Dentistry Clinic of the Prince Philip Dental Hospital in Hong Kong who were interviewed using the Hong Kong Rapid Estimate of Adult Literacy in Dentistry (HKREALD-30) (13) and Hom et al. who used the (REALD-30) to measure OHL level of a sample of women who were pregnant for the first time in seven counties in North Carolina (22) found no significant association between age and oral health literacy. This disagreement might be referred to the difference in the nature of the studies' samples, as those samples were comprised of different ethinic groups, non english speakers and pregnant women.

The present study showed a significantly lower mean OHL score for males than females. A possible explanation for such finding may be that females usually care more about their general and oral health and they are usually more concerned about their oral appearance so they tend to use dental care services, seek more information and ask more questions about oral health than males. This result aligns with that found by Sistani et al. who measured oral health literacy of a sample of 1031 adults in Tehran the capital of Iran using the (OHL-AQ) and found that females had significantly higher OHL scores than males (23). However, other studies found no significant association between gender and OHL (13,16,20). This disagreement might be referred to the increased awarness about oral health among both males and females in those communities.

Employees with postgraduate studies had a statistically significant higher mean OHL score than those with secondary education. As might be expected, more highly educated participants are more able to find and understand oral health information and make wise decisions regarding oral health problems. This finding agrees with Atchison et al. (20), Lee et al. (21), Divaris et al. (19) Hom et al. (22). On the other hand, it disagrees with Sabbahi et al. (16) and Wong et al. (13) who found no significant association between the educational level and OHL which might be because the sample they included had no variability regarding educational level, the majority of participants in one sample were highly educated and in the other the majority had secondary or below secondary school education.

Participants who previously visited the dentist had higher but not significantly different OHL score than those who had no previous dental visits. This noted difference in OHL scores might be due to information gained through dentist-patient communication during the dental visit. This result agrees with Atchison et al. (20) and Wong et al. (13), while it disagrees with other study which found a significant association between frequency of dental visits and OHL (16).

To our Knowledge, this is the first study in Egypt that discussed oral health literacy and attempted to evaluate its level among employees of FOD and FOE who represent a literate adult category in the community. The OHL-AQ assesses different aspects of individuals' literacy skills. It is more general than other existing OHL instruments in that it evaluates two additional skills: listening or communication and appropriate decision-making. However, as it is a self-administered questionnaire, some respondents carelessly answered the questionnaire by giving the answer of (don't know) to all questions which may have affected the quality of data. Besides, the study findings cannot be generalized to other colleges or universities in other countries or Egypt because of the small number of respondents, including two colleges and due to the use of convenience sampling which considered to be limitations of the study. Investigators in future studies should examine OHL for other categories of the population to add to the OHL knowledge base. Based on study results, it is recommended that health education classes should be included in schools' curricula. Teachers' health literacy level should be assessed and improved as it can hinder that of the students.

CONCLUSIONS

Study results indicated that oral health literacy scores were significantly higher in the FOD group which might demonstrate the effect of the dental educational environment on the OHL level of FOD employees. Furthermore, age, gender and educational level were found to have a significant effect on oral health literacy scores.

CONFLICT OF INTEREST

The authors declared that they have no conflicts of interest.

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