

*Full Length Research Paper*

# Understanding community views and engagement with teeth whitening in Saudi Arabia: A comprehensive survey analysis

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Advances in restorative dentistry have made many tooth whitening techniques economical and cost effective both in developed and developing countries. The purpose of this study was to evaluate the attitude and awareness of tooth bleaching among a sample of adults attending shopping malls in Riyadh city, Saudi Arabia. A cross sectional survey was performed in four major malls located in different regions of Riyadh city in Saudi Arabia. A total of 520 adult visitors were randomly selected to participate in this study. In addition, 82 dentists were requested to participate in the study. Knowledge and attitude toward teeth color and dental bleaching were assessed by using self-administered and pretested questionnaire. Descriptive statistics were carried out to express participant's socio-demographic information. Multivariate logistic regression analysis (using enter method) and chi-square tests were used to identify independent predictors of positive attitudes toward dental bleaching. A total of 55.8% of male and 44.2% female responded to the questionnaire. Among all the respondents 67.4% were not satisfied with their tooth color and 77.7% were willing to undergo tooth whitening procedure. Females showed more positive attitude towards tooth bleaching (odd ratio (OR) 1.9, 95% confidence interval (CI): 1.181-3.166). Participants rated with having excellent, good and fair knowledge exhibited positive attitude toward tooth bleaching compared to participants with poor knowledge (OR: 8.4, 3.4, and 2.0; 95% CIs: 3.31-21.18, 1.81-6.36, and 1.08-3.76). The results depict that majority of the study participants were not satisfied with their tooth color and were willing to undergo tooth whitening procedures. Additionally, gender differences were observed with regards to the attitude towards bleaching. Moreover, participants who had the knowledge of tooth color showed more positive attitude towards tooth bleaching.

**Key words:** Attitude, awareness, perception, tooth bleaching, teeth color.

## INTRODUCTION

Tooth discoloration is classified as intrinsic and extrinsic discoloration; former develops at the time of tooth

formation and later develops after the tooth formation. Drugs like tetracycline, high levels of fluoride and exposure to certain metals during tooth formation causes intrinsic staining (Hannig and Joiner, 2006; Alshara et al., 2014). These stains are non-responsive to abrasives and home use bleaching agents. Whereas certain foods such as tea, coffee and tar products from tobacco and certain occupational exposure to metals cause extrinsic stains and many times these stains are responsive to home use of bleaching agent (Hannig and Joiner, 2006; Alshara et al., 2014).

Recent advancement in restorative and adhesive technology has increased the opportunities for both patients and clinicians to provide best non-invasive treatment for better esthetics through conservative and economical approaches (Terry and Geller, 2012). Tooth bleaching is one of the blessings of development in restorative and esthetic dentistry (Dahl and Pallesen, 2003). Recent advancement under the professional supervisions and proper examination and diagnosis has increased its acceptability worldwide. But in the past, its side effects and less conservative techniques had restricted its use and acceptability among patients (ADA Council on Scientific Affairs, 2009).

Globally, many studies have been conducted to evaluate patient's level of satisfaction in terms of dental esthetics (Azodo and Ogbomo, 2014; Mehl et al., 2014, 2015). Caucasian study reported certain predictors of tooth bleaching which included hiding teeth during smiling, bleached teeth, female gender, lower levels of satisfaction with dental appearance and the absence of the previous orthodontic therapy (OR: 5.8, 2.4, 1.8, 0.5, and 0.4, respectively) (Grzić et al., 2012). A study conducted among 235 Malaysian adult population showed that the 52.8% were unhappy with their dental appearance, 56.2% were not satisfied with their tooth color, and 48.1% desired tooth bleaching (Tin-Oo et al., 2011). Patient's attitudes and feelings towards aesthetics dentistry have been improved due to the simplicity of the procedure followed by speedy result of tooth bleaching. Over the past five years, a 300% increase in the demand for bleaching among American adults aged 20 to 50 years has been observed (Morley, 1999). Similarly, study conducted at the Medical University of Lodz, Poland among 313 patients seeking tooth bleaching treatment showed that the 61.0% were not satisfied with the appearance of their teeth and 89.1% had attempted to improve the appearance of their teeth by using whitening dentifrices. However, half of them were concerned about the safety of the bleaching procedures (Wisniewski et al., 2004).

In New Zealand, a study conducted among 600 general dental practitioners (GDPs) reported an increased demand for tooth whitening (77.8%) and veneers (54.8%). Additionally, 56.8% GDPs believed that patients had higher aesthetic expectations and female had increased demand for tooth whitening than male (Theobald et al., 2006). Similar study conducted among

693 young adults from Hong Kong reported that the 80.2% perceived that their teeth were not white enough. Age was found to be a significant predictor for the increased demand of tooth bleaching (Chan et al., 2013). On contrary, Saudi Arabian study conducted in 2000 reported that 25.6% dental patients used saline and 10% used lemon as bleaching agent at home (Almas et al., 1999). In the recent year with the advancement in restorative dentistry, dental esthetics has become an important aspect among individuals in developing countries. Study conducted in 2013 in Saudi Arabia reported that of the 220 patients evaluated on visual analogue scale scores for satisfaction was  $6.8 \pm 2.3$  with 65.9% were dissatisfied with tooth discoloration (Al-Zarea, 2013).

Until now, very little information about esthetic awareness of orthodontics, prosthesis and restorative dentistry is available from Saudi Arabia. Moreover, past studies mainly focus on dental patients rather than general public, thus limiting their generalizability of results to the wider population. With advancement in restorative dentistry, many techniques have become economical and cost effective for both developed and developing countries and one of such technique is tooth bleaching. Nowadays, tooth bleaching becomes cost effective and conservative with added advantages of long term functionality and effectiveness. Hence, the aim of this study was to evaluate the attitude and awareness of tooth bleaching among the adult population aged 18 to 45 years from Riyadh city, Saudi Arabia.

## **METHODOLOGY**

### **Study design and sampling technique**

This is a population-based cross sectional study. A cluster-sampling technique was employed and 4 shopping malls were selected randomly from the five regions of the capital city, Riyadh: northern, eastern, western, southern, and central regions. The four malls were visited in the period between June 20 to July 19, 2015 and individuals visiting the mall were asked to complete the self-administered questionnaire. To know about the professional views regarding tooth bleaching, a convenient sample of dentists was also recruited from King Abdul Aziz Medical City-Riyadh (KAMCR) to complete the questionnaire.

### **Data collection tool**

The self-administered questionnaire composed of two main sections. Firstly, socio-demographic data which included age, gender, occupation, educational level, area of residence, and smoking history. Secondly, attitude towards teeth bleaching was assessed by three questions addressing the following: willingness to undergo bleaching in the future, approving the use of whitening material on the teeth surfaces to get a lighter shade of teeth color and lastly willingness to recommend teeth bleaching for family or friends. An initial draft of the questionnaire was prepared by author and validated in two steps. Firstly, study instrument was sent to experts in the field of esthetic dentistry and their opinion was taken with regards to the content of the questionnaire. Secondly, pilot study was undertaken in a sample of 20 adults by using the

questionnaire and changes were made to ensure comprehensibility and reliability. A satisfactory Cronbach's alpha was obtained for conducting the study. Participants involved in the pilot study were excluded from the final study. Responses such as yes, no, agree, disagree or uncertain were used in the questionnaire.

### **Ethical considerations**

The participation in the study was voluntary. Confidentiality of the data was assured throughout the study. Study was approved by the King Abdul Aziz Medical City-Riyadh, National Guard Ministry of Health Affairs Saudi Arabia (IRB approval no. RSS-004).

### **Statistical analysis**

Descriptive statistics of Bar charts and frequency tables were generated to display the characteristics of the population and their attitude towards teeth bleaching. Multivariate logistic regression analysis (using enter method) and chi-square tests were used to identify independent predictors of positive attitudes. Potential predictors of tooth bleaching, include nationality, region of residency, smoking status, frequency of visiting the dentist, satisfaction with teeth color, and perception about tooth bleaching. SPSS Statistics for Windows, Version 21 Armonk, NY: IBM Corporation was used for statistical analysis and  $p \leq 0.05$  was used to define statistical significant results.

## **RESULTS**

Out of 647 subjects approached, 520 completed the questionnaire (80.37% response rate) along with a sample of 82 dentist were also included in the survey. Thus, a total of 602 participants were included in the study.

Total of 602 filled questionnaires were obtained which included-males (55.8%) and females (44.2%) with majority of the study participants (90.4%) were Saudi nationals. Most of the study participants (41%) had their residence in Northern part followed by other regions of the Riyadh city. Age distribution of the study participants ranged from 18 to 45 years and above. Of the total participants, 37.5% were in the age range of 18 to 24 years, followed by others. Smoking history revealed that most (86.9%) of the participants were non-smokers and 83.1% had no habit of water-pipe tobacco use. Among the participants, 86.4% were non-dentists. Table 1 shows the socio-demographic data of the study participants.

The present study revealed that 67.4% were not satisfied with their tooth color and 72.8% had visited dentist 5 or more times. Almost 40% of the participants had a good knowledge of teeth whitening. In addition, 76.7% participants had positive attitude towards tooth bleaching. Chi square test showed gender, age, marital status, satisfaction with tooth color and knowledge about teeth whitening significant differences in attitude towards tooth bleaching. Female had significantly higher positive attitude towards bleaching than male (83.8% vs. 71.1%,  $P=0.001$ ). Study participants aged 18 to 24 years showed significantly higher positive attitude followed by

respondent of age 25 to 34 years,  $\geq 45$  and 35 to 44 years (82.7% vs. 75.9, 72.7, and 67.3%,  $p=0.018$ ), respectively. Moreover, unmarried study participants had more positive attitude than married (82.7% vs. 70.6%,  $p=0.001$ ). Similarly, participants satisfied with the color of their teeth and those who had excellent knowledge about the bleaching showed significantly positive attitude towards teeth bleaching ( $p=0.001$ ) (Table 2).

Around 77.7% of the study participants reported their willingness to undergo teeth bleaching in near future and 65.8% expressed their agreement for the placement of the whitening agent on the tooth surface involving the smile line to get lighter tooth color shade. More than three fourth 76.6% of the study participants reported that they will recommend teeth bleaching to their family and friends (Figure 1).

Logistic regression analysis was performed to identify the predictors of positive attitude towards tooth bleaching. Females and those satisfied with color of teeth showed higher odds ratio compared to their counterparts (OR=1.9; 95% CI: 1.181-3.166) and (OR=0.3; 95% CI: 0.208-0.505). Moreover, study participants who rated their knowledge excellent, good and fair had higher odds as compared to those who had poor knowledge (ORs= 8.4, 3.4, and 2.0; 95% CIs: 3.31-21.18, 1.81-6.36, and 1.08-3.76), respectively (Table 3).

## **DISCUSSION**

Introduction of the tooth whitening technique has changed the individual's attitudes and perceptions towards dentistry. This present cross-sectional study was conducted among 602 participants to investigate the knowledge and attitude towards tooth bleaching in Riyadh city, Saudi Arabia. Study findings suggested that 67.4% were not satisfied with their tooth color. This study finding was higher than that reported in Malaysia 56.2% and Poland 61% (Wisniewski et al., 2004; Tin-Oo et al., 2011).

Further analysis showed that around three quarter of the participants had a positive attitude towards tooth bleaching. Comparative data suggested that females, young age group (18 to 24 years), unmarried individual, those who were not satisfied with their tooth color and those with excellent knowledge of tooth color had positive attitude towards tooth bleaching. This study finding is in line with other reported studies from Malaysia and Newzealand (Theobald et al., 2006; Tin-Oo et al., 2011; Grzić et al., 2012).

Logistic regression analysis showed that the females, those not satisfied with tooth color, and those having excellent knowledge of tooth colour significantly had higher odds ratio as towards tooth bleaching compared to their counterparts. This could be explained on the basis that females are more interested about their appearance than male and seems to be more concerned about dental appearance and are more critical in their judgment

**Table 1.** Socio-demographic data of the study participants (n=602).

Characteristic	Levels	n	%
Nationality	Saudi	544	90.4
	Non-Saudi	58	9.6
Residency	Central Riyadh	101	16.8
	Northern Riyadh	247	41.0
	Eastern Riyadh	134	22.3
	Western Riyadh	65	10.8
	Southern Riyadh	55	9.1
Gender	Male	336	55.8
	Female	266	44.2
Age in years	18–24	226	37.5
	25–34	212	35.2
	35–44	98	16.3
	≥ 45	66	11.0
Marital status	Unmarried	306	50.8
	Married	296	49.2
Education	High school or less	67	11.1
	University	535	88.9
Cigarette smoke	No	523	86.9
	Yes	79	13.1
Waterpipe tobacco use	No	500	83.1
	Yes	102	16.9
Satisfied with the color shade of your teeth?	No	406	67.4
	Yes	196	32.6
Occupation	Dentists	82	13.6
	Non-Dentists	520	86.4
How many times did you visit the dentist?	Never	29	4.8
	1-5 times	135	22.4
	5 or more	438	72.8
Respondents rate their knowledge about teeth whitening	Excellent	110	18.3
	Good	242	40.2
	Fair	173	28.7
	Poor	77	12.8

towards dental esthetics (Vallittu et al., 1996; Hassel et al., 2008). In our study, female gender was also found as an important predictor factor for tooth bleaching. Unlike the studies conducted in Sweden and China, this study highlighted that gender is associated with dental esthetics (Xiao et al., 2007; Carlsson et al., 2008).

Additionally, this study also reported that the female gender as an important predictive factor for tooth bleaching which is contrary to the findings reported Chinese and Swedish studies (Xiao et al., 2007; Akarslan et al., 2009). In this study, education level did not influence the positive attitude towards tooth bleaching like

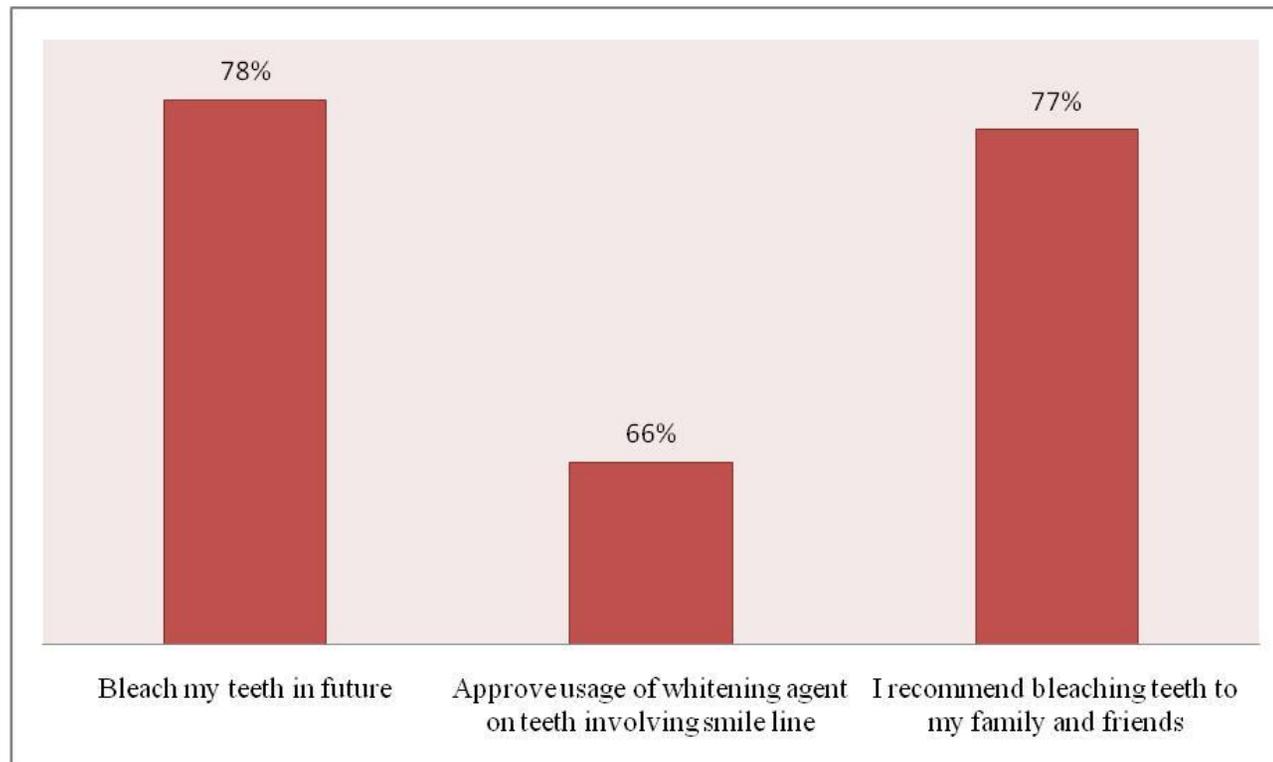
**Table 2.** The attitude towards tooth bleaching and its relation to sample characteristics (n=602).

Characteristics	Levels	Negative [140 (23.3%)]		Positive [462 (76.7%)]		P value
		n	%	n	%	
Nationality	Saudi	122	22.4	422	77.6	0.140
	Non-Saudi	18	31.0	40	69.0	
Residency	Central Riyadh	23	22.8	78	77.2	0.861
	Northern Riyadh	63	25.5	184	74.5	
	Eastern Riyadh	28	20.9	106	79.1	
	Western Riyadh	14	21.5	51	78.5	
	Southern Riyadh	12	21.8	43	78.2	
Gender	Male	97	28.9	239	71.1	0.001*
	Female	43	16.2	223	83.8	
Age in years	18–24	39	17.3	187	82.7	0.018*
	25–34	51	24.1	161	75.9	
	35–44	32	32.7	66	67.3	
	≥ 45	18	27.3	48	72.7	
Marital status	Unmarried	53	17.3	253	82.7	0.001*
	Married	87	29.4	209	70.6	
Education	High school or less	17	25.4	50	74.6	0.663
	University	123	23.0	412	77.0	
Cigarette smoke	No	124	23.7	399	76.3	0.498
	Yes	16	20.3	63	79.7	
Waterpipe tobacco use	No	120	24.0	380	76.0	0.339
	Yes	20	19.6	82	80.4	
Satisfied with the color shade of your teeth?	No	75	18.5	331	81.5	0.001*
	Yes	65	33.2	131	66.8	

**Table 2. Cont'd**

Occupation	Dentists	14	17.1	68	82.9	0.154
	Non-Dentists	126	24.2	394	75.8	
How many times did you visit the dentist?	Never	11	37.9	18	62.1	0.116
	1-5 times	27	20.0	108	80.0	
	5 or more	102	23.3	336	76.7	
Respondents rate their knowledge about teeth whitening	Excellent	10	9.1	100	90.9	0.001*
	Good	48	19.8	194	80.2	
	Fair	48	27.7	125	72.3	
	Poor	34	44.2	43	55.8	

\*Chi-square test is significant at  $\alpha=0.05$ .



**Figure 1.** The Attitude towards tooth bleaching (N= 602).

**Table 3.** Logistic regression: Factors associated with positive attitude toward tooth bleaching (n= 602).

Characteristic	Reference	B	SE	P	OR	95% CI for OR	
						Lower	Upper
Saudi	Non-Saudi	0.22	0.34	0.529	1.2	0.633	2.438
Central Riyadh	Southern Riyadh	-0.38	0.44	0.391	0.7	0.285	1.632
Northern Riyadh	Southern Riyadh	-0.39	0.40	0.331	0.7	0.312	1.481
Eastern Riyadh	Southern Riyadh	-0.24	0.43	0.585	0.8	0.338	1.844
Western Riyadh	Southern Riyadh	-0.15	0.49	0.767	0.9	0.331	2.262
Female	Male	0.66	0.25	0.009*	1.9	1.181	3.166
18–24 Years	≥ 45 Years	-0.03	0.45	0.949	1.0	0.403	2.343
25–34 Years	≥ 45 Years	-0.25	0.36	0.493	0.8	0.385	1.583
35–44 Years	≥ 45 Years	-0.41	0.39	0.287	0.7	0.310	1.415
Unmarried	Married	0.35	0.30	0.235	1.4	0.795	2.548
University	High school or less	0.45	0.34	0.188	1.6	0.802	3.078
Cigarette smoke	None	0.36	0.34	0.287	1.4	0.740	2.776
Waterpipe tobacco use	None	0.20	0.30	0.518	1.2	0.672	2.200
Satisfied with the color shade of your teeth	No	-1.13	0.23	0.001*	0.3	0.208	0.505
Dentists	Non-dentists	-0.41	0.38	0.288	0.7	0.315	1.408
<b>How many times did you visit the dentist</b>							
1-5 times	Never	0.91	0.50	0.069	2.5	0.932	6.574
5 or more	Never	0.46	0.46	0.317	1.6	0.641	3.944
<b>How would you rate your knowledge about teeth whitening</b>							
Excellent	Poor	2.13	0.47	0.001*	8.4	3.319	21.188
Good	Poor	1.22	0.32	0.001*	3.4	1.818	6.363
Fair	Poor	0.70	0.32	0.026*	2.0	1.087	3.763
Constant	-	-0.48	0.74	0.516	0.6	-	-

\*Wald Chi-square test is significant at  $\alpha=0.05$ .

the study conducted in Malaysia (Tin-Oo et al., 2011). However, in this study, the people who rated their knowledge as excellent about tooth whitening had positive attitude towards tooth bleaching.

There are few limitations in our study. Firstly, the assessment was subjective and did not

correlate the findings with their dental problem. However, obtaining dental record was not possible due to the selection of the study participants from the general population visiting the malls instead of patients visiting dental clinics. The present study surveyed the sample from general population rather the patients visiting

dental clinic who are generally sensitive about their dental appearance. Secondly, study included wide age range of participants from either gender with sufficient numbers so that the results can be generalized. Thirdly, participants were recruited from the different area of Riyadh so that variability of findings can be maintained.

## Conclusion

Within the limitations of the study, it can be concluded that most of the study participants were not satisfied with their tooth color, and were willing to undergo tooth whitening procedures. Additionally, gender differences existed with regards to the attitude towards bleaching. Participants who had the knowledge of tooth color showed more positive attitude towards tooth bleaching.

## Conflict of interest

The author has not declared any conflict of interest.

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