

**Title:** Parental knowledge, attitude, and practice toward their children's oral hygiene of age 2 to 12 years (A Web-Based Study)

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## **Abstract-**

The present study was designed as an attempt to explore parental knowledge, attitude, and practice toward their children studying in a school in Faridabad from 2 to 12 years of age and their requirement for health-based applications for their children's oral health. A web-based questionnaire was generated as a link through google forms which was sent to 200 parents through an official WhatsApp group by their children's class teachers. A total of 147 complete responses were received and analyzed. Frequency Analysis was done using SPSS software version 21. Understanding parents' knowledge, attitude, and practice about children's oral health care will contribute useful information for planning health policies, implementing preventive programs, and designing the future of oral healthcare infrastructure. For countries; like India, with health policies aiming largely at disease prevention, and where the field of dentistry is in its infancy, such studies are essential. This study also draws the attention of various private institutions and startups to build public-private relationships and collaborate to bring changes in dentistry. The Indian Govt needs to increase its focus on increasing the awareness and skills among the general public and healthcare providers regarding the use, benefits, and privacy concerns associated with digital health technologies. Also, rather than developing a federated system, a unified system with a focus on incentivizing the Health workers for qualitative care in reducing the number of patient visits need to be increased. Healthcare transparency, increase funding, a robust system for tackling threats and penalties, and accessibility of healthcare to all citizens whether visiting Govt or Private hospitals need to be focused on.

## **Keywords-**

Digital health, Healthcare technology, AI-based health applications, oral care, dental awareness, public dentistry

## **Introduction-**

Digital health technologies ranging from wearable sensors and portable diagnostic technologies to telemedicine tools and mobile healthcare apps have the potential to transform the healthcare delivery system by empowering consumers to play an active role in their care and define what services are important to them [1][2]. The sensors in portable devices and wearables send messages to the Internet of Things (IoT) platform. IoT gathers all the information from the sensor, filters it, and transforms the data into valuable information by applying analytics to the same. This information can then be stored in the cloud and used to make recommendations, diagnose and predict possible diseases that the patient might be suffering from before they become critical. These IoT devices hence can be used as a diagnostic and predictive tool in preventive healthcare services. Telehealth allows virtual assessment of a patient's health condition through video calls or m- health applications avoiding in-person visits to clinicians. This saves time and money for both the patients and the clinicians and provides safety against communicable diseases and hospital-acquired infections. Smartphone applications can present images, videos, audio, and text resources, providing a greater patient/professional interaction, and facilitating access to medical advice and to important care and treatment guidelines, diagnosis, and patient follow-up [4]. In a study by C Ernsting et al [3] in 2017, it was found that 61.25% (2538/4144) of participants used a smartphone. Among smartphone users, 20.53% (521/2538) used health apps.

The interest of medical research is focusing on the field of dentistry, which has been underestimated for years, as oral health, or oral pathology could be the key to some systemic diseases. In recent decades, numerous clinical pieces of evidence have highlighted an association between dental disorders and cardiovascular diseases and diabetes, lung diseases, and obstetric complications [6]. One such AI-based Smartphone application has been designed by J Xiao et al [5] that can detect Dental Caries in Children at an early and reversible stage of ECC. Parents can use their regular smartphones to take photos of their children's teeth and detect ECC aided by AICaries so that they can actively seek treatment for their children at an early and reversible stage of ECC. Using AICaries, parents can also obtain essential knowledge on reducing their children's caries risk [5].

Besides focusing on dental caries diagnosis and prevention, AI-based mobile applications have also been used in notifying the patient regarding their dental appointments, post-surgical instructions and medications, brushing and next appointments with the dentists. The parent's willingness to spend on these dental-oriented applications and their services depend on their awareness regarding these applications and Knowledge about the necessity of preventive dentistry procedures. Less information on oral health make them visit the dentist at a later stage of caries progression or malocclusion etc.

The purpose of the study is-

- 1) To assess the knowledge regarding oral hygiene practices of children from 2 to 12 years of age.
- 2) To know the requirement of parents for a health-based application for their child's oral health.

## **Questionnaire-**

For the survey, a self-administered pre-validated questionnaire was formulated using google forms to assess the knowledge, attitude, and practices of parents regarding the oral hygiene of their children and their requirement for a health-based application for their children's oral health. The questionnaire consisted of 6 sections.

The **first section** consisted of the basic details of the survey.

The **second section** consisted of details regarding the email id of the parents and names of their children

The **third section** asked the parents to select the appropriate age group

The further three sections contained questions with respect to the age group selected by the parents in the previous section

The **fourth section** consisted of questions to assess their knowledge regarding the oral hygiene of their children

The **fifth section** consisted of questions to assess their attitude regarding the oral hygiene of their children

The **sixth section** consisted of questions to assess their practices regarding the oral hygiene of their children

## **Target Population, Sample Frame, and Sampling Design-**

A web-based survey was conducted in a school in Faridabad, Haryana during the parents-teacher meeting (PTM). 2 sections of pre-primary and 2 sections from primary education were selected for the survey. The link to the survey was shared among 200 parents (50 in each section) on 6th August 2022 by the class teachers in their respective official WhatsApp groups before the PTM started.

## **Methodology**

This KAP and the web-based survey was created using Google Forms and conducted in accordance with CHERRIES (Checklist for Reporting Results of Internet E-Surveys) guidelines. The survey's questions were validated using a reliability analysis scale of SPSS software. The primary investigator sent the link to the survey to the class teachers of the four sections. The link to the Google forms along with a text related to the purpose of the study mentioning the investigators' details was shared among the parents through WhatsApp by the concerned class teachers during the PTM. It was a purely voluntary survey in which the participants were asked to respond to the questionnaire (consisting of open-ended questions) if they are willing or consent to participate. Each participant was explained in a brief about the objectives and purpose of the study before filling in the responses. No incentives were offered. Data was collected. The survey was conducted after approval by the administrative head of the school. Each class was handled by a separate investigator who was responsible for explaining the survey and collecting the responses from their respective classrooms. The primary investigator was responsible for the storage of the data and other investigators along with the primary investigator were responsible for data mining and comparing the results with the previous surveys and investigations. It was a 6-section survey containing questions to assess the knowledge, attitude, and practices among the parents of the children in age groups- 2 up to 6 years and 6-12 years. The parents had to select the age group provided in the Google Form and answer the questions accordingly. The 2 up to 6 years age group contained 14 questions and the 6-12 years age group contained 16 questions. For the important questions, the mandatory selection of one response was enforced to contemplate the completeness of the questionnaire before submission. Therefore, only completed responses were submitted for further analysis. Adaptive questioning or randomization of items was not required. Also, no timeframe was used to determine the amount of time taken to fill out the questionnaire.

## **Statistical Analysis**

The results were descriptively presented using proportions or percentages, a measure of central tendency in terms of means, and dispersion in terms of standard deviation. The responses obtained were presented in the form of pie charts and tables.

## **Results**

Out of 200 parents who were approached, 147 responded to the questionnaire constituting the completion rate was 73.5%.

Assessment of knowledge of the parents of the students in age group 6-12 years regarding oral health practices and oral health-oriented application is depicted in Table 1. Out of 92 participants in the age group 6-12 years that took part in the study, 60.9% of parents knew the professionally recommended brushing technique for their children, whereas 39.1% were not aware of it. 66.3% of the total participants knew the correct amount of toothpaste to be used for their children, whereas 33.7% of the subjects weren't aware of it. 72.8% of the parents were aware of the milk teeth-shedding timeline, whereas 27.2% agreed that they were aware of it. Unfortunately, 57.3% of parents did not know the right time for the treatment of maligned teeth, whereas 42.7% knew about it. On assessing the knowledge of parents regarding the use of dental-oriented applications for oral care, only 42.4% had an idea about it but 57.6% were unaware of it.

Table 2 depicts the attitude of the parents of the students in the age group 6-12 years regarding oral health practices for their children. Out of 92 participants, 72 participants (78.3%) think dental health affects the general health of their children and 20(21.7%) think that dental health is a separate entity with no relation to the general health of their children. 45(48.9%) participants had an idea about the dental issues caused by retained teeth, whereas 47(51.1%) think that retained milk teeth can't cause any dental issues in the future. 39(42.4%) participants feel that their children's teeth are not aligned properly and out of them, only 61.54% of participants had a concern about their children's maligned teeth. Others never considered them a problem and did nothing in this regard. According to 80(87%) participants, an attractive smile is important psychologically and professionally for their children and there were 12(13%) participants who did not consider it much important for their children's professional careers. Lastly, 55(59.8%) participants feel the need for an oral health-oriented that can assist them in maintaining and answering their queries regarding the oral hygiene of their children.

Table 3 depicts the oral hygiene practices of the parents and their children in the age group 6-12 years. All the participants state that their children brush their teeth. 57.6% of students brush their teeth only once a day, 38% of students brush their teeth twice a day, and 4.3% brush only sometimes or occasionally. Out of 92 participants, 82(89.1%) make their children brush their teeth under their supervision and 10(10.9%) do not show their presence while their children are brushing their teeth. Out of 82(89.1%) participants, 38% make their children brush once a day under their supervision, 23.9% twice a day and 27.2% prefer supervision only occasionally. 55(59.78%) participants prefer visiting a dentist for their children's oral care and dental problems and out of these 55, 41.3% visit a dentist once a year, 13% visit twice a year and 5.4% visit only sometimes/occasionally to a dentist for their children's dental issues. Lastly, 34(37%) participants admitted that they search on the internet for any oral-related query concerning their children, and out of these 34 participants, 70.59% rely on the answers they get online.

Assessment of knowledge of the parents of the students in age group 2 up to 6 years regarding oral health practices and oral health-oriented application is depicted in Table 1. Out of 55 participants in the age group 2 up to 6 years that took part in the study, 54.5% of parents knew the professionally recommended brushing technique for their children, whereas 45.5% were not aware of it. 61.8% of the total participants agreed that they knew the correct amount of toothpaste to be used for their children, whereas 38.2% of the subjects weren't aware of it. On assessing the knowledge of parents regarding the use of dental-oriented applications for oral care, only 63.6% had an idea about it but 36.4% were unaware of it. 44(80%) participants do not know about any injury to the tooth/teeth that their children might have faced during any sports activities, whereas 11(20%) participants have faced the situation when their children got some dental injuries. 21(38.18%) participants admitted that their children are having oral habits, whereas 34(61.8%) participants denied it.

The prevalence of Thumb/finger sucking as an oral habit can be appreciated as 52.38% of the parents agreed that their children are having this habit.

Table 5 depicts the attitude of the parents of the students in the age group 2 up to 6 years regarding oral health practices for their children. Out of 55 participants, 40(72.73%) participants think dental health affects the general health of their children and 15(27.27%) think that dental health is a separate entity with no relation to the general health of their children. Out of 21 parents, who agreed that their children are having oral habits, 52.38% of participants are concerned about oral habits and trying to adopt some practices to break the habits. Other 47.62% just ignore these habits thinking that the habits will wipe out with time and hence adopted no practices to break them. Out of 11 participants who have faced the situation when their children got some dental injuries, 63.64% felt the need of visiting the dentist. Other 36.36% preferred not to visit the dentist. 35(63.6%) participants feel the need for an oral health-oriented that can assist them in maintaining and answering their queries regarding the oral hygiene of their children, whereas 20/55(36.4%) do not feel its necessity in their daily life.

Table 6 depicts the oral hygiene practices of the parents for their children in the age group 2 up to 6 years. Out of 55 participants, 53(96.4%) make their children brush their teeth under their supervision and 2(3.6%) do not show their presence while their children are brushing their teeth. Out of 53(96.4%) participants, 45.5% make their children brush once a day under their supervision, 43.6% twice a day, and 7.3% prefer supervision only occasionally. 28(50.9%) participants prefer visiting a dentist for their children’s oral care and dental problems and out of these 28, 23.6% visit a dentist once a year, 20% visit twice a year, and 7.3% visit more than twice a year to a dentist for their children’s dental issues. Lastly, 28(50.9%) participants admitted that they search on the internet for any oral-related query concerning their children, and out of these 28 participants, 82.12% rely on the answers they get online.

Table 1: Assessment of Knowledge among 92 parents of children in the age 6-12 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Do you know the professionally recommended brushing technique for your child?	<b>56(60.9%)</b>	<b>36(39.1%)</b>
Do you know the correct amount of toothpaste to be used?	<b>61(66.3%)</b>	<b>31(33.7%)</b>
Are you aware of the milk teeth-shedding timeline?	<b>67(72.8%)</b>	<b>25(27.2%)</b>
Do you know the right time for the treatment of your child's maligned teeth?	<b>35(42.7%)</b>	<b>57(57.3%)</b>
Are you aware of any dental-oriented applications for your child's oral care?	<b>39(42.4%)</b>	<b>53(57.6%)</b>

Table 2: Assessment of Attitude among 92 parents of children in the age 6-12 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Do you think dental health affects the general health of your child?	<b>72(78.3%)</b>	<b>20(21.7%)</b>
Do you think retained milk teeth can cause dental issues in the future?	<b>45(48.9%)</b>	<b>47(51.1%)</b>
Do you feel that your child's teeth are not aligned properly? It concerns you It does not concern you	<b>39(42.4%)</b> 24(61.54%) 15(38.46%)	<b>53(57.6%)</b>
Do you consider an attractive smile to be important psychologically and professionally for your child?	<b>80(87%)</b>	<b>12(13%)</b>
Do you think any oral health-oriented app is required that can assist you in maintaining and answering your queries regarding the oral hygiene of your child?	<b>55(59.8%)</b>	<b>37(40.2%)</b>

Table 3: Assessment of Practice among 92 parents of children in the age 6-12 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Does your child brush his/her teeth? Once a day Twice a day Sometimes/Occasionally	<b>92(100%)</b> 53(57.6%) 35(38%) 4(4.3%)	<b>0(0%)</b>
Does your child brush his/her teeth under your supervision? Once a day Twice a day Sometimes/Occasionally	<b>82(89.1%)</b> 35 (38%) 22 (23.9%) 25 (27.2%)	<b>10(10.9%)</b>
Do you visit the dentist for your child? Once a year Twice a year >2 times a year	<b>55(59.78%)</b> 38(41.3%) 12(13%) 5(5.4%)	<b>37(40.22%)</b>
Do you search on the internet for any oral health-related query concerning your child? Rely on answers Do not rely on answers	<b>34(37%)</b>  24(70.59%) 10(29.41%)	<b>58(63%)</b>

Table 4: Assessment of Knowledge among 55 parents of children in the age 2 up to 6 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Do you know the professionally recommended brushing technique for your child?	<b>30 (54.5%)</b>	<b>25 (45.5%)</b>
Do you know the correct amount of toothpaste to be used?	<b>34(61.8%)</b>	<b>21(38.2%)</b>
Do you know about any dental-oriented applications for your child's oral care?	<b>35(63.6%)</b>	<b>20(36.4%)</b>
Do you know about any dental injury that your child might have faced during sports activities?	<b>11(20%)</b>	<b>44(80%)</b>
Do you know about any oral habit your child has been suffering from? Thumb/finger sucking Mouth Breathing Tongue thrusting More than one	<b>21(38.18%)</b> 11(52.38%) 7(33.33%) 1(4.76%) 2(9.52%)	<b>34(61.8%)</b>

Table 5: Assessment of Attitude among 55 parents of children in the age 2 up to 6 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Do you think dental health affects the general health of your child?	<b>40/55(72.73%)</b>	<b>15/55(27.27%)</b>
Do you consider oral habits normal?	<b>39/55(70.9%)</b>	<b>16/55(29.1%)</b>
Do your child's oral habit/habits bother you? Child has a habit Child does not have any habit	<b>11/21(52.38%)</b> 21/55(38.18%) 34/55(61.81%)	<b>10/21(47.62%)</b>
Did you feel the need to visit the dentist when your child injured his/her tooth/teeth while playing? Encountered the situation Never encounter the situation	<b>7/11(63.64%)</b>  11/55(20%) 44/55(80%)	<b>4/11(36.36%)</b>

Do you think any oral health-oriented app is required that can assist you in maintaining and answering your queries regarding oral hygiene of your child?	<b>35/55(63.6%)</b>	<b>20/55(36.4%)</b>
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Table 6: Assessment of Practices among 55 parents of children in the age 2 up to 6 years

<b>Variables</b>	<b>Yes n(%)</b>	<b>No n(%)</b>
Does your child brush his/her teeth under your supervision? Once a day Twice a day Sometimes/Occasionally	<b>53(96.4%)</b> 25(45.5%) 24(43.6%) 4(7.3%)	<b>2(3.6%)</b>
Do you visit the dentist for your child? Once a year Twice a year >2 times a year	<b>28(50.9%)</b> 13(23.6%) 11(20%) 4(7.3%)	<b>27(49.1%)</b>
Do you search on the internet for any oral health-related query concerning your child? Rely on answers Do not rely on answers	<b>28(50.9%)</b> 23(82.12%) 5(17.86%)	<b>27(49.1%)</b>

## **Discussion-**

Young children depend on their parents for their health behaviors, daily hygiene, lifestyle habits, and oral health maintenance, including tooth brushing, eating behaviors, and dental visits [19]. Less information on oral health make them visit the dentist at a later stage of caries progression or malocclusion etc. [7] According to a study conducted by Abdulrahman Alshehri et al. [15] in the year 2014, out of 300, only 35.5% of the parents took their children for a regular dental check-up. According to our study, including both age groups of children (2 to 12 years), 55% of the 147 parents had regular visits to a dentist for their children's oral concerns. The differences in our result in comparison with the result obtained in the previous study might be because of the differences in the study population in terms of the size and the attitude of the parents towards preventive oral practices for their children.

A study conducted by Fawaz Pullishery et al [16] among parents of 130 preschool children in Karnataka depicted that only 27% of the preschool children of age between 13 and 72 months had received no instruction from their parents on tooth brushing. About 63% of preschool children were supervised. This result is contrasting with the result obtained by Abdulrahman Alshehri et al. [15] in Pakistan in the year 2014 which included 300 parents of children grouped into two age groups 4 to 10 years and 6 months to 4 years. According to their analysis, 88.5% of parents supervised their children's brushing. The results in the later study seem similar to the results obtained in our study. According to our study, among 55 parents of children in the age group 2 up to 6 years, 53(96.4%) supervised their children's brushing. Out of these 53, 45.5% of parents supervised once a day, 43.6% of parents supervised twice a day and 7.3% supervised only occasionally. Among 92 parents of the children in the age group 6-12 years, 82(89.1%) parents supervised their children's brushing. 38% (35) supervised once a day, 23.9% (22) supervised twice a day and 27.2% (25) supervised only occasionally. The geographic disparity and the difference in the size and age of the study population might have resulted in contrasting results.

Research by Blinkhorn et al [11] supports the point that effective tooth-brushing requires something more than simply knowing it is important. They reported that most mothers (71%) knew they should brush twice daily, but only half knew they should use a small amount of toothpaste and less than half (40%) showed adequate tooth-brushing skills. According to our study, among 147 parents of children in the age group 6-12 years, 60.9% knew the professionally recommended brushing technique and 66.3% knew the correct amount of toothpaste for their children. Out of 55 participants in the age group 2 up to 6 years that took part in the study, 54.5% knew the professionally recommended brushing technique and 61.8% knew the correct amount of toothpaste for their children. 45.5% of the 55 participants were unaware of the professionally recommended brushing technique and 38.2% did not know the correct amount of toothpaste for their children

Parents play a major role in changing the adverse habits of their children for the betterment of their general health. Changing and avoiding these habits may prevent major problems at their adult age. Prevention of oral habits can prevent Fixed orthodontic treatment during adulthood. A study conducted by Vishnu Prasanna SG et al in the year 2020 [17] among 100 parents to assess their knowledge and awareness in relation to oral habits and habit-breaking appliances. According to their statistical analysis, 46% of male and 27% of female parents were aware that adverse oral habits can lead to malocclusion in their children. On inspection, they derived a conclusion that about 36% of parents were aware of the necessity of regular dental checkups and 37% of the total participants were focused on regular monitoring of their children's parafunctional habits like bruxism and other deleterious habits like tongue thrusting, thumb sucking. Kharbanda et al. observed the occurrence of digit sucking, most frequently, in 50% of the children [13]. Mouth breathing habit was the second most prevalent habit in the study conducted by Bhayya and Shyagali, [14] which correlates with our current study in which 21(38.18%) participants out of 55 admitted that their children are having oral habits and out of these 21 participants, 52.38% agreed that their children are having the habit of thumb/digit sucking and 33.33% agreed that their children are having the habit of mouth breathing.

Primary teeth are the most neglected among parents especially in developing nations, considering the fact that they will shed off and new dentition will replace them. In a study conducted by Sultan A Almalki et al in 2020, 68.7% of parents agreed that problems in deciduous teeth would affect permanent dentition. Early loss of deciduous teeth may result in malocclusion in permanent dentition. Malocclusion is the second most frequent dental disease in children and young adults, next to dental caries [8]. Malocclusion results in Aesthetic, Functional, and Psychological issues. According to a survey conducted by Patidar Deepika et al [18] among parents of 500 children in Mullana, 88.4% of parents felt that their children's teeth were not aligned properly. Also, aesthetic reasons were the main reasons for the parents to approach the dentist for the maligned teeth of their children. They did not consider perfectly aligned dentition to be much more important for their children's psychological health. The attitude of the parents in the previous study contrasts with our study in which only 39(42.4%) parents (out of 92) of the children in the age group 6-12 years felt that their children's teeth are maligned. Among these 39 parents, the problem of maligned dentition concerns only 61.54% and 38.46% feel it to be a self-correcting anomaly and did not consider approaching a dentist for the same. 57.3% of the 92 parents did not even know the right time for the treatment of their children's maligned teeth. Also, 87% of the participants in our study considered an attractive smile to be important psychologically and professionally for their children.

Dental Trauma is one of the biggest dental emergencies faced by dentists. Children of age groups 2 to 6 years are likely to face dental injuries due to incomplete motor development [9]. This results in trauma to primary teeth and effecting the developing permanent tooth germ. The lack of knowledge among people while dealing with dental emergencies results in either early loss of teeth or poor prognosis of the treatment planning in later stages. According to our study 44(80%), participants out of 55 participants do not know about any injury to the tooth/teeth that their children might have faced during any sports activities, whereas 11(20%) participants have faced the situation when their children got some dental injuries.

According to a study conducted by Gyanendra Kumar et al among 500 parents in the year 2020 [12] to assess the parent' attitude toward the use of the internet for their children's oral health and treatment, 56.1% of the participants use the internet to gather information on oral health, whereas only 41.9% reported that they have access to the internet but do not use to search information related to oral health and disease. 26.1% of the participants often search for information on the internet before consulting a doctor, and 29.3% discuss treatment plans after searching the internet with their doctor. According to our study, 34(37%) parents of children in the age group 6-12 years admitted that they search on the internet for any oral-related query concerning their children, and out of these 34 participants, 70.59% rely on the answers they get online. 28(50.9%) parents of children in the age group 2 up to 6 years admitted that they search on the internet for their children's oral-related queries and out of these 28 participants, 82.12% rely on the answers they get online. On assessing the knowledge of parents of children in the age group 6-12 years regarding the use of dental-oriented applications for oral care, only 42.4% had an idea about it but 57.6% were unaware of it. The statistical analysis involving the parents of the children in the age group 2 up to 6 years showed that 63.6% had an idea about it but 36.4% were unaware of such applications. In a questionnaire-based study done by B. Underwood et al [10] in the year 2019 to assess the efficacy of an app on brushing technique and duration, out of 189 participants, 70% reported that their teeth felt cleaner since they started using the app. 80% of the participants reported that the app motivated them to brush their teeth for a longer duration and 92.3% would recommend the app to their family and friends [10]

## **Solution- DentoHELP For Children Through AI**

- Based on the study that I conducted this year; my proposal is for building an AI-based application for both android and iPhone users focusing on the dental needs of children up to the age of 12 years.
- The application rather than being for professional use or giving treatment guidance to the patient will be more patient-centric and user-friendly. It will focus on preventive care, guiding the patient in case of emergency, and Educating the patient regarding what is normal and what needs to be treated.
- It will give personalized guidance to the patient (or the guardian) dependent on the age, sex, medical history, comorbidities, physiological conditions, and stage of their children and then address the child's chief complaint
- It will help the parents\guardian to build a positive attitude in their children toward dental care and thus can be used for behavior management in dental clinics. It will also help the patient during the post-treatment phase e.g.- Post extraction care.

### **DESIGN AND FUNCTIONING-**

- Establishing User Profile- The parents first need to sign up for the app using their email id. The app will ask the basic questions concerning their children i.e. Name, Age, date of birth, Height, Weight, Medical Condition (If any), and Drug History (if any).
- Storing Information- The information will be stored in the cloud system by Digital Ocean.
- The app will record all the details and update the details according to the time and date itself.
- As time passes, the age of the child will automatically be updated in the application.

### **APP FOR NOTIFICATION AND REMINDER-**

- According to the age of the child, will notify the parent regarding the dental health care routine, the importance of dental health, and its relation with general health.
- As a child will attain the age of 6-7 months, the app will notify the parent regarding The eruption of milk/primary teeth, care of the primary teeth, the importance of care for primary teeth, and its cleanliness.
- As the age will pass, the app will notify about the type of toothbrush and toothpaste beneficial for the child and the professionally recommended brushing technique with the link to the video for the same.
- For children in age group 2 up to 6 years, the app will notify them regarding the oral habits of the child and their management.
- After 6 years of age, the app will notify regarding the shedding of the primary teeth and eruption of the permanent teeth with every birthday of the child. The app will ask the parent to answer in "Yes" or "No" whether the tooth has erupted/shedded or not. If Yes- Congratulates the child If No- Then will ask the parent to wait for a maximum 6months-1 year and if still not, then the app will ask the parent to consult the pedodontist.
- It will also notify about eating habits, and flossing techniques and will remind the parents to visit the dentist every 6 months.
- It will also ask the patient about any discoloration or staining present on the tooth twice every month. The parent needs to answer Yes or No. If No- The child is congratulated. If Yes- Then the symptoms associated with it will be asked, the photograph of the same will be uploaded to the app and accordingly, the best guidance will be given.
- When the child attains the stage of permanent dentition, the app will congratulate the child. The child will be notified regarding oral hygiene maintenance, the importance of smile, and esthetics. Proper brushing technique will be notified to the patient.

### **App for addressing oral-related queries and first aid guidance during dental emergencies-**

- The parents and children can ask any of their oral health queries from the app. The app will be a substituent for internet searching with an add-on of being 'personalized'
- The app can help parents during dental emergencies like Traumatic Injuries, connecting them to dentists directly for professional guidance and treatment planning.
- It can pave the way to preventive dentistry by avoiding severities that can occur in the future due to parental or societal negligence towards oral care.



## **Conclusion**

In terms of knowledge regarding oral hygiene maintenance, almost 50-60% of parents are well versed with the basic oral hygiene practices but lack knowledge regarding oral habits, dental trauma, and its management. Despite of insane promotion of Digital Health services and applications, parents lack knowledge about such applications to manage their children's oral hygiene and emergency situations. Parents have a positive attitude toward managing their children's oral hygiene and consider the importance of a perfect smile in their children's professional and personal life. The parents feel the requirement of dental applications to manage their dental queries and are aware of dental issues for their children. The habit of searching on the internet for children's oral hygiene queries is more among the parents of children of age group 2 up to 6 years as compared to the 6-12 years age group. The habit of brushing twice a day is increasing among children but the habit of making the children brush under supervision needs to be built among parents of children of age group 2 up to 6 years. The current healthcare advancement requires collaborative efforts from developers, entrepreneurs, clinicians, government, researchers, and consumers to enable better communication, coordination, accessibility, awareness, and cost-effective delivery of healthcare services.

## **Ethical Statement**

This is a KAP-based survey and does not need any ethical permission.

## **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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