

Research Article

Mouthwash Use and Associated Factors among Saudi Adults: A Cross-sectional Study

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Abstract

The purpose of this study was to determine the state of mouthwash use, practice, and attitude among a cohort of adult Saudi population. A convenience sample of 999 outpatients was asked to participate in a self-administered survey on the mouthwash use, effects, attitude, and practice. While 38% of the participants reported that they never used a mouthwash, 14.4%, 28.7%, and 18.8% used a mouthwash either daily, once every few days, or less than once a month, respectively. More than half of the respondents (55.4%) trusted that the use of mouthwash does not cause any side effects and 70.5% indicated that they do not know whether using mouthwash would be considered a risk factor for oral cancer. Similarly, more than half of the respondents (50.4%) were not aware of the active ingredients in a mouthwash. 69% indicated that the use of mouthwash does not compromise the importance of tooth brushing in plaque removal. There was significant difference in the practice and frequency of mouthwash use with regards to the social status, educational level, tooth brushing and flossing frequency, presence of caries, periodontal disease, and fixed restoration among respondents ($p \leq 0.05$). There were diverse patterns of knowledge and understanding regarding the proper and safe use of mouthwash among the studied sample.

Keywords: Mouthwash, Oral hygiene, Side effects, Oral health

Introduction

Mouthwashes are medicated solutions used as a supplement oral hygiene measure. Several oral conditions may require the use of a mouthwash ranging from halitosis, gingivitis and other periodontal diseases to treatment of ulcerative and infectious lesions and oral mucositis. Its ease of use in addition to the antibacterial effectiveness made mouthwashes a valuable preventive and therapeutic practice especially for periodontal diseases. A mouthwash may be recommended as an antimicrobial, anti-inflammatory, analgesic, deodorant, or astringent agent [1-3].

Oral Diseases, specifically caries and periodontitis, are a major public health concern owing to their high prevalence, incidence, and their effects on the individual's quality of life. The severe impact in terms of pain and suffering, impairment of function together with the high cost of treatment makes them also one of the leading health problems in most parts of the world, including Kingdom of Saudi Arabia (KSA). In 2012 the World Health Organization (WHO) estimated that, worldwide, 60-90% of school children and almost 100% adults would have dental problems [4-6].

The oral cavity harbors hundreds of microbial species that occur in both planktonic and biofilm forms. Poor oral hygiene leads to accumulation of oral bacteria and thus reducing the microbial load is considered the first step toward achieving good oral hygiene. This

is usually achieved primarily through the use mechanical aids such as brushing and flossing. Studies have confirmed that the use of adjunct chemical measures such as mouthwashes has positive synergetic effect in improving the oral hygiene [7,8]. The aim of the current cross-sectional study was to investigate the state of mouthwash use, practice, and attitude among a cohort of adult Saudi population.

Materials and Methods

The present cross-sectional study was carried out in the outpatient department of King Khaled University Hospital and the Dental Hospital, King Saud University in Riyadh, KSA. A convenience sample of 999 outpatients were asked to participate in the study. A self-administered structured questionnaire was distributed to the patients to evaluate the mouthwash use, effects, attitude, and practice. The inclusion criteria were adult patients above 18 years of age with no gender predilection and able to provide responses in the questionnaire form. The questionnaire was designed by the authors and was hand delivered to the respondents. Participation was voluntary and anonymous. The questionnaire included questions about the personal and demographic data as well as questions about the use of mouthwash, general oral health and oral hygiene practice. The study was reviewed and approved by the Research Ethics Review Committee (Research project no E-17-2744). The questionnaire was pre-tested on a representative sample of 35 subjects to check for appropriateness and any required modifications. The first

seven questions determined subjects' demographic profile and included information on the gender, nationality, age, marital status, education, monthly income, and smoking status. The rest of the questions focused on type of dental care, oral hygiene practice, oral health conditions, and the use of mouthwashes.

All data were statistically analyzed using SPSS (Statistical Package for Social Science, IBM SPSS 21.0; Chicago, IL, USA). The data were subjected to a descriptive analysis and statistically represented in terms of numbers, percentages, and 95% confidence interval. Association between the parameters was done using crosstab chi-square test. Differences were considered statistically significant when the p-values were ≤ 0.05 .

Results

The total number of adult subjects participating in the survey was 999 (394 males, 605 females, age range 18-65 years). Almost 75% of the respondents were college educated or higher with half of them

(50.1%) reporting a private educational institute. The sample almost composed of Saudi citizens (94.4%). Demographic characteristics of the participants are shown in Table 1.

Table 2 summarizes the oral hygiene practice and attitude among the study sample. Out of the 999 respondents, 68% had visited their dentist for regular dental care in less than a year. The reason for the visit was an emergency treatment in 38.5% of the cases while 25% and 15.8% were either for non-urgent treatment or dental checkup. Approximately 56% reported brushing their teeth twice or more a day while 33%, 11% either brushed once a day or less than daily, respectively. Similarly, 16.4% reported flossing daily while 27%, 16%, 40.5% flossed either once every few days, less than once a month, or never flossed, respectively.

Table 3 presents the general and oral health of the respondents. Almost half of the sample indicated good general and oral health, more than 70% being dentulous with more than 20 teeth. Caries was reported in 36%, periodontal diseases in 20.7%, oral ulcers in 4.8%, staining in 8.7%, halitosis in 21%, and infections or abscesses in 5.6% of the sample. About half of the respondents (49%) reported having a restoration or prosthetic appliances either removable, fixed, or implants.

Table 4 presents the responses regarding mouthwash use, knowledge, and practice. While 38% of the participants reported that they never used a mouthwash, 14.4%, 28.7%, and 18.8% used a mouthwash either daily, once every few days, or less than once a month respectively. More than half of the respondents (55.4%) trusted that the use of mouthwash does not cause any side effects and 70.5% indicated that they do not know whether using mouthwash would be considered a risk factor for oral cancer. Similarly, more than half

Table 1: Demographic characteristics of the study sample (n=999).

Characteristics	n	%
<i>Gender</i>		
Male	394	(39.40)
Female	605	(60.60)
<i>Nationality</i>		
Saudi	943	(94.40)
Non-Saudi	56	(5.60)
<i>Age</i>		
18-25 yrs	324	(32.40)
26-35 yrs	386	(38.60)
36-45 yrs	184	(18.40)
46-55 yrs	92	(9.20)
56-65 yrs	13	(1.30)
<i>Social Status</i>		
Single	404	(40.40)
Married	561	(56.20)
Divorced	24	(2.40)
Widow	10	(1.00)
<i>Educational Level</i>		
Uneducated	2	(0.20)
Less than high school	49	(4.90)
High school	201	(20.10)
College	619	(62.00)
Post graduate studies	128	(12.80)
<i>Public/Private</i>		
Public	499	(49.90)
Private	500	(50.10)
<i>Monthly Family Income</i>		
Less than 5000 SAR	86	(8.60)
5000-10000	269	(26.90)
10000-20000	344	(34.40)
More than 20000	300	(30.00)
<i>Smoking Status</i>		
Currently Smoking	158	(15.80)
Previous Smoker (stopped within the last 12 months)	26	(2.60)
Previous Smoker (stopped over 12 months ago)	34	(3.40)
Never Smoked	781	(78.20)

Table 2: Oral health practice and attitude among the study sample.

Type of regular dental care	n	%
Governmental Practice	160	(16.00)
Private Practice	585	(58.60)
None	254	(25.40)
<i>Time since last dental check-up</i>		
Less than a year	679	(68.00)
1-2 years	198	(19.80)
2-5 years	70	(7.00)
5-10 years	29	(2.90)
Have not visited a dentist for over 10 years	23	(2.30)
<i>Reasons for last dental visit</i>		
Emergency treatment needed for teeth or gums	385	(38.50)
Non-urgent treatment for teeth or gums	251	(25.10)
Dental Check-up	158	(15.80)
Can't remember	61	(6.10)
Other	144	(14.40)
<i>Tooth brushing frequency</i>		
Twice or more a day	558	(55.90)
Once a day	329	(32.90)
Less than daily	108	(10.80)
Never	4	(0.40)
<i>Flossing Frequency</i>		
Daily	164	(16.40)
Once every few days	271	(27.10)
Less than once a month	159	(15.90)
Never	405	(40.50)

Table 3: General and oral health characteristics of the study sample.

General Health		n	%
	Excellent	421	(42.10)
	Good	481	(48.10)
	Fair	82	(8.20)
	Poor	15	(1.50)
Dental Health			
	Excellent	224	(22.40)
	Good	527	(52.80)
	Fair	196	(19.60)
	Poor	52	(5.20)
Current number of natural teeth			
	Fewer than 10	44	(4.40)
	Between 10 and 19	255	(25.50)
	20 or more	700	(70.10)
Do you currently suffer of any of these conditions?			
Caries			
	Yes	361	(36.10)
	No	525	(52.60)
	Do not know	113	(11.30)
Periodontal Disease			
	Yes	207	(20.70)
	No	681	(68.20)
	Do not know	111	(11.10)
Oral Ulcer			
	Yes	48	(4.80)
	No	846	(84.70)
	Do not know	105	(10.50)
Stains			
	Yes	87	(8.70)
	No	815	(81.60)
	Do not know	97	(9.70)
Halitosis			
	Yes	210	(21.00)
	No	677	(67.80)
	Do not know	112	(11.20)
Infections (Abscess)			
	Yes	56	(5.60)
	No	857	(85.80)
	Do not know	86	(8.60)
Do you currently have any of the following?			
Bridges			
	Yes	269	(26.90)
	No	670	(67.10)
	Do not know	60	(6.00)
Implants			
	Yes	149	(14.90)
	No	783	(78.40)
	Do not know	67	(6.70)
Dentures			
	Yes	77	(7.70)
	No	848	(84.90)
	Do not know	74	(7.40)

Table 4: Mouthwash use and practice among the study sample.

How often do you rinse with a mouthwash		n	%
	Daily	144	(14.40)
	Once every few days	287	(28.70)
	Less than once a month	188	(18.80)
	Never	380	(38.00)
Does the use of mouthwashes have any side effects			
	Yes	106	(10.60)
	No	553	(55.40)
	Do not know	340	(34.00)
Is the use of mouthwashes a risk factor for oral cancer			
	Yes	24	(2.40)
	No	271	(27.10)
	Do not know	704	(70.50)
Are you aware of the different active ingredients found in the mouthwashes			
	Yes	121	(12.10)
	No	375	(37.50)
	Do not know	503	(50.40)
Does the use of mouthwashes reduce the importance of tooth brushing in plaque removal			
	Yes	67	(6.70)
	No	690	(69.10)
	Do not know	242	(24.20)

mouthwash use with regards to the social status, educational level, the reason for last dental visit, tooth brushing and flossing frequency, caries, periodontal disease, and the presence of fixed restoration among respondents (Tables 5 and 6).

Discussion

Changing food habits along with the fast-paced modern lifestyle resulted in sharp rise of cavities and dental problems extensively. To combat these problems, adoption of oral hygiene practices that are easy to use and effective such as the use of mouthwashes seem to be a practical solution especially when mechanical aids are not sufficient to maintain optimum oral health. Studies have suggested that in combination with brushing, using an antimicrobial mouthwash could be more effective than flossing when it comes to preventing gingivitis. Some clinicians suggest that this is particularly important since at any given time, more than 50% of the public has gingivitis, and many with gingivitis may not even know they have it. Antimicrobial mouthwash help eliminate plaque-causing bacteria that brushing and flossing miss [9-12].

Generally, mouthwashes are classified into preventive, cosmetic, and therapeutic. Chemotherapeutic mouthwashes usually contain active ingredients that reduce inflammation. They also function as remineralizing agents, antimicrobial, astringent, analgesic, buffering, deodorizing to neutralize odor, or oxygenating cleansing action. Cosmetic mouthwashes can be used as fresheners or to reduce staining when it is superficial in unattached biofilm [13,14].

The results of the current study indicated that, among the studied sample, mouthwash use was significantly associated with the frequency

of the respondents (50.4%) were not aware of the active ingredients in a mouthwash. 69% indicated that the use of mouthwash does not compromise the importance of tooth brushing in plaque removal.

There was significant difference in the practice and frequency of

Table 5: Association of mouthwash use and practice with the demographics, socioeconomic and educational status, and smoking among the studied sample.

Characteristics	Total	Responses								P-value	
		Daily		Once every few days		Less than once a month		Never			
		Count (%)	95% CI	Count (%)	95% CI	Count (%)	95% CI	Count (%)	95% CI		
Sex											0.083
Male	394	49 (12.40)	(9.54-16.07)	102 (25.90)	(21.81-30.43)	84 (21.30)	(17.56-25.63)	159 (40.40)	(35.63-45.27)		
Female	605	95 (15.70)	(13.02-18.81)	185 (30.60)	(27.04-34.36)	104 (17.20)	(14.39-20.40)	221 (36.50)	(32.79-40.44)		
Age										0.415	
18-25 yrs	324	48 (14.80)	(11.36-19.09)	98 (30.20)	(25.50-35.46)	55 (17.00)	(13.28-21.45)	123 (38.00)	(32.85-43.36)		
26-35 yrs	386	57 (14.80)	(11.58-18.66)	116 (30.10)	(25.69-34.80)	79 (20.50)	(16.75-24.78)	134 (34.70)	(30.14-39.60)		
36-45 yrs	184	28 (15.20)	(10.75-21.12)	45 (24.50)	(18.81-31.15)	32 (17.40)	(12.60-23.52)	79 (42.90)	(35.99-50.15)		
46-55 yrs	92	11 (12.00)	(6.81-20.16)	26 (28.30)	(20.07-38.19)	17 (18.50)	(11.87-27.62)	38 (41.30)	(31.79-51.51)		
56-65 yrs	11	0 (0.00)	(0.00-25.88)	2 (18.20)	(5.14-47.70)	5 (45.50)	(21.27-71.99)	4 (36.40)	(15.16-64.62)		
> 65 yrs	2	0 (0.00)	(0.00-65.76)	0 (0.00)	(0.00-65.76)	0 (0.00)	(0.00-65.76)	2 (100.00)	(34.24-100.0)		
Social Status											0.012
Single	404	60 (14.90)	(11.71-18.65)	125 (30.90)	(26.63-35.61)	67 (16.60)	(13.27-20.52)	152 (37.60)	(33.03-42.44)		
Married	561	73 (13.00)	(10.48-16.05)	150 (26.70)	(23.24-30.55)	117 (20.90)	(17.70-24.41)	221 (39.40)	(35.43-43.49)		
Divorced	24	7 (29.20)	(14.92-49.17)	11 (45.80)	(27.89-64.92)	2 (8.30)	(2.31-25.84)	4 (16.70)	(6.68-35.86)		
Widow	10	4 (40.00)	(16.82-68.73)	1 (10.00)	(1.79-40.41)	2 (20.00)	(5.67-50.98)	3 (30.00)	(10.78-60.32)		
Educational Level											0.023
Uneducated	2	0 (0.00)	(0.00-65.76)	1 (50.00)	(9.45-90.55)	0 (0.00)	(0.00-65.76)	1 (50.00)	(9.45-90.55)		
Less than high school	49	9 (18.40)	(9.98-31.36)	10 (20.40)	(11.48-33.64)	7 (14.30)	(7.10-26.67)	23 (46.90)	(33.70-60.62)		
High school	201	35 (17.40)	(12.79-23.25)	43 (21.40)	(16.29-27.57)	32 (15.90)	(11.51-21.61)	91 (45.30)	(38.54-52.18)		
College	619	88 (14.20)	(11.69-17.19)	190 (30.70)	(27.19-34.43)	115 (18.60)	(15.71-21.83)	226 (36.50)	(32.81-40.38)		
Post graduate studies	128	12 (9.40)	(5.45-15.68)	43 (33.60)	(25.99-42.14)	34 (26.60)	(19.67-34.81)	39 (30.50)	(23.16-38.92)		
Monthly Family Income											0.879
Less than 5000 SAR	86	16 (18.60)	(11.79-28.10)	20 (23.30)	(15.59-33.21)	16 (18.60)	(11.79-28.10)	34 (39.50)	(29.86-50.10)		
5000-10000	269	37 (13.80)	(10.14-18.38)	76 (28.30)	(23.21-33.91)	49 (18.20)	(14.07-23.27)	107 (39.80)	(34.11-45.73)		
10000-20000	344	43 (12.50)	(9.41-16.41)	103 (29.90)	(25.34-34.98)	66 (19.20)	(15.38-23.68)	132 (38.40)	(33.39-43.61)		
More than 20000	300	48 (16.00)	(12.29-20.57)	88 (29.30)	(24.47-34.72)	57 (19.00)	(14.96-23.82)	107 (35.70)	(30.46-41.24)		
Smoking Status											0.770
Currently Smoking	158	26 (16.50)	(11.49-23.02)	47 (29.70)	(23.17-37.29)	24 (15.20)	(10.43-21.61)	61 (38.60)	(31.37-46.39)		
Previous Smoker (stopped within the last 12 months)	26	4 (15.40)	(6.15-33.53)	5 (19.20)	(8.51-37.88)	8 (30.80)	(16.50-49.99)	9 (34.60)	(19.42-53.78)		
Previous Smoker (stopped over 12 months ago)	34	3 (8.80)	(3.04-22.96)	10 (29.40)	(16.83-46.17)	8 (23.50)	(12.44-40.00)	13 (38.20)	(23.90-54.96)		
Never Smoked	781	111 (14.20)	(11.94-16.83)	225 (28.80)	(25.74-32.08)	148 (19.00)	(16.36-21.85)	297 (38.00)	(34.69-41.49)		

Table 6: Association of mouthwash use and practice with the oral health and oral hygiene practices among the studied sample.

Characteristics	Total	Responses								P-value
		Daily		Once every few days		Less than once a month		Never		
		Count (%)	95% CI	Count (%)	95% CI	Count (%)	95% CI	Count (%)	95% CI	
Reasons for last dental visit										0.025
Emergency treatment needed for teeth or gums	385	49 (12.70)	(9.76-16.43)	111 (28.80)	(24.53-33.55)	76 (19.70)	(16.07-24.01)	149 (38.70)	(33.97-43.65)	
Non-urgent treatment for teeth or gums	251	38 (15.10)	(11.23-20.10)	81 (32.30)	(26.79-38.28)	44 (17.50)	(13.33-22.71)	88 (35.10)	(29.42-41.15)	
Dental Check-up	158	23 (14.60)	(9.90-20.90)	46 (29.10)	(22.59-36.62)	31 (19.60)	(14.18-26.50)	58 (36.70)	(29.59-44.46)	
Can't remember	61	11 (18.00)	(10.38-29.47)	9 (14.80)	(7.96-25.72)	4 (6.60)	(2.58-15.69)	37 (60.70)	(48.12-71.94)	
Other	144	23 (16.00)	(10.88-22.83)	40 (27.80)	(21.11-35.60)	33 (22.90)	(16.81-30.44)	48 (33.30)	(26.15-41.37)	
Flossing Frequency										0.001
Daily	164	50 (30.50)	(23.96-37.92)	52 (31.70)	(25.08-39.18)	16 (9.80)	(6.10-15.26)	46 (28.00)	(21.74-35.37)	
Once every few days	271	81 (29.90)	(24.75-35.59)	100 (36.90)	(31.38-42.79)	47 (17.30)	(13.30-22.30)	43 (15.90)	(12.00-20.69)	
Less than once a month	159	59 (37.10)	(29.99-44.84)	42 (26.40)	(20.18-33.77)	42 (26.40)	(20.18-33.77)	16 (10.10)	(6.29-15.72)	
Never	405	190 (46.90)	(42.10-51.78)	93 (23.00)	(19.13-27.30)	83 (20.50)	(16.84-24.69)	39 (9.60)	(7.12-12.89)	
Tooth brushing frequency										0.001
Twice or more a day	558	167 (29.90)	(26.28-33.86)	174 (31.20)	(27.48-35.14)	103 (18.50)	(15.46-21.89)	114 (20.40)	(17.29-23.97)	
Once a day	329	154 (46.80)	(41.49-52.21)	93 (28.30)	(23.68-33.37)	58 (17.60)	(13.89-22.11)	24 (7.30)	(4.95-10.62)	
Less than daily	108	57 (52.80)	(43.43-61.94)	18 (16.70)	(10.81-24.82)	27 (25.00)	(17.79-33.93)	6 (5.60)	(2.57-11.60)	
Never	4	2 (50.00)	(15.00-85.00)	2 (50.00)	(15.00-85.00)	0 (0.00)	(0.00-48.99)	0 (0.00)	(0.00-48.99)	
Caries										0.001
Yes	361	147 (40.70)	(35.78-45.86)	93 (25.80)	(21.52-30.51)	68 (18.80)	(15.14-23.19)	53 (14.70)	(11.40-18.70)	
No	525	176 (33.50)	(29.61-37.66)	169 (32.20)	(28.34-36.30)	95 (18.10)	(15.04-21.62)	85 (16.20)	(13.29-19.58)	
Do not know	113	57 (50.40)	(41.36-59.49)	25 (22.10)	(15.46-30.62)	25 (22.10)	(15.46-30.62)	6 (5.30)	(2.46-11.10)	
Periodontal Disease										0.001
Yes	207	58 (28.00)	(22.35-34.50)	73 (35.30)	(29.08-41.99)	37 (17.90)	(13.25-23.66)	39 (18.80)	(14.10-24.72)	
No	681	272 (39.90)	(36.33-43.67)	196 (28.80)	(25.51-32.29)	117 (17.20)	(14.53-20.20)	96 (14.10)	(11.69-16.92)	
Do not know	111	50 (45.00)	(36.11-54.32)	18 (16.20)	(10.51-24.19)	34 (30.60)	(22.82-39.73)	9 (8.10)	(4.33-14.70)	
Oral Ulcer										0.336
Yes	48	8 (16.70)	(8.70-29.58)	13 (27.10)	(16.56-40.99)	5 (10.40)	(4.53-22.17)	22 (45.80)	(32.57-59.71)	
No	846	121 (14.30)	(12.10-16.82)	252 (29.80)	(26.81-32.96)	159 (18.80)	(16.30-21.56)	314 (37.10)	(33.93-40.43)	
Do not know	105	15 (14.30)	(8.86-22.24)	22 (21.00)	(14.26-29.69)	24 (22.90)	(15.87-31.76)	44 (41.90)	(32.91-51.46)	

Stains											0.709
	Yes	87	13 (14.90)	(8.94-23.90)	26 (29.90)	(21.29-40.19)	14 (16.10)	(9.83-25.21)	34 (39.10)	(29.50-49.59)	
	No	815	118 (14.50)	(12.23-17.06)	239 (29.30)	(26.31-32.55)	150 (18.40)	(15.89-21.21)	308 (37.80)	(34.53-41.17)	
	Do not know	97	13 (13.40)	(8.00-21.59)	22 (22.70)	(15.48-31.96)	24 (24.70)	(17.23-34.18)	38 (39.20)	(30.06-49.13)	
Smell											0.188
	Yes	210	34 (16.20)	(11.82-21.77)	54 (25.70)	(20.27-32.02)	44 (21.00)	(15.99-26.95)	78 (37.10)	(30.89-43.85)	
	No	677	100 (14.80)	(12.30-17.64)	205 (30.30)	(26.94-33.84)	116 (17.10)	(14.48-20.15)	256 (37.80)	(34.24-41.52)	
	Do not know	112	10 (8.90)	(4.92-15.66)	28 (25.00)	(17.90-33.76)	28 (25.00)	(17.90-33.76)	46 (41.10)	(32.40-50.33)	
Infections (Abscess)											0.448
	Yes	56	8 (14.30)	(7.42-25.74)	20 (35.70)	(24.45-48.80)	8 (14.30)	(7.42-25.74)	20 (35.70)	(24.45-48.80)	
	No	857	126 (14.70)	(12.49-17.23)	249 (29.10)	(26.11-32.18)	161 (18.80)	(16.32-21.54)	321 (37.50)	(34.28-40.75)	
	Do not know	86	10 (11.60)	(6.44-20.10)	18 (20.90)	(13.67-30.68)	19 (22.10)	(14.62-31.94)	39 (45.30)	(35.25-55.84)	
Others											0.495
	Yes	112	17 (15.20)	(9.70-22.97)	33 (29.50)	(21.81-38.47)	20 (17.90)	(11.87-25.98)	42 (37.50)	(29.09-46.74)	
	No	733	109 (14.90)	(12.48-17.63)	216 (29.50)	(26.28-32.87)	141 (19.20)	(16.55-22.25)	267 (36.40)	(33.03-39.98)	
	Do not know	154	18 (11.70)	(7.52-17.72)	38 (24.70)	(18.54-32.05)	27 (17.50)	(12.34-24.30)	71 (46.10)	(38.42-53.97)	
Bridges											0.037
	Yes	269	96 (35.70)	(30.20-41.58)	73 (27.10)	(22.18-32.75)	55 (20.40)	(16.06-25.67)	45 (16.70)	(12.74-21.65)	
	No	670	257 (38.40)	(34.75-42.10)	207 (30.90)	(27.52-34.50)	117 (17.50)	(14.77-20.52)	89 (13.30)	(10.92-16.06)	
	Do not know	60	27 (45.00)	(33.09-57.51)	7 (11.70)	(5.77-22.18)	16 (26.70)	(17.14-39.01)	10 (16.70)	(9.32-28.04)	
Implants											0.171
	Yes	149	26 (17.40)	(12.20-24.34)	51 (34.20)	(27.09-42.16)	22 (14.80)	(9.96-21.35)	50 (33.60)	(26.48-41.47)	
	No	783	105 (13.40)	(11.20-15.98)	223 (28.50)	(25.43-31.74)	151 (19.30)	(16.67-22.19)	304 (38.80)	(35.48-42.29)	
	Do not know	67	13 (19.40)	(11.70-30.42)	13 (19.40)	(11.70-30.42)	15 (22.40)	(14.07-33.71)	26 (38.80)	(28.05-50.78)	
Removable											0.762
	Yes	77	15 (19.50)	(12.18-29.68)	18 (23.40)	(15.33-33.96)	15 (19.50)	(12.18-29.68)	29 (37.70)	(27.67-48.82)	
	No	848	117 (13.80)	(11.64-16.29)	250 (29.50)	(26.51-32.64)	157 (18.50)	(16.04-21.26)	324 (38.20)	(35.00-41.53)	
	Do not know	74	12 (16.20)	(9.53-26.24)	19 (25.70)	(17.10-36.66)	16 (21.60)	(13.77-32.27)	27 (36.50)	(26.44-47.87)	

of tooth brushing and flossing. Patients who regularly brush their teeth and use a dental floss were keener to ensure sufficient oral hygiene by also using a mouthwash. Lang et al., [15] reported that the use of antimicrobial mouthwash for 30 seconds once a day as an adjunct to daily tooth brushing reduced gingivitis and caries incidence within six months. Other reports suggested that although using mouthwashes as antimicrobial agents have a good potential in controlling gingivitis, their regular use can cause significant adverse effects like teeth staining and drug resistance [16]. This highlights the importance of evaluating the risk/benefits of recommending a mouthwash by the dental practitioner and that the advice should be tailored and modified case by case.

In regard to the association of mouthwash use and the demographic factors, only social and educational status showed significant association with the frequency of the mouthwash use among the study sample. Contrary to the expectation, mouthwash use was not significantly different in relation to other important demographic criteria such as gender, age or even the smoking status. It is always predictable that oral hygiene practices are more significant in females who are potentially more attentive to appearance. It was also assumed that smokers would necessarily report more mouthwash use than nonsmokers. However, this could be related to the small sample size in the current study that is also should only hardly be considered representative to the whole community as the respondents were all recruited from only two outpatients' clinics.

The results of the present study also indicated that more than 89% of the respondents who used mouthwash either did not know or declined the fact that mouthwash use may have any side effects. Similarly, 97% indicated that they do not believe mouthwash use can present a risk factor for development of oral cancer. In addition, almost 88% of the respondents did not know the active ingredient of a mouthwash. Whether the patient is aware of or not, clinicians need to make careful recommendation on mouthwashes based on several factors that include most importantly the efficacy and safety of the mouthwash. The selection of the right mouthwash recommendation majorly depends on the patients' oral condition as well as the ability to perform good oral hygiene practice especially brushing and flossing. Active ingredient is another factor to consider since some precautions need to be considered. For example, xerostomia could be worsened by the drying effect of an alcohol containing mouthwash.

The results showed significant difference in the frequency of mouthwash use when patients reported existing caries and periodontal diseases which indicate that the presence of chronic oral health conditions would encourage patients to seek additional oral hygiene means such as using mouthwashes. These results were in line with those reported by other investigators [3,17,18]. The presence of fixed restoration such as dental bridges also seemed to be a trigger to use mouthwash, most probably because those patients are traditionally advised on the importance of maintaining excellent oral hygiene and then using mouthwash could be recommended to facilitate cleaning the areas that are inaccessible to tooth brushing and flossing.

In conclusion, mouthwashes are formulated for a variety of oral benefits including mouth freshening, prevention of caries, biofilm control, and control of odor. Several factors must be considered

when making a mouthwash recommendation including whether the patient is currently able to control biofilm through other methods and whether they may consider rinsing a substitute for another mechanical procedures such as brushing and flossing. It is important that target populations receive oral health advice that is tailored to meet their individual needs. These messages may need to be adapted and the influence on these target groups has to be taken into account. It is thus very important to understand the behavior, knowledge, and attitude of any community group toward the oral hygiene practices including mouthwash use. A targeted and tailored health education advice on the proper oral hygiene practice is a significant, cost-effective strategy to reduce the burden of oral disease and maintain oral health and quality of life.

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