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Knowledge, Attitudes, and Practices Regarding Over-the-Counter Teeth Whitening Products Among Adults in Saudi Arabia: A Cross-Sectional Survey

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Introduction: Over-the-counter (OTC) teeth whitening products are widely accessible and commonly used without professional supervision. However, public knowledge, attitudes, and practices regarding these products remain insufficiently explored in Saudi Arabia.

Methods: A cross-sectional survey was conducted using a self-administered questionnaire distributed via social media platforms. A total of 420 adults participated. Data were analyzed using descriptive statistics and chi-square tests to assess associations between demographic variables and whitening-related knowledge, attitudes, and practices.

Results: Awareness of OTC whitening products was high (93.8%), with 53.6% reporting prior use. Whitening toothpaste was the most commonly used product (51.4%). Tooth sensitivity was the most frequently reported side effect (39%), while gingival irritation was less common (4.9%). Despite this, only 5.7% perceived OTC whitening products as posing health risks. Neutral satisfaction was reported by 46.6% of participants. Social media was the primary source of information (43%), and tooth color concern was the main motivation for use (45.4%).

Conclusion: Although awareness of OTC whitening products is high, perceived health risks remain low despite frequent reports of adverse effects. These findings highlight the need for increased professional guidance and public education regarding the safe use of OTC whitening agents.

Keywords: over-the-counter whitening, tooth bleaching, dental aesthetics, Saudi Arabia, knowledge attitude practice

Introduction

In developed countries, dental aesthetics have become an increasingly important component of oral health, alongside the maintenance of general oral health. Tooth discoloration is one of the most common aesthetic concerns and often motivates individuals to seek whitening treatments.[1] The success of tooth whitening depends on the type of discoloration present, which may be classified as extrinsic or intrinsic. Accurate diagnosis therefore requires identifying the underlying cause of discoloration to determine the most appropriate whitening approach.[2–4]

Tooth bleaching products may be broadly categorized into in-office treatments, at-home with supervision, OTC products, and non-dental alternatives. Among these options, OTC and non-dental products are readily accessible to consumers without professional supervision.[5–8] Common OTC whitening products include whitening strips, paint-on varnishes or gels, whitening toothpaste, and tray-based gels.

Dental discoloration may be either extrinsic or intrinsic.[9] Extrinsic stains result from surface-level factors such as chromogenic foods and beverages, tobacco use, poor oral hygiene, and certain medications.[10–14] Smoking and the

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consumption of tea or coffee are major contributors to surface staining,[15–17] while poor oral hygiene and the use of iron- or chlorhexidine-containing medications may further exacerbate discoloration.[18–20] In contrast, intrinsic stains originate within the tooth structure and are more difficult to remove. These stains may be caused by systemic factors, such as tetracycline exposure or excessive fluoride intake, or by local factors including pulp necrosis, endodontic materials, aging, caries, and restorative procedures.[3,4,21] Tetracycline leads to gray/brown discoloration if taken during development, while fluorosis results in white streaks/spots due to high fluoride intake.[4] Age-related enamel thinning may also expose the underlying dentin, resulting in a yellowish appearance of the teeth.[22]

Because the underlying cause and type of discoloration directly influence treatment outcomes, understanding stain characteristics is essential when selecting appropriate whitening agents. Several chemical agents are used in tooth whitening, including hydrogen peroxide, carbamide peroxide, sodium hypochlorite, and chlorine dioxide. Hydrogen peroxide acts by breaking down chromophore bonds to reduce color,[23] while carbamide peroxide decomposes into hydrogen peroxide and urea, allowing for extending whitening duration.[2] Sodium hypochlorite also disrupts chromophore bonds and possesses antimicrobial properties.[24] Chlorine dioxide is a selective oxidant used in pulp bleaching and water treatment, with its effectiveness dependent on appropriate generation and application protocols.[25]

The growing demand for improved dental aesthetics has contributed to the increasing popularity of both in-office and at-home whitening procedures. In parallel, OTC whitening products such as toothpaste, rinses, trays, strips, and gels have gained widespread acceptance due to their convenience and accessibility.[26] OTC whitening strips typically contain approximately 6% hydrogen peroxide and are commonly used twice daily for periods ranging from 7 to 14 days.[27–29] These products have been reported to be more effective than 10% carbamide peroxide tray systems[30,31] and offer a cost-effective and easily accessible alternative to professional treatments.[32,33] However, their use may be associated with limitations, including incomplete tooth coverage, poor adaptation in cases of misaligned teeth, and potential contact with gingival tissues.[34]

Other OTC whitening modalities include paint-on varnishes, gels, and whitening toothpaste. Paint-on varnishes and gels allow for targeted application and may reduce gingival irritation. These products typically contain bleaching agents combined with stabilizers and adhesive components for gradual and effective whitening.[35] A systematic review found better results when applied three times daily and with higher hydrogen peroxide concentrations.[31] Whitening toothpaste, which is one of the most commonly used OTC products, primarily acts by removing extrinsic stains through abrasive and chemical mechanisms. These formulations generally contain abrasives, detergents, moisturizers, and remineralizing agents designed to enhance stain removal without substantially altering intrinsic tooth color.[36]

Prefabricated whitening gels are among the most commonly used OTC products. These gels, usually based on hydrogen peroxide or carbamide peroxide, are valued for their ease of use and rapid results.[37,38] They are often supplied with pre-measured doses or applicators to improve convenience and consistency.[12] Additionally, they are more affordable than professional treatments, making them a practical option for many and while users frequently report satisfactory whitening outcomes when products are used as directed,[39,40] adverse effects such as tooth sensitivity and gingival irritation may occur, particularly with higher peroxide concentrations.[41,42] Proper usage is therefore essential to minimize potential risks while maintaining effectiveness.[43–45]

Despite the widespread availability and increasing use of OTC whitening products, limited information is available regarding how these products are used by the public in Saudi Arabia and the extent of public awareness concerning their potential adverse effects, especially given their accessibility without professional oversight. Therefore, the objective of this study was to assess the knowledge, attitudes, and practices of Saudi adults toward over-the-counter (OTC) teeth whitening products, with particular emphasis on their availability, patterns of use, perceived effectiveness, and awareness of potential health risks.

Materials and Methods

This study was approved by the Institutional Review Board of King Saud University (Project No. E-24-9198) and the College of Dentistry Research Center, King Saud University (Approval No. IR 0521). All study procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Informed consent was obtained electronically from all participants prior to participation. Participation was voluntary, and all responses were collected anonymously to ensure privacy and confidentiality.

A cross-sectional survey was conducted over a 12-month period to assess the knowledge, attitudes, and practices related to the use of over-the-counter (OTC) teeth whitening products among adults in Saudi Arabia. The study population included Saudi and non-Saudi adults aged 18–60 years residing in Saudi Arabia. The inclusion criteria were adults aged 18–60 years who agreed to participate and completed the questionnaire. The exclusion criteria included individuals younger than 18 years, older than 60 years, and incomplete survey responses. Required sample size was calculated and a convenience sampling method was employed. A total of 420 completed questionnaires were included in the final analysis.

Data were collected using a self-administered electronic questionnaire distributed through social media platforms, including WhatsApp, Instagram, and Twitter. The questionnaire consisted of 30 structured close-ended questions presented in the form of multiple-choice items, multiple-response questions, and 5-point Likert-scale statements. The questionnaire was administered in both English and Arabic.

The questionnaire was newly developed based on a review of previously published literature to address the objectives of the current study. No formal pilot testing or psychometric validation was conducted prior to data collection.

Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were calculated for categorical variables. Associations between variables were assessed using the Chi-square test. A p-value of < 0.05 was considered statistically significant.

Results

A total of 420 adults participated in the study, with the majority being female and within the younger adult age groups. Most participants were Saudi nationals and resided in the central region of Saudi Arabia. Overall awareness of over-the-counter (OTC) teeth whitening products was very high, and more than half of the participants reported having used these products at least once (Table 1).

Regarding usage patterns (Table 2 and Figure 1), whitening toothpaste was the most commonly used OTC product, while other modalities such as strips, gels, and pens were used less frequently. Most users reported occasional rather than daily use, and the majority had used OTC whitening products for relatively short durations, typically less than six months, indicating limited long-term reliance on these products.

Table 1 Demographic Information of the Study Participants (N=420)

Items		n	%
Age	20-30	221	52.6%
	31-40	84	20.0%
	41-50	69	16.4%
	>50	46	11.0%
Gender	Female	380	90.5%
	Male	40	9.5%
Educational Level	Post Graduate	374	89.0%
	High School	39	9.3%
	Intermediate School	7	1.7%

(*Continued*)

Table 1 (Continued).

Items		n	%
Occupation	Student	136	32.4%
	Employed	185	44.0%
	Unemployed	41	9.8%
	Intern	1	0.2%
	Self Employed	31	7.4%
	Retired	26	6.2%
Nationality	Saudi	400	95.2%
	Non-Saudi	20	4.8%
Region	Northern Region	24	5.7%
	Eastern Region	38	9.0%
	Southern Region	27	6.4%
	Western Region	33	7.9%
	Central Region	298	71.0%
Monthly Income	Below 10,000 SAR	104	24.8%
	10,000–15,000 SAR	92	21.9%
	15,001–20,000 SAR	62	14.8%
	20,000–30,000 SAR	77	18.3%
	Above 30,000 SAR	85	20.2%

Table 2 Awareness and Usage of Over-the-Counter Teeth Whitening Products

Items		n	%
Have you ever heard about over-the-counter whitening Products?	Yes	394	93.8%
	No	17	4.0%
	Do not know	9	2.1%
	Total	420	100.0%
Have you ever used over-the-counter whitening Products?	Yes	225	53.6%
	No	188	44.8%
	Do not know	7	1.7%
	Total	420	100.0%
How often do you use Over-the-Counter Whitening Products?	Daily	19	4.6%
	Several times a week	53	12.8%
	Once a week	39	9.4%
	Less than once a week	59	14.3%

(*Continued*)

Table 2 (Continued).

Items		n	%
	Rarely/Never	244	58.9%
	Total	414	100.0%
What form of Over-the-Counter Whitening Products do you prefer?	Whitening toothpaste	213	51.4%
	Whitening strips	89	21.5%
	Whitening gels or trays	75	18.1%
	Whitening pen	5	1.2%
	Other	32	7.7%
	Total	414	100.0%
Where do you usually purchase your whitening Products?	Pharmacy	271	65.8%
	Supermarket	25	6.1%
	Online store	61	14.8%
	Beauty store	18	4.4%
	Other	37	9.0%
	Total	412	100.0%
How long have you been using over-the-counter whitening products?	Less than 6 months	118	28.4%
	6 months to 1 year	41	9.9%
	1 to 2 years	53	12.8%
	More than 2 years	68	16.4%
	Never used	135	32.5%
	Total	415	100.0%
Have you noticed any side effects from using over-the-counter whitening agents?	Yes	107	25.8%
	No	165	39.9%
	I do not know	142	34.3%
	Total	414	100.0%
If yes, what side effects have you experienced?	Tooth sensitivity	144	39.1%
	Gum irritation	18	4.9%
	Changes in tooth surface	30	8.2%
	Allergic reactions	31	8.4%
	Others	145	39.4%
	Total	368	100.0%

(*Continued*)

Table 2 (Continued).

Items		n	%
How satisfied are you with OTC over-the-counter whitening Products?	Very satisfied	36	8.7%
	Satisfied	96	23.2%
	Neutral	193	46.6%
	Dissatisfied	51	12.3%
	Very Dissatisfied	38	9.2%
	Total	414	100.0%
How frequently do you seek advice?	Always	61	14.7%
	Often	50	12.0%
	Sometimes	76	18.3%
	Rarely	101	24.3%
	Never	128	30.8%
	Total	416	100.0%
Cultural Perception	Very unaware	22	5.3%
	Unaware	33	7.9%
	Neither aware nor unaware	77	18.5%
	Aware	196	47.1%
	Very unaware	88	21.2%
	Total	416	100.0%
How important is having white teeth to you?	Very important	151	36.2%
	Important	194	46.5%
	Neutral	60	14.4%
	Unimportant	9	2.2%
	Very Unimportant	3	0.7%
	Total	417	100.0%

In terms of side effects (Table 2), tooth sensitivity was the most frequently reported adverse effect, whereas gingival irritation and other complications were comparatively uncommon. Despite the occurrence of sensitivity, most participants did not perceive OTC whitening products as posing significant health risks, suggesting a discrepancy between experienced side effects and perceived safety. Regarding satisfaction, responses were predominantly neutral, with fewer participants reporting high levels of satisfaction. This finding may reflect modest whitening outcomes, variability in product effectiveness, or unmet expectations regarding the longevity of results (Table 2).

Regarding attitudes and beliefs, a considerable proportion of participants considered having white teeth to be important; however, fewer believed that tooth whitening substantially enhanced self-confidence. Most respondents supported the need for stricter supervision and regulation of OTC whitening products, indicating public recognition of the importance of professional oversight (Table 3).

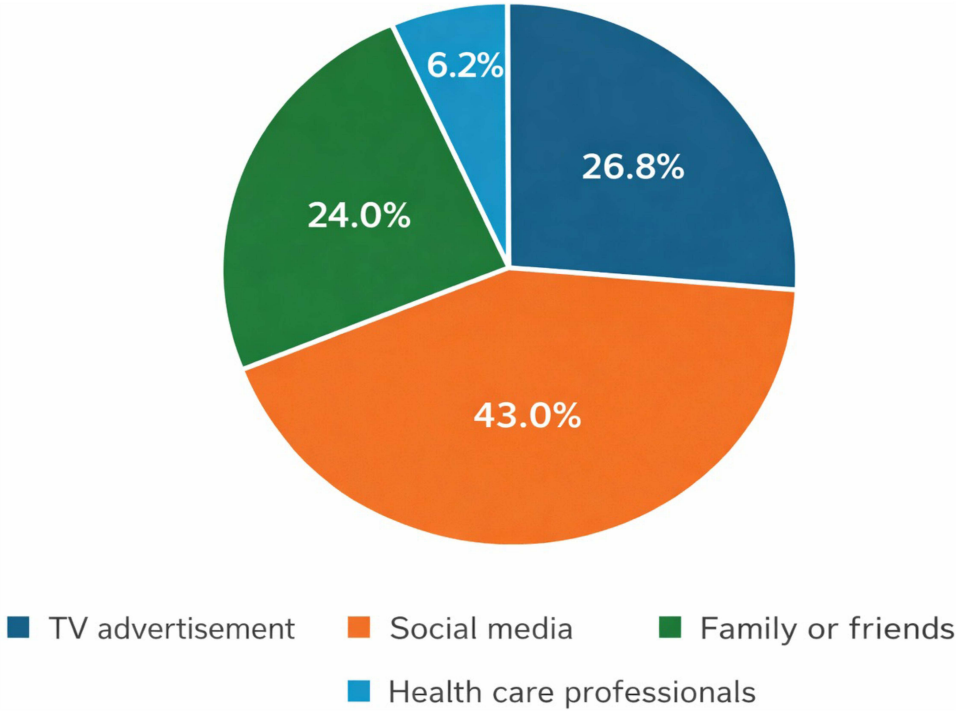

Figure 1 Multiple response analysis for First learn about Over-the-Counter Whitening Products.

In terms of information sources (Table 4), social media emerged as the primary source of information about OTC whitening products, followed by advertising and personal contacts, while healthcare professionals were infrequently cited. The main motivation for using OTC whitening products was concern about tooth color, whereas factors such as affordability, accessibility, and curiosity were secondary.

Table 3 Attitudes and Beliefs

Items		n	%
More confidence	Strongly agree	24	5.7%
	Agree	84	20.1%
	Neither agree nor disagree	130	31.1%
	Disagree	109	26.1%
	Strongly disagree	71	17.0%
	Total	418	100.0%
OTC supervision	Yes	286	68.3%
	No	60	14.3%
	Do not know	73	17.4%
	Total	419	100.0%
Health Risks	Very unconcerned	24	5.7%
	Unconcerned	25	6.0%

(*Continued*)

Table 3 (Continued).

Items		n	%
	Neutral	70	16.7%
	Concerned	171	40.9%
	Very concerned	128	30.6%
	Total	418	100.0%
How satisfied	Very satisfied	23	5.5%
	Satisfied	123	29.4%
	Neutral	124	29.7%
	Dissatisfied	103	24.6%
	Very Dissatisfied	45	10.8%
	Total	418	100.0%
Whitening priority	Strongly agree	80	19.1%
	Agree	168	40.1%
	Neither agree nor disagree	101	24.1%
	Disagree	56	13.4%
	Strongly disagree	14	3.3%
	Total	419	100.0%
Do you think that over-the-counter whitening agents provide long-lasting results?	Yes, very long-lasting	16	3.8%
	Yes, somewhat long-lasting	50	12.0%
	Neutral	108	25.8%
	No, not very long-lasting	161	38.5%
	No, not long-lasting at all	83	19.9%
	Total	418	100.0%
Misinformation	Yes	175	62.3%
	No	106	37.7%
	I do not know	0	0.0%
	Total	281	100.0%
Find misinformation	Personal experience	93	24.3%
	Professional advice	90	23.9%
	Online research	110	29.2%
	Media report	19	5.0%
	Others	65	17.2%
	Total	377	100.0%

(*Continued*)

Table 3 (Continued).

Items		n	%
Preference between OTC whitening and home remedies	Strongly agree	56	13.4%
	Agree	107	25.6%
	Neither agree nor disagree	150	35.9%
	Disagree	66	15.8%
	Strongly disagree	39	9.3%
	Total	418	100.0%
Recommend OTC	Very likely	33	7.9%
	Likely	157	37.6%
	Unlikely	109	26.1%
	Very unlikely	119	28.5%
	Total	418	100.0%

Table 4 Motivations for Using Over-the-Counter Teeth Whitening Products

		Responses		Percent of Cases
		N	Percent	
Motivation of tooth whitening OTC	Improve tooth color	270	45.4%	66.0%
	Results gained from others	72	12.1%	17.6%
	Curiosity	57	9.6%	13.9%
	Advertisements	40	6.7%	9.8%
	Ease of accessibility	54	9.1%	13.2%
	Affordable price	38	6.4%	9.3%
	Other	64	10.8%	15.6%
Total		595	100.0%	145.5%

Finally, demographic analysis revealed statistically significant associations between age, education level, and occupation with several aspects of OTC whitening awareness, usage patterns, satisfaction, and attitudes. In contrast, income showed no consistent association with knowledge or use of OTC whitening products (Table 5 and Table 6).

Table 5 Association Between Demographic Variables and Awareness and Usage of Tooth Whitening

Items		Age	Gender	Education	Occupation	Nationality	Region	Income
Have you ever heard about over-the-counter whitening Products?	χ^2	24,193	295	26,440	9347	500	17,632	8272
	df	6	2	4	10	2	8	8
	p	0.000*	0.863	0.000*	0.500	0.779	0.024*	0.407

(*Continued*)

Table 5 (Continued).

Items		Age	Gender	Education	Occupation	Nationality	Region	Income
Have you ever used over-the-counter whitening Products?	χ^2	13,391	1046	32,688	19,816	3624	12,523	10,827
	df	6	2	4	10	2	8	8
	p	0.037*	0.593	0.000*	0.031*	0.163	0.129	0.212
How often do you use Over-the-Counter Whitening Products?	χ^2	23,595	7997	2323	32,728	2750	29,668	11,095
	df	12	4	8	20	4	16	16
	p	0.023*	0.092	0.969	0.036*	0.601	0.020*	0.804
What form of Over-the-Counter Whitening Products do you prefer?	χ^2	27,836	979	13,617	31,388	12,882	13,171	20,159
	df	12	4	8	20	4	16	16
	p	0.006*	0.913	0.092	0.050	0.012*	0.660	0.213
Where do you usually purchase your whitening Products?	χ^2	30,464	3686	12,383	27,468	7399	30,986	12,048
	df	12	4	8	20	4	16	16
	p	0.002*	0.450	0.135	0.123	0.116	0.014*	0.741
How long have you been using over-the-counter whitening products?	χ^2	23,772	3260	11,336	38,364	5252	13,662	18,827
	df	12	4	8	20	4	16	16
	p	0.022*	0.515	0.183	0.008*	0.262	0.624	0.278
Have you noticed any side effects from using over-the-counter whitening agents?	χ^2	10,118	603	557	10,466	4777	5118	11,712
	df	6	2	4	10	2	8	8
	p	0.120	0.740	0.968	0.401	0.092	0.745	0.165
If yes, what side effects have you experienced?	χ^2	18,074	3645	26,159	32,940	1153	14,595	22,871
	df	12	4	8	16	4	16	16
	p	0.113	0.456	0.001*	0.008*	0.886	0.555	0.117
How satisfied are you with OTC whitening products?	χ^2	33,110	10,866	8819	23,981	7380	10,948	22,760
	df	12	4	8	20	4	16	16
	p	0.001*	0.028*	0.358	0.243	0.117	0.813	0.120
How frequently do you seek advice?	χ^2	7628	1774	4906	18,958	8991	20,432	15,674
	df	12	4	8	20	4	16	16
	p	0.813	0.777	0.768	0.525	0.061	0.201	0.476
Cultural Perception	χ^2	14,053	708	9797	17,279	2481	22,488	18,602
	df	12	4	8	20	4	16	16
	p	0.297	0.950	0.280	0.635	0.648	0.128	0.290
How important is having white teeth to you?	χ^2	18,844	2640	8901	19,022	11,151	28,562	14,300
	df	12	4	8	20	4	16	16
	p	0.092	0.620	0.351	0.520	0.025*	0.027*	0.576

Notes: *Indicates significant results $p<0.05$, χ^2 indicates chi-square critical value, df indicates degrees of freedom, and **p** indicates p-values.

Table 6 Association Between Demographic Variables and Attitude and Belief of Tooth Whitening

Items		Age	Gender	Education	Occupation	Nationality	Region	Income
More confidence	χ^2	38.965	2.677	10.915	33.308	3.068	13.401	12.728
	df	12	4	8	20	4	16	16
	p	0.000*	0.613	0.207	0.031*	0.547	0.643	0.693
OTC supervision	χ^2	14.538	1.615	3.311	18.158	0.484	11.269	9.456
	df	6	2	4	10	2	8	8
	p	0.024*	0.446	0.507	0.052	0.785	0.187	0.305
Health Risks	χ^2	19.177	4.047	7.923	21.585	3.319	16.311	17.412
	df	12	4	8	20	4	16	16
	p	0.084	0.4	0.441	0.363	0.506	0.431	0.359
How satisfied	χ^2	23.26	2.929	12.437	22.043	3.001	30.528	20.342
	df	12	4	8	20	4	16	16
	p	0.026*	0.57	0.133	0.338	0.558	0.015*	0.205
Whitening priority	χ^2	19.052	3.345	4.259	14.952	10.428	24.351	17.847
	df	12	4	8	20	4	16	16
	p	0.087	0.502	0.833	0.779	0.034*	0.082	0.333
Do you think that over-the-counter whitening agents provide long-lasting results?	χ^2	13.534	3.377	10.905	14.853	4.944	12.306	12.168
	df	12	4	8	20	4	16	16
	p	0.331	0.497	0.207	0.785	0.293	0.723	0.732
Misinformation	χ^2	0.684	0.245	3.743	3.72	1.508	4.541	7.857
	df	3	1	2	5	1	4	4
	p	0.877	0.621	0.154	0.59	0.219	0.338	0.097
Find Misinformation	χ^2	13.427	3.635	8.915	16.609	4.297	35.746	32.345
	df	12	4	8	16	4	16	16
	p	0.339	0.458	0.35	0.411	0.367	0.003*	0.009*
OTC whitening between Houseremedies	χ^2	26.649	1.251	3.376	42.533	5.215	17.379	16.472
	df	12	4	8	20	4	16	16
	p	0.009*	0.87	0.909	0.002*	0.266	0.361	0.421
Recommend OTC	χ^2	24.593	0.528	9.289	36.223	3.746	8.265	14.876
	df	9	3	6	15	3	12	12
	p	0.003*	0.913	0.158	0.002*	0.29	0.764	0.248

Notes: *Indicates significant results $p<0.05$, χ^2 indicates chi-square critical value, df indicates degrees of freedom, and **p** indicates p-values.

Discussion

Different tooth-whitening techniques and products have become increasingly popular over the years among both dental professionals and the general public. Bleaching of vital teeth involves direct contact of highly oxidizing agents with the enamel surface for varying periods, depending on the product used.[46]

Based on the findings of this study, the majority of respondents were female (90.5%), while males accounted for 9.5%. This gender distribution is consistent with several studies conducted in Saudi Arabia that reported higher female participation in oral health–related research. For example, Jaha HS[47] focused exclusively on female participants, highlighting the strong interest and involvement of women in tooth-whitening practices. Furthermore, studies assessing gender differences in oral health knowledge and practices have shown that females tend to demonstrate better awareness and practices compared to males, which may explain their higher participation rates.[48]

In the present study, 93.8% of participants reported being aware of tooth-whitening products. This high level of awareness is consistent with the findings of Al-Shamrani,[49] who reported that 99.3% of participants had prior knowledge of tooth bleaching. While Jaha HS[47] reported that whitening toothpaste was the second most preferred whitening method following in-office bleaching, 51.4% of participants in the current study reported using whitening toothpaste, further supporting its widespread use.

Despite the high level of awareness, satisfaction with tooth-whitening products was generally moderate. Only 8.7% of participants reported being very satisfied, while 46.6% expressed neutral satisfaction. This finding is comparable to Alhablain,[50] who reported moderate satisfaction levels following bleaching procedures. Neutral satisfaction may be attributed to variability in product efficacy, unrealistic expectations regarding whitening outcomes, and the limited durability of whitening effects.

Many over-the-counter products provide modest or short-term improvements, which may not align with expectations shaped by advertising or online content, resulting in neutral rather than positive evaluations.An important finding of this study is the discrepancy between participants' low concern regarding the potential health risks of over-the-counter whitening products and the relatively high prevalence of reported tooth sensitivity (39%). This discrepancy may be explained by the common perception that tooth sensitivity represents a mild, temporary, and acceptable side effect rather than a genuine oral health risk. Participants may fail to associate transient sensitivity with possible cumulative effects on enamel or dentin, particularly when whitening products are marketed as safe and suitable for frequent use.

Consequently, personal experience of sensitivity does not necessarily translate into heightened risk awareness. Regarding the perceived importance of tooth color, 36.2% of respondents considered having whiter teeth to be very important. This finding aligns with reports from the American Dental Association, which identified tooth whitening as one of the most desired cosmetic dental improvements.

The growing emphasis on dental aesthetics reflects a broader shift toward appearance-related health perceptions, where whiter teeth are often associated with youthfulness and good oral hygiene, while discoloration is linked to aging and poor self-care.[51] Only 5.7% of participants reported that whiter teeth enhanced their self-confidence, while 26.1% disagreed. This variation highlights individual differences in the psychological impact of dental aesthetics. Although previous studies suggest that dental appearance can influence facial attractiveness and social interaction, the effect of tooth whitening on self-confidence appears to be influenced by personal expectations, cultural norms, and baseline satisfaction with dental appearance.[52]

Social media played a significant role in shaping awareness of tooth-whitening products, with 43% of respondents reporting it as their primary source of information. This finding is consistent with AlAwdah's study, which demonstrated high reliance on social media for information regarding esthetic dental treatments.[53] However, previous research has shown that social media platforms often promote exaggerated whitening outcomes while downplaying potential adverse effects, which may contribute to unrealistic expectations and diminished perception of risk among users.[54,55] This highlights the need for increased professional involvement and regulatory oversight to ensure accurate and balanced information dissemination.

Study Limitations

This study has several limitations. The predominance of female participants limits the generalizability of the findings across genders. Additionally, the relatively high educational level of participants may have contributed to increased awareness of tooth whitening products, which may not reflect the knowledge of the general population. Online recruitment may have introduced selection bias by attracting individuals more interested in cosmetic dentistry or active

on social media platforms. Furthermore, the use of self-reported data may be subject to recall bias and subjective interpretation, particularly regarding adverse effects such as tooth sensitivity.

Conclusion

The results indicated that individuals were generally familiar with non-prescription tooth whitening products. Nevertheless, their comprehension of potential oral health risks was restricted. Tooth sensitivity was a frequently mentioned side effect, though it was often perceived as minor and transient, rather than a serious health concern. Participants generally expressed a moderate degree of satisfaction with the whitening products. These results emphasize the necessity for increased engagement from dental professionals in educating patients regarding the safe utilization of whitening products. Furthermore, clearer regulation and labeling are important to facilitate informed consumer choices and improve oral health results.

Data Sharing Statement

Data from this research is available upon reasonable request to the corresponding author.

Ethics Approval and Consent to Participate

This study was approved by the institutional review board of King Saud University, project No. (E-24-9198), and the College of Dentistry Research Center of King Saud University No. (IR 0521). We confirm that all study procedures were conducted per the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants prior to their inclusion in the study. We have taken all necessary measures to protect the privacy and confidentiality of the participants.

Consent for Publication

All authors consent to publish this research.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to beaccountable for all aspects of the work.

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