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Evaluation of The Oral Health Status among Smoker Men Associated with Their Practices in Benghazi City-Cross sectional study

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Abstract: **Background:** Smoking is a major risk factor for systemic and oral diseases, yet many smokers demonstrate poor oral hygiene and irregular dental care evaluate the oral Therefore, the aim of this a study is evaluate oral health status of male smokers in Benghazi and assess associations with their smoking practices. **Methodology:** A cross-sectional study analyzed secondary data from 100 male smokers (response rate 82.5%) attending the Specialized Oral and Dental Education Center. A structured questionnaire collected socio-demographic and behavioral data, while oral health status was assessed using DMFT, OHI-S, and GI indices. Data were analyzed using SPSS version 28, applying Chi-square, ANOVA, and T-tests ($p \leq 0.05$). **Results:** Over half of participants were older than 35 years, 37% had higher education, and 78% reported good socioeconomic status. Most (80%) visited dentists only when in pain, and 34% brushed twice daily. DMFT was significantly higher among older, less educated, and poorer participants ($p < 0.001$). OHI-S and GI were also worse in those with low education and income. Smoking frequency showed a dose–response effect, with heavier smokers exhibiting higher caries and gingival inflammation. Notably, 58% expressed willingness to quit, mainly for medical reasons. **Conclusion and recommendation:** Smoking frequency and poor oral hygiene practices were strongly associated with adverse oral health outcomes. Preventive strategies should focus on oral health education, smoking cessation support, and regular dental check-ups.

Keywords: Smoking, Oral health, DMFT, OHI-S, Gingival Index, Benghazi.

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INTRODUCTION

Tobacco and tobacco-related products are various types, but cigarette smoking is the most popular method of using tobacco. Each cigarette contains 10–14 mg of nicotine, 1–1.5 mg is absorbed into the body when smoked.

There are many major systemic adverse effects of cigarettes smoking consumption include various forms of cancer and cardiovascular diseases. Similarly, there is strong evidence that smoking has numerous negative effects on oral health like staining of teeth and dental restorations, reduction of the ability to smell and taste, development of oral diseases such as smokers' palate, smokers' melanosis and coated tongue, In addition, smoking can be partially related to oral pre-cancer, oral cancer, oral candidosis, periodontal disease, implant failure and dental caries [1-3].

Quit smoking greatly reduces the risk of developing many diseases. Also, good oral health practices and behaviors is an excellental way to minimize the impact of smoking on oral health, many researches found that dentists are good venue for providing cessation intervention for patients who smoke [4]. However, Dentists can see the adverse effects attributable to smoking immediately and easy recognition opportunity, most oral health professionals do not offer smoking cessation advice to their patients [5]. Moreover, Smokers have lower rates of dental care utilization and an annual visit to the dentist compared to non-smokersmake [6].

many studies assessed smokers characteristics on smoking and oral health care like brush their teeth, use dental flossing, regular dental check-ups, failing to quit, prefer to smoke frequently in the morning, use any other tobacco products other than conventional

cigarettes(others: electronic cigarette or water pipe) and if they received any smoking cessation advice [7].

Accordingly, to provide a baseline data for planning and evaluation of oral health promotion programmes, this study was designed and conducted to evaluate the oral health status among smoker men associated with their practices in Benghazi city.

METHODOLOGY

Study design and subject

The data used for this study was secondary data extracted from primary data that was collected through a cross-sectional study of a random sample 130 questions among male patients, the sample participants were chosen from a public dental Centre. Where our goal was the largest places in Benghazi that accommodate the largest number of sample, which is the Specialized Oral and Dental Education Center in Benghazi City. Details of the primary study have been reported by Halima *et al* [8].

The questionnaire that addressed the following topics was included in the first section: socio-demographic information such as age, Level of education and socioeconomic. It also included questions regarding the practices of smokers as oral hygiene and smoking habits.

The universal DMFT, simplified oral hygiene and gingival index was used to perform a diagnosis to assess oral health status.

Statistical analysis

Each questionnaire received an individual identification number to permit checking for any inconsistent responses. All questionnaires were collected and the data was entered on Microsoft office Excel 2021 database and checked for entry errors. The uncompleted questionnaires were excluded.

Data entry was followed by coding, analysis, and tabulation. The results were statistically analyzed using SPSS's statistical software for social science, version 28 (Chicago, IL, USA). Both qualitative and quantitative variables' descriptive statistics were shown as percentages. Chi square and the T-test were used to compare the data. P value of 0.5 or less was considered to be the threshold for significance.

RESULTS

The distribution of males' sociodemographic information is displayed in **Table1**. It shows that a total of 100 questionnaires (out of 130) were received, giving a response rate of 82.5%. However, it found that more than half of 57% of the respondents were more than 35 years old. Regarding educational level, 37% were highly educated, and the majority of them had good income, according to socioeconomic status 78%.

Table-1: Socio demographic data among participations

Variables		Frequency	Percent %
Age Group	less than 35	43	43.0
	more than 35	57	57.0
Educational level	elementary school	27	27.0
	high school	36	36.0
	college educated	37	37.0
Socioeconomic level	Poor	17	17.0
	well off	78	78.0
	Rich	5	5.0

Table (2) shows the males's practices, about 80% of samples were visiting a dentist only when there's pain and 34% brushing their teeth twice a daily. While, about 84% started the smoking during 15-20 years, and used 74% of them used them alone. About 44% drinks coffee with smoking. However, about 58% of them quit smoking due to medical reasons.

Table-2: Oral health practices among smoker's males

Variables		Frequency	Percent %
Number of dental visits per year	1 - 2 once	16	16.0
	2 - 3 once	4	4.0
	only when there's pain	80	**80.0**
Frequency of tooth brushing daily	once a day	33	33.0
	twice a day	34	**34.0**
	none	20	20.0
	once a week	13	13.0
How old were you when you start smoking?	15-20 Y	84	**84.0**
	25-45 Y	15	15.0

	50-60 Y	1	1.0
How do you smoke?	Alon	74	
	with family member	9	9.0
	with friends	17	17.0
Having a habit after smoking	Drinking tea.	32	32.0
	soft drink juice	11	11.0
	drinking coffee	44	**44.0**
	Rince with water	7	7.0
	Nothing	6	6.0
If you quit smoking, what would be the reason?	It's an expensive habit.	7	7.0
	for medical reasons	58	**58.0**
	Medical advice.	8	8.0
	Usage warning.	7	7.0
	Religious reasons	18	18.0
	Other reasons	2	2.0
If you have succeeded in quitting smoking, what methods have you used?	Session in specialized clinic.	8	8.0
	Medication	53	**53.0**
	Alternative treatment	32	32.0
	other	7	7.0

According to frequency of smoking per a day, about 25% of the male used them for 1-3 times daily, while 40% used more than a pack daily (Figure 1).

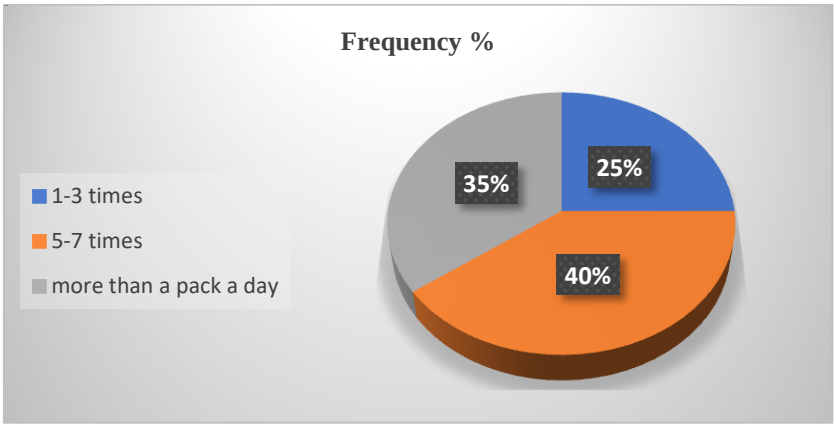

Fig-1: Frequency of smoking daily

However, there were a significant association between caries rate DMFT and Sociodemographic variables. On other hands, oral hygiene status and gingival index had a significant association with socioeconomic status.

Table-3: Relationship between Sociodemographic data and DMFT, OHI-S and GI

	Mean ± SD	**T - test**	**P - value**
Age group DMFT score			
less than 35	4.302 ± 3.51	- 3.648	0.000**
more than 35	8.596 ± 7.08		
PHI_S			
less than 35	1.293 ± 1.16	- 0.373	0.710
more than 35	1.376 ± 1.05		
GI			
less than 35	1.196 ± 1.03	- 0.550	0.584
more than 35	1.307 ± 0.96		
Educational level DMFT score			

elementary school	10.037 ± 6.38	8.195	0.001**
high school	6.972 ± 5.99		
college educated	4.135 ± 5.04		
OHI_S			
elementary school	2.003 ± 0.088	11.485	0.000**
high school	1.402 ± 1.14		
college educated	0.795 ± 0.92		
GI			
elementary school	1.877 ± 0.750	11.758	0.000**
high school	1.294 ± 1.024		
college educated	0.774 ± 0.871		
Socioeconomic level DMFT score			
poor	11.176 ± 4.92	6.792	0.001**
well off	6.064 ± 6.15		
Rich	2.400 ± 1.34		
OHI_S			
Poor	2.458 ± 0.639	15.530	0.000**
well off	1.163 ± 1.04		
Rich	0.300 ± 0.42		
GI			
poor	2.076 ± 0.62	8.834	0.000**
well off	1.124 ± 0.98		
Rich	0.580 ± 0.68		

According to relationship between smoker's practices and caries index, there were a significant associated between frequency of tooth brushing and caries rate as well as among times of smoking (**Table 4)**. However, regarding to oral hygiene status, there were a significant associated between OHI-S and frequency of dental visit, toothbrushing and smoking habit (**Table 5**). Furthermore, there were significant associations among frequency of tooth brushing, age for smoking started and other habits with smoking **(Table 6).**

Table-4: Relationship between Smokers's practices and DMFT

	DMFT score		ANOVA test	
	Mean	**(SD)**	**F value**	**P value**
yearly number of visits to the dentist				
1 - 2 once	4.6250	2.41868	2.122	0.125
2 - 3 once	3.0000	2.44949		
only when there's pain	7.3625	6.67177		
daily tooth brushing frequency				
once a day	5.7879	6.49883	13.919	**0.000****
twice a day	3.7059	2.40617		
none	13.0500	6.94698		
once a week	7.4615	3.82133		
How old were you when you start smoking				
15-20 Y	7.2738	6.55349	2.456	0.091
25-45 Y	3.6000	1.54919		
50-60 Y	10.0000	---		
How do you smoke				
Alon	6.8919	5.86040	0.111	0.895
with family member	5.8889	4.56740		
with friends	6.5882	8.28446		
Having a habit after smoking				
Drinking tea.	8.5625	6.47047	1.831	0.129
soft drink - juice	5.5455	2.76997		
drinking coffee	6.7273	6.95288		
Rince with water	3.0000	2.08167		
Nothing	3.8333	2.48328		

How many times do you smoke a day				
1-3 Aday	3.2353	1.67815	5.545	**0.006****
5-7 Aday	6.2955	5.81329		
more than a pack a day	8.7949	7.07174		
If you quit smoking, what would be the reason?				
It's an expensive habit.	2.5714	3.73529	1.227	0.303
for medical reasons	7.7414	6.00164		
medical advice.	5.1250	4.94072		
Usage warning.	4.8571	3.38765		
Religious reasons	6.8333	8.27647		
Other reasons	5.0000	2.82843		
If you have succeeded in quitting smoking, what methods have you used?				
Session in specialized clinic.	3.2500	3.01188	1.879	0.138
Medication	7.9623	6.23255		
Alternative treatment	5.8438	6.71594		
other	5.7143	3.86067		

Table-5: Relationship between Smokers's practices and OHI-S

practice variable		**OHI_S**			
		Good	**Fair**	**Poor**	**P- value**
yearly number of visits to the dentist	1 - 2 once	13	3	0	0.046**
		81.3%	18.8%	0.0%	
	2 - 3 once	4	0	0	
		100.0%	0.0%	0.0%	
	only when there's pain	38	38	4	
		47.5%	47.5%	5.0%	
daily tooth brushing frequency	once a day	27	6	0	0.000**
		81.8%	18.2%	0.0%	
	twice a day	24	10	0	
		70.6%	29.4%	0.0%	
	none	0	18	2	
		0.0%	90.0%	10.0%	
	once a week	4	7	2	
		30.8%	53.8%	15.4%	
How old were you when you start smoking	15-20 Y	43	37	4	0.460
		51.2%	44.0%	4.8%	
	25-45	11	4	0	
		73.3%	26.7%	0.0%	
	50-60	1	0	0	
		100.0%	0.0%	0.0%	
How do you smoke	Alon	39	32	3	0.818
		52.7%	43.2%	4.1%	
	with family member	5	4	0	
		55.6%	44.4%	0.0%	
	with friends	11	5	1	
		64.7%	29.4%	5.9%	
Having a habit after smoking	drinking tea.	11	19	2	0.079
		34.4%	59.4%	6.3%	
	soft drink juice	5	5	1	
		45.5%	45.5%	9.1%	
	drinking coffee	28	15	1	
		63.6%	34.1%	2.3%	
	Rince with water	7	0	0	
		100.0%	0.0%	0.0%	
	Nothing	4	2	0	

		66.7%	33.3%	0.0%	
How many times do you smoke a day	1-3 Aday	14	3	0	0.041**
		82.4%	17.6%	0.0%	
	5-7 Aday	26	16	2	
		59.1%	36.4%	4.5%	
	more than a pack a day	15	22	2	
		38.5%	56.4%	5.1%	
	30-60 min	22	9	0	
		71.0%	29.0%	0.0%	
If you quit smoking, what would be the reason?	It's an expensive habit.	5	2	0	0.954
		71.4%	28.6%	0.0%	
	for medical reasons	30	24	4	
		51.7%	41.4%	6.9%	
	Medical advice.	5	3	0	
		62.5%	37.5%	0.0%	
	Usage warning.	4	3	0	
		57.1%	42.9%	0.0%	
	Religious reasons	10	8	0	
		55.6%	44.4%	0.0%	
	Other reasons	1	1	0	
		50.0%	50.0%	0.0%	
If you have succeeded in quitting smoking, what methods have you used?	Session in specialized clinic.	4	4	0	0.523
		50.0%	50.0%	0.0%	
	Medication	26	23	4	
		49.1%	43.4%	7.5%	
	Alternative treatment	21	11	0	
		65.6%	34.4%	0.0%	
	other	4	3	0	
		57.1%	42.9%	0.0%	

Table-6: Relationship between Smokers's practices and GI

practice variable		**GI**			
		Mild inflammation	Moderate inflammation	Severe inflammation	**P- value**
yearly number of visits to the dentist	1 - 2 once	10	5	1	0.131
		62.5%	31.3%	6.3%	
	2 - 3 once	4	0	0	
		100.0%	0.0%	0.0%	
	only when there's pain	39	19	22	
		48.8%	23.8%	27.5%	
daily tooth brushing frequency	once a day	26	7	0	0.000**
		78.8%	21.2%	0.0%	
	twice a day	24	6	4	
		70.6%	17.6%	11.8%	
	none	0	5	15	
		0.0%	25.0%	75.0%	
	once a week	3	6	4	
		23.1%	46.2%	30.8%	
How old were you when you start smoking	15-20 Y	41	23	20	0.048**
		48.8%	27.4%	23.8%	
	25-45	12	0	3	
		80.0%	0.0%	20.0%	
	50-60	0	1	0	
		0.0%	100.0%	0.0%	
How do you smoke	Alon	36	19	19	0.253
		48.6%	25.7%	25.7%	
	with family	4	2	3	

	member	44.4%	22.2%	33.3%	
	with friends	13	3	1	
		76.5%	17.6%	5.9%	
Having a habit after smoking	drinking tea.	11	7	14	0.006**
		34.4%	21.9%	43.8%	
	soft drink juice	4	4	3	
		36.4%	36.4%	27.3%	
	drinking coffee	28	10	6	
		63.6%	22.7%	13.6%	
	Rince with water	7	0	0	
		100.0%	0.0%	0.0%	
	Nothing	3	3	0	
		50.0%	50.0%	0.0%	
How many times do you smoke a day	1-3 Aday	14	3	0	0.041**
		82.4%	17.6%	0.0%	
	5-7 Aday	24	11	9	
		54.5%	25.0%	20.5%	
	more than a pack a day	15	10	14	
		38.5%	25.6%	35.9%	
If you quit smoking, what would be the reason?	It's an expensive habit.	5	0	2	0.710
		71.4%	0.0%	28.6%	
	for medical reasons	28	17	13	
		48.3%	29.3%	22.4%	
	medical advice.	5	2	1	
		62.5%	25.0%	12.5%	
	Usage warning.	5	0	2	
		71.4%	0.0%	28.6%	
	Religious reasons	9	4	5	
		50.0%	22.2%	27.8%	
	Other reasons	1	1	0	
		50.0%	50.0%	0.0%	
If you have succeeded in quitting smoking, what methods have you used?	session in specialized clinic.	3	4	1	0.225
		37.5%	50.0%	12.5%	
	Medication	24	15	14	
		45.3%	28.3%	26.4%	
	Alternative treatment	22	4	6	
		68.8%	12.5%	18.8%	
	other	4	1	2	
		57.1%	14.3%	28.6%	

DISCUSSION

This study evaluated the oral health status and practices among male smokers in Benghazi city, providing valuable baseline data to guide preventive and educational strategies. The overall response rate was 82.5%, which strengthens the reliability of the findings, given that most of the distributed questionnaires were completed and returned.

However, the results revealed that smokers above 35 years of age, those with lower education, and those from poorer socioeconomic backgrounds had significantly higher DMFT scores compared to their counterparts. These findings are in agreement with Jiang *et al.* [2] who confirmed a positive correlation between smoking and dental caries in their systematic review. This rate may be explained by both biological and behavioral mechanisms leading to raise the caries process. As well as, the smoking reduces salivary flow and buffering capacity, promotes bacterial adhesion and interferes with remineralization processes. At the same time, individuals with limited education and income often exhibit weaker oral health awareness and reduced access to preventive care.

According to he oral hygiene index (OHI-S) and gingival index (GI) showed significant associations with education and socioeconomic status. Participants with only elementary education or poor income had the worst oral hygiene and highest levels of gingival inflammation. These findings mirror those of Beklen *et al.*, who found that smokers with inadequate oral hygiene practices experienced higher periodontal disease prevalence [9]. Interestingly, while some

participants reported brushing twice daily, their oral hygiene and gingival scores still indicated disease. This highlights a brushing paradox, suggesting that the harmful biological effects of smoking—such as nicotine-induced vasoconstriction, suppressed immune function, and delayed tissue repair—can override the benefits of mechanical plaque control. Thus, good oral hygiene alone may not fully protect smokers against gingival and periodontal disease.

On other hands, about 80% of participants reported visiting the dentist only when experiencing pain. Preventive visits were rare, despite the visible impact of smoking on oral health. This behavior is consistent with Blasi *et al*., who demonstrated that smokers are less likely to engage in preventive dental care and often delay treatment until problems become severe. Such care-seeking patterns not only increase treatment costs but also lead to avoidable tooth loss and disease progression [10].

This also highlights a missed opportunity for oral health professionals to engage in smoking cessation counseling. Carr and Ebbert [11] emphasized that dentists are ideally positioned to provide cessation interventions because of their frequent contact with smokers and the visibility of smoking-related oral damage. However, as shown in our study and supported by Chan, Chan, and Tsang [12]. In additions, individuals should be encouraged for self-oral examination and regularly visit the dental clinics. This would play an important role in smoking cessation and early recognition of the cancer and better prognosis would be expected [13].

Moreover, most smokers (84%) initiated smoking between ages 15–20, underscoring the vulnerability of adolescents and young adults. This finding is consistent with regional observations that adolescence is a critical window for tobacco initiation and prevention [14]. Preventing initiation at this age could substantially reduce future oral disease burden. Furthermore, smoking frequency showed a strong dose–response effect: those smoking more than one pack per day recorded significantly higher DMFT, poorer oral hygiene, and more severe gingival inflammation compared to lighter smokers. These findings align with results from previous studies showing that heavy smokers experience higher caries experience and periodontal destruction [15-17].

A positive observation was that 58% of participants expressed willingness to quit smoking for medical reasons, with medication being the most common cessation method. This aligns with national data indicating that health concerns are the leading motivation for quitting among Libyan smokers [18]. Such readiness suggests that if properly supported, dental students and professionals could play a pivotal role in motivating and guiding cessation efforts during routine visits [19]. With proper training, dentists in Benghazi could provide brief, effective interventions that capitalize on the visible oral consequences of smoking, turning clinical encounters into opportunities for meaningful behavior change.

CONCLUSION AND RECOMMENDATIONS

This study revealed significant associations between smoking practices and oral health outcomes. Caries rate (DMFT) was linked to sociodemographic variables, while oral hygiene status (OHI-S) and gingival index (GI) were related to socioeconomic status. Moreover, smoking frequency, age of initiation, and toothbrushing habits showed strong associations with caries and oral hygiene. Therefore, strongly recommended that, promote oral health education on smoking risks, encourage regular toothbrushing and dental visits, implement early prevention programs against smoking initiation, and integrate socioeconomic factors into oral health strategies.

Limitations and Future Directions

The cross-sectional design of this study limits the ability to establish causality between smoking and oral health outcomes. As well as, further research with larger sample sizes is encouraged to explore causal relationships and long-term effects of smoking on oral health in Libyan populations.

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