



**Review Article**

**Impact of social media in educating and improving the oral health status in children – A Comprehensive review**

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**How to cite:** Nagaveni et al, Impact of social media in educating and improving the oral health status in children – A Comprehensive review, *Int J Pedo Rehab* 2022; 7(1):63-72

<https://doi.org/10.56501/intjpedorehab.v7i2.649>

Received : 06.04.2022

Accepted: 12.06.2022

Web Published: 30.06.2022

**ABSTRACT**

Electronic media in the form of television and radio has played a pivotal role over the decades in influencing human minds. Social media is the most popular form of modern-day media that directly connects people all over the world. Due to its fast access and ease of use, in the form of text messages, images, audio and video files, social media has irreplaceably taken over present-day modes of communication. It is also the most economical means which have made its use span across all age groups.

Children love the variety of exciting videos that brings to them a plethora of information and are hooked onto it from a very young age. Social media has limitless potential when used as a learning tool. It can create awareness, spread knowledge and can guide in adopting new life style practices. We are all familiar with how kids like to imitate. They watch and learn simple manners such as saying ‘thank you’ and ‘sorry’ like their favourite cartoon characters who become their role models. Images and videos help children absorb information in a fun way that can easily be reproduced when needed. As learning begins early, surely the impact of social media on young minds is surmounted and can help them develop healthy habits. In this essay it has been discussed in detail how social media can be made useful in both educating and improving oral health status of children.

*Keywords: Children; Social media; Oral health*

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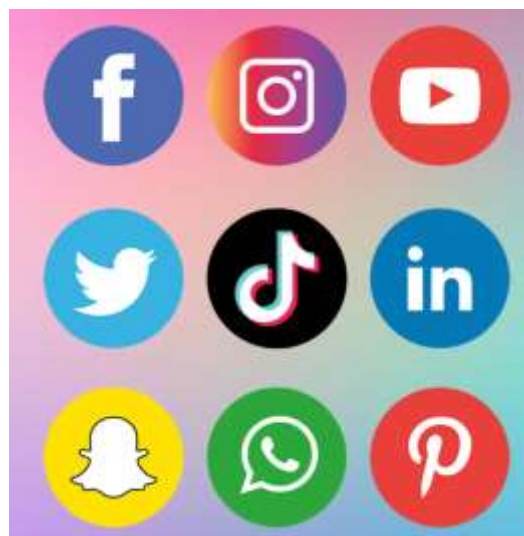
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## INTRODUCTION

Children are nation's future and tomorrow's citizens. Overall health of children is important in building a strong nation. During their active years of growth a good set of teeth is needed in achieving dietary goals but sadly oral health is the most neglected of all. World Health Organisation states that tooth decay is one of the most common chronic diseases in children.<sup>1</sup> Many psychological, social and physical disorders are associated with poor oral health in children. To say that, this disease can be effectively prevented by proper oral hygiene measures is an understatement. Lack of awareness among parents and children is the root cause and there is nothing more befitting that social media (SM) tools to curb this evil.<sup>1</sup>

Social media are web based effective tools and have become integral part of daily lives of all mankind throughout the world. Health field is not exception to this. Pertaining to health of an individual, this specific field designated in terms of "infodemiology" that has become an emerging field in public health research.<sup>2</sup> Infodemiology means the 'the science of distribution and determinants of information in an electronic media, specifically the Internet, or in a population, with the ultimate aim to inform public health and public policy'.<sup>2</sup> From an epidemiological perspective, they are used for evaluation and reporting of real-time disease trends (surveillance of information often called infoveillance) and the recruitment of patients for online studies and clinical trials.<sup>2,3</sup> They are popularized fast in the last fifteen years compared to conventional social interactions and gained the maximum usage in recent years as the COVID-19 has imposed restrictions on the conduction of face-to-face epidemiological inquiries, along with the economic crisis that has impacted research in many countries including developing India. Moreover, SM are used to maintain, improve and accelerate communication in health care as well as to promote institutional branding and education.<sup>2,3</sup>

Creating awareness can begin with simple posters showing how germs and sugars attack teeth. Various forms of SM are employed in oral health research to study, disseminate or to record the different aspects of oral health status.<sup>3,4</sup> They may be Google Search, blogs, podcasts, You Tube, Whatsapp, Twitter, Face book and Instagram etc (Figure 1).<sup>2,5</sup> For those more interested to read, detailed information may be included as a blog which can be shared via a link directing to the blog. These can be shared online by the primary health care provider through different platforms of SM.<sup>1,4-6</sup> Opening the comment section to active discussions can make it more interactive and engaging. Instagram is the most favourite among the various SM platforms with stories and reels to keep it most exciting.<sup>4,5</sup> Rewards in the form of likes, comments and shares engage both the provider and follower. YouTube videos on 'flossing and brushing teeth', 'visiting the dentist' and 'taking care of tiny, milk teeth' help kids understand what needs to be done more effectively. Most kids can relate to their favourite peppa pig at the dentist episode and this helps them follow through the instructions given by the dentist without anxiety. Another tool is games guiding them to fight germs off the teeth and modify decay causing foods by replacing them with teeth friendly options.<sup>1,6</sup> The information gathered by kids through these channels can then be put into practice by the guidance of parents in building healthy habits for teeth.<sup>2,5</sup>



**Figure 1:** Different Social Media (Source: Internet)

## **DEFINITIONS OF SOCIAL MEDIA**

Various authors have defined SM with focusing on the various features of SM that differs from traditional technologies.<sup>2,3</sup>

1. A type of application based on the internet and web 2.0 technology (Kaplan and Haenlein – focusing on technological feature of SM)
2. An online environment where users can contribute to the content and consume content mostly generated by other users (McGowan et al – focusing on communication features of SM)

Therefore, emphasizing its communication features, SM is a web 2.0 based platform for individuals to get access to, share, and generate content being “created by users for users.”<sup>2,3</sup>

## **SOCIAL MEDIA AND PEDIATRIC DENTISTRY**

SM is one among the strongest tool for disseminating health information and its impact on general health has been widely explored in the literature. Various scoping reviews have been done from 2002 to 2022 to emphasize the uses of SM regarding oral health of children.<sup>1,4</sup> Chen and Wang<sup>2</sup> in their systematic review categorized the uses of SM pertaining to oral health aspect based on user types like 1. Health researchers and professionals 2. Public and 3. Health institutions to overcome research gaps and future avenues for qualitative research in SM for improving oral health of an individual.

Recently, Bastani et al<sup>1</sup> in their bibliometric analysis, analysed 80 articles from 1997-2022 to show the impact of SM on oral health of children. Increased usage of SM was evident after 2005. The most used indexed key words in children’s oral care research from 2005-2015 were image processing, audio-visual equipment, nuclear magnetic resonance imaging, computer program, computer simulation and computer-assisted therapy/surgery. Whereas after 2015, with the terms of dental caries, dental anxiety and dental procedures, other digital technologies like mobile application, medical information, virtual reality and tele dentistry were identified.

Parents or guardians/caretakers play a pivotal role in developing and improving an oral health care behaviour among their children.<sup>6</sup> Use of SM in dissemination of oral health information (OHI) among children and their parent is also emerging nowadays. Daily oral hygiene maintenance habits or procedures like tooth brushing, flossing, mouth rinsing should be regularly incorporated in children’s day to day life with the help of their parents.<sup>7</sup> If these oral health practices do not improve there are more chances of developing early childhood caries resulting in severe oral health complications affecting overall health of the children. Therefore, children’s oral health is directly related with the level of parental awareness and attitude towards oral health. To show this well-known fact, various studies<sup>6,7,8</sup> carried out to determine the association of parental knowledge and attitude regarding OHI and habitual improvement of oral hygiene measures in their children. As parents (particularly mothers) spend much time with SM and easy access to internet and the continuous update of health-related information, it is crucial responsibility of parents to overcome the negative beliefs and perceptions of parents to improve the oral health of their children.<sup>8</sup>

In addition to this, schools play a major role in propagating the oral health knowledge among children as they stay in school for longer time.<sup>9</sup> Therefore, it is wise in modifying the school curriculum both in rural and urban schools keeping SM education intervention as a permanent addition to the curriculum. To shed light on this aspect, research has shown a positive effect on the improvement of oral health care behaviours among children when education was provided in schools.<sup>10</sup> One study showed, King Salman Centre for Children’s Health (KSCCH) and Riyadh Elm University in Riyadh city conducted maximum school educational programs with the aim of improving oral health knowledge of Riyadh school children.<sup>11</sup>

Numerous studies<sup>6-8,12</sup> have been carried out to show the association of SM educational intervention and change in behaviour of children. It is confirmed that children’s mind accepts animations and presentations more effectively compared to written or verbal information. And this has proved in various research works with pre and post-tests to conclude the final result of improvement.<sup>12,13</sup> As we all know, according to social learning behavioural theory, behaviour is learnt from the environment through observation.<sup>14</sup> Based on this concept, social media imagery content has the potential to influence oral health behaviour not only in children but also in adolescent age group.

There are also some comprehensive reviews which revealed when internet based interventions used as oral health promotion tools emphasized their role in managing dental anxiety, improving oral hygiene, improving acceptance to orthodontic treatment and increasing dental knowledge in maternal caries transmission and effect of dental caries on oral health of children.<sup>6-8,12,13,15</sup>

An Indian study<sup>15</sup> found a statistically significant difference and improvement in children's knowledge following a method of video incorporation as a tool of education to provide the OHI for children. Saudi Arabian study also found similar results.<sup>11</sup> Palin-Palokas et al.,<sup>16</sup> showed association between use of SM and prevalence of dental caries experience among 12 to 15 years old children. They showed that dental caries experience most commonly mediated by behavioural factors, like tooth brushing, dietary habits, consumption of sugary drinks or medicated syrups, dental visits, fluorides consumption and child-parent relationship. On contrary to this, those children, staying in most deprived areas were more likely to experience caries prevalence and this association found significant after adjusting to SM or internet usage.<sup>10</sup>

In adolescents, use of SM has become one of the most common activities in the present scenario. Adolescents use digital technology like SM and internet as the primary way of receiving and sharing information.<sup>17</sup> Therefore there are noticeable differences in behaviours of SM use between age groups. This age group use SM for health-related reasons mainly as a complement to professional healthcare and seeking for social support to fulfill unmet needs by health services. However, health related information is not a direct main priority for them. Moreover, they tend to use more social networking compared to blogging or other online support groups. Hence, it is very essential to engage these young people by using clear and simple language in their terms in order to provide a supportive and friendly environment.<sup>18</sup>

Pediatric dentistry also includes tele dentistry that use SM as a platform to deliver information on tooth eruption, deciduous tooth, pulpectomy, enamel hypoplasia, tooth radiography and dental restorations for children.<sup>19</sup> So proper policy statements are mandatory to both facilitate applying the technology and increase the access of children with their parents to dental services and also to create incentives for specialists and dentists to use web based technologies.<sup>4,19</sup>

Therefore, it is evident from various publications that, it is necessary to advice dental professionals to direct their attention toward these tools for the dissemination of OHI.<sup>1-18</sup> To obtain evidence – based OHI material, it is helpful in translating research findings into easy-to-understand language and disseminating these findings to attract the attention of online users. Therefore, a paradigm shifts from conventional method of education to a novel method of patient-oriented, technology-based, outcome centered, prevention based oral and dental health service delivery for children is required in restructuring of oral and dental health services and care using SM. The new interventions should also empower the whole community including mothers, teachers and families to accept and adapt to new network platforms for improvement of oral health status in children.<sup>1-18</sup>

#### Impact of different types of SM in educating and improving oral health status of children

The literature search revealed various forms of SM in spreading OHI in children.<sup>1</sup> The digital cell phone was mainly used for dental caries, dental plaque, oral health education, caries risks assessment and cariogram.<sup>7,8</sup> For oral health related behaviors like oral hygiene and tooth brushing, internet and different SM were applied. Audio-visual SM found to be more beneficial for oral health propagation not only in children but also in adolescents when compared to only text- based medium.<sup>9-13,15</sup>

One study found, YouTube as the most popular SM for OHI. This is due to the fact that the videos played on YouTube requires multiple senses, like hearing and seeing at the same time which is essential for information retention. Because children can remember up to 10% of what they read, 20% of what they hear, 30% of what they see, and 50% of what they see and hear both.<sup>12</sup>

As we all know, Twitter and Facebook have been created or open to the public since 2006.<sup>1-4</sup> Twitter found to be a leading SM for evaluating topics related to health by various health researchers in children.<sup>2,3,20,21</sup> Sinnenberg et al.,<sup>20</sup> distinguished six major uses of this network service for people health content recruitment, intervention, engagement surveillance and analysis. Gradually this is overtaken by Facebook and Instagram in the last couple of years with abundant percentage of research publications using data from these network platforms.<sup>1-3</sup> Both Facebook and Instagram enable access to groups of individuals and huge quantities of data on the population with relative efficiency and lower cost compared to traditional databases.<sup>21</sup>

In contrast to this study, El Tantawi et al<sup>22</sup> found more of Instagram usage for seeking OHI. This highlights that use of different types of SM to obtain OHI may differ by country or culture or even by time as certain SM become popular at that time. Recent reviews revealed Twitter as main tool of SM to disseminate OHI as most studies were done almost eight years back and at that time Twitter was most popular SM.<sup>1,23</sup> An Indonesian study done in 2019 showed You tube as main source of SM for OHI.<sup>24</sup> As technology advances the type of SM also get changed.

Compared to other SM, Instagram is a highly unique, user-friendly platform that enables users to share photos and videos on their mobile apparatus anywhere at any time.<sup>1-4</sup> This network service gave pave to evolution of a visually oriented culture by promoting images first and text second. It also helps users to share their personalities and lifestyles and form relationships with other users of the different part of the world who express similar values and interests.<sup>25</sup> Compared to Facebook and Twitter, the Instagram contributes the concept of “photo-first” culture to different user behaviour and motivation.<sup>25</sup> In the world, we can see 71% of Instagram account users compared to 38% of Twitter users. As a result, it is quite difficult point to understand the role of Twitter SM in promoting oral health in children. Instagram facilitates conversations between dentists and patients, with a good communication channel, constitute a tool for educational development, sample recruitment and surveillance. In addition, both dissemination of information and interaction of users in social networks make Instagram a powerful tool for research.<sup>2,3,25</sup>

Scribante et al in 2021,<sup>26</sup> investigated the effect of chair side verbal instructions in contrast to Instagram SM using educational posts on improving oral hygiene of young orthodontic patients. They found no difference in plaque and gingival inflammation scores between two methods of education tool in improving oral health. However, a systematic review with meta-analysis in 2019,<sup>27</sup> showed that conventional oral hygiene instructions found less effective compared to mHealth (an abbreviation for mobile health, a term used for practice of medicine and public health supported by mobile devices) interventions in improving oral health. This emphasizes the need for quality researches to investigate the disparity and compare the performance of different SM in improving the oral health status in children.

Study done in Jakarta<sup>18</sup> revealed that about 40% used Google, 16.9% used only SM and 36.1% used both Google and SM with a total of 93.7% used some internet platform to search for OHI. Participants using SM used 40.7% of YouTube, Instagram - 24%, Facebook - 5%, and Twitter of 1.7%. In OHI, users used OHI about treatment (49.3%), 47.6% about prevention, 43.4% about causes and 14.6% about symptoms of oral diseases. These findings stressed upon importance of the SM as a source of OHI in this vulnerable age group. Whereas study done by Wang et al.,<sup>[28]</sup> reported that adolescents used more of Google compared to other medias to obtain OHI. They attributed to the fact that Google actively mediates and shapes the information seen by its users. It offers a variety of information and had minimal advertisements. Moreover content obtained from Google can be re-checked through its preview feature without the need to visit the original website thus making users to skim through information directly.<sup>18,28</sup>

On SM platform, it is easy for patients to share posts of their opinions or doubts regarding treatments and experiences. Even dental health institutions can also share podcast audios and YouTube videos on various SM platforms to deliver OHI and categorized four main uses of SM in improving oral health.<sup>23</sup> They are 1. Analysis of frequency or other descriptive analysis of information on a particular topic, 2. As a platform to deliver an exposure or intervention,<sup>3</sup> As a sample recruitment tool and 4. Evaluation of the content of posts.<sup>1-3,23</sup>

Therefore, It is evident from the listed studies (**Table 1**) that there is a profound improvement in the oral health status of children when educational intervention was introduced using various SM.

Sl. No.	Author & Year	Type of social media used	Type of oral health problem studied	Results/ conclusion
1.	Ribeiro et al., 2022 <sup>[8]</sup>	Smartphone whatsapp	Deliver oral health education to mother-child pairs	Smart phone whatsapp messenger was found effective in delivering OHI
2.	Zolfaghari M et al., 2021 <sup>[29]</sup>	Smart phone with gamification	Oral health promotion in early childhood	Improvement in mother's knowledge

*Nagaveni et al, Impact of social media in educating and improving the oral health status in children – A  
Comprehensive review*

3.	Sarwer-Foner et al., 2021 <sup>[7]</sup>	Whatsapp Messenger	Tooth brushing and flossing habits of children	Smartphone app was found effective for providing oral health care for children
4.	Almarshad et al., 2021 <sup>[6]</sup>	Whatsapp video	Parental oral health education	Significant improvement in oral health of children with whatsapp education intervention video.
5.	Maharani et al., 2021 <sup>[18]</sup>	Internet platform like Google	Causes, symptoms, prevention or treatment of oral diseases	Most adolescents used Google to seek OHI
6.	Scheerman et al., 2020 <sup>[30]</sup>	Online social media platform (Telegram)	Promote oral health among Iranian adolescents.	Improvement in oral health
7.	Basch et al., 2018 <sup>[5]</sup>	Internet	Health information seeking behavior in college students.	Improvement in behavior
8.	Marchetti et al., 2018 <sup>[31]</sup>	Mobile oral health app	Adolescent's periodontal health	Periodontal health improvement following mobile app education
9.	Shahnavaz S et al., 2018 <sup>[32]</sup>	Internet	Cognitive behavioral therapy for children and Adolescents with dental anxiety.	Reduction in anxiety
10.	Gray-Burrows KA et al., 2017 <sup>[33]</sup>	Internet using Email	Oral health promotion for parents of young children	Parental awareness improved following email communication
11.	Do et al., 2017 <sup>[34]</sup>	Internet	Oral health behaviors of Iranian adolescents.	Improvement in oral health behavior
12.	Al-Saffan et al., 2017 <sup>[11]</sup>	Video	Children's oral health information	Significant improvement with video intervention
13.	ElKarmi et al., 2017 <sup>[12]</sup>	YouTube	Parent's education on early childhood caries.	Significant result with YouTube education video
14.	Li et al., 2016 <sup>[35]</sup>	Messaging app in mobile	Compliance and duration of treatment in orthodontic patients	Compliance improved
15.	Albert et al., 2014 <sup>[36]</sup>	Web based intervention	Maternal caries transmission and prevention knowledge, and oral health attitudes.	Mothers knowledge improved
16.	Gray et al., 2005 <sup>[37]</sup>	Internet	Health information seeking behavior in adolescence	Adolescent's behavior improved with internet education
17.	Palin-Palokas T et al., 1997 <sup>[16]</sup>	Video	Oral health education for mental handicaps.	Significant result with video teaching

**Table 1**

## ADVANTAGES OF SOCIAL MEDIA

Several advantages of SM for disseminating health information in improving oral health have been reviewed.<sup>1-4,10-18</sup> They are

1. It provides a communication platform for stakeholders during disease outbreaks. Government SM provides official information sources about disease outbreaks for journalists and local agencies in a timely manner.
2. Has the potential to reach and influence a broad audience, particularly as a means of engagement rather than just spreading information.
3. Make users feel secure in expressing their primary concerns because their identities are masked and their privacy is guaranteed.
4. Users can engage with content uploaded by others.
5. It allows leveraging various media types to engage the public by integrating hyperlinks thereby helping to posts directly to the public or to other online resources for additional health information.
6. Allows users to communicate, develop their creativity, expand their knowledge and obtain health information.
7. Help dental professionals to examine children in their most familiar atmosphere, like home environment (Tele dentistry using SM).
8. It is fastest among available channels to share alerts and updates about disease outbreaks.
9. Save considerable time by not travelling to a clinic, thereby reducing the children's and their parents/guardians/caregiver's dental anxiety and fear.

## LIMITATIONS OF SOCIAL MEDIA

Maximum usage of SM or internet can have a negative impact on general and oral health of an individual. Over usage of SM can cause poor oral health behaviors, unhealthy lifestyles; more oral symptoms like tooth ache, bleeding gums poor self-perceived oral health and low self-esteem.<sup>1</sup> Moreover majority reviews condemned that children sleep for fewer hours, engage in unhealthy eating and eventually develop caries and become obese as they spend more time on using the SM due to attraction and addiction.<sup>1-3,34</sup> Several studies<sup>15-38</sup> showed the higher caries experience prevalence and untreated caries in those children who used SM obtain OHI. In addition to this, there is an evidence-based literature showing excessive usage of SM in adolescents found associated with poor dietary habits like high consumption of sugary drinks and snacks, poor oral hygiene and infrequent tooth brushing.<sup>30,31</sup> Therefore, it is strongly said that internet based SM should be well supported by effective strict preventive strategies to promote an effective and positive use of SM aiming to minimize harmful use of SM and internet.<sup>1-3,34</sup>

More than 20% of the population in the world are existing in deprived areas and are more likely to have no internet or reduced broadband access, limited speeds and poor quality of internet service and hence they are less likely to benefit from the innovation in health promoting activities.<sup>10</sup> Moreover, some age groups may not use SM. As a result, systematic differences in internet access and use across deprivation groups has led to reflect on the risk of a “digital inverse care law” where disadvantaged groups that already have worse health outcomes and are unable to access digital services and interventions.<sup>1</sup> Therefore, these intrinsic limitations to the infodemiological design can compromise the external validity of the results. With regard to reporting bias, social desirability should be considered when interpreting self-reported outcomes. Children may under or over report tooth brushing, dietary intake and other activities with internet use.<sup>1</sup>

Finally, it is unclear whether the consequence of using internet or SM regarding health is really helpful. It is evident that accurate and relevant information provided by SM can potentially support and reinforce the health professional-patient relationship when used in proper way. On the other hand imprecise and inappropriate information can disturb this precious bond with greater impact on health care and health outcomes. Therefore it is essential to explore the quality of OHI presently available on different SM.<sup>2,3</sup>

## NEWER PERSPECTIVES IN USE OF SOCIAL MEDIA

Novel avenues identified in the oral and dental health research are internet of things (IOT), gamification (online gaming, video games etc.,) and artificial intelligence.<sup>1,29</sup> Virtual Reality (VR) is also one among other modern technologies used for dental education at schools and improving oral health literacy among school teachers, school children, mothers and adolescents.<sup>38</sup> Usage of virtual reality in dental education has popularized during the COVID-19 era to improve the students' access to more useful theoretical content and clinical dental expertise remotely. VR was more used for pain control, oral disease prevention, and dental health practices and this was utilized most for the autism children for their oral health improvement.<sup>1,38</sup>

Therefore, implementation of digital health with SM in pediatric dentistry is likely to be required concept to reduce the oral health care inequalities which may be caused by the lack of access to specialists and timely oral and dental care services.<sup>39</sup> It is essential to design the technology-based interventions to improve children's oral health and make them easier to use and more accessible at each primary, secondary, and tertiary levels.<sup>39,40</sup>

## CONCLUSION

SM has great potential in promoting awareness and we need to tap into this storehouse of magic to achieve improved oral health in children. However, apart from all the positives, it is to be firmly noted that this immense knowledge which is just a click away can also lead to many misinformation and myths. Therefore, it is important that the source is correct and is approved by the dentist or any health care worker with use of SM.

**FINANCIAL SUPPORT AND SPONSORSHIP:** Nil.

**CONFLICTS OF INTEREST:** There are no conflicts of interest.

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