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MEASURING ORAL HEALTH LITERACY FOR NURSES AND DENTAL ASSISTANTS AT KING ABDULAZIZ UNIVERSITY HOSPITAL AND UNIVERSITY DENTAL HOSPITAL

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ABSTRACT

Objectives: To measure and compare level of oral health literacy (OHL), dental knowledge (DK) for dental assistants (DA) and medical nurses (MN) working at the King Abdulaziz University Medical and Dental Hospitals (KAUH and UDH), Jeddah, Saudi Arabia.

Material and Methods: This study was conducted using a convenient sample. Participants were asked to fill-out a questionnaire about demographic data, oral health behavior, and dental services usage and to complete a previously validated DK test and Oral Health Literacy Instrument (OHLI). Descriptive statistics were used to summarize the data. Bivariate non-parametric tests followed by logistic regression were used to analyze the data (α=0.05).

Results: Forty-eight MN and 58 DA participated in this study with a mean age of 35±8.7 years. The majority of the participants were female (81%), non-Saudi (77%), and had college/university education or higher (90%). The mean OHLI and DK test scores for the DA were significantly higher than MN ($p<0.001$). DK test score was the only statistically significant predictor for the OHLI level at the multivariate level, as it whipped the association of the participants' group (DA/MN), after controlling for the demographic variables.

Conclusion: This study sheds the light on the DK and OHL inadequacy among some of the MN at KAUH. More effort should be directed towards educating medical personnel about oral health by incorporating oral health-related materials in their curriculum and continuing education courses.

KEYWORDS: Order Alphabetical: Dental Assistants, Dental Knowledge, Nurses, Oral Health Behaviors, Oral Health Literacy

INTRODUCTION

Oral health literacy (OHL) has been defined as "the degree at which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions and act on them"[1]. During the last decade, OHL has emerged as an important determinant of oral health [2]. Limited OHL was

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linked with poor oral health behaviors, knowledge and conditions [3,4]. In addition, limited parental OHL was associated with higher prevalence of caries lesions and lower quality of life in their children[5].

Today's oral health care environment is quite complex, often requiring advanced reading and numeracy skills that exceed the abilities of the average individual. Thus, dental patients might need the help of dental team to pass through this complex environment. In routine dental setting, most of the interactions between patients and dental team occur through dental assistants, who are expected to acquire, understand and comprehend related oral health information and communicate it to their patients. This role is not limited to dental assistants, nurses in the medical field sharing similar responsibilities because oral health is an integral part of the overall health and well-being. Nurses might be encountered by questions related to oral health and might need to communicate oral health information to their patients. Moreover, they might act as caregivers to help dependent hospitalized patients with their oral care. Thus, both dental assistants and nurses are expected to have a high level of OHL in order to perform all of these tasks.

Several studies linked low OHL level caregivers to poor oral health-related quality of life and poor self-reported as well as clinical oral health status of their children [6–12]. Literature is lacking any related studies that measured and compared the OHL level for dental assistants and nurses. This study was conducted to fill this knowledge gap. The aim of this study is to compare the OHL level and dental knowledge for dental assistants with nurses working at the Medical Hospital and University Dental Hospital at King Abdulaziz University, Jeddah, Saudi Arabia. In addition, self-reported oral health status, oral health behaviors and dental services usage were compared among dental assistants and nurses.

MATERIALS AND METHODS

This study was conducted on a convenient sample of dental assistants and nurses at King Abdulaziz University Medical and Dental Hospitals, Jeddah, Saudi Arabia. The study protocol was approved by the Research Ethics Committee at Faculty of Dentistry, King Abdulaziz University. Participants were approached and asked to participate in this study. First, participants were asked if they could read, speak and understand English (well, little, or none). And those selected to participate in the study were the ones that show satisfactorily in reading, speaking and understanding English Language. The eligible participants who agreed to participate in the study were asked to sign an informed consent, and they were notified that they are also entitled to drop out of the study at any given time without any consequences. Participants were asked to fill a self-administered questionnaire consisted of two different sections. The first section focused on participant's demographics (age, gender, educational level, and nationality). The second section collected information regarding oral health behavior (frequency and duration for teeth brushing, frequency of interdental flossing and the use of mouthwash), dental services usage (Frequency and pattern of dental visits) and self-reported oral health status. Then, participants were also asked to complete a previously validated oral health literacy instrument (OHLI) and dental knowledge test [13].

Briefly, the OHLI is a functional oral health literacy test consisting of cloze-procedure based reading comprehension and numeracy sections. The reading comprehension section comprises of two passages concerning dental caries and periodontal disease. Thirty-eight words were omitted from the passages and four possible options were given to each omitted word. The numeracy section has 19 items which evaluates the individual's ability to comprehend medication prescriptions, dental appointments and instructions related to dental procedures.

The dental knowledge test consists of seven pictures showing some perioral and intraoral structures, oral conditions and diseases, dental fillings, dental prosthesis, and oral hygiene aids. Seventeen parts of these pictures were labelled, and a list of numbered words was given to participants to choose from and describe the labelled part.

The reading comprehension and numeracy OHLI scores range between 0 and 50 each, which gives an overall score that ranges between 0 and 100. Similarly, the dental knowledge scores range between 0 and 100. The following cut-off points were used to assess the OHL level: inadequate (0-59), marginal (60-74), and adequate (75-100). Further details about the OHLI and dental knowledge test can be found in development and validation publication [13].

Descriptive statistics (frequencies, percentages, median, means and accompanying standard deviations, where appropriate) were used to summarize the recorded variables. The chi-square test (or the Fisher's exact test) was used to evaluate the distribution of the demographic variables, self-perceived oral health status, oral health behaviors and dental services usage among dental assistants and nurses. The Mann-Whitney *U* test was used to compare the test scores (OHLI and the knowledge test scores) among dental assistants and nurses and for the subgroups divided by gender, nationality, education level, self-perceived oral health status, frequency of duration of teeth brushing and frequency of interdental flossing, mouthwash usage, dental visit during the last 12 months and frequency of dental visits.

Logistic regression (using forced-entry technique) was used to evaluate the association between the oral health literacy level measured using OHLI, as the dependent variable, and the following independent variables: group (dental assistants versus nurse), age, gender, nationality, educational level and knowledge test scores. The variance inflation factor (VIF) and tolerance were used for the multicollinearity diagnosis. VIF and tolerance values greater than 10 or tolerance values less than 0.4 were used as an indicator for the presence of multicollinearity.

The data were analyzed using the SPSS software for Windows (version 22, (SPSS Inc., IBM, Somers, New York, USA). All statistical tests were two-tailed and performed at an alpha level of 0.05. Normality of the data distribution was evaluated before the statistical analysis and non-parametric tests were used due to departure from normality for most of the continuous variables.

RESULTS

Sample Characteristics

Forty-eight medical nurses and 54 dental assistants agreed to participate in this study. Participants' ages ranged between 21 and 61 years, with a mean of 35 (± 9) years. Only 11% of the participants were older than 65 years. Most participants were female (81.4%), non-Saudi (76.5%) and had college or university education (90.2%). Descriptive statistics of the sample characteristics are summarized in table 1.

About 89% of the participants reported that they have good, very good or excellent oral health. Similarly, 89.2% indicated that they brush their teeth twice daily and about 80% reported that they brush their teeth for 1 minute or more. About 75% of the sample stated that they floss their teeth at least once daily, while only 64.7% stated that they use mouthwash regularly. Nearly 74% of the sample reported visits their dentists regularly; while only 58.8% reported visit their dental care provider once during the last 12 months. Participants' responses to self-reported oral health status, and oral health behavior questions are summarized in table 2.

Both graphical and statistical evaluations of the OHLI score revealed a negative skewness of the

distributions and departure from normality (Table 3). Only 55% of the participants had adequate level of dental knowledge, while 65% had adequate OHL level. The mean scores of OHLI and dental knowledge test were somewhat comparable, 76.3 and 70.9, respectively, which indicates a moderate level of OHL and dental knowledge among the sample. Similarly, the mean scores for both the reading comprehension and numeracy components were moderate and comparable, 38.5 and 35.4, respectively.

Comparing the Responses for Medical Nurses to Dental Assistants

Tables 1 and 2 show the comparison between nurses and dental assistants in regard to sociodemographic variables, self-reported oral health status, oral health behaviors and dental attendance. No statistically significant differences were noticed for education level, self-reported oral health status and frequency of brushing. Higher percentages of dental assistants were male and non-Saudi. Dental assistants reported better oral health behaviors concerning the duration of brushing, frequency of interdental flossing and mouthwash usage. On the other hand, medical nurses reported better dental attendance pattern having about 56% of them reported visiting their dentist frequently in comparison to the 28% approximate of the dental assistants. In addition, about 42% of the medical nurses reported that they have visited their dentist during the last 12 months in comparison to only 13% of the dental assistants.

Dental assistants scored significantly higher in OHLI test and its components and the dental knowledge test in comparison to nurses as shown in Table 3. Mean OHLI overall scores were 70.15 and 81.82 for nurses and dental assistants, respectively. More than half of the nurses (54%) had inadequate or marginal OHL compared to only 19 % of the dental assistants. Similarly, about 68% of the nurses had inadequate or marginal dental knowledge level in comparison to 26 % of the dental assistants.

Association Between Oral Health Literacy Score and Different Variables

Table 4 shows the associations between OHL score and demographic variables, self-perceived oral health status, oral health behaviors and dental services usage. Bivariate analyses identified significant associations between the OHLI overall score

TABLE (1) Sample sociodemographic characteristics (n=102)

Variable	Nurse		Dental Assistant		Total	
	%	n	%	n	%	n
Gender						
Female	91.7%	44	72.2%	39	81.4%	83
Male	8.3%	4	27.8%	15	18.6%	19
P-value	0.012*					
Nationality						
Saudi	33.3%	16	14.8%	8	23.5%	24
Non-Saudi	66.7%	32	85.2%	46	76.5%	78
P-value	0.028*					
Education level						
College/University or Post-graduate	91.7%	44	88.9%	48	90.2%	92
Some College/University or Less	8.3%	4	11.1%	6	9.8%	10
P-value	0.746**					

**** Using chi-square Test **using Fischer's Exact Test***

and gender, duration of teeth brushing, frequency of interdental flossing, mouthwash usage, pattern of dental visits and dental visit during the last 12 months. Male participants and those who brush their teeth for 1 min or more, floss at least once daily, use mouthwash, visit their dentists regularly or visited their dentists during the last 12 months had significantly higher mean oral health literacy score. In contrast, the associations between OHLI scores and all other variables summarizing the socio-demographics, oral health behaviors and self-perceived oral health status were not statistically significant.

Multivariate Analysis

Logistic regression analysis revealed that dental knowledge test scores was the only statistically significant predictor for oral health literacy level as it whipped the association between the group of participants (medical nurses versus dental assistants) and OHLI level after controlling for demographic variables (age, gender, nationality and education level). About 4% decrease in the likelihood of having marginal or low oral health literacy level for each unit increase in the dental knowledge test score. Logistic regression analysis details can be seen in table 5.

TABLE (2) Participants' responses to oral health behavior questions and self-reported oral health status among dental assistants and nurses (n=102)

Variable	Nurse		Dental Assistant		Total	
	%	n	%	n	%	n
Self-perceived oral health status						
Excellent, very good or good	83.3%	40	94.4%	51	89.2%	91
Fair or poor	16.7%	8	5.6%	3	10.8%	11
P-value			0.071*			
Frequency of brushing						
1/day	12.5%	6	9.3%	5	10.8%	11
2 or more/day	87.5%	42	90.7%	49	89.2%	91
P-value			0.598*			
Duration of brushing						
<1 min	31.3%	15	9.3%	5	19.6%	20
1 min or more	68.8%	33	90.7%	49	80.4%	83
P-value			0.005*			
Frequency of flossing						
None	39.6%	19	11.1%	6	24.5%	25
1/day or more	60.4%	29	88.9%	48	75.5%	77
P-value			0.001*			
Mouthwash usage						
No	45.8%	22	25.9%	14	35.3%	36
Yes	54.2%	26	74.1%	40	64.7%	66
P-value			0.036*			
Pattern of dental visits						
Frequent visits	56.3%	27	27.8%	15	73.5%	75
When needed	43.8%	21	72.2%	39	26.5%	27
P-value			0.004*			
Dental visits during the last 12 months						
No	58.3%	28	87.0%	47	41.2%	42
Yes	41.7%	20	13.0%	7	58.8%	60
P-value			0.001*			

**** Using chi-square Test***

TABLE (3) Descriptive statistics for dental knowledge test and OHLI and its components among dental assistants and nurses (n =102)

Variable	Nurse	Dental Assistant	Total
OHLI Reading Comprehension Section			
Mean (SD)	35.39 (7.45)	41.28 (5.97)	38.51 (7.30)
Median	36.84	42.11	39.47
Minimum	14.47	13.16	13.16
Maximum	46.05	50.00	50.00
P-value*	< 0.001		
OHLI Numeracy Section			
Mean (SD)	34.76 (10.29)	40.55 (8.22)	35.39 (7.45)
Median	35.53	42.11	36.84
Minimum	2.63	7.89	2.63
Maximum	50.00	50.00	50.00
P-value*	0.002		
OHLI overall score			
Mean (SD)	70.15 (14.48)	81.82 (12.55)	76.33 (14.64)
Median	71.71	82.24	78.95
Minimum	17.11	21.05	17.11
Maximum	93.42	100.00	100.00
P-value*	< 0.001		
OHLI Level, n (%)			
Adequate (≥75)	22 (45.8)	44 (81.5)	66 (64.7)
Marginal (60-74)	20 (41.7)	8 (14.8)	28 (27.5)
Inadequate (< 60)	6 (12.5)	2 (3.7)	8 (7.8)
Dental Knowledge Test Score			
Mean (SD)	60.17 (23.09)	80.61 (10.26)	70.99 (20.21)
Median	58.82	82.35	76.47
Minimum	5.88	35.29	5.88
Maximum	100.00	88.24	100.00
P-value*	< 0.001		
Dental Knowledge Level, n (%)			
Adequate (≥75)	16 (33.3)	40 (74.1)	56 (54.9)
Marginal (60-74)	7 (14.6)	13 (24.1)	20 (19.6)
Inadequate (< 60)	25 (52.1)	1 (1.9)	26 (25.5)

**** Using Mann-Whitney U Test***

TABLE (4) Mean scores for OHLI by sociodemographic variables, self-reported oral health status, oral health behavior variables and dental attendance pattern.

Variable	Median	Mean	SD	P-value *
Gender				
Female	78.95	75.29	14.61	0.09
Male	81.58	80.89	14.25	
Nationality				
Saudi	66.45	70.39	21.28	0.135
Non-Saudi	78.95	78.15	11.47	
Education level				
College/University or Post-graduate	78.95	76.40	14.81	0.924
Some College/University or Less	78.29	75.66	13.71	
Self-perceived oral health status				
Excellent, very good or good	78.95	77.01	14.86	0.062
Fair or poor	72.37	70.69	11.81	
Frequency of brushing				
1/day	72.37	70.33	12.57	0.072
2 or more/day	78.95	77.05	14.77	
Duration of brushing				
<1 min	73.68	69.80	17.01	0.034
1 min or more	79.61	77.92	13.65	
Frequency of flossing				
None	72.37	71.32	14.73	0.019
1/day or more	80.26	77.96	14.33	
Mouthwash usage				
No	75.66	74.31	11.40	0.049
Yes	80.26	77.43	16.11	
Dental visits during the last 12 months				
No	73.03	71.96	15.62	0.006
Yes	80.92	79.39	13.20	
Pattern of dental visits				
Frequent visits	80.26	79.25	12.85	0.001
When needed	69.74	68.23	16.43	

**** Using Mann-Whitney U Test***

TABLE (5) Logistic regression model for OHLI Level (marginal or inadequate) (n=102)

Independent Variables		Coefficient	Odds ratio	95% CI of odds ratio		p value
				Lower	Upper	
Group	Nurse			Ref.		
	Dental assistants	-0.798	0.450	0.153	1.322	0.146
Age		0.017	1.018	0.956	1.083	0.581
Gender	Female			Ref.		
	Male	-0.234	0.792	0.190	3.293	0.748
Nationality	Saudi			Ref.		
	Non-Saudi	-0.677	0.508	0.140	1.845	0.304
Education level	College/University or Post-graduate			Ref.		
	Some College/University or Less	0.556	1.744	0.399	7.620	0.460
Dental knowledge test score		-0.044	0.957	0.929	0.986	0.004
Constant		2.710	15.025	-	-	0.034

-2 Log-likelihood = 104.492; Cox & Snell R^2 = 0.235; Nagelkerke R2 = 0.323; Hosmer and Lemeshow chi-squared test = 12.681, d.f. = 8, P = 0.123

DISCUSSION

This study was one of the first studies to shed the light on the oral health literacy of the medical nurses. Previous studies focused on the oral health knowledge, attitude and behaviors amongst nurses in different settings[13–18].

The results of this current study revealed higher level of dental knowledge, favorable oral health behaviors and unfavorable utilization of dental services for dental assistants in comparison to medical nurses. A thorough literature review revealed no previous study that compared medical nurses to dental assistants in this regard. Several studies assess the dental knowledge for nurses in different settings and in different countries and revealed low level of oral health and dental knowledge among nurses[14–19]. Comparing the knowledge level between these studies and the current study might be difficult due to the heterogeneity of the methods used in assessing dental knowledge in these studies as most of the studies used questions to assess dental knowledge in comparison to the ability of the participants to label different dental-related pictures that was used in the current study. This method is very specific and require a real understanding of different dental terms and how they look which might explain the low mean dental knowledge score for medical nurses in the current study. The unfavorable oral health behaviors reported in the present study among nurses is in agreement with previous studies which reported similar findings[14,19,20]. The favorable dental service utilization reported by nurses challenges the previous study by Oyetola et al. [19] in which 98% of nurses reported unfavorable attendance pattern.

Association between demographic variables (age, gender, nationality and educational level) was evaluated at bivariate and multivariate levels. None of these variables was confirmed as a significant predictor at the multivariate level. The lack of association between age and gender and OHL is in agreement with the body of the literature[6,21–26]. However, the lack of association between education level and OHL is in agreement with some of the previous reports with inconsistency in the literature in this respect [13,21,24–26].This lack of association may

be explained in part by the high level of education (90% with a college / university or post-graduate education) among the participants for whom OHL may not be an issue.

In the present study, no significant association was found between self-perceived oral health status and OHL. Controversial results were found in the literature about the association between OHL and self-perceived oral health status, with 4 of 7 studies reporting significant associations between them[21,24,25,27–30].

In the current study, the following variables were used to represent the oral health behaviors: frequency and duration of teeth brushing, frequency of flossing, mouthwash usage, dental visits within the last 12 months and pattern of dental attendance. Statistically significant associations were found between OHL and all these variables except the frequency of brushing, with all the relationships in the expected direction. Two previous studies evaluated the associations between OHL and frequency of teeth brushing with controversial results[31,32]. The other oral health behaviors-related variables that were used in the current study were not evaluated previously in the literature. The association between OHL and dental visitation within the last 12 months was evaluated in 3 previous studies, with two of these studies showing similar results to the current study[33,34]and one study showing non-significant association[35].

In the present study, we hypothesized that there is a significant difference between OHL level of nurses and dental assistants. This hypothesis was evaluated at bivariate level with more than half of the nurses having marginal or inadequate level of OHL. However, these differences disappeared at the multivariate level after controlling for demographic variables and the dental knowledge score. In the logistic regression model, dental knowledge remained as the only predictor for OHL level. These results in agreement with the body of the literature[6,8,13,22,24,31] and can be explained in different ways. Oral health literacy can be viewed as a prerequisite to obtain oral health knowledge or as an outcome of oral health knowledge. In other words, those with increased oral health-related vocabulary and conceptual knowledge about dental disease would find it easier to read and comprehend the materials, or those with adequate oral health literacy would be able to navigate and obtain oral health knowledge.

The results of this study should be interpreted within some limitations. One of these limitations was that it was conducted on a convenience sample, which might lead to skewed distribution of the participants among some of the variables. Non-parametric statistical techniques were used to analyze the data in this study due to skewness observed in some of the variable distributions. Unfortunately, all attempts to transform the data and utilize parametric techniques failed. This propelled us to use the oral health literacy level (dichotomized) in logistic regression instead of the actual oral health literacy score in multiple linear regression. This approach might lead to loss of some of the information and a decrease in power. In addition, all the questionnaires and tests used in this study were in English Language. Thus, a certain level of English proficiency is required to complete the questionnaires. All efforts were made to ensure that the participants can read, speak and understand English very well as the readability levels of all questionnaires were kept to the lowest possible level. Although, most of the participants were not native English speakers, but language is not expected to be a barrier for the participants as English is the official language used in the health care facilities in the country.

CONCLUSION

This study shed the light on the inadequacy about dental knowledge and oral health literacy among some of the medical nurses that may interfere with

their ability to comprehend and deliver dental-related information to their patients. More effort should be directed toward educating medical personnel about oral health by incorporating materials related to oral health in their curriculum and continuous education courses to close this gap.

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