

Digital Dentistry: A Modern Era

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DOI: [10.36348/sjodr.2023.v08i12.003](https://doi.org/10.36348/sjodr.2023.v08i12.003)

| Received: 27.10.2023 | Accepted: 05.12.2023 | Published: 08.12.2023

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Abstract

The use of smartphones and apps has helped this new generation in every aspect of life. So, the concept of introduction of smartphone apps in dental education and treatment might provide an innovative way of modern dental practise both for clinicians and for the patients as well. This review literature enumerates the knowledge and purpose of all the important smartphone apps available on the Indian server. **Clinical Relevance Statement:** This review article provides a platform and description of available smartphone dental apps which makes convenient for the patient to have a knowledge regarding dental treatment. **Objective:** To educate dental professionals and patients about available smartphone dental apps and its applications in dentistry.

Keywords: Smartphones, Mobile Applications, Dental Trauma Management, Orthodontic Space Analysis, Dental Clinic Management.

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INTRODUCTION

Smartphones have been one of the achievement of the last decade (Boulos *et al.*, 2011). They are mobile phones with an integrated computer capable of performing a wide variety of tasks, including downloading various applications that are not typically associated with an ordinary mobile phone (Franko, 2011).

The Smartphone mobile dental app is a software application used on a mobile device for medical procedure purposes and it is the wireless technology to deliver the health services and knowledge details for the patient with mobile communication [1].

The conditions imposed by the pandemic prompted significant changes regarding how healthcare is delivered. There has been a shift towards remote healthcare with proper interventions [2]. With global lockdowns, most non-essential treatment ceased and services were significantly impacted when restarted [3]. As we all know that the use of smartphones have been increased significantly in the last decade. These factors warrant exploration of the need and value of digital tools to implement wide-scale educational and clinical interventions.

Mobile phone apps are helping people manage their own dental health and wellness, promote healthy living and gain access to useful information wherever needed [4, 5]. A study in UK advocated that 70% of individuals reported their tooth cleaner after using smartphone dental apps [6, 7].

Mobile apps promote oral hygiene, eliminates fear regarding the dental treatment for the patients and to gain clinical knowledge of the most recent trends within the field [8]. There are numerous dental-related detailed explanations and pictures for various dental treatment, and also allow the patient to report dental emergencies and for prior appointments [9].

There are only few studies considering the use of apps for mobile phones on Dentistry, regarding clinical practice, patient orientation and teaching and learning process. Furthermore, an overview of the dental applications for smartphones available in North India has not been conducted yet. Therefore, the aim of this study is to review the literature about Dental applications (DAPP) for smartphones (SP) and search/describe those available in India.

Mobile Dental Apps Available in India:

1. Dental 3D Illustrations – Helps dentist to consult their patients with dental app
2. My dental clinic – Helps dentists manage their patients and clinics.
3. DentiCalc – This app has several dental photos and videos which is essential for daily dental practise and case management
4. My dentist – To consult and make appointments online for any patient
5. Dental Expert - Book job and works on your terms in dental field
6. Brush DJ - Properly brushing your teeth is more complicated than simply scrubbing your toothbrush across each tooth.
7. Dental kart – Online dental materials shopping app
8. Measurement tool (I phone) / Photo Ruler (Android) – To measure value for orthodontic space analysis
9. I model analysis – For model analysis in orthodontic treatment
10. Dental SOS- For 1st aid treatment of dental trauma.

1. Dental 3D Illustrations (Fig 1)

It helps dentists to consult their patients with dental app and is designed for professionals dentists who need to advise their patients more effectively. A large collection of 3D illustrations of dental treatment is sorted into the groups and located inside this application. It eliminates the difficulty of drawing illustrations on papers to explain the patient.

Remarks- This is far better than photographs as patients may become frightened by seeing photographs of blood operations or real photo of the tooth.

2. My Dental Clinic (Fig 2)

It helps dentists manage their patients and clinic by keeping a database of patient records on their mobile phone, tablet and desktop. It provides facilities of keeping patient's information, call & send sms services, keeping track of appointments, and to attach images related to patient's case and records. It also keeps record of patient's payments and charts.

Remarks - Day to day hectic schedules of dentists have made it difficult to keep the important records of every patient, especially in case of missed appointments or long follow up cases. But, this app provides comfortable base of keeping all these important records.

3. DentiCalc (Fig 3)

DentiCalc is a 4in1 dental care app which has dental photos, videos, calculator and smart watch specially designed for dentists. It is a unique tool that helps to communicate better with patients and manage work faster. It comprises a treatment visualizer which

helps in showing the patients personalized dental animations and let them know about the whole process.

Remarks- It is a revolutionary consultation tool to help dental professionals to present the procedures of different treatments and give prices chair side to the patients.

4. My Dentist App (Fig 4)

It is an application that lets a patient track oral health of himself and his and his family. It will allow them to enter medical treatment performed by the dentists and helps in keeping records of previous work done, remainder for upcoming appointments and expenses in dental treatment.

Remarks- It provides a convenient platform for a patient to keep track records of all the dental treatments of entire family. It serves as a remainder for follow-up procedures too.

5. Dental Expert (Fig 5)

It is the best app for Dental Studies available in Microsoft store. It provides various tools to study and master dental subjects and can also enjoy the process of learning. The app offers a huge collection of topics covering complete dental studies and basic topics from medical studies. One can explore this collection or simple search for study topic and the app will find the right content from online flashcard sets. Any subject like Anatomy, Medicine, Radiology, Dental Materials, Implantology, Esthetic Dentistry and many more can be learnt. Any topics related to DDS, DMD, BDS, MSD, MDS, and other exams like NBDE, NEET, and many more can be explored.

Remarks- For studies and reference purposes, it is considered one of the finest tool available on the internet.

6. Brush DJ (Fig 5)

It is a reminder app and it is the only approved dental app to motivate oral hygiene routine, and help patients manage their tooth brushing frequency and duration. This app aims to prompt users to brush for 2min while listening to music, chosen either from a playlist, or randomly, from the music stored in the user's device or music streaming service. Moreover, this app allows the users to set reminders to brush twice a day. The app also links to videos published on YouTube showing how to effectively use a toothbrush, dental floss, or interdental brushes.

Remarks – If usage frequency is positively correlated with the brushing duration and frequency, this smartphone app, as motivators and reminders, can improve orthodontic patients' oral hygiene compliance, especially in adolescence.

7. Dental Kart (Fig 7)

Dentalkart (Vasa Denticity Ltd) is a one-stop online shop for next-generation dental equipment and tools, with the widest assortment of 35,000+ products across 390+ diverse categories from over 125 regional, national, and international brands. Dentalkart (Vasa Denticity Ltd) delivers to 6000+ cities and towns in India and is a trusted brand recommended by dentists across the country. This app offers products act as a guarantee of quality, dimensional accuracy, user-friendliness, and durability. It provides quick delivery, even to the remotest corners of the country, with free shipping, cash on delivery, daily deals, and much more. This app is available to on Google Play Store and Apple Store.

Remarks - It provides a one stop centre of online ordering of dental products at almost all locations.

8. Measurement tool (I phone) / Photo Ruler (Android) (Fig 8)

AR Ruler is an AR-based measurement app that helps in measuring real-world objects. Based on Google’s ARCore, AR Ruler offers measurement in feet, yards, centimeters, meters, millimeters, and inches. All we have to do is to point the viewfinder towards the surface plane and tap the screen to start measuring. Alongside the ruler functionality, the app also offers a handy feature to measure rooms and create a 3D floor plan. In orthodontic treatment, it has played a major role in measuring the arch space, spacings available between teeth and spaces required to correct the mal-alignment.

Remarks- Measurements on casts is a tough job using mechanical gauges and ruler so it is easy to measure the casts more easily and accurately.

9. I model analysis (Fig 9)

It is an app to simplify the mathematical calculations required for analysis of orthodontic casts. This app, called I Model Analysis, runs on Android-based smartphones (an iPhone app is planned) and is

available as a free download from the Google Play store or by scanning the QR code on this page with an Android phone.

The app performs quick and accurate mathematical calculations for:

- Bolton analysis
- Tooth-size/ arch-length discrepancies in the maxillary and mandibular arches
- Howes analysis
- Pont and Linder-Harth arch-width analysis
- Tanaka-Johnston mixed-dentition analysis

It also functions as a pocket reference to these analyses, making it a tool for e-learning.

Remarks - This app is only a small indication of how diagnosis and treatment planning will be stream-lined and organized for orthodontists in the future. Additional apps could range from simple diagnostic tools to full-fledged orthodontic case management programs.

10. Dental SOS (Fig 10)

The International Association of Dental Traumatology (IADT) launched the ToothSOS App in 2018 to share information about first aid with the public in case of any dental trauma, by taking advantage of the rapid accessibility of information in mobile technology. It is thought that the application can be a useful source of information for people in emergency and non-emergency situations. The purpose of the App is to provide information about TDIs (Traumatic Dental Injuries) to the general public, patients, parents, teachers, and dental professionals. The App can be downloaded for free on smartphones. The patient section has instructions on how an individual can deal with TDIs before visiting a dentist.

Remarks- The ToothSOS App is effective in increasing the knowledge level of individuals about the emergency management of TDIs.

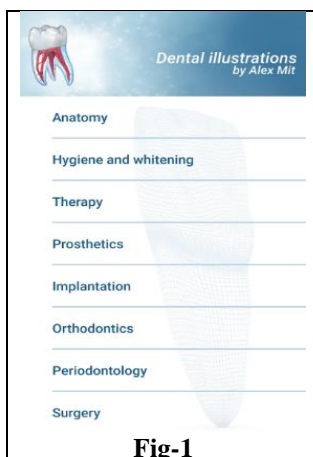


Fig-1

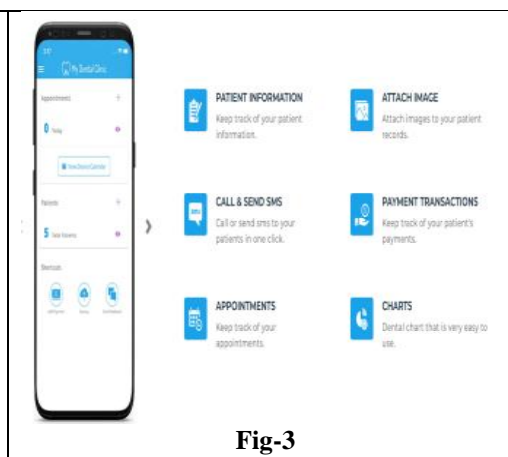


Fig-3

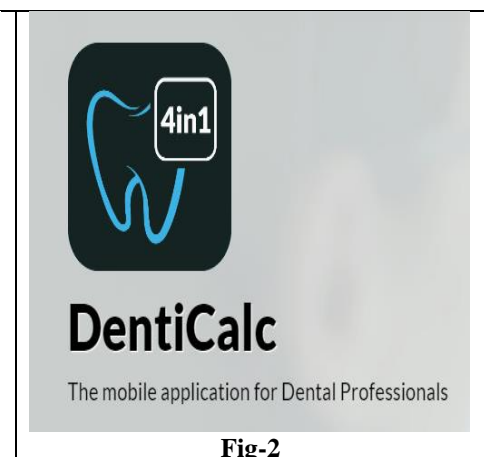
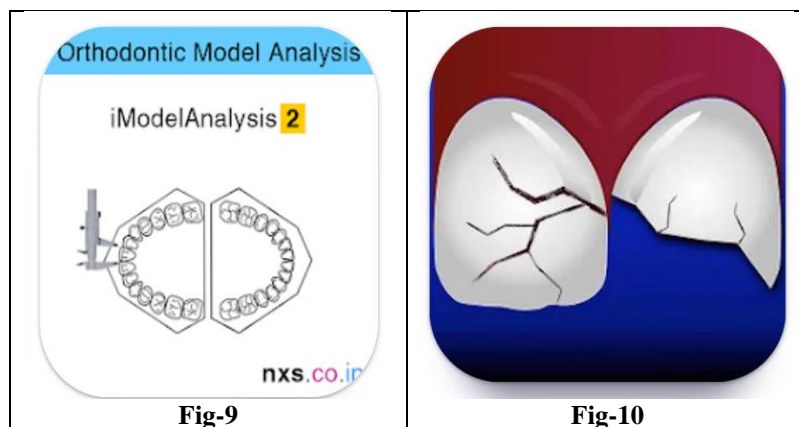
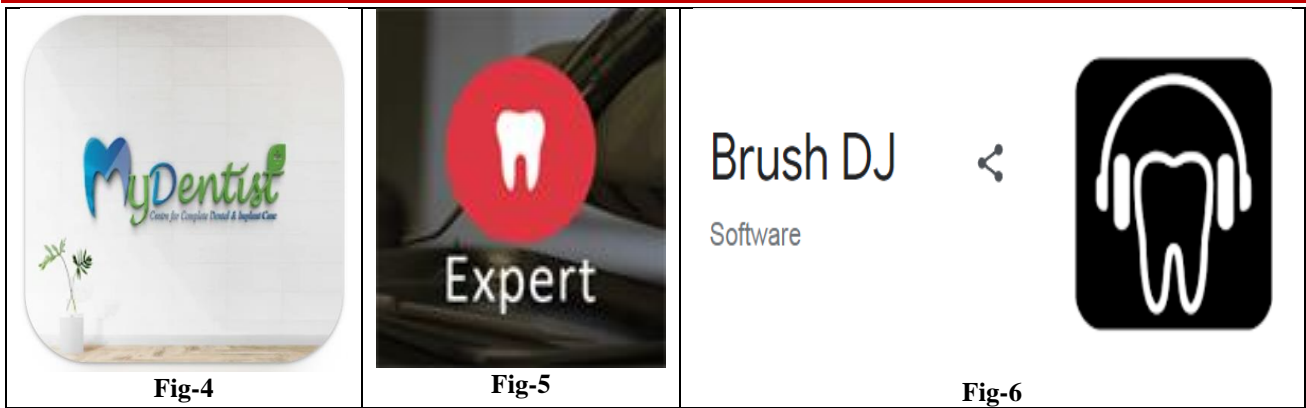


Fig-2



DISCUSSION

In the field of health care and medical science, smartphone applications have contributed in the advancements in recent times. With the increase in use of smartphones and data connectivity, it has become easier to access dental treatment, education, and appointments too. Applications can facilitate the dental practice in keeping the registration records, communication of the case with the dental auxiliaries and the fellow professionals as well as research in specific literature.

Iskander *et al.*, [10] conducted a study in which training was provided to parents for TDIs emergency management using tools like poster and a mobile app and they concluded that parents chose smartphone apps over poster for acquiring knowledge about TDIs. Currently smartphones are assessable to most people due to fast

popularization and affordable costs. However, it can be more beneficial for the society, if oral health applications can be presented through smartphone applications. Applications are interesting method to reduce patient’s anxiety helping them to manage dental fear and understanding the procedures. A study was conducted by Prince *et al.*, [11] in which they reported that step-by-step instructions of the mobile app along with the subjective training can help parents or patients retain the information in the longer term. They are efficient in analysing space for orthodontic corrections and have in depth ideas about medical emergencies. There have been previous studies about smartphones as an educational tools and remainder [12, 13]. Zotti *et al.*, [14] assessed the efficacy of a WhatsApp-based program that was a combination of oral hygiene maintenance during orthodontic treatment and using a chat room known as “Brush Game.”

A study was conducted by Alkadhhi *et al.* [15], in which a mobile app was designed which consisted of oral hygiene instructional texts and videos, whose aim was to encourage patients to practice daily oral hygiene routines. This study showed that the app decreased the plaque index and gingival index more effectively than verbal oral hygiene instructions.

In a study conducted in UK, an improvement in patient knowledge was seen in people using mobile applications to educate and motivate parents [16, 17].

Some of the newly developed apps are absolutely brilliant in management of dental clinics as they are capable of booking appointment slots, keeping records of payments and detailed descriptions of the on-going treatments. In recent years, it will be quite interesting to see a new programmes if developed for the detailed explanation and interpretation of the dental radiographs. This article has shortlisted almost every popular mobile phone applications available on android and apple devices in India and discussed all the available parameters like advantages and capabilities. It presents a compilation of all the apps available for the smartphones and their benefits.

Smart phone dental applications overcome the physical and logistical barriers in taking essential steps in rendering proper dental health care. This knowledge of parents using mobile phones applications for oral health promotion could be added to the attractiveness of social media and the enormous use of smartphones [18-20].

CONCLUSION

Dental applications available for Indian smartphones have shown a significant growth in terms of ease of assess as well as detailed knowledge about the ailments in past few years. Corona pandemic has shown an alternative method of treatment which includes telepathy. With the recent advancements in dental apps, it has become convenient for both the professionals and the patients to assemble their dental knowledge and data. It is expected that future updates and launching of dental smartphone apps must provide evidence based and comprehensive. It is also expected that in coming years, there will be distinct apps in every segments of dentistry.

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