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**Original Article**

# Misconceptions About Dental Topics on Social Media Platforms: Fluoride Toxicity, Teeth Whitening, and Waterjet Use on YouTube and Instagram

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## ABSTRACT

This study aimed to assess the prevalence of dental misconceptions circulating on SM, focusing on the most popular topics. In addition, the accuracy of the information was assessed and validated through evidence-based dentistry. Two SM platforms, "YouTube and Instagram," were selected due to their distinct advantages over the others. A range of posts was examined by searching various dentistry-related hashtags. Posts that frequently contained incorrect information were identified, narrowing the selection to three key topics: "fluoride toxicity, bleaching, and water-jet." Each topic was further explored using multiple hashtags. Misleading posts were identified and ranked based on engagement metrics, such as the number of views and likes, leading to the selection of six posts per topic. The presenter's profession, post type, and content validity were assessed for each. The analysis showed that fluoride-related posts had a 100% misconception rate, bleaching had 50%, and water-jet had 33.33%. Presenter background appeared to be a contributing factor, as posts by non-professionals were twice as common as those by dental experts, with only 27.3% of non-professionals providing accurate information. Regarding content validity, 61.1% of posts across the three topics contained incorrect data. When considering audience engagement, using a cut-off of 100 likes, 61.1% of the most-liked posts contributed to misinformation. Despite the limited sample size, a high prevalence of misconceptions was observed. This is concerning, as SM significantly influences people's lifestyles, and many individuals rely on it for health-related information.

**Keywords:** Bleaching, Fluoride F, Social media SM, Waterjet Wj, Misconceptions, Community water fluoridation CWF.

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## Introduction

The rise of social media and the increasing engagement of the general public with these platforms have grown significantly in recent years. Social media refers to internet-based tools that enable user-generated content [1], facilitate real-time interaction, and promote collaboration among users. These platforms provide individuals and communities with the ability to access and exchange information, ideas, videos, photos, and personal messages.

A wide range of social media sites offers various services, including social networking, professional

connections, information dissemination, and entertainment purposes [2]. In today's world, social media plays a crucial role in shaping lifestyles. It holds significant value and exerts a notable influence on professional environments [2].

The growing role of social media in healthcare is undeniable, with increasing evidence supporting its use in this field. Reports indicate a substantial rise in social media engagement among doctors, surging from 41% in 2010 to 90% in 2011, while usage rates among medical students have surpassed 90% [2].

Many patients dealing with specific health conditions find social media to be a convenient platform for accessing information about their illnesses and connecting with others facing similar challenges [2]. Beyond the previously mentioned features, social media serves as a valuable tool for healthcare professionals, facilitating professional education, institutional promotion, patient care, public health initiatives, and patient education [3].

Despite these advantages, social media presents significant risks within dentistry and healthcare. Its potential benefits are often overshadowed by the widespread dissemination of inaccurate information, harm to the professional image [2], and the spread of dental misconceptions. These issues frequently stem from misinformation shared by unqualified general practitioners, unlicensed doctors, and uninformed public users.

*Objective*

This review aims to assess the prevalence of dental misconceptions on Social Media (SM) platforms, specifically YouTube and Instagram, by focusing on the most popular topics. Additionally, it seeks to evaluate the accuracy of the information and validate it through Evidence-Based Dentistry.

## Materials and Methods

Traditional literature reviews in dentistry have largely adhered to positivistic epistemologies, aiming to measure, quantify, and generalize findings, much like Cochrane reviews.

This review specifically focuses on addressing popular misconceptions circulating on social media, particularly those shared by general practitioner dentists and well-known users. It aims to assess the accuracy of the information, critically examine its validity, and present these findings. The insights gathered will provide readers with the necessary knowledge to form their conclusions.

For this research, YouTube and Instagram were selected as the primary search platforms due to their unique advantages over other social media applications. These platforms enable data storage and retrieval while allowing researchers to track engagement metrics such as followers, likes, and views. Additionally, they offer the ability to review the video creator's profile and access supplementary details, including the posting date.

Although social media platforms like Snapchat, Twitter, and Facebook enjoy greater overall popularity, they were excluded from this study. Snapchat, in particular, lacks a comprehensive search function, and its content disappears after a set period without an option for retrieval, making it unsuitable for analysis.

Twitter and Facebook are effective search tools that offer several advantages. However, YouTube and Instagram were chosen for this study due to their unique benefits. These platforms function as efficient search engines, allow data storage and retrieval, and are user-friendly. Additionally, their exclusive focus on videos and photos enhances the way people convey their thoughts and ideas, making the content more impactful compared to simple text-based posts on other platforms. Moreover, they provide visible engagement metrics such as likes and views, along with access to the presenter's profile—key factors necessary for statistical analysis in this study. While these platforms have certain drawbacks, their advantages outweigh the limitations of other excluded applications like Facebook, Twitter, and Snapchat.

The research process began by identifying various dental-related videos and images through hashtag searches. Keywords used included "Dental health, teeth, oral health, fluoride, teeth bleaching, teeth whitening, veneers, braces, scaling, teeth cleaning, and cosmetic dentistry." The accuracy of the content was examined, and posts containing incorrect information were selected. These were then categorized based on frequency and popularity, narrowing the focus to three primary topics: "fluoride toxicity, bleaching, and water jet."

Next, targeted searches were conducted for each of these topics using relevant hashtags. Posts containing misinformation were further filtered and ranked according to engagement levels—video posts were sorted by the highest number of views, while photo posts were ranked by the highest number of likes. This selection process resulted in six posts per topic.

Each topic was assigned a numerical code: 1 for fluoride toxicity, 2 for bleaching, and 3 for water jet. A structured table was created to analyze the posts based on specific criteria. The first parameter identified the type of post, assigning code 1 to videos and code 2 to photos. The second parameter assessed the presenter's

professional background, with dental professionals labeled as code 1 and non-dental presenters as code 2. The third criterion evaluated content validity, where accurate information was given code 1 and misinformation was assigned code 2. Additionally, the number of views and likes was recorded. A double-entry method was used to ensure accuracy. Based on these factors, posts were categorized as either contributing to misconceptions (coded as 1) or not (coded as 0).

**Results and Discussion**

A descriptive analysis was conducted to examine the data. Posts related to fluoride toxicity, bleaching, and water jet were equally distributed, each accounting for 33.33%, with a statistically significant P-value of 0.048 (refer to **Table 1**). However, when comparing the format of content, photos appeared less frequently than videos, making up only 27.8% of the total posts (see **Table 2**).

Findings revealed that misinformation was present in all fluoride-related posts (100%) while bleaching had a 50% rate of misconceptions, and water-jet content contained inaccuracies in 33.33% of cases (see **Table 3**). The role of presenters was also analyzed, indicating that non-professionals contributed twice as much as dental professionals, who accounted for only 38.9% of the total. In contrast, non-dental professionals were responsible for 61.1% of the dental-related posts (see **Table 4**).

These outcomes suggest that social media users may show greater interest in aesthetic topics rather than oral hygiene, as misconceptions were lower for water-jet content. Additionally, the data highlights the minimal involvement of dental professionals in sharing accurate information within these platforms.

**Table 1.** Representation of sample size

| Social media post | Frequency | Percent | Valid percent | Cumulative percent |
|---|---|---|---|---|
| 1 | 6 | 33.3 | 33.3 | 33.3 |
| 2 | 6 | 33.3 | 33.3 | 66.7 |
| 3 | 6 | 33.3 | 33.3 | 100.0 |
| Total | 18 | 100.0 | 100.0 | |

Social media posts which are 1: fluoride, 2: Bleaching, and 3: Water jet, represented equally by 33.33% in the data.



**Table 2.** Frequency of videos versus photos

| Type of post | | Frequency | Percent | Valid percent | Cumulative percent |
|---|---|---|---|---|---|
| Valid | 1 | 13 | 72.2 | 72.2 | 72.2 |
| | 2 | 5 | 27.8 | 27.8 | 100.0 |
| | Total | 18 | 100.0 | 100.0 | |

This table shows the percentage of videos that had been coded 1 and the percentage of photos with code 2; the images are less in terms of presentation in social media by 27.8% than videos representing 72.2%.

**Table 3.** The percentage of misconception among each topic

| SM post | | Misconception | | Total | Percentage |
|---|---|---|---|---|---|
| | | 0 | 1 | | |
| P | 1 | 0 | 6 | 6 | 100% |
| | 2 | 3 | 3 | 6 | 50% |
| | 3 | 4 | 2 | 6 | 33.33% |
| Total | | 7 | 11 | 18 | |

This table shows the percentage of misconception in fluoride, which coded 1 is 100%, bleaching, which coded 2 is 50%, and water-jet, which coded 3 is 33.33%; code 0: post did not cause misconception, and code 1: post cause misconception.

**Table 4.** Number of dental professional presenters versus the number of non-dental professional presenters

| Type of presentation | Frequency | Percent | Valid percent | Cumulative percent |
|---|---|---|---|---|
| 1 | 7 | 38.9 | 38.9 | 38.9 |
| 2 | 11 | 61.1 | 61.1 | 100.0 |
| Total | 18 | 100.0 | 100.0 | |

The table shows the percentage of dental professional presenters, which coded 1 is 38.9%, whereas the percentage is double in non-dental presenters, which coded 2 is 61.1%.

The analysis examined the link between the type of presenter sharing information on social media and the likelihood of spreading misconceptions. Findings indicated that when non-professionals created the posts, the probability of conveying accurate information was only 27.3%. This contributed to a 30% increase in misinformation among those exposed to the content (see **Table 5**). However, due to the limited sample size, the results were not statistically significant, with a P-value of 0.22.

**Table 5.** Misconceptions released by dental professional presenters versus non-dental presenters

| Presentation | Misconception | | Total |
|---|---|---|---|
| | 0 | 1 | |
| 1 | 4 | 3 | 7 |
| 2 | 3 | 8 | 11 |
| Total | 7 | 11 | 18 |

The table shows codes 1 and 2 for dental and non-dental professional presenters, respectively; in contrast, codes 0 and 1 didn't cause misconception and caused misconception, respectively; it explains if the non-professionals did the post, the percentage of delivering the right information is 27.3%, and it will cause 30% misconception.

The relationship between social media posts and the number of likes was analyzed, with the following results: fluoride posts had a mean of 7,139.8 likes (SD = 10,865.3), bleaching posts had a mean of 5,183.5 likes (SD = 5,655.9), and water-jet posts had a mean of 126 likes (SD = 78.5). Due to the high variability in the data, the results were found to be insignificant, with a P-value of 0.240, which can be attributed to the small sample size, as previously mentioned. Interestingly, this lack of significance suggests that users do not show preference or bias toward any particular group of posts (see **Table 6**).

**Table 6.** Mean value (± std. deviation) of the number of likes in each post

| | N | Mean | Std. deviation | Std. error | 95% Confidence interval for mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower bound | Upper bound | | |
| 1 | 6 | 7139.83 | 10865.255 | 4435.722 | -4262.55 | 18542.22 | 121 | 24631 |
| 2 | 6 | 5183.50 | 5655.902 | 2309.012 | -752.01 | 11119.01 | 44 | 12267 |
| 3 | 6 | 126.00 | 78.483 | 32.041 | 43.64 | 208.36 | 30 | 233 |
| Total | 18 | 4149.78 | 7306.100 | 1722.064 | 516.54 | 7783.02 | 30 | 24631 |

Regarding the accuracy of the information posted, 38.9% of the data across all three topics were correct, while 61.1% were incorrect. When considering posts with at least 100 likes, 61.1% of the posts contributed to misconceptions among those who viewed and liked them. To further explore the results, we examined the likelihood of a post with accurate information still causing misconceptions. The statistics revealed that even when a post contained correct information, there was still a 28.6% chance that people would misunderstand it, leading to misconceptions. In contrast, 71.4% of the time, correct posts did not result in any misconceptions (see **Table 7**).

**Table 7.** The relation between formation validity and misconception

| Beneficial | | Misconception | | | | Total | |
|---|---|---|---|---|---|---|---|
| | | 0 | | 1 | | | |
| | | No. of posts | Percentage | No. of posts | Percentage | No. of posts | Percentage |
| Incorrect information | 1 | 2 | 18.2% | 9 | 81.8% | 11 | 61.1% |
| Coreect information | 2 | 5 | 71.4% | 2 | 28.6% | 7 | 39.9% |
| Total | | 7 | 39.9% | 11 | 61.1% | 18 | 100% |

The table explains the percentage of correct and incorrect information, in addition to the percentage of misconceptions caused by correct information; codes 1 and 2 under beneficial mean incorrect and correct information, respectively.

This pilot study, the first of its kind in Saudi Arabia, was conducted with a small sample size, which contributed to a high degree of variability in the results and some insignificant P-values. Despite these limitations, the findings revealed a 100% rate of misconceptions regarding fluoride, 50% for bleaching, and 33.33% for water-jet topics. These results highlight a significant issue with the accuracy of health-related information shared on social media, a platform widely used by patients and individuals seeking medical advice. The large number of media followers underscores the importance of presenters addressing this problem, as they influence the information being shared. Many presenters provide a mix of both accurate and inaccurate content, and followers often struggle to distinguish between valid and misleading information. Moving forward, we aim to expand our research with a larger sample size and explore a wider range of topics.

*The most common trendy oral health-related misconceptions in S.M accounts*

The topics were categorized into three primary groups: fluoride toxicity, water-pick applications, and bleaching techniques.

*Fluoride*

Fluoride is an inorganic ion derived from fluorine, naturally found in water, air, and soil. It ranks as the thirteenth most abundant element in the Earth's crust and has various industrial applications, including its addition to water, toothpaste, and other products [4]. Approximately 437.2 million people worldwide are exposed to both naturally occurring and artificially fluoridated water [5]. According to the World Health Organization (WHO), dental caries is a significant public health issue in most developed nations, affecting 60-90% of schoolchildren and the majority of adults [6]. Fluoride is now widely recognized as a key factor in the substantial reduction of caries prevalence globally [7]. However, dental caries is more prevalent among individuals in lower socioeconomic groups, making community water fluoridation (CWF) a safe and effective intervention. CWF benefits all socioeconomic levels without requiring active participation from individuals [8].

Despite its proven benefits, numerous individuals on social media spread false claims about fluoride toxicity, suggesting it can cause various diseases and may even be fatal in small doses. Some people mistakenly believe that fluoride is carcinogenic or that it enhances the harmful effects of certain drugs. Even more concerning are beliefs that fluoride negatively affects the brain, potentially leading to memory loss, and that it harms the thyroid gland, increasing the risk of hypothyroidism. Additionally, many claim that fluoride weakens bones and teeth. Unfortunately, these misconceptions are widely supported by members of the public, who avoid using fluoridated toothpaste and mouth rinses, even advising others to do the same. The most alarming aspect of this situation is that these beliefs are entirely unfounded and unsupported by scientific evidence.

It is undeniable that a significant portion of the population experiences fluorosis, a condition characterized by hypomineralization of tooth enamel, which occurs when young children consume fluoride over the recommended amount during the development of their teeth. This condition can be easily prevented and managed by consulting with a qualified dentist to prescribe the appropriate type and dosage of fluoride [9].

Fluoride is regarded as a groundbreaking advancement in dentistry due to its numerous benefits, particularly in the reduction and treatment of dental caries, thanks to its anti-cariogenic and anti-microbial properties [4]. It has been scientifically established that the most effective method for preventing cavities is the use of fluoridated dental products [10]. Fluoride works by lowering the pH level in the oral cavity, causing bacteria to expend more energy in maintaining the pH balance, leaving them with less energy to carry out vital processes such as growth, reproduction, and acid production. As a result, the risk of caries is reduced. Additionally, fluoride can aid in remineralizing tooth structure, making the enamel more resistant to acids and decay. However, fluoride must be used responsibly, with the correct amount, at the appropriate time, and under the supervision of a qualified dentist [4].

*Teeth bleaching*

Teeth whitening is a procedure aimed at lightening the color of teeth. As the public's focus on aesthetics and facial appearance grows, concerns about the color of teeth have become more prominent. Studies have shown that between 20-35% of people in the United States and the United Kingdom are dissatisfied with the shade of their teeth, leading to an increased demand for whitening treatments, especially among younger individuals. One of the advantages of teeth whitening is that it helps preserve the natural structure of the teeth, and the procedure is considered relatively safe and

quick [11]. A smile's appearance plays a significant role in how individuals perceive their overall facial attractiveness, and research suggests that teeth whitening can boost dental confidence [12].

Whitening can be achieved through various methods, which may be either extrinsic or intrinsic. However, some common misconceptions about teeth-whitening methods posted on social media involve over-the-counter (OTC) products and home remedies, such as using charcoal, lemon, baking soda, strawberries, and whitening strips. These techniques can potentially harm the tooth structure, damaging the enamel or making the mouth more prone to cavities and oral sores. Teeth whitening should be carried out by a dental professional following a comprehensive oral evaluation, including both dental and medical history, along with a thorough intra-oral exam. A precise diagnosis is crucial to rule out any discoloration caused by underlying diseases or conditions that may require endodontic, restorative, or surgical intervention. If any treatments are necessary, the whitening procedure should be postponed until all required dental work is completed. Once deemed appropriate, the dentist will determine whether the patient is a suitable candidate for whitening. Lastly, patients should be cautioned about purchasing products that may not effectively whiten their teeth and could even cause harm [13].

*Water-jet*

Also referred to as an oral pulsating irrigator, a water flosser is a device that uses a stream of water to help remove plaque from the teeth. Effective plaque removal and maintaining oral hygiene are crucial in controlling and preventing oral infections and diseases [14]. Mechanical cleaning of the teeth is necessary to reduce the risks of cavities and periodontal disease. In addition to daily brushing with a manual or electric toothbrush, interdental cleaning aids should be used. These aids include manual options, such as interdental brushes, dental floss, and wooden toothpicks, as well as power-driven devices like oral irrigators [15]. The water jet operates through a combination of pulsation and pressure to disrupt and eliminate plaque and debris from the teeth. It can also deliver antimicrobial solutions into the sulcus and between the teeth. One key advantage of the water flosser is that it is particularly beneficial for individuals with reduced manual dexterity [16]. In some cases, the water flosser may be more effective than traditional string floss, particularly for those with braces, permanent retainers like lingual bars, crowns, bridges, implants, or those suffering from periodontal disease.

Studies have shown that water picks are more effective than string floss in reducing gingival bleeding and removing plaque when used alongside brushing [17]. In patients undergoing orthodontic treatment, research has demonstrated that water jets significantly reduce plaque and bleeding in both the entire mouth and the interdental areas compared to regular flossing [18]. Water flossers are considered an effective, reliable, and easy method for flossing. Adding a water flosser to a regular tooth brushing routine has been shown to greatly enhance oral and gingival health compared to brushing alone. While there are many discussions on social media regarding the use of regular floss versus water jets, the majority of posts tend to be accurate, though the number of such posts is relatively limited.

## Conclusion

The statistical analysis revealed significant dental misconceptions, with a P-value of 0.048. These misconceptions were found to be prevalent across social media on the topics of fluoride, bleaching, and water-jet usage, with prevalence rates of 100%, 50%, and 33.3%, respectively. Despite the small sample size, this issue remains critical, especially given the influence of social media on people's lifestyles today. Many patients now find it easier to obtain health-related information via social media.



*Recommendations*

To address this problem, several steps should be taken, starting with the implementation of awareness programs, which should be the first line of defense. Additionally, dental associations must collaborate with relevant authorities to regulate the participation of presenters on social media.

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