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Role of social media in child oral health

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Abstract
Dental caries is one of the most significant oral health burden among the children which has to be addressed early to avoid future complications. The detrimental effect includes effects on children's lives, including changes in behaviour (irritability and low self-esteem), difficulty chewing, decreased appetite, weight loss, difficulty sleeping and decreased academic performance. The degree of parental awareness and attitude toward oral health is directly correlated with the dental health of the child. The primary duty of those who provide oral health care is to change the detrimental attitudes and perceptions of parents to enhance the dental health of their children. Social media is transforming communication into a double-way interactive process by fostering a conversation amongst people who are either sending or receiving the information. This narrative review will explain in detail the potential oral health issue in the pediatric population and how social media plays a major role in inculcating better knowledge of oral health along with its drawbacks.

Keywords: Oral health, social media, parental awareness, child oral health

Introduction

The most significant health issues in the world are oral diseases like dental caries, periodontal disease, tooth loss, oral mucosal lesions, and oropharyngeal cancers, as well as oral diseases linked to the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and Oro dental trauma. Nevertheless, it is evident that the burden of oral disease is rising worldwide. The most significant global oral health burdens among them historically have been regarded as dental caries and periodontal disease [1]. Early-childhood oral illnesses and disorders can adversely affect preschoolers' and their parents' quality of life [2, 3]. Early childhood caries (ECC) affects the pediatric age group which has an impact on the general health of the child. The detrimental effect includes effects on children's lives, including changes in behaviour (irritability and low self-esteem), difficulty chewing, decreased appetite, weight loss, difficulty sleeping and decreased academic performance [4, 5]. Thus, prevention of the occurrence of ECC is better than facing the upcoming challenges after its occurrence. Various modalities of dental health education play a pivotal role in the prevention of the incidence of oral diseases. Social media is one of the oral health education platforms available to enhance the knowledge of the individual and improve behaviour and oral health outcome. Patients belonging to higher socioeconomic status are more likely to search for the cause, effect, and treatment plan of the disease [6]. Internet-based interventions employed as oral health promotion tools have shown promise in a number of areas, including managing dental anxiety, enhancing dental awareness of maternal caries transmission, and improving oral hygiene and adherence to orthodontic treatment [7, 10]. Thus, this narrative review will explain in detail the potential oral health issue in the pediatric population and how social media plays a major role in inculcating better knowledge of oral health along with its drawbacks. A detailed search was done with the following keywords: social media, videos, mobile applications, dental health applications, oral health applications, child oral health, early childhood caries, parental knowledge etc in various databases such as PUBMED, Cochrane library, Google scholar, Trip database, Lilacs, ProQuest, Wiley library.

Oral health of child

The Present prospects of a nations youth can directly measure its future promise. Despite having a smaller population than China (269 million young people), India has the world's largest youth population, with 356 million 10-24 year-olds. Adolescence is a life stage with unique health and developmental needs and rights. It is also a time to gain knowledge and skills, learn how to manage emotions and relationships, and acquire characteristics and abilities that will be useful in enjoying adolescence and assuming adult roles [11].

Unfortunately, this is also a high-risk age group for numerous oral diseases.

The high prevalence of early childhood caries has made it a challenge globally. I is the most common chronic illness in kids [12]. The overall health of a child is negatively impacted by early childhood caries.

Dental caries causes pain, orthodontic issues, impaired eating and speaking functions, difficulty in sleeping, behavioural changes and even decreased success in schools [13, 14].

Since early childhood caries can have such a huge negative impact on a child's health and quality of life, it is critical to begin practising protective measures as soon as possible.

Although professionally given information is an important st ep in providing appropriate care, awareness of acquired knowledge tends to decrease over time, as patients forget about 40- 80% of the information provided by healthcare professionals.
As a result, the internet has grown in popularity as a source of information to supplement oral health knowledge [15, 16].

Oral health issues and needs in children
Children have a high incidence of caries, which is caused by poor food habits, poor oral hygiene, and the physical features of deciduous teeth. Dental caries and related complications in primary dentition can occasionally have far more severe and wide-ranging effects than in permanent dentition. It has been reported that severe untreated cases of primary tooth decay will lead to an imbalance in the chewing efficiency of the child which will ultimately lead to an alteration in functional occlusal load. This uneven occlusal load has a negative impact on the dentofacial growth and development of the jaw and teeth [17, 19].
Cavitated primary teeth can act as a potential source of food lodgement. This in turn provides a nidus of micro-organisms to develop thereby altering the normal oral microbiomes. This alteration may prevail till the development of the permanent dentition which has a potential concurrent influence on the developing dentition. It has been proven that carious primary dentition during childhood is followed by carious permanent teeth. On the other hand, a caries-free child had a caries-free permanent set of teeth [20, 21].

Oral health of the children and parental knowledge
The degree of parental awareness and attitude toward oral health is directly correlated with the dental health of the child [22]. A child's sense of oral healthcare behaviour can be developed and improved with the help of parents. Thus parents play an important role in maintaining routine oral hygiene practices such as tooth brushing, mouth rinsing and flossing in children either directly or indirectly [23]. Numerous researches have been conducted to ascertain the relationship between parental attitudes and knowledge regarding oral health and the improvement of their children's oral habits. The primary duty of those who provide oral health care is to change the detrimental attitudes and perceptions of parents to enhance the dental health of their children [24, 25].

What is social media?
Social media is an online forum for interacting with the general population. Social media is transforming communication into a double-way interactive process by fostering a conversation amongst people who are either sending or receiving the information.
Internet-based tools such as blogs, forums, content communities, and social networking sites like Twitter, YouTube, Facebook, LinkedIn, GDPUK, Instagram, and Pinterest are all included under the umbrella term "social media." This approach applies to other types of social media, such as dental-specific professional social networking platforms [26].
In current history, interest in utilising a broader framework to examine children's oral health outcomes, including biological measurements investigated by research scientists with psychological and environmental variables, has increased [27].

A holistic conceptional model
The multilayer character of health determinants is highlighted by recent population health research. Health-related factors manifest at the individual, family, and community levels. People and disease-carrying pathogens both move between communities in this mobile era. Studies have revealed an association between general health and oral health, especially when it comes to self-reported health status [28]. The risk of oral disease in a child cannot be isolated from his/her risk of overall illness since the mouth is an integral part of the body [29, 31]. Taking into account the aforementioned elements a holistic conceptional model which puts various influential factors of a child's oral health, in a nutshell, was proposed as shown in figure 1and table 1 [32].

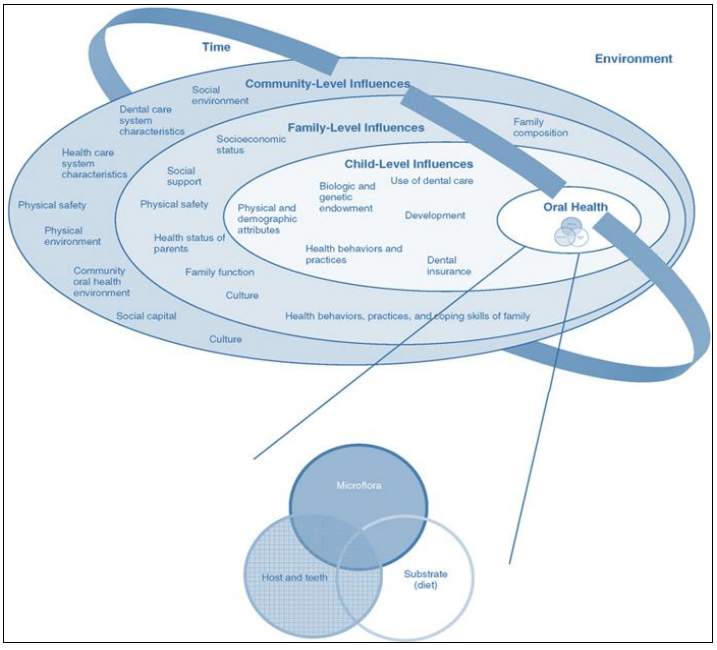

Fig 1: conceptional model (32)

Table 1: domains of determinants of oral health according to level of influence: [32]

Level	Genetics and Biology	Social Environment	Physical Environment	Health- Influencing Behaviors	Medical and Dental Care
Child level	Physical attributes; biological and genetic endowment; microflora; host and teeth	Substrate/diet; microflora	Health behaviors and practices (including injury protection gear)	Health behaviors and practices; development; diet	Use of dental care; dental insurance
Family level	Health status of parents	Socioeconomic status; social support; family function; culture; health behaviors, practices, and coping skills of family	Socioeconomic status; family function; physical safety	Status of parents; Family composition; Family function; culture; health behaviors, practices, and coping skills of family	Health behaviors, practices, and coping skills of family
Community level		Social environment; social capital; culture; community oral health environment	Social capital; physical safety; physical environment (including fluoridation)	Culture	Health care system characteristics; dental care system characteristics

Etiology and pathogenesis of dental caries and impact of social media (Fig 2)

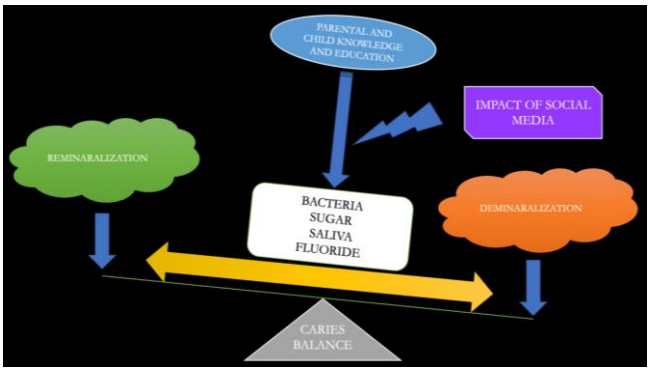

Fig 2: Caries balance and site of impact of social media

The most prevalent chronic disease in children is dental caries. This process of caries formation acts through the dynamic process of intermittent demineralization and remineralization on the surface of the calcified structures of the oral cavity. This is called the caries balance of the teeth [32, 33]. This process is intervened or influenced by various factors such as bacteria, Sugar, saliva and fluoride. These factors have a major impact on the process of caries formation and the oral health of the individual [34]. Thus, these factors can be positively reinforced through anticipatory guidance to the parents. Apart from the process of dental caries formation parents should have advanced knowledge of the non-nutritive habits that the child may develop, use of pacifiers and developing malocclusion [35]. With the growing knowledge about oral health and social media, parents have improvised in their attempt in maintaining their child's health. Proper intervention with the social media platform has shown proven results in the maintenance of oral hygiene of the children via adding the knowledge of the parent [36].

Review of literature

In 2021 one of the studies conducted by Almarshad M et, comparing the pre-operative and post-operative oral hygiene status of the children after the educational video demonstration to parents has shown positive results. The study aimed to encourage and teach parents and their children, the right way of using a toothbrush and dental floss and to find and assess modern ways to learn rather than traditional ways. The study concluded that there is a significant improvement in the oral health of children when educational intervention is induced and the knowledge of children can be enhanced if attractive videos can be used as a tool of education [37].

Sarwer-Foner SND *et al* in 2021 analysed the outcome of the oral hygiene status of the children by comparing the conventional oral health education methods and a combination of conventional health education methods with digital educational content through WhatsApp messenger. The intervention proved that Both approaches to oral health education-conventional and digital had a positive impact on the oral health status of the individual, and the use of a smartphone app seemed to be an effective resource for providing oral health education to students [38].

In 2019 Scheerman JF *et al* in their three-arm randomized-controlled trial design concluded by saying the use of the theory-based program delivered by Telegram has helped in improving good oral hygiene behaviour and oral health outcomes among Iranian adolescents and involving the parent in digital education conferred additional benefits in oral hygiene status maintenance among the adolescent people [39].

In one of the online surveys which were conducted by Almaiman S *et al* in 2016, it was proven the necessity and significance of bolstering social media posts with reliable, high-quality online OHRI information to raise public awareness of oral health and dental services. In the survey, it was evidenced that More than two-thirds, 67.7% of the participants reported they were seeking Arabic online OHRI [40].

Subburaman N *et al* 2021 intervened among 18 to 20 years individuals to analyse their oral hygiene status using WhatsApp messenger as a tool to deliver pictures, videos and text messages relating to oral health guidance. They concluded by saying the WhatsApp application significantly improved the oral health status and knowledge, attitude and practice among its users [41].

However, Almoddahi D et was contradictory to the aforementioned studies and surveys. Their study aim was to learn more about oral health and assess the effect of this behaviour on oral health disparities among 12 and 15-year-olds, research the relationship between dental caries and the usage of the internet and social media. The number of untreated cavities was not substantially correlated with internet and social media use. Hence they concluded by quoting that health behaviours may act as a moderator in the relationship between social media and internet use and dental caries. Although younger people and children may use the Internet and social media to explore the knowledge

about dental caries, spending more time online may also raise the risk of developing the condition. To encourage efficient and beneficial internet use, preventive techniques should be used in conjunction with internet-based health interventions [42].

In 2020, Duman, C *et al* conducted a study, to review YouTube videos on kids' dental hygiene practices and evaluate their value for educating parents. The survey was conducted to analyse the viewing and interaction rates of the uploaded oral health-related videos on youtube. The study gave information about video lengths, upload dates, total views, likes, dislikes, and comments. They concluded by saying videos can be a helpful resource for teaching parents. But public health and oral health experts still need to do a better job of educating their students [43].

Dumas AA et, in 2020 in their study outlined the methods used in a randomised controlled trial (RCT) to evaluate a healthy eating intervention provided via a blog among mothers of pre-schoolers and school-aged children. Comparing the sociodemographic traits, Internet usage patterns, and retention rates of mothers hired via conventional techniques and Facebook. 76.4% of the moms who replied to the recruiting call were successful in being recruited, meaning that out of them, 44.4% were eligible and 42.9% were randomly assigned to the trial. A small percentage of 3.6% of those were recruited via Facebook. Due to various drawbacks of the conducted study, it was concluded that to design effective social media recruitment and intervention delivery, future research should examine mothers' perceptions and preferences regarding social media platforms, including Facebook and blogs about healthy eating. It should also consider using platforms that are an essential part of mothers' daily social media routines and offering remote outcome assessments to encourage participant retention [44].

One of the cross-sectional study which was conducted by Kumar G *et al* in 2020 to assess parents' perception about using the internet to research and treat their children's dental health. Questionnaires were collected regarding the parental acceptance and ideology behind internet usage about children's dental care and treatment. The majority of respondents were aware of the negative consequences of such material and claimed that looking for a remedy or prescription online made their situation worse than it was originally [45].

When compared to conventional health promotion programmes, educational films distributed to mother-child pairs via the WhatsApp application were known to improve dental hygiene behaviour as resulted in a study conducted by Ribeiro YJS *et al*, in 2022. It involved 100 pairs of mothers and children in a parallel, double-blind clinical trial that was randomised. Twice weekly, instructive videos were provided over WhatsApp Messenger. The outcome of which was assessed for the behavioural changes and health outcomes after the intervention. It was finally concluded that oral hygiene behaviour and health outcomes will improve when digital media are added to conventional oral health programmes (56).

Health education applications: (Fig: 3)

This can be broadly distinguished into 3 categories:

Web-based application

Desktop application

Mobile application

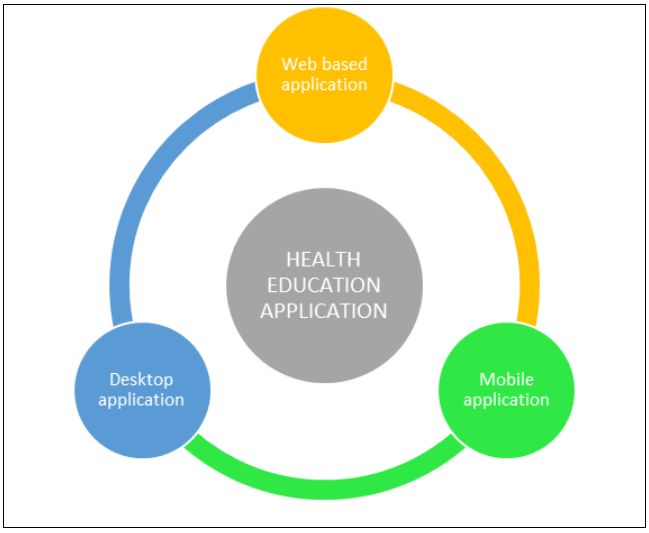

Fig 3: Health Education Applications

Web-Based Application

This kind of health education app/software requires the internet to run and provides a platform for consumers to access health information.

Various kinds of health education web-based apps/software are as follows

- YouTube
- Google
- Twitter
- Facebook
- LinkedIn
- Websites such as DCI, WHO
- Yahoo answers
- Online journals

Desktop Based Application

These kinds of health education apps are of two kinds i.e. online apps & offline apps.

Examples

- Diagnostic software
- Public health and surveillance
- Dental management and patient record
- Imaging/visualization

Mobile Based Application

Smartphones, the most common "personal computer" today, have revolutionized the communication landscape.

Communication via smartphones is personalized: smartphones store and exchange large amounts of personal information and users can customize their phones to suit their personal preferences and needs.

The mobile revolution is offering an opportunity to provide medical support when and where people need it. Large numbers and varieties of medical and health-related apps exist on the market today.

From basic apps composed of text message reminders, these apps play a multitude of functions in health and healthcare [47].

The Internet

According to studies, India is currently ranked fourth in the world for internet usage. In the present era, people popularly use the internet for a variety of purposes, including social networking, entertainment, business, information seeking,

and financial transactions. It is frequently used in the medical field to raise awareness of emerging diseases, medical trends, and health education. The ubiquity of communication channels, the speed of communication, and the reflexivity of information all have significant effects on the promotion of health. [3, 4] WhatsApp's user base in India has grown to 70 million active users, accounting for more than a tenth of the company's global user base. [48]

Social media for oral awareness

The reach of health messages to a vast population can be made feasible using mobile technology and electronic communication. Mobile technology enables real-time delivery of interventions to people in routine contexts, thus it takes an upper hand over face-to-face communication or telephone-based intervention. This mobile technology encompasses a wide agenda of devices and services, which in a nutshell include:

- Mobile phones
- Personal digital assistants (PDAs) and PDA phones (e.g., BlackBerry, Palm Pilot)
- Smartphones (e.g., iPhone)
- Enterprise digital assistants (EDAs)
- Portable media players (i.e., MP3-players, MP4-players, e.g., iPod)
- Handheld video-game consoles (e.g., Playstation Portable [PSP], Nintendo DS)
- Handheld and ultra-portable computers such as tablet PCs (e.g., iPad) and
- Smartbooks.

These gadgets may perform a variety of tasks, such as mobile cellular communication utilising text messages (SMS), images and video (MMS), telephone, and World Wide Web access, as well as multi-media playback and software programme support and are known to deliver high performance in many of the tasks mentioned above. [49]

Some of the websites are already present for oral health education.

- April 25, 2011 -- The ADA agreed with Sharecare, an online resource that allows the public to submit health-related questions and have them answered by health professionals, to provide dental-specific expertise to the site
- Young Dental has produced a brochure to help patients better understand the oral-systemic health link. The brochure can be downloaded free at http://www.youngdental.com/pdf/OralHealthLit.pdf, or by visiting the Young Dental site
- The Oral Cancer Foundation has put together a nice website for professionals and patients alike, www.oralcancerfoundation.org.
- The National Institute of Dental and Craniofacial Research have a web page full of educational resources at http://www.nidcr.nih.gov/EducationalResources/.

Drawbacks

The use of the internet however has had some negative impacts as well. Patients of higher socioeconomic status are more likely to look for a disease's cause, effect, and treatment plan. This practice may cause patients' ideologies to clash and result in dissatisfaction with their doctor.

The risks of using SMS messaging include data entry errors and the use of flawed data, misinterpretation of the data, and difficulty in reading for those with poor vision. Text messaging is also not a good way to reach people who need oral health care the most in a nation like India, where literacy rates are low. Text messaging cannot record the verbal and nonverbal cues that can affect the context and, hence, the message's interpretation.

People who are illiterate or otherwise unable to understand a written message can benefit from oral health education by u sing multimedia message service (MMS) and voice messagi ng. MMS includes formatted text, photographs, drawings, graphics, animations, PowerPoint presentations, audio samples and video clips to be included in the message [50].

Conclusion: Fig 4

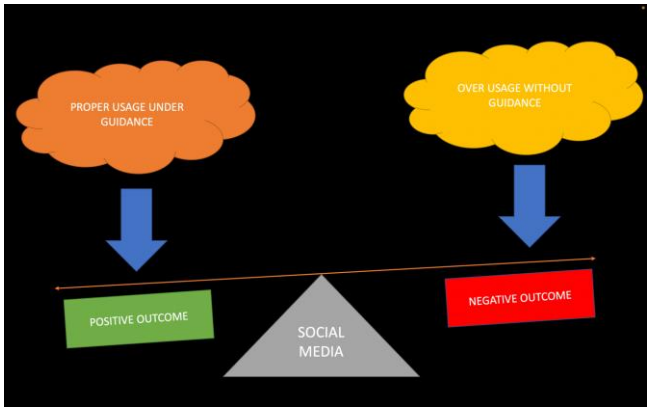

Fig 4: Social media balance on oral health

Thus this narrative review gives a cumulative knowledge about dental health problems which arise during infancy through adolescence and various levels of primary health education for improving oral health knowledge. Parental knowledge is directly reflected in the child's knowledge of oral health. Social media is also a modality of dental health education which is considered a double-way sword. When used for preventive health knowledge under the guidance of dental health professionals it can be utilized to the fullest for gaining maximum advantage. On the other hand, when used without proper guidance and usage of it with irrelevant data may mislead the parents as well as the child which will ultimately lead to the negative side of the balance.

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