

Research

## Oral Health and Social Media: A Cross-sectional Study Exploring Oral Misinformation and Facts in Western Region of Saudi Arabia

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### ABSTRACT

**Background:** Thyroid cancer, while generally treatable, presents significant challenges in terms of awareness and timely diagnosis, particularly in gender-specific contexts. Previous studies have highlighted an increasing trend in the prevalence and severity of TC globally. This study aimed to investigate the awareness of TC risk factors and diagnostic practices among the Saudi Arabian population, focusing on identifying gender-specific disparities.

**Methods:** A cross-sectional survey was conducted using a structured questionnaire among 698 participants (N=698) from Saudi Arabia. Demographic factors, awareness levels, and societal barriers to thyroid cancer screening were assessed. The Mann-Whitney U test revealed statistically significant differences ( $p < 0.05$ ) in gender awareness levels.

**Results:** A significant disparity was found, with females demonstrating higher awareness than males (67.3% vs. 32.7%). Despite this, systemic barriers impeded effective prevention and treatment for females. Males exhibiting lower awareness were more likely to be diagnosed with aggressive subtypes at later stages. Statistical analysis confirmed these gender differences as significant ( $p < 0.001$ ).

**Conclusion:** The gender differences in awareness and diagnosis of TC in Saudi Arabia underscore the need for targeted public health strategies. While it is vital to maintain a high level of awareness among females, there is a pressing need for campaigns specifically designed to increase awareness among males at higher risk. This study is a foundation for future interventions to reduce gender disparities in TC outcomes.

### INTRODUCTION

Social media is an interactive and dynamic computer mediated communication technology that is widely used by high- and middle-income populations (Grajales III et al., 2014). However, many people in medicine and healthcare, including clinicians, administrators, professional colleges, academic institutions, and ministries of health, remain unaware of the significance of social media, its potential applications in their daily practices, and the inherent risks, as well as how these can be reduced or eliminated (Grajales III et al., 2014). Over the past two decades, there has been a notable increase in the use of health information by consumers across all social groups on social platforms, irrespective of gender or age. In response to the public's diverse information needs, social media has emerged as a leading source of information (Chou, et al., 2018 ; Sagnia et al., 2020 ; Xiong & Liu, 2014). It also offers people numerous opportunities to interact with one

another in positive ways, but it also facilitates the spread of false information without evidence or accuracy (McKee & Diethelm, 2010). Moreover, people seek health information online for various reasons, including concern for themselves, their families, or their friends (Signorini, Segre, & Polgreen, 2011). Unfortunately, misinformation and biased stories are frequently found on social media (Truumees et al., 2021). As a result, it is crucial to understand how health misinformation spreads and how it may influence decisions and health behaviors (Pagoto, Waring, & Xu, 2019). Health myths or misinformation are defined as health-related claims that are based on anecdotal evidence, are inaccurate, or are misleading due to the absence of current scientific knowledge (Chou, Oh, & Klein, 2018). Misleading health information spreads more rapidly over social media than accurate information (Levy & Strombeck, 2002 ; Vosoughi et al., 2018). A study conducted

in China differentiated between real and false health information shared by users of social media platforms. The study reported that about 55% of the information spread by female using social media was false (Li, Zhang, & Wang, 2017). The relationship between relevant search activity and underlying disease patterns remains unclear in the absence of adequate background knowledge (Signorini, Segre, & Polgreen, 2011). The reasons why some individuals, communities, and organizations are more susceptible to health misinformation are not well understood. It is somewhat surprising that researchers studying health promotion and public health are now focusing on the internet's role in disseminating health information (Chew & Eysenbach, 2010 ; Murray et al., 2009 ; Ritterband & Tate, 2009 ; Scandfeld et al., 2010). Misinformation can hinder medical and healthcare advancements (Chou, Oh, & Klein, 2018). The current need to control the quality and accessibility of internet information is highlighted by the lack of regulation over health-related content on social media (Freeman et al., 2014). To combat health misinformation on social media, interdisciplinary research involving experts from various fields must be conducted.

In dentistry, the concept of a dental myth typically arises from incorrect traditional beliefs and unreliable information. Over time, these ideas become deep-rooted in the minds of successive generations, making it difficult for people to be aware of evidence-based dental care (Khan, Dawani, & Bilal, 2012). Healthy oral environment is a crucial asset for a person's social, economic, and personal development. Poor dental health can lead to demoralization, strained social relationships, chronic stress and depression, and significant financial costs. Therefore, it is sensible to emphasize that dental health is a strong indicator of overall health and quality of life (Khan, Dawani, & Bilal, 2012). Dentists must address many misconceptions and outdated beliefs that have been passed down through generations, some of which significantly impact general oral health (Pandya et al., 2016). While a study has been conducted in the Riyadh region of Saudi Arabia, to the best of our knowledge, no other studies has been conducted in the Western Region (Gowdar et al., 2021). This research aims to determine the frequency of the spread of health-related misinformation and its association with social media platforms used by individuals in the Western Region of Saudi Arabia.

## 2. MATERIALS AND METHODS

This is a cross-sectional study assessed the prevalence of dental misinformation via an online questionnaire. The questionnaire was developed using validated published studies (Gowdar et al., 2021 ; Vignesh & Priyadarshni, 2012). In addition, a pilot study was conducted to assess the modified added questions to the questionnaire, and a test-retest procedure was also carried out to refine the survey and determine the time required

to be completed. The survey consisted of four sections. The first section gathered participants' demographic information, including age, gender, and level of education. The second section included scaled questions about myths and facts related to oral health. The third section included multiple-choice questions about foods that reduce carious lesions and systemic diseases or conditions linked with periodontal problems. The final section contained myths and facts questions about the "Hollywood smile". Ethical approval for the study was obtained from the Institutional Review Board of Umm Al-Qura University on November 10, 2022, with reference number (HAPO-02-K-012-2022-11-1042).

A soft copy of the questionnaire was created using Google Forms. The questionnaire was distributed through various social media platforms, including WhatsApp, X, Snapchat, Instagram, and TikTok. The study employed a convenience sampling method. Data were collected from the population in the Western Region of Saudi Arabia. A total of 700 subjects were invited to participate in the study. All participants who willingly signed the consent form were included. Participants from the dental field, those from cities outside the Western Region of Saudi Arabia, and those who refused to sign the consent form were excluded. Data were collected, tabulated, and statistically analyzed using the Statistical Package for Social Sciences (SPSS v.20). Descriptive statistics were used to analyze the responses, and the Chi-square test was used to determine significance among different platform users. A p-value of <0.05 was considered the level of significance

## 3. RESULTS

A total of 481 questionnaires were collected via Google Forms, yielding a response rate of 68.7%. The majority of participants were female (85.7%), aged between 18 and 25 years (40.5%), held a bachelor's degree (64.9%), and resided in the Makkah region (81.1%) (Table 1). Approximately 60% of participants indicated that the factor they rely on most when choosing a dentist on social media is the experience and competencies of the doctor. Additionally, the factor that most influenced participants' choice of a dentist was the people's responses and opinions about the dentist on social media (62%). Among the various social media platforms, Snapchat was the most commonly used by the participants, with 41.6% reporting regular use (Table 1).

Table1: Sociodemographic data, Information regarding the preference for social media, and factors that influence participants' choosing a dentist			
Demographic variables		Total n	% Total
Age	18-25	195	5.40
	26-35	80	6.16
	36-45	120	9.24
	46	86	9.17
Gender	Female	412	7.85
	Male	69	3.14
Educational level	Dip/HS or Less	143	7.29
	Bachelor degree	312	9.64
	Higher degree	26	4.5
Place of residence	Makkah	390	1.81
	Jeddah	73	2.15
	Taif	12	5.2
	Madinah	6	2.1
?Do you have a personal account on social networking sites	Yes	432	8.89
	No	49	2.10
What is the most program you use on social media and follow doctors and celebrities through it	Instagram	81	16.8
	X	65	13.5
	Tiktok	64	13.3
	Snapchat	200	41.6
	WhatsApp	71	14.8
What are the factors you rely on most when choosing your dentist on social media	Prices of treatment services provided	76	8.15
	The experience and competencies of the doctor	290	3.60
	Accredited qualifications and certificates	48	0.10
	The center or clinic in which he works	37	7.7
	Doctor's account on social network	10	1.2
	Others	20	2.4
What are the possible factors that could influence your choice of dentist	Having an active account on social media	54	2.11
	Doctor's nationality	31	4.6
	People's responses and opinions about him on social media	298	0.62
	doctor character	98	4.20
? Do dental clinic ads on social media draws your attention	Yes	281	58.4
	No	200	41.6

Regarding myths and facts about oral health across social media platforms, participants' views are presented in Table (2). X and Snapchat users had the highest percentage of correct answers regarding oral health and dental treatment procedures. Among Instagram users, 59.30% did not believe there was a need to visit a dentist if they were not experiencing pain ( $p=0.001$ ).

Among all participants across various platforms, approximately 47% correctly disagreed with the statement that teeth scaling weakens tooth structure and may lead to sensitivity and mobility. A statistically significant difference was observed among social media users, with WhatsApp

users demonstrating the lowest level of understanding compared to users on other platforms ( $P=0.021$ ). Regarding the question assessing the importance of primary teeth, 43.20% of Instagram users recognized their significance, while the lowest awareness was among WhatsApp users, at 29.60% ( $P = 0.013$ ). Around 28.20 % of WhatsApp users disagreed that oral infection might spread among siblings.

Additionally, myths about tooth care practices, such as "brushing with baking soda or charcoal whitens your teeth" and "using hard bristles makes your teeth whiter," showed no significant differences across platforms. However, a statistically significant difference was observed regarding the knowledge about the recurrence of caries after a tooth is treated ( $P = 0.043$ ).

Myths and facts	Correct Answer	Instagram	X	TikTok	Snapchat	WhatsApp	Total across all platforms	P-Value
If there is no pain in the tooth no need of visiting a dentist?	Disagree	59.30%	56.90%	43.80%	45.50%	42.30%	48.60%	0.001
Scaling will weaken and leads to sensitivity, and mobility in the tooth structure	Disagree	50.60%	41.50%	39.10%	53.50%	38.00%	47.20%	0.021
Not to worry about milk teeth as they will eventually fall out with time	Disagree	43.20%	43.10%	34.40%	33.50%	29.60%	36.00%	0.013
The dental infection will not spread among siblings	Disagree	24.70%	26.20%	26.60%	23.50%	28.20%	25.20%	0.178
Root Canal Treatment (Pulpotomy/pulpectomy) should not be done for children, it's better to extract the teeth.	Disagree	48.10%	53.80%	37.50%	50.50%	50.70%	48.90%	0.065
Once a tooth is treated, the decay stops in that tooth	Disagree	49.40%	64.60%	51.60%	43.50%	43.70%	48.40%	0.043
Antibiotics can be stopped once the pain subsides	Disagree	58.00%	58.50%	43.80%	53.50%	50.70%	53.20%	0.381
Pregnant ladies were not supposed to take dental treatment until delivery	Disagree	37.00%	43.10%	28.10%	39.50%	33.80%	37.20%	0.201
Brushing with baking soda/charcoal whitens your teeth	Disagree	49.40%	49.20%	39.10%	38.50%	38.00%	41.80%	0.256
The more you brush using hard bristles, the whiter your teeth become	Disagree	76.50%	78.50%	62.50%	74.50%	66.20%	72.60%	0.128
Change your toothbrush after a cold, flu, or mouth infection because the germs can hide in the brush bristles and reactivate the infection	Agree	40.70%	41.50%	50.00%	56.00%	49.30%	49.70%	0.017
Stress may cause you to grind your teeth at night, resulting in worn-down teeth and jaw pain	Agree	51.90%	56.90%	50.00%	54.00%	43.70%	52.00%	0.507
People with gum disease are twice as likely to have coronary heart disease	Agree	19.80%	26.20%	28.10%	22.50%	31.00%	24.50%	0.172
The tooth is the only part of the body that can't heal itself	Agree	60.50%	55.40%	56.30%	69.50%	63.40%	63.40%	0.052
Using a pacifier during sleep reduced the chances of a baby suffering from sudden infant death syndrome (SIDS)	Agree	17.30%	13.80%	14.10%	21.00%	19.70%	18.30%	0.138
Sucking on objects after age 3 can lead to bite problems	Agree	70.40%	76.90%	67.20%	76.50%	67.60%	73.00%	0.158
Clove is used to relieve tooth pain	Agree	59.30%	64.60%	65.60%	72.50%	70.40%	68.00%	0.595

P ≤ 0.05 considered statistically significant

Table (3) presents the knowledge of the participants regarding types of food that reduce the risk of carious lesions and systemic diseases linked to periodontal problems across social media platforms revealed vary-ing levels of awareness. Cheese was the most recognized food with antibacterial effects, particularly on X (49.20%), but there were no statistically significant differences between platforms ( $p = 0.138$ ). Carrots are also known for its positive effect, especially on TikTok (64.10%), though platform differences were not statistically significant ( $p = 0.232$ ). Other foods, such as nuts, peanut butter, coconut, and tea, were less recognized, with no statistically significant difference across platforms ( $p > 0.05$ ). Regarding systemic diseases linked to periodontal problems, diabetes had the highest recognition, particularly on X (67.70%), but platform differences were not statistically significant ( $p = 0.084$ ). Hepatitis, osteoporosis, and pregnancy were less frequently associated with periodontal health, with no significant platform differences ( $p > 0.05$ ).

The study assessed knowledge of myths and facts related to the “Hollywood smile” across social media platforms (Table 4). Regarding the myth that “Hollywood smile cannot decay”, Instagram users showed the highest correct response percentage (48.10%) and WhatsApp the lowest (28.20%), but no statistically significant platform differences were found ( $p = 0.113$ ). Regarding the idea that “the artificial surface of a tooth may not decay, TikTok users had the highest correct answer (60.00%), with statistically significant platform differences ( $p = 0.036$ ). For the statement that anyone can get a Hollywood, TikTok users had the highest correct response percentage (59.40%). The Snapchat users had the highest cor-

rect response percentage (72.50%) for the myth “a specialist performs many diagnostic procedures”, with a statistically significant differences between platforms ( $p = 0.027$ ). Finally, for the statement that “a Hollywood smile lasts a lifetime”, there was with no statistically significant differences between platforms ( $p = 0.13$ ).

#### 4. DISCUSSION

Social media has become a tool influencing interpersonal interactions and communication, with the potential to play an important role in oral health education and awareness (Baik, Anbar, Alshaiikh, & Banjar, 2022). This widespread use of social media can help disseminate critical information on oral health, which is an essential aspect of overall well-being (Communications, Space and Technology Commission, 2021; Glick & Meyer, 2014). However, many myths and misconceptions about oral health persist (Gowdar et al., 2021). The aim of this study was to assess oral health misinformation and its association with different social media platforms. Our results showed that 62% of participants in the Western Region in Saudi Arabia made healthcare decisions, such as choosing their doctors, based on others' opinions and recommendations. This finding contrasts with a study conducted in Romania, where only 20.56% of respondents relied on personal

recommendations to choose their dentist. The higher percentage in our study may be attributed to the predominantly female participants, who are perhaps more likely to base health-related decisions on advice from others (Ungureanu & Mocean, 2015).

Table 3: Myths and Facts about Foods and Systemic Diseases/Conditions Linked Oral Health Across Social Media Platforms							
Foods that reduce the risk of carious lesions and have an anti-bacterial effect	Instagram	X	TikTok	Snapchat	WhatsApp	Total across all platforms	P-value
Cheese	28.4%	49.20%	46.90%	47.00%	42.30%	43.50%	0.138
Nuts	37.00%	36.90%	48.40%	46.00%	40.80%	42.80%	0.549
PeanutButter	27.20%	33.80%	28.10%	29.00%	26.80%	28.90%	0.705
Carrots	46.90%	50.80%	64.10%	55.50%	50.70%	53.80%	0.232
Coconut	35.80%	29.20%	37.50%	43.00%	35.20%	38.00%	0.206
Tea	27.20%	29.20%	25.00%	20.50%	26.80%	24.30%	0.33
Systemic diseases or conditions that are linked with periodontal problems							
Hepatitis	% 8.60	12.30%	18.80%	16.00%	12.70%	14.10%	0.304
Diabetes	50.60%	67.70%	53.10%	65.00%	53.50%	59.70%	0.084
Pregnancy	42.00%	41.50%	43.80%	48.50%	47.90%	45.70%	0.544
Osteoporosis	25.90%	49.20%	48.40%	48.00%	39.40%	43.20%	0.132

P ≤ 0.05 considered statistically significant

Table 4: Myths and Facts Regarding Hollywood Smile across Social Media Platforms							
	Instagram	X	TikTok	Snapchat	WhatsApp	Total	P-value
Hollywood smile cannot decay	48.10%	52.30%	50.00%	42.50%	28.20%	43.70%	0.113
The artificial surface of a tooth may not decay, but the natural tooth underneath it can if not properly cared for	51.90%	60.00%	51.60%	63.50%	54.90%	58.20%	0.036
Anyone can get a Hollywood smile	44.40%	43.10%	59.40%	51.00%	32.40%	47.20%	0.172
After a long period of time, the artificial teeth begin to lose their strength, so the patient must change them, but with care, you may live with the patient for 15 years or more	60.50%	53.80%	60.90%	60.50%	53.50%	58.60%	0.726
The specialist doctor performs many diagnostic procedures to ensure that the person qualifies for the installation of cosmetic lenses	56.80%	52.30%	64.10%	72.50%	50.70%	62.80%	0.027
A Hollywood smile lasts a lifetime	55.60%	50.80%	57.80%	51.50%	36.60%	50.70%	0.13

P ≤ 0.05 considered statistically significant

In this study, around 47.20% of participants across all platforms reported that scaling weakens teeth, leading to sensitivity and mobility. A study was conducted by Vignesh and Indra Priyadarshni in 2012 found that 63.2% of participants agreed with the same misconception (Vignesh & Priyadarshni, 2012). However, our study did not directly assess negative experiences with dental procedures, so it is possible that observed sensitivity among younger participants was influenced by prior dental treatments or individual susceptibility. Additionally, approximately 25% of participants across all platforms reported that dental infections do not spread among siblings, which mirrors findings from a similar study in Riyadh (Gowdar et al., 2021). Concerning the significance of primary teeth, 36% of social media users were aware of their importance, with the lowest correct response percentage found among WhatsApp users (29.6%). This is consistent with previous studies where knowledge about the role of primary teeth was also limited (Setty & Srinivasan, 2016). This lack of understanding may be due to the common belief that primary teeth are temporary and less important (Balakrishnan & Vadakkepurayil, 2023).

In terms of the relationship between oral health and general health, only 24.5% of participants across all platforms recognized the link between gum disease and coronary heart disease. This finding aligns with previous research where only a small percentage of individuals were aware of the connection

between periodontal disease and cardiovascular conditions (Bawankar, Kolte, & Kolte, 2021). Given the importance of oral health in overall well-being, further research is needed to explore risk factors, prevention strategies for gum disease, and its potential links to heart disease. Regarding oral health during pregnancy, 37.20% of participants across all platforms believed that dental treatment should be avoided until after delivery. This contrasts with a study from Indonesia, where 92% of respondents recognized the importance of routine dental care during pregnancy (Azizah, Ramadhani, Suwargiani, & Susilawati, 2021). The difference may stem from the higher proportion of female participants in our study, who expressed concerns about the potential effects of dental procedures on fetal development.

Dietary balance is critical for overall and oral health, but knowledge of the oral health benefits of certain foods was generally low. For instance, fewer than 25% of social media users were aware of tea's potential anti-cariogenic effects, despite supporting research (Goenka et al., 2013). Similarly, only 43% of participants recognized the anti-cariogenic properties of cheese, a finding that is consistent with a previous study (Sreshtaa & An-janeyulu, 2020). These results suggest a general lack of public knowledge about foods that could benefit oral health. Regarding the connection between diabetes and periodontal health, approximately 60% of participants were

aware of this link, with users on X showing the highest percentage of correct answer. This contrasts with earlier research, which reported lower levels of knowledge regarding the association between periodontal disease and diabetes mellitus (Alsalleeh et al., 2022). Variations in these findings could be due to differences in sample characteristics, study methodologies, or the timing of the research.

Finally, the study also explored myths and facts related to Hollywood smiles. The results indicated that beliefs about Hollywood smiles varied depending on the social media platform. For example, 63.50% of Snapchat users correctly answered that the natural tooth underneath a Hollywood smile could decay, consistent with previous studies (Alsurayyi et al., 2022). Additionally, 60.90% of TikTok users correctly answered that artificial teeth may need replacement after a long period, supporting findings from another research (Alsurayyi et al., 2022). However, less than half of WhatsApp users disagreed with the myth that a Hollywood smile lasts a lifetime, which contradicts other studies (Alsurayyi et al., 2022). These differences in knowledge across platforms may be attributed to the distinct demographics of each platform's users. In Saudi Arabia, for instance, 73% of female social media users prefer Snapchat, a platform often associated with greater interest in aesthetic and cosmetic procedures. In contrast, WhatsApp and X are more popular among males. Additionally, females tend to follow more dental or dentist-related accounts, which may explain some of the platform-specific differences in awareness. It is also important to note that platforms like Instagram and Snapchat have been shown to be particularly effective in conveying oral health messages (Bahabri & Zaidan, 2021; Aboalshamat et al., 2023).

Overall, the findings of this study emphasize the important role social media can play in influencing oral health knowledge. While there is some level of understanding about the myths surrounding oral health, dietary factors, and the connection between oral health and general health, misconceptions persist, particularly on certain platforms. This highlights the need for targeted oral health education campaigns on social media to improve public knowledge and promote better health outcomes.

## 5. STRENGTHS AND LIMITATIONS

Despite the strengths of the study, there are several limitations to consider. Firstly, the study relied on a self-reported questionnaire, which introduces the potential for response biases, such as social desirability bias or inaccurate recall. Additionally, the use of a convenience sampling method limits the generalizability of the results, as the sample may not fully represent the broader population. Another limitation is that Facebook was excluded from the survey, as it is less commonly used in our sample, which may have reduced the precision of the findings. However, the study benefited from the inclusion of various other social media platforms, including relatively newer applications like TikTok, which helped reach a diverse range of participants. Furthermore, the study was conducted in the Western Region of Saudi Arabia, and no pre-

vious studies were found in our search that directly compare to this region.

## 6. IMPLICATIONS AND RECOMMENDATIONS

The knowledge gaps identified in this study can serve as a foundation for guiding future research, particularly in aiding the Saudi Ministry of Health in the development of evidence-based strategies across various platforms to combat oral health misinformation. It is recommended that the Ministry regulate spread of oral health information via trusted and reliable individuals then authorize its publication through their official social media accounts, to effectively reach and educate the public on oral health matters. Furthermore, dental professionals should actively engage with these platforms to promote accurate oral hygiene practices and address common misconceptions surrounding dental care topics which interest the population. Additionally, conducting longitudinal studies across different regions of Saudi Arabia would be valuable in obtaining more generalized, robust, and comprehensive insights that could inform public health policies and initiatives on a national scale.

## 7. CONCLUSION

The results of this study indicate that the selection of correct answers regarding myths or facts was influenced by the type of social media account. Furthermore, the widespread prevalence of oral health myths on social media platforms underscores the critical need for accurate information on oral hygiene practices. Dental professionals are therefore encouraged to actively engage with patients to provide education on proper oral hygiene and to address common misconceptions. Utilizing social media platforms offers an opportunity to reach a broader audience and disseminate reliable and evidence-based information about oral health.

## AUTHOR CONTRIBUTION

A.A.N.: study design, questionnaire development, statistical analysis, paper writing and editing; A.A, J.A and H.A., M.A., T.A.: questionnaire development and testing, data collection, data entry, and paper writing; H.A.: statistical analysis and paper reviewing. S.S.: paper editing. All authors have read and agreed to the published version of the manuscript.

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## INSTITUTIONAL REVIEW BOARD STATEMENT

The study was approved by the ethical research committee at Umm Al-Qura University, Faculty of Dentistry, Makkah, Saudi Arabia (IRB number HAPO-02-K012-2022-11-1042).

## INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study.

## Data Availability Statement

The datasets are available from the corresponding author on reasonable request.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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