

Relationship of Periodontal Disease and Electronic Cigarette Usage among Adolescents in Jazan Population, KSA

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Abstract

Electronic cigarette (e-cigarette) usage is on the rise, particularly among teenagers and former smokers. Gingivitis is mainly caused by retained dental plaque while dental plaque is considered the most common risk factor. On the other hand, cigarette smoking has been shown to be a risk factor for periodontal diseases. The use of both electronic and traditional cigarettes were related to a higher risk of periodontal diseases. Exposure to e-cigarettes raised the incidence of periodontal, dental, and gingival diseases, as well as changes in the oral microbiota. Some studies suggest that e-cigarettes have a similar impact on periodontal tissues as traditional cigarettes. It has been proven that subjects who smoke cigarettes have higher periodontal inflammatory parameters than those who use electronic cigarettes or never smoke.

To study the relationship between periodontal diseases and e-cigarette usage among adolescents in Jazan population.

292 males and females participants from diagnostic clinics of CODJU were included in this cross-sectional study after meeting the inclusion and exclusion criteria. The inclusion criteria included participants aged between 18-25 years using electronic- cigarette > 6 months. The exclusion criteria included participants with uncontrolled diabetes, mental illness, pregnant patients, orthodontic patients and patients smoking cigarette or smokeless tobacco or khat chewer. A Questionnaire was given to all participants to obtain information about age, systemic diseases or type of smoking. Clinical parameters such as bleeding on probing, deep probing depth, clinical attachment loss and x-rays were used to assess periodontal disease. Confidence intervals (CI) were set at 95% and values of $p < 0.05$ were interpreted as statistically significant.

Out of 292 participants, 157 (53.7%) were males and 135 (46.2%) were females. Mean age was 22 and the mean duration of using e-cigarette was 14 months. 22.6% participants showed no signs of periodontal diseases while 64% had gingivitis and 13.3% had periodontitis. 31.5%, 61.3%, 6.8% participants were brushing their teeth once, twice, and thrice per day, respectively. 97% of participants used extra daily oral hygiene measures rather than tooth brushing alone, 46.5% used different types of mouthwash, 38% used dental floss, and 12.3% used waterpik.

The results show more gingival inflammation parameters related to participants who are using e-cigarette.

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Introduction

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Out of 292 participants, 157 (53.7%) were males and 135 (46.2%) were females. Mean age was 22 and the mean duration of using e-cigarette was 14 months. 22.6% participants showed no signs of periodontal diseases while 64% had gingivitis and 13.3% had periodontitis. 31.5%, 61.3%, 6.8% participants were brushing their teeth once, twice, and thrice per day, respectively. 97% of participants used extra daily oral hygiene measures rather than tooth brushing alone, 46.5% used different types of mouthwash, 38% used dental floss, and 12.3% used waterpik.

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Materials and methods

This is a descriptive cross-sectional study, and the study sample consisted of 292 randomly chosen participants, males and females from the diagnostic department of CODJU according to inclusion and exclusion criteria. The participants filled out a questionnaire and got a clinical exam to evaluate their eligibility to be part of this study. The questionnaire consisted in total of eight multiple-choice questions. It contained two

domains of questions. Four demographic questions (age, gender and medical history) and four oral hygiene questions (electronic cigarette usage duration, oral cleaning method, brushing frequency and brushing technique). The question about the oral cleaning method asked about the type of cleaning tool to clean the interproximal surfaces between teeth and the gingival pockets around them. It has included three options which were mouthwash, dental floss and waterpik. The brushing technique question included three options which were horizontal, vertical and combination brushing stroke directions. Thenceforth, a clinical exam was performed to assess the periodontal condition of the selected patients. Patients with bleeding on probing, deep probing depth, and clinical attachment were included in the sample

Statistical analysis

Statistical tests were utilized using Stata/SE version 15.1. Frequency, percentages, mean and standard deviation were used in descriptive analysis. The normality test Shapiro-Wilk was executed to assess the normal distribution of the data. Transformation tests were executed. Data were not normally distributed. Median and interquartile range comparisons were assessed using Wilcoxon rank-sum and Kruskal-Wallis tests. Chi-square was executed to test the association between oral hygiene among gender and periodontal health condition groups. Ordinal logistic regression was performed to assess the association between periodontal condition and demographics and oral hygiene tools. Tests were considered significant when alpha value below 5% for all tests.

Results

A total of 292 participants were included in this study, of which 157 (53.7%) were males and 135 (46.2%) were females. The mean age was 22 years old, while the mean duration of using e-cigarettes was 14 months. Upon clinical exam, 22.6% showed no signs of periodontal diseases, while 64% had gingivitis and 13.3% had periodontitis. 31.5%, 61.3%, and 6.8% were brushing their teeth once, twice, and thrice per day, respectively. Most of the participants (97%) used extra daily oral hygiene measures rather than tooth brushing, while 46.5% used mouthwash, 38% used dental floss, and 12.3%

used Waterpik. (Table 1). There was a significant association between gender and dental floss use. Also, between all oral hygiene assessments and periodontal condition. Table 2, there is a significant difference in median age between males and females. Females (n=133) brush twice a day significantly more than males (n=77). The age and duration of participants with periodontitis was more than those with gingivitis and control groups. Participants with gingivitis have reported more usage of mouthwash (n=83) and dental floss (n=60) than other groups. The control group had more frequency in using waterpik (n=23) than other diseased groups. Regarding brushing frequency, gingivitis groups reported brushing once (n=70) and twice a day (n=108) more than other groups. Table 3, age (OR=1.18, CI 95% = 1.06, 1.315) and duration (OR=1.04, CI 95% = 1.00, 1.07) were significant predictors of more periodontal disease odds. Whilst mouthwash (OR=.381, CI 95%= .226, .643) and dental floss (OR=.306, CI 95%=.168, .556) were significant protective factors from gingival disease progression.

Variables (n=292)	Categories	Measures
Age (mean ± SD)		22.14 ± 2.61
Duration (mean ± SD)		14.64 ± 9.28
Gender; n (%)	Male	157 (53.77)
	Female	135 (46.23)
Oral Hygiene assessment; n (%)	Mouth wash	136 (46.58)
	Dental floss	111 (38.01)
	Waterpik	36 (12.33)
Brushing frequency; n (%)	Once a day	92 (31.51)
	Twice a day	179 (61.30)
	Three times	20 (6.85)
	Four times	1 (.34)
Brushing technique; n (%)	Vertical	15 (5.14)
	Horizontal	36 (12.33)
	Combination	241 (82.53)
Periodontal condition; n (%)	Control	65 (22.26)
	Gingivitis	187 (64.04)
	Periodontitis	40 (13.70)

Table 1. Descriptive statistics of demographics and oral hygiene practices.

	Males	Females	Control	Gingivitis	Periodontitis	
Age	23(21- 25)	22(20-24) ^a	23(20-24)	23(20-24)	24(23-24) ^b	
Duration	12 (9-24)	12 (6-8)	12(8-12)	12(8-18)	18 (12-24) ^b	
Oral hygiene assessment	Mouth wash	75	61	42	83	11 ^c
	Dental floss	77	34 ^c	43	60	8 ^c
	Waterpik	6	20	23	9	4 ^c
Brushing frequency	Once a day	77	15 ^c	1	70	21 ^c
	Twice a day	66	113	53	108	18
	Three times	13	7	11	8	1
	Four times	1	0	0	1	0
Brushing technique	Vertical	6	9	2	10	3
	Horizontal	22	14	4	26	6
	Combination	129	112	59	151	31

Table 2. Comparison and association tests of oral hygiene practices by gender and periodontal condition groups.

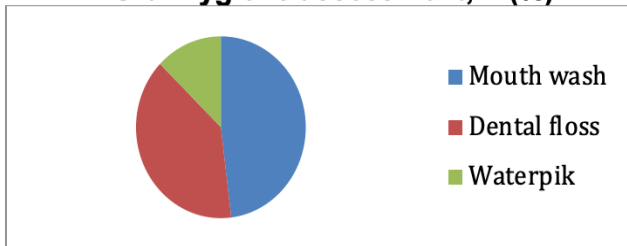
Tests are significant at p-value < .05 for: ^aWilcoxon rank-sum test, ^bKruskal-Wallis, ^cChi-square.

Variable	Categories	OR	CI (95%)
Age		1.18*	1.06 1.315
Duration		1.04*	1.00 1.07
Gender	Males	955	526 1.73
	Females	Reference	
Oral hygiene assessment	Mouth wash	381*	226 643
	Dental floss	306*	168 556
	Waterpik	Reference	
Brushing frequency	Once a day	12.97	127 1326.08
	Twice a day	3.23	032 329.07
	Three times	849	008 86.09
	Four times	Reference	
Brushing technique	Vertical	1.33	418 4.25
	Horizontal	1.66	776 3.56
	Combination	Reference	

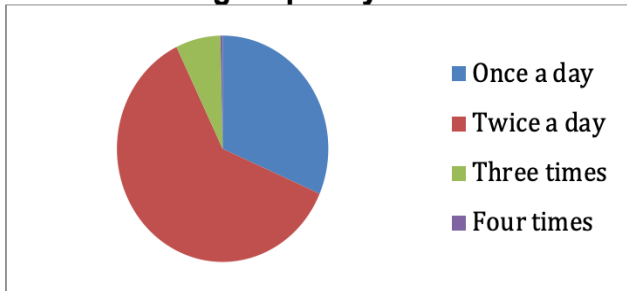
Table 3. Ordinal regression having 1= no disease (control), 2= gingivitis and 3= periodontitis.

*Test is significant at p < .05

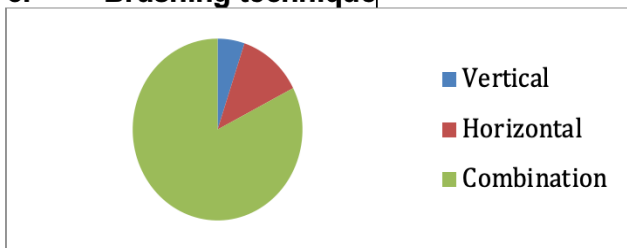
1. Oral Hygiene assessment; n (%)



2. Brushing frequency



3. Brushing technique



4. Periodontal condition

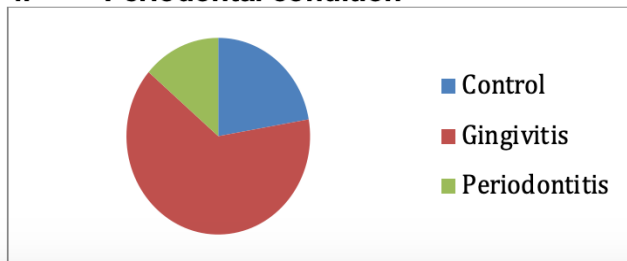
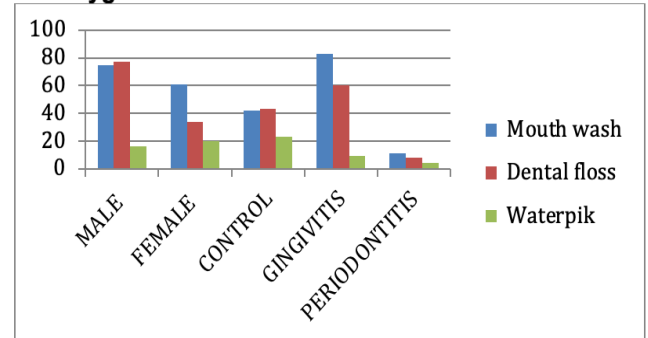
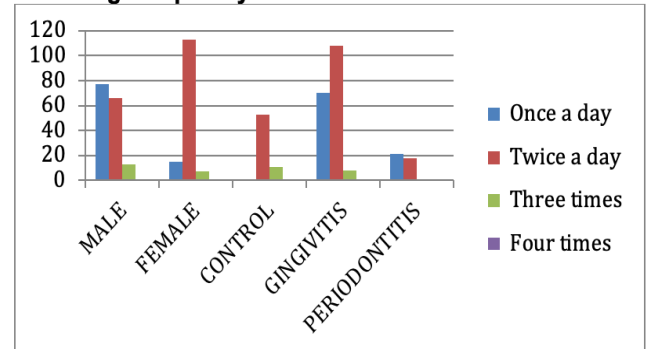


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Oral Hygiene Assessment



Brushing Frequency



Brushing Technique

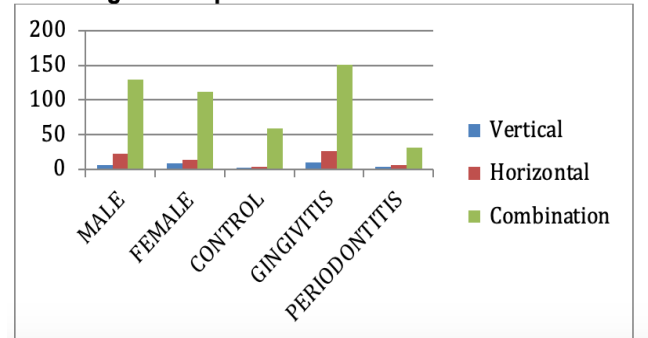


Table 2. Comparison and association tests of oral hygiene practices Oral Hygiene Assessment.

Discussion

In the kingdom of Saudi Arabia the culture of shisha smoking is widespread and practiced widespread amongst the various strata of population, hence the use of technological smoking like e-cigarette is gaining widespread popularity.

The present study conducted using a total of 292 participants, which were included in this study, of which 157 (53.7%) were males and 135 (46.2%) were females, the participant of the study shows almost equal e-cigarette amongst the male and female population. The mean age was 22 years old which is suggestive of the use of technology to smoking is upgrading from the

previous cultural shisha smoking as use of e-cigarette is with the use of electronic cigarette smoking gadgets. The present study conducted presents the mean duration of using e-cigarettes was 14 months which signifies the introduction of e-cigarettes among the younger generation is at a very young age and the use is consistent as the mean duration presents.

The most significant finding lies on the clinical examination where 22.6% showed no signs of periodontal diseases, while 64% had gingivitis and 13.3% had periodontitis. Although the spread of periodontal disease was significant the younger population although tech savvy were considering brushing regularly, 31.5%, 61.3%, and 6.8% were brushing their teeth once, twice, and thrice per day, respectively. Most of the participants (97%) used extra daily oral hygiene measures rather than tooth brushing, while 46.5% used mouthwash, 38% used dental floss, and 12.3% used Waterpik. The use of adjuncts to regular brushing the younger population were well aware of the additional methods to overcome the effects of vaping and show concern about the personal oral hygiene, this is a very interesting finding as the previous studies don't discuss about the concern for oral hygiene as which is found in the present study.

There was a significant association between gender and dental floss use. Between all oral hygiene assessments and periodontal condition. There is a significant difference in median age between males and females. Females (n=133) brush twice a day significantly more than males (n=77). The age and duration of participants with periodontitis was more than those with gingivitis and control groups. Participants with gingivitis have reported more usage of mouthwash (n=83) and dental floss (n=60) than other groups. The control group had more frequency in using waterpik (n=23) than other diseased groups. Regarding brushing frequency, gingivitis groups reported brushing once (n=70) and twice a day (n=108) more than other groups.

Our present study shows that the majority of those who vaped had gingivitis, while 13.3% had periodontitis. This increase in the incidence of those who have gingival and periodontal disease among vapers is concurrent with studies by Javed et al and Atuegwu et al.^{15,19} Our present study shows that females flossed their teeth more than men. This is in conformity with

results from studies by Lipsky et al and Su et al, where women show better oral hygiene habits than men.^{20,21}

The association of periodontal disease with age is debatable.²² However, age and periodontal disease often have a tendency to relate. Similar to earlier research by Tadjoein et al and Al-Abdaly et al, the age of the patients in our current study who had periodontitis was higher than that of the subjects who had gingivitis.^{22,23,24}

Previous study by the author evaluated the periodontal status of patients undergoing orthodontic treatment using a fixed orthodontic appliance. The results were increased progression of periodontitis were observed among the 20 patients undergoing orthodontic treatment²⁵, the reason although was poor oral hygiene but the inferences of electronic smoking must be taken into consideration as this is a significant finding and a missing link as most patient undergoing orthodontic treatment are young adolescent and use of electronic cigarettes are common among them which can lead to loss of periodontium leading to complication and delay of the treatment.

Conclusions

The use of electronic cigarette among the adolescent population of Saudi Arabia is exponentially increasing and the negative effects of periodontal disease is on the rise even with the use of various and regular oral hygiene measures.

Declaration of Interest

The authors report no conflict of interest.

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