



The Influence of Different Factors on the Oral Health Status of Smoking and Nonsmoking Adults

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ABSTRACT

Aim: The aim of this study to determine the influence of smoking on self-reported oral health status among university students.

Materials and methods: Voluntary sample of 669 adults of 18 to 26 years old were invited to participate in the study. They were asked to read a self-designated questionnaire and a covering letter which explained the purpose of the study. The questionnaire addressed self-reported demographics, oral hygiene and smoking habits; knowledge about smoking and its effects on oral health. Data were statistically analyzed using Chi-square test to determine statistically significant differences across the oral health status.

Results: The sample included 340 (56.7%) males and 240 (43.3%) females; 56.8% of the subjects were nonsmokers; 43.2% were current smokers, and 17.5% smoke argileh. Almost 24.7% of subjects started smoking because of emotional effects; 66.9% did not smoke because of its harm to health. The percentage of subjects with dental plaque on their teeth was 27.1%, and with calculus was 27.9%, and with stains was 26.9%. About 35.5% of the subjects brushed their teeth once daily. Statistically, significant association was proven between smoking and gender ($p < 0.01$); and smoking and halitosis ($p < 0.01$).

Conclusion: Smoking is significantly related to esthetics, calculus, tooth stains, halitosis, gingival bleeding, and gender with $p < 0.01$, $p < 0.01$, $p < 0.01$, $p < 0.01$, $p = 0.05$, and $p < 0.01$ respectively.

Keywords: Jordan, University students, Oral health, Smoking

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INTRODUCTION

Throughout the developing world, smoking behavior is increasing rapidly and considered a major threat to world health. It has been reported that smoking increased the risks of periodontal disease, tooth loss, tooth discoloration, and

was the main cause of throat and oral cancers. *Ezine Articles*.¹ Smoking is believed to be responsible for 75% of all cancers of the mouth, *HealBlog.net Medical Advice and Soul Support*.² Monteiro da Silva, Newman, Oakley and O'Leary³ suggested that smoking may interfere with plaque accumulation on dental surfaces. A study on plaque-induced gingivitis showed that gingival bleeding and vascular changes were caused by smoking.⁴

According to the World Health Organization, the percentage of smoking Jordanians is 46%. Although the percentage of smokers among Jordanian is relatively high, there is still paucity in the literature about its effect on the oral health status of Jordanian. Therefore, the purpose of this study was to explore self-reported oral health status in a sample of Jordanian adults and to study the effect of smoking on the oral health.

SMOKING IN JORDAN

Tobacco smoking is a serious public health problem and major source of morbidity and mortality. It reduces life expectancy, increases overall medical costs and contributes to loss of workforce productivity; therefore, smoking prevention programs have been a high priority in World Health Organization (WHO) policies. Haddad and Malak⁵ conducted a study to estimate the prevalence of smoking and to describe habits, attitudes, and practices related to smoking among students of Jordan University of Science and Technology. They reported that about 46% of the students had smoking parents and or siblings. The number of smoking students increased with the number of study years at the university. The percentage of smoking students in the first year was 9.6%, in second year 25%, in third year 28.9, and in the fourth year 56.7%, ($p < 0.000$).

According to a survey released by the United Nation's Global Youth Tobacco Survey; 12.7% of UNRWA students

in Jordan smoke cigarettes. Azab, Khabour, Alkaraki, Almuthann, Eissenberg, Alzoubi and Primack⁶ reported that water pipe tobacco smoking was highly prevalent in Jordan and associated with male gender and upper middle income levels.

Khader and Alsadi⁷ conduct a survey to determine the prevalence of smoking and its associated factors among Yarmouk University students in north Jordan. They reported that the prevalence of smoking among university students by year of educational level in the university increased significantly with age ($p < 0.0001$); the prevalence of smoking increased significantly with increasing income ($p = 0.007$) and with decreasing academic achievement. Increased prevalence of smoking was significantly associated with an increased number of family members who smoke ($p < 0.005$) and an increased number of friends who smoke ($p < 0.0001$).⁷

Effects of Cigarette Smoking on Periodontal Diseases

Using a case-control study, Al-Wahadni and Linden⁸ in 2003 investigated the effects of smoking on the periodontal status of 20 to 35 years old Jordanians attending a dental hospital in Jordan for routine dental treatment. Clinical measurements of plaque, bleeding on probing and probing depth were recorded and interproximal bone levels of molar teeth were assessed from bitewing radiographs. They concluded that cigarette smoking was associated with accelerated periodontal destruction. Natto, Baljoon, Dahlen and Bergstrom⁹ explored the subgingival periodontal microflora in a Saudi Arabian population and focused on its relationship with various smoking habits. They concluded that the subgingival periodontal microflora is independent of tobacco smoking.

Effect of Cigarette Smoking on General Health

Belbeisi, Al Nsour, Batieha, Brown and Walke¹⁰ reported that the burden of smoking-related diseases in Jordan is increasing. The burden of smoking-related diseases in Jordan is increasingly evident.¹¹ Abu-Baker, Haddad and Mayyas¹² compared the frequency of cigarette smoking before and after diagnosis of coronary heart disease (CHD), and reported that there was a statistically significant difference in the number of cigarettes smoked before CHD occurrence, $p < 0.01$, and after diagnosis of CHD occurrence, $p < 0.01$. The age groups of 40 to 49 and 50 to 59 had the highest percentages of persistent smokers (74.3 and 87.5% respectively) compared to subjects who quit smoking. The researchers concluded that the majority of the CHD patients continue to smoke after their disease

occurrence, suggesting that these patients need evidence-based smoking-cessation programs.

Kofahi and Haddad¹³ studied a random sample of 400 students using a questionnaire based on the health belief model. Their results demonstrated that most of students disagreed that lung cancer could be easily cured. Former smokers were more knowledgeable than current smokers about the health hazards of smoking, and those who never smoked were more knowledgeable than both. Addiction and friends were the reasons most frequently given for not quitting smoking.

Smoking Cessation

Alzoubi, Azab, Khabour, Al-Shamaila, Ayoub, Al-Omiri, Al-Nasser, Mhaidat and Al-Azzam¹⁴ conducted a study aimed at evaluating the awareness and implementation of the Smoking Cessation Clinical Practice (SCCP) guidelines. A self-reported questionnaire based on the updated version of the SCCP guidelines was completed by 422 healthcare providers (HCPs). The researchers concluded that Jordanian HCPs showed good spontaneous smoking cessation practice. However, this practice could have been better if HCPs had adequate awareness of the SCCP guidelines.

Our research is based on the following null hypotheses:

1. Males smokers would not be more than female smokers.
2. Smokers would report less gingival bleeding during brushing than nonsmokers.
3. The number of smokers with bad breath would not be more than that of nonsmokers.
4. Smokers would not report more stains on their teeth than nonsmokers report.
5. Smokers would not report less tooth brushing frequency than nonsmokers.

MATERIALS AND METHODS

Arrangements for data collection were approved by university human resources. The sample included 18 to 26 years old of a total of 669 university Jordanian students. Questionnaires with covering letters were distributed to students in the university cafeteria during the period of 4 weeks. Subjects were asked to read the information in the covering letter and were allowed to see the questionnaire before they decided to participate. Volunteers were asked to complete the questionnaire; they were then collected and returned to the principal investigator.

Because the questionnaire was self-designed, content validity was established by a panel of dental health sciences faculty experts at the University. Test-retest reliability was also documented by administering the questionnaire twice to the same 10 students within one week. Given multiple

choice and numeric open end questions were created. Participants were asked to select one and sometimes more than one response regarding their perceived oral health status and oral care behaviors. Items in the questionnaire included: demographics, tooth-brushing and smoking habits; Knowledge about smoking and its effect on oral health was also addressed (Chart 1). Persons were considered current smokers, if they reported a history of cigarette smoking; and nonsmokers, if no history of cigarette smoking was reported. The results are generalized to Jordanian students, who are similar to those represented in this study.

Statistical Treatment

Data were statistically analyzed using statistical software (SPSS for Windows, 16.0; SPSS, Inc, Chicago, Ill). Frequencies and percentages were used to summarize categorical data. Chi-square was used to analyze nominal data and most of the demographic data to determine statistically significant difference across the subject's self-report oral health status. Analyses employed frequency distributions and bar graphs. A p -value ≤ 0.05 was considered significant.

RESULTS

A total number of 669 questionnaires were distributed; and 628 of the forms were completed by volunteering students. This accounts for a return rate of (93.8%). According to demographics, 56.7% of the participants were males, and 43.3% were females. The result indicated that 41.4% of respondents were ≤ 20 years old, 38.1% were between 21 to 22 years old and 20.5% were ≥ 23 years old. The number of students according to their number of years in the university is given in Table 1. In terms of smoking status, the majority of volunteers, 56.8%, were non-smokers, and 43.2% were current smokers. Self-reported results showed that almost 35.5% of the students brushed their teeth once a day while 34.4% brushed their teeth 2 to 3 times daily (Table 2). Self-reported results also showed that 27.1% of volunteers have had dental plaque, and 27.9% had calculus, and only 26.9% stated had stains on their teeth. When nonsmokers were asked about their reasons for not smoking, the majority 66.9%, stated that smoking was harmful to health; and 5% expressed concern about smoking expenses.

Hypothesis

Males Smokers would not be more than Female Smokers

Hypothesis 1 was rejected as Chi-square analysis showed a statistically significant relationship between gender and smoking habits ($p < 0.01$). The percentage of female non-

smokers was 85.7% while that of male nonsmokers was 34.8%, (Table 3).

Smokers would Report less Gingival Bleeding during Brushing than Nonsmokers

This hypothesis was rejected. About 54% of smokers reported having gingival bleeding, while (40.2%) of nonsmokers reported having gingival bleeding ($p = 0.05$).

The Number of Smokers with Bad Breath would not be more than that of Nonsmokers

About 58.5% of smokers reported halitosis (Table 4). Analysis revealed a statistically significant relationship between halitosis and smoking ($p < 0.01$). Therefore, hypothesis 3 was rejected.

Smokers would not Report more Stains on their Teeth than Nonsmokers Report

As Chi-square analysis showed a statistically significant relationship between smoking and respondent's concern about appearance ($p < 0.01$). Almost 67% of smokers reported having tooth stains (Table 5). This hypothesis was rejected also as Chi-square analysis showed a statistically significant relationship between smoking status and stains on teeth ($p < 0.01$).

Smokers would not Report less Tooth Brushing Frequency than Nonsmokers

Chi-square analysis revealed a statistically significant relationship between brushing frequency and smoking status ($p < 0.001$). About 76% of respondent were smokers and did not brush their teeth; and 62% of them did not brush their teeth daily (Table 6). Thus, the above hypothesis was rejected.

Chi-square analysis showed a statistically significant relationship between number of years at the university and smoking status ($p = 0.001$). The results showed that smoking incidence among students increased as the students spend more years at the university, (Table 7).

DISCUSSION

All the hypotheses at the present study were rejected. Male smokers were more than female smokers. Smokers reported more gingival bleeding during tooth brushing than nonsmokers, the number of smokers with bad breath was more than that of nonsmokers; and smokers reported more stains on their teeth than nonsmokers.

In the present study, the sample included under or postgraduate students thus the age of the volunteers ranged between 18 and 26 years. Subjects were interviewed and asked if they were willing to participate in the study. The 4

Chart 1: Smoking effects on oral health among university students in Northern Jordan questionnaire

DIRECTIONS: Please answer each question by checking (✓) the answer that BEST reflects your own beliefs and practices. After completing the questionnaire, please return the completed questionnaire to the person who distributed it to you. The questionnaire takes about 10 minutes to complete, and all the information will remain confidential only for research purpose thank you

Section I. Demographics

What is your birthday?

Gender: Male Female

Faculty:.....Year of study: First Second Third Fourth Fifth

Section II. Smoking Habits

1. Are you smoker? No Yes

If you are smoking (what smoke)?

Cigarette how many?.....daily No. of years.....

Argilla how many?.....daily No. of years.....

2. If you are not smoker, why?

Harmful

Have asthma

No body in my family smoke

Other.....

Need money

Not accepted in our community

No body encourage me

3. Main reason that make you to smoke at the 1st time:

For enjoyment

To escape from problems

To feel that I became feel you a man/adult

Advertisement promote for it

Because I like to try new things

To decrease stress and tension

To increase my self-confidence

Smoking not harmful

Because no one of my family smoke

Other, Specify:.....

Section III. Oral Hygiene Habits and Status

4. Frequency of brushing daily?

Don't brush Not daily

Once/day

2-3 daily

5. Do you have plaque on your teeth?

No Yes

Don't know

6. Do you have dental calculus?

No Yes

Don't know

7. Do you have stain on your teeth?

No Yes

Don't know

8. Do you have a periodontal pocket?

No Yes

Don't know

9. Do you have bad breath (halitosis)?

No Yes

Don't know

10. Do you have enlargement in your gum?

No Yes

Don't know

11. Do you have bleeding in your gum?

No Yes

Don't know

12. Do you have dental caries?

No Yes

Don't know

13. Do you have root caries?

No Yes

Don't know

14. What does it mean for you the presence of bleeding in your gum?

Healthy gum

Having periodontal disease

Weakness in gum

I Don't know

15. How do you protect your gum from periodontal disease?

Brush and floss teeth

Eat balanced food

Do not smoke

All of them

Section IV. Knowledge about Smoking effects on Oral Health

16. Cigarette consists of:

Substances decrease the O₂ and nutrient to cells

Dangerous substances cause cancer

Substances cause bad breath

All of them

17. Relationship between smoking and periodontal healing:

Delay gingival healing due to smoke

Increase gingival healing due to smoke

Prevent bleeding

Nothing

18. Increasing the frequency of smoking will cause:

Increase the prevalence of the periodontal disease

Increase the probability of implant failure for smoker

Reduce the prevalence of cancer

1 + 3 only

19. How do you think that smoking affect on person's esthetic dental appearance?

Staining teeth and prosthesis

Causes hairy tongue

Halitosis

All of them

20. If you are smoking, would you like to quit smoking?

No

Yes

I don't know

Thank you

Table 1: Number of students according to the number of university years

	Frequency	Percent (%)	Valid percent	Cumulative percent
1st	107	17.0	17.0	17.0
2nd	141	22.5	22.5	39.5
3rd	165	26.3	26.3	65.8
4th	150	23.9	23.9	89.6
5th	65	10.4	10.4	100
Total	628	100	100	

Table 2: Brushing frequency distribution among the respondents

Variable	Frequency	Valid percent (%)
No brushing	33	5.3
Not daily	137	21.8
Once daily	242	35.5
2-3 times a day	216	34.4
Total	628	100

Table 3: Gender and smoking status among the respondents

Gender (%)	Smoking Status (%)		Chi-square
	No	Yes	
Male	34.8	65.2	p < 0.01
Female	85.7	14.3	
Total	56.8	43.2	

Table 4: Smoking status and its effects on esthetics among the respondents

Smoking effects on esthetics	Smoking status (%)		Chi-square
	No	Yes	
Discoloration	35.8	64.2	p < 0.01
Halitosis	41.5	58.5	
Hairy tongue	42.1	57.9	
Total	56.8	43.2	

Table 5: Tooth stains present and smoking status as reported by the respondents

Tooth stains	Smoking status (%)		Chi-square
	No	Yes	
No	67.3	32.7	p < 0.01
Yes	33.1	66.9	
Don't know	54.1	45.9	
Total	56.8	43.2	

Table 6: Brushing frequency and smoking status as reported by the respondents

Brushing frequency	Smoking status (%)		Chi-square
	No	Yes	
No brushing	24.2	75.8	p < 0.001
Not daily	38.0	62.0	
Once daily	60.3	39.7	
2-3 daily	69.9	30.1	
Total	56.8	43.2	

Table 7: Number of study year at the university and smoking status as reported by the respondents

Year at just	Smoking status (%)		Chi-square
	No	Yes	
1st	66.4	33.6	p = 0.001
2nd	71.6	28.4	
3rd	60.0	40.0	
4th	46.0	54.0	
5th	26.2	73.8	
Total	56.8	43.2	

weeks' time frame of the study dictated the number of subjects.

A total number of 669 questionnaires were distributed and 628 of the forms were completed by the volunteering students. To increase the returned rate of this study; the principals investigators stayed at the site and assistants collected the completed forms; this procedure allowed achieving a good return rate of about 94%.

Volunteers were asked to complete the questionnaire. Multiple choice and numeric open end questions were created. Questionnaires were designed as short as possible. Items of the questionnaire included: demographics, tooth-brushing and smoking habits, and knowledge about smoking and its effects on oral health.

As the assessment of smoking and oral health status in the present study was based on self reports, the validity of the results might be questioned. Participants may exaggerate symptoms in order to make their situation seem worse or may under-report the severity to minimize their problem. The results would have more meaningful if the oral health volunteering subjects were examined; but then the feasibility of the study would be troublesome.

In the present study, 56.7% of participants were males; finding that is similar to those of Khader and Alsadi.⁷ The percentage of smokers in sample was generally higher for males and females than that reported in a previous study,⁷ in which fewer females, 6.5% but more males, 50.2%, were smokers. The majority, 65%, of the participants were non-smokers; a results which was supported by that, 57%.⁷

The current results indicated that 43.2% of participants were smokers which might indicate an awareness of smoking health hazards among university students. This result is higher than that reported by Khader and Alsadi⁷ in which only 35.5% of Yarmouk University students were smokers.

It seems that smoking increases as number the student's years at the university increases; a finding might be attributed to increased stress in university life as the level of university education gets higher. Only 5.3% of the students did not brush their teeth which might suggest that

they appreciate the importance of having good oral hygiene. Moreover, less than 50% of the students had dental plaque, calculus and dental stains. A statistically significant relationship was proven between smoking status and stains on teeth ($p < 0.01$), which may indicate a need to improve oral hygiene in the smokers group.

The percentage of participants who reported that they knew the health hazards of smoking was 66.9%; and this is closely similar to that reported in another study.⁶ It seems that cost is a factor that may reduce the number of smokers among university students as 5% of the respondents in this study expressed concern about the expense associated with smoking. However, Azab, Khabour, Alkaraki, Almuthann, Eissenberg, Alzoubi and Primack⁶ reported that smoking was associated with the upper middle income.

Third year students had the highest percentage, 26.3%, of smokers while the fifth year students had the lowest percent 10.4%. This result was supported by the results of previous reports.⁷ The reported findings showed that males were significantly associated with smoking more than females, $p < 0.01$. This finding was supported by a previous study⁵ which reported that smoking prevalence differed significantly among genders. Smokers tend to accumulate bacterial plaque more than non-smokers, $p < 0.001$. A previous study⁸ supported the current findings and reported higher levels of bacterial plaque.

Additionally, a statistically significant relationship between gingival bleeding and smoking status was revealed, $p = 0.05$. This finding is in contraindication with previous reports which reported less bleeding in smokers. It was claimed that nicotine constricts the blood vessels including those in gingiva; thus less bleeding may be induced. This result was surprising; since this study is self-report assessment, subjects may exaggerate symptoms in order to make their situation seem worse. This could be the main reason for this surprised result.

The volunteers reported that their concern about the smoking potential health hazard was their major reason for not smoking. The results were consistent with those of Kofahi and Haddad,¹³ which demonstrated that smokers were more knowledgeable than current smokers about the health hazards of smoking.

The participants in this study were more concerned about their esthetics and staining on their teeth as the results showed that there was a statistically significant association with age groups and smoking effects on esthetic. The majority of students started smoking due to emotional reasons, and less than half smoked for pleasure. The current results were supported by Khader and Alsadi⁷ who reported that 38.9% of subjects for pleasure, and 30.5% of subjects smoked due to stress. The current study is consistent with

another study which demonstrated that subjects smoked due emotional reasons including stress.

It seems that the number of cigarettes being smoked by smokers is increasing in Jordanian populations. The percentage of subjects who smoked more than 20 cigarettes a day was 35.8% which is more than that, 21.5% reported in a previous study.

As a sample of the present study was chosen specifically in the university, the findings of the present study may not be generalized to larger population.

CONCLUSION

There is a significant difference in oral health status between the smokers and nonsmokers including bleeding on brushing, tooth stains and bad breath. Most of university students who smoke cigarettes were males. Smoking has had a significant association with; esthetics, calculus, tooth stains, halitosis, gingival bleeding, and gender with $p < 0.01$, $p < 0.01$, $p < 0.01$, $p = 0.05$, and $p < 0.01$ respectively.

Several factors may limit the validity of this study. The sample was not randomly selected; therefore, findings may not be generalized to larger population. Moreover, there was no objective clinical examination of the subjects.

Future studies should focus on the prevalence of smoking in various segments of the population and its influence on the oral health status.

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