Influence of Lifestyle on Dental Health Behavior

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Background: Lifestyle is a general way of living, which is based on the interplay between living conditions, and individual patterns of behavior as determined by socio-cultural factors, and personal characteristics. There is a paucity of studies assessing the role of various factors, including lifestyle, on the dental health behavior. The present study aims to determine the factors that influence the dental health behavior among a subgroup of adult patients attending a tertiary care center in Riyadh, Saudi Arabia.

Methods: This cross-sectional questionnaire survey was conducted at King Abdulaziz Medical City, Riyadh, Saudi Arabia. The questionnaires were distributed to a convenient sample of 300 individuals, which gathered information on the socio-demographic data, lifestyle and dental health behaviors. Bivariate analyses were used to explore the associations between each of the covariates and p-value < 0.05 was considered to be statistically significant. Multivariate logistic regression model was built using backward stepwise method for the dependent variable 'dental behavior'.

Results: Of the 300 questionnaires that were distributed, 279 were returned completed (response rate = 93%). The majority of our samples were Saudis (73.1%) and females (54.1%), with more than half the respondents having completed baccalaureate degree (55.2%) and about a quarter with either Masters or PhD. The mean age ± SD of the respondents was 35 ± 9.1 and the median age of '32 years' was used to categorize the age (≤ 32 and > 32). Multivariate logistic regression analysis showed that gender (OR[a] = 2.84; 95% CI: 1.63–4.95), age (OR[a] = 0.51; 95% CI: 0.3–0.87) and lifestyle (OR[a] = 1.4; 95% CI: 1.18–1.68) were independently associated with dental behavior after adjusting for all the other variables. Age, gender and nationality were also found to be significantly associated with lifestyle ($p < 0.01$).

Conclusion: Older adults, women and individuals with a healthy lifestyle were found to be significantly associated with positive dental behaviors.

Key Words: Cross sectional survey, Life style, Oral health behavior

INTRODUCTION

According to the Fédération Dentaire Internationale (FDI) "Oral health is multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex" [1]. Oral health is an integral part of general health and oral health should not be viewed separately [2]. The World Health Organization's (WHO's) glob-

al policy for improvement of oral health in the 21st century stated that the promotion of oral health needs to be integrated with general health promotion, as the risks to health are linked, preventable, and related to lifestyle [3]. This is the basis of the common risk factor approach which states that, changing a small number of risk factors would have a positive impact upon a large number of diseases [4]. Indeed, physical inactivity, smoking, and poor dietary practices are major risk factors to many chronic diseases [5]. Therefore, healthy lifestyles are fundamental to public health [5].

According to Backett et al. [6], lifestyle is a behavior associated with an individual or group. Lifestyle is a general way of living, which is based on the interplay between living conditions, and individual patterns of behavior as determined by socio-cultural factors, and personal characteristics [7]. The 2002 World Health Report indicates that the most important risk factors for non-communicable diseases include high blood pressure, high blood cholesterol, inadequate fruit and vegetable intake, overweight and obesity, physical inactivity and tobacco use [8]. Unhealthy diet, tobacco use, harmful alcohol use, and poor oral hygiene are all considered as risk factors for oral diseases. Nutbeam et al. [9] reported that good oral hygiene habits is related to healthy diet, use of vitamins, and regular physical activity among adolescents.

Lifestyle modification and changes in health related behavior would reduce the unhealthy behavior. Prochaska et al. [10] stated that with health related behavior change the unhealthy behaviors such as excessive sugar in diet and smoking was reduced and there was an improvement in healthy behaviors such as flossing and dental attendance. Several previous published studies have shown the relationship between various socio-demographic variables and oral health behavior [7,11].

Kingdom of Saudi Arabia has undergone tremendous changes in lifestyle, which includes reduction in the physical activity and unhealthy eating habits. These detrimental lifestyle changes negatively affects the general and oral health of the society [12]. Studies from Saudi Arabia report an increasing trend in the prevalence and severity of caries [13,14]. There is a paucity of studies assessing the role of factors such as lifestyle, in influencing the dental health be-

haviors in this population. The present study aims to determine the factors that influence the dental health behavior among a subgroup of adult patients attending a tertiary care center in Riyadh, Saudi Arabia.

MATERIALS AND METHODS

This cross-sectional study was conducted among patients visiting King Abdulaziz Medical City, Riyadh, Saudi Arabia for non-dental related problems between January and March 2015. The research was conducted in accordance with the World Medical Association Declaration of Helsinki and was approved by the King Abdullah International Medical Research Center, Riyadh.

Assuming a conservative proportion of 50% adults to be having adequate dental behavior, it was estimated that 250 patients would be required to obtain a power of 80% with a 95% confidence interval (95% CI). This was further rounded off to 300 to adjust for missing data and non-respondents. Pregnant women and severely ill patients were excluded from the study. The desired sample size was reached by convenient random sampling of participants from National Guard employee health clinic's waiting area. Authors performed a pilot study on the same population prior to the original study to validate the questionnaire. All study participants completed a self-administered structured questionnaire. The first part of the questionnaire consisted the socio-demographic variables (age, gender, socioeconomic status, etc.). Socioeconomic status (SES) was measured based on monthly income and the number of household members. This was followed by questions on dietary patterns, physical activity and smoking habits. The third part of the questionnaire was on the dental behaviors. Written informed consent was obtained from all the individuals who agreed to participate in this study.

Diet, physical activity, and smoking were used as standard measures of lifestyle in the present study [15]. Smoking habits were estimated by recording the average number of cigarettes smoked per day and the number of years the person has smoked. Non smoker was assigned the score 3 and current smoker was assigned a score of 1. Physical activity was measured by asking respondents about their frequency of vigorous physical activity, including sports and physical

labor at work. This variable was categorical and included the following options: more than once a week, once a week, one to three times a month, or hardly ever or never. Physical inactivity was defined as engaging in vigorous physical activity less than once per week (score of 1), while physical activity was defined as performing physical activity more than once a week (score of 3). Dietary practices were assessed through questions on daily average sugar intake, frequency of snacking and average daily intake of fruits and vegetables. Good dietary practices were given a score of 3 and poor dietary practices were given a score of 1. Smoking history, physical activity and dietary practices were computed and the total scores were used to categorize lifestyle. Score of 3-5 were categorized as 'Poor', score of 6 & 7 were categorized as 'Moderate' and score of 8 & 9 were categorized as 'Healthy' lifestyles.

The body adiposity status was determined by calculating body mass index (BMI) and was categorized as underweight (BMI < 18.5), normal (BMI = 18.5-24.9), overweight (BMI = 25-29.9) and obese (BMI > 30), according to the WHO classification [16].

The outcome variable of interest was 'dental behavior', which was calculated based on the responses to questions on:

1) the frequency of brushing (more than twice daily, twice daily, and infrequent or once daily); 2) use of floss/mouthwash (daily, infrequent, never) and 3) frequency of dental visit (irregular, 6-12mo and less than 6 mo). Each of these variables were score on a 3-point scale ranging from 1-3. The dental behavior scores were computed by adding the scores of these three variables (range 3-9). Dental behavior was categorized into 2: poor (score 3-6) and adequate (score 7-9).

The responses were entered into the Statistical Package for the Social Sciences (SPSS 22.0; SPSS Inc., Chicago, IL, USA) for Windows. The missing values for some of the variables were imputed using mean substitution method. Bivariate analysis were used to explore the associations between each of the covariates and p-value < 0.05 was considered to be statistically significant. Multivariate logistic regression model was built using backward stepwise method for the dependent variable 'dental behavior'.

RESULTS

Of the 300 questionnaires that were distributed, 279 were returned completed (response rate = 93%). Relationship be-

Table 1. Relationship between the socio-demographic variables and lifestyle

| | Variables | Lifestyle | | | | p-value |
| | | Poor 71 (25.4%) | Moderate 128 (45.9%) | Healthy 80 (28.7%) | Total 279 (100.0%) | |
		n (%)	n (%)	n (%)	n (%)	
Gender	Male	46 (35.9%)	55 (43.0%)	27 (21.1%)	128 (45.9%)	< 0.01
	Female	25 (16.6%)	73 (48.3%)	53 (35.1%)	151 (54.1%)	
Nationality	Saudi	62 (30.4%)	96 (47.1%)	46 (22.5%)	204 (73.1%)	< 0.01
	Non-Saudi	9 (12.0%)	32 (42.6%)	34 (45.3%)	75 (26.9%)	
Age	≤ 32 yrs	41 (29.3%)	66 (47.1%)	33 (23.6%)	140 (50.8%)	< 0.01
	> 32 yrs	30 (21.6%)	62 (44.6%)	47 (33.8%)	139 (49.2%)	
Marital Status	Single	32 (27.1%)	56 (47.5%)	30 (25.4%)	118 (42.3%)	0.58
	Married	39 (24.2%)	72 (44.7%)	50 (31.1%)	161 (57.7%)	
Degree	High school	19 (19.0%)	21 (38.2%)	15 (27.3%)	55 (19.7%)	0.271
	Bachelor	40 (26.0%)	68 (44.2%)	46 (29.8%)	154 (55.2%)	
	Master/PhD	12 (17.1%)	39 (55.7%)	19 (27.1%)	70 (25.1%)	
SES status	Low/medium	41 (26.5%)	69 (44.5%)	45 (29.0%)	155 (55.6%)	0.863
	High	30 (24.2%)	59 (47.6%)	35 (28.2%)	124 (44.4%)	
BMI	Underweight/normal	41 (31.3%)	52 (39.7%)	38 (29.0%)	131 (47.0%)	0.142
	Overweight	21 (23.6%)	45 (50.6%)	23 (25.8%)	89 (31.9%)	
	Obese	9 (15.3%)	31 (52.5%)	19 (32.2%)	59 (21.1%)	

tween the various socio-demographic variables and lifestyle is described in (Table 1). The majority of our sample included Saudi Nationals (73.1%) and women (54.1%), with more than half the respondents having completed baccalaureate degree (55.2%) and about a quarter with either Masters or PhD. The mean age ± SD of the respondents was 35 ± 9.1 and the median age of '32 years' was used to dichotomize the age (≤ 32 and > 32). About 55% of the sample belonged to either low or medium socio-economic status. Age, gender and nationality were found to be significantly associated with lifestyle (p < 0.01). Women exhibited better lifestyle than men (35% and 21%, respectively). Respondents who were above the age of 32 had better lifestyle than those who were younger (33.8% and 23.6%, re-

spectively). Non-Saudi subjects have a better lifestyle than Saudi subjects (45.3% and 22.5%, respectively).

Table 2 presents the bivariate analysis of the socio-demographic variables, BMI, lifestyle and the three dental health behaviors (brushing, regular dental visits, and using of extra cleaning devices). Females were found to have better dental behaviors compared to males (p < 0.05). The frequency of brushing was significantly better for non-Saudi's as compared to Saudi's (p < 0.001). Young respondents (≤ 32 yrs) reported higher frequency of brushing and also reported using floss and mouthwash more frequently than the older respondents (p < 0.05). Higher proportion of the obese respondents reported brushing only once daily as compared with normal or overweight individuals (p < 0.006).

Table 2. Relationship between the various independent variables and three oral health behaviors

Variables	Frequency of brushing teeth per day (%)				Frequency of using extra cleaning materials such as floss and mouth wash (%)				Frequency of checkup visits to the dentist (%)			
	1	2	> 2	p-value	Daily	Less than daily	Never	p-value	Within 6 months	Every 6-12 months	Only when there is a need	p-value
Gender												
Male	38.3	43.8	18.0	< 0.001	26.6	46.1	27.3	0.02	7.0	24.2	68.8	0.001
Female	12.6	51.0	36.4		40.4	43.0	16.6		20.5	29.8	49.7	
Nationality												
Saudi	29.9	52.9	17.2	< 0.001	30.4	45.6	24.0	0.183	13.2	25.0	61.8	0.454
Non-Saudi	14.9	48.9	36.2		44.0	41.3	14.7		17.3	33.4	49.3	
Age												
≤ 32 yrs	24.3	56.4	19.3	0.002	40.7	37.9	21.4	0.041	15.0	28.6	56.4	0.794
> 33 yrs	24.5	38.8	36.7		27.3	51.1	21.6		13.7	25.9	60.4	
Marital status												
Single	20.3	51.7	28.0	0.357	39.0	39.8	21.2	0.294	17.8	29.7	52.5	0.187
Married	27.3	44.7	28.0		30.4	47.8	21.7		11.8	25.5	62.7	
Education												
High school	32.7	50.9	16.4	0.184	36.4	30.9	32.7	0.058	3.6	25.5	70.9	0.052
Bachelor	22.1	48.7	29.2		36.4	44.8	18.8		16.2	30.5	53.2	
Master/PhD	22.9	42.9	34.3		27.1	54.3	18.6		18.6	21.4	60.0	
SES												
Low/medium	21.9	50.3	27.7	0.504	34.8	42.6	22.6	0.77	12.3	28.4	59.4	0.53
High	27.4	44.4	28.2		33.1	46.8	20.2		16.9	25.8	57.3	
BMI												
Normal	16.0	51.1	32.8	0.006	32.1	47.3	20.6	0.831	13.7	30.5	55.7	0.465
Overweight	28.1	51.7	20.2		36.0	43.8	20.2		18.0	21.3	60.7	
Obese	37.3	33.9	28.8		35.6	39.0	25.4		10.2	28.8	61.0	
Lifestyle												
Poor lifestyle	29.6	52.1	18.3	0.025	23.9	45.1%	31.0	0.006	11.3	25.4	63.4	0.011
Moderate lifestyle	24.2	50.8	25.0		30.5	47.7	21.9		14.1	20.3	65.6	
Healthy lifestyle	20.0	38.8	41.3		48.8	38.8	12.5		17.5	40.0	42.5	

Table 3. Multivariate logistic regression model (Backward Stepwise) with dependant variable as overall dental behavior (adequate/poor)

Predictor variable	SE	Exp (B)	95% CI for exp (B)	
			Lower	Upper
Gender	0.283	2.842	1.633	4.945
Age	0.271	0.508	0.299	0.865
Lifestyle	0.19	1.377	1.177	1.682
Constant	0.656	0.133		

Nagelkerke R Square: 12.7.
Excluded variables that were present in the initial model were: Nationality, marital status, education, SES status and BMI.
SE: standard error.

Lifestyle was found to be significantly associated with dental behavior. Respondents who were categorized as having 'good' lifestyle had significantly (p < 0.05) better oral hygiene habits (frequency of brushing and using floss/mouthwash) as compared to those who were categorized as having 'poor' or 'moderate' lifestyle. Those respondents with good lifestyle were also more regular in seeking regular dental care as compared to others. Table 3 presents the findings of the multivariate logistic regression analysis. Gender (OR[a] = 2.84; 95% CI: 1.63-4.95), age (OR[a] = 0.51; 95% CI: 0.3-0.87) and lifestyle (OR[a] = 1.4; 95% CI: 1.18-1.68) were independently associated with dental behavior after adjusting for all the other variables (Nagelkerke R Square: 12.7).

DISCUSSION

The main objective of this study was to determine the various factors that influences dental health behaviors. We observed that age, gender and lifestyles were significantly associated with dental behaviors.

Older individuals (> 32 yrs) were found to have better dental behaviors than younger individuals. Similar findings were reported in the study by Sakki et al. [7] In the present study, age had a significant association with the frequency of brushing and with the use of oral hygiene aids. Age was also significantly associated with the lifestyle, where higher proportion of older individuals reported to have healthier lifestyle than younger individuals. This might be due to the increased concern about oral health and also due to the raised awareness on the importance of oral health as people age.

Females reported better dental behaviors as compared to males. In the current study, though most respondents reported brushing their teeth twice a day, almost twice the number of females as compared to males reported brushing their teeth more than twice daily. Further, the daily use of extra cleaning aids such as dental floss and mouthwash were higher among females. Females also were more regular in their dental appointments. Better dental behavior among females can be attributed to their raised perception to esthetics and also their greater sensitivity towards illness and discomfort [7].

Measures of lifestyle included dietary habits, smoking habit and physical activity. Alcohol consumption was not included in the current study as alcohol is banned in the country. Age, gender and nationality were found to be significantly associated with lifestyle. Women were found to have better lifestyle than men. This might be due to the general cultural and social norms where women are more concerned about their general and oral health than men [17]. Lifestyle showed statistically significant relation with age group; we observed that older individuals adopt healthier lifestyle habits compared to younger individuals. Lifestyle shows a statistical significant relation with nationality which might be due to differences in the cultural practices and the dietary habits. There was no significant association between SES and lifestyle or dental behavior. This is in contrast to the findings of Ronis et al. [18], which found better dental health behavior among high SES individual's. However, the results of this study show that there were no participants who brushed their teeth once a day under the low SES category, which may be due to the small number of participants. Sakki et al. [7] found that individuals with low SES tend to have worse oral hygiene habits compared

to others.

BMI was only significant with tooth brushing, which is in agreement with Harada et al. [17] study. There was no significant association between BMI and lifestyle. The major limitation of this study is the lack of generalizability of the study findings to the general population as this study was a hospital based cross-sectional study. Further research in a more diverse population is recommended to expand on the findings of this study.

CONCLUSION

Older adults, women and individuals with a healthy lifestyle were found to be significantly associated with positive dental behaviors.

ACKNOWLEDGEMENTS

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