

Different Approaches for Managing Oro-Dental Problems by the Public during the COVID-19 Lockdown Period

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Abstract

Introduction and Objective: Home remedies and quick management of urgent conditions could be available information to people through internet searches. But that itself could result in worsening the conditions known by the majority of dental patients in Saudi Arabia. In order to reach our objective, we have to: Evaluate the knowledge of dental patients in Saudi Arabia regarding managing common orodental urgencies, and determine the most common approaches they used to solve their problems. The objective of this study is to evaluate the need for structured distant dental consultation and prescription services in Saudi Arabia.

Materials and Methods: A cross sectional study consisted of a survey that was conducted in May, 2021. An online questionnaire was in English and Arabic versions using Google forms was used to collect the data. The questionnaire consists of a series of questions related to demographic characteristics and orodental problems as experienced by the patient during the lockdown. A convenience sampling technique was used in this study. All the participants were informed about the purpose of the survey and the confidentiality of their responses.

Results: We had a 100% response rate with 210 respondents completed the survey within the 7 days of the publication of the questionnaire. Regarding what we need most in Saudi Arabia to manage orodental problems in such situations 41.4% of the respondents suggested distant dental consultation and prescription services, 39.5% suggested more oral health education about these types of approaches, 50.5% suggested dental emergency clinics, 45.7% suggested mobile dental clinics, 4.8% suggested that we have enough dental services, 3.3% suggested others such as availability of dental clinics at all times, affordable prices, apply penalties.

Conclusion: Our study shown that the respondents have managed these conditions during the lockdown by different ways, most of them went to emergency clinics to take medications to alleviate their symptoms, and they asked relatives and friends about treatments, which suggests the need for more structured distant dental services. Further research should be done to include a bigger sample size and more cities of Saudi Arabia.

Keywords: Covid19; Dental; Lockdown; Treatment; Teledentistry; Anxiety

Abbreviations

OPG: Orthopantomogram; CBCT: Cone Beam Computed Tomography; TRPV: Transient Receptor Potential Vanilloid; OTC: On-the-Counter; SARS: Severe Acute Respiratory Syndrome; MERS: Middle East Respiratory Syndrome; TMJ: Temporomandibular Joint; SES: Socioeco-

conomic Status; NSAIDs: Non-Steroidal Anti-Inflammatory Drugs; ADA: American Dental Association; RPM: Remote Patient Monitoring; VP: Virtual Patient

Introduction

Saudi Arabia was the first countries around the globe to carry out early and unmatched precautionary measures to prevent COVID-19 introduction into the country or to lessen its impact when it arrives; such measures were implemented early, even before the first case was reported on March 2nd, 2020 [1]. A month before the first COVID-19 case in the country was identified, the Saudi government took the virus seriously by banning travel between Saudi Arabia and China [1]. On February 27th, the isolation from the virus continued by the government. Saudi Arabia suspended entry of all international Umrah pilgrims and tourists and monitored all entry points to Makkah and Madinah [1]. By February 28th, as Gulf countries around Saudi Arabia started having COVID-19 cases, the government banned the inbound travel of individuals from Gulf countries [1].

Eventually, all international and domestic air travel and workplaces (except security and health sectors) were suspended [1]. In addition, the government, represented by the Ministry of Islamic Affairs, banned all Muslims from praying in mosques across the country and requested them to pray in their homes for the first-ever experience in the kingdom's history [1]. In its more drastic actions from April 2020 to Late June 2020, Saudi Arabia implemented a 24-hour curfew in most of the country, enforced lockdown, imposed isolation of several districts in major cities, and started mass and extensive testing in communities [1]. The emergence of COVID-19 in Saudi Arabia pandemic greatly impacted the health systems countrywide, and dental practice is no exception [6]. Although emergency dental care was still provided during the lockdown in limited locations, dental practices had to stop all elective dental treatment in line with the lockdown announced by the government. The suspension of elective dental treatment ensured that all of the potential routes of the spread of the virus were closed off because the majority of routine dental treatments generate significant amounts of droplets and aerosols [15].

As a result, residents in lockdown regions might have suffered from oral conditions but could not receive treatment. Conditions that might have required urgent dental management would include the dental tissues or the oral mucosa.

Conditions in dental tissues include dental trauma, pain due to pulpal inflammation, pericoronitis, localized dental/periodontal abscess, loss of filling, loss or fracture of dental prosthesis, etc. These could range from simple to potentially life-threatening, such as severe cellulitis spreading to facial spaces.

Conditions in oral mucosa include painful ulcerative lesions due to trauma, burns, or oral health conditions. The conditions also range from minor to potentially life-threatening, such as pemphigus vulgaris, mucous membrane pemphigoid, erythema multiform, and Stevens-Johnson syndrome.

Patients may have managed the earlier stated conditions during the lockdown in various ways. Some may have attempted to treat the disease on their own, while others attended emergency clinics or pharmacies to take medications to alleviate their symptoms. It is essential to see that leaving the residence required a permit to break the curfew due to lockdown, whereas others tend to ask relatives and friends about treatments, and some choose to communicate with their dentists via mobile or video conferencing applications.

Dentistry has seen significant technological advancements over the last decade. These advancements include using computers, digital medical imaging, digital models, digital planning and design, and the analysis and follow-up of patients using software [18]. Teledentistry was adopted as a subspecialty of telemedicine by the United States (US) Army in 1994 as part of a military project to enhance patient care and dental education [33]. The telemedicine project revealed that teledentistry could reduce patient care costs and expand dental care to remote rural areas [33]. The word "Teledentistry" can be interpreted as providing treatment advice and diagnosis over a distance using technology such as video conferencing [31]. Teledentistry may also provide formal education online through web-based self-instruction

or virtual video conferencing. Teledentistry's had an important role in sustaining dental educational activities (didactic and clinical) during the COVID-19 outbreak [31]. The general dentist is the patient's first contact in urgent cases.

The most common dental urgencies a general dentist encounters during a quarantine are pain, swelling (intraoral or extraoral), or both. The first line of care to address urgencies is to prescribe enough antibiotics and analgesics [18]. If these symptoms persist, the dentist may encourage the patient to seek emergency care at a clinic. In cases of dislodged temporary cement, the patient will be instructed to keep the cavity clean after each meal using regular tooth brushing. If the tooth is managed endodontically, the patient will be instructed to clean the tooth with a solution of water and hydrogen peroxide using a syringe without a needle [18]. Until meals, a sterilized cotton pellet should be kept in the cavity. Such patients are advised to avoid hot and cold foods and to chew on the opposite side. The dentist utilizes teledentistry to resolve as many issues as possible. However, in a dental emergency, the dentist must consider referring to or consulting a specialist dentist [34].

Most patients with oral ulcerative lesions or soft tissue ulcers will take photos of their lesions and give them to their dentist using their smartphones. After enquiring about the patient's medical and allergy history, the dentist will examine them and prescribe appropriate medications via teleprescription [18].

In case of cysts or tumours, digital orthopantomogram (OPG) and cone beam computed tomography (CBCT) may be submitted to oral and maxillofacial radiologists for timely diagnosis and treatment planning [18]. Torres-Pereira, *et al.* [19] proposed that remote diagnosis involves the transfer of digital images through e-mail, an effective alternative for diagnosing oral lesions.

In oral and maxillofacial surgery, the most often encountered complaint is a pain in the third molars. Patients in this category should submit clinical and radiographic images to dentists, who can then refer them to a specialist for consultation [18]. Dental trauma and elective treatments have declined due to the COVID-19 pandemic. Duka, *et al.* [20] demonstrated that telemedicine-assisted clinical diagnosis of impacted or semi-impacted third molars was equivalent to real-time clinical diagnosis. Additionally, Saad Ahmed and Omar report [21] that oral surgery benefits from Teledentistry for dental procedures and monitoring patients' postoperative conditions.

The most often reported symptom of patients on lockdown is dental pain and swelling. Ather, *et al.* [22] distinguished primary and secondary treatment protocols for endodontic interventions. Analgesics can be prescribed under certain circumstances, such as symptomatic reversible pulpitis. If the primary protocol is unsuccessful, a pulpotomy procedure may be performed as a backup. The dentist will choose between antibiotic therapy or urgent clinical intervention is required. Zivkovic, *et al.* [23] established that teledentistry using the internet as a means of communication could be used effectively to diagnose periapical lesions.

In the field of periodontics, teledentistry employs the store-and-forward approach. The dentist should gather all necessary images of patients (intraoral and extraoral) and radiographs and forward them to the periodontist for consultation [18]. The periodontist will then review the photographs and radiographs to decide the most appropriate course of treatment. The dentist and periodontist will then determine whether to treat the patient urgently or to delay treatment until the lockout is removed [18].

The advantages of teledentistry during the COVID-19 lockdown include that the dentist could treat primary emergencies by administering appropriate antibiotic treatment and instructing the patient on proper home care [18]. The teledentistry approach will prolong the treatment before the lockdown is lifted. Also, teledentistry is an effective method of obtaining a specialist consultation without seeing a dentist during the lockdown [18]. Tele-dentistry enables the patient's care plan to be developed more efficiently and expeditiously. Also, for following emergency procedures such as extractions or emergency access openings in cases of swelling, the dentist may ensure adequate follow-up for patients using photos taken of the infection site by the patient [18].

Although teledentistry is a boon for dentists in these challenging times, nothing compares to the precision of clinical diagnosis. Teledentistry does not allow for the performance of critical diagnostic measures, the most critical of which are palpation and percussion. Teledentistry is only beneficial in preventing and diagnosing dental problems [18]. If a patient needs medication, he or she must make an appointment with the clinic to undergo procedures such as restorations, endodontic treatments, and extractions [18].

The diagnosis is made using clinical photography and is subject to change during face-to-face communication [35]. The accurate representation of intraoral photographs or video recordings can vary from what is displayed. Additional diagnostic procedures, such as percussion and palpation, are impossible [18].

Concerns are raised about the cost of telecommunications equipment. Systematic analysis of cost-effectiveness; and trials of telemedicine approaches failed to support telemedicine as a cost-effective mode of healthcare delivery by Whitten PS, *et al* [26]. At the same time, Scuffham PA and Steed M [27] suggested that teledentistry did not result in cost savings after a 12-month trial. They predicted that as familiarity and equipment use increased, teledentistry's cost-effectiveness would improve. These cost-effectiveness analyses have been conducted for more than a decade. Nowadays, almost every dental practice is equipped with intra-oral cameras, digital cameras, and computers with Internet access, all of which are automatically configured to support teledental solutions. Technological advancement decreases the cost of teledental consultations due to improvements in the scale, features, and costs of various technical components [28].

The utilization of telecommunication through video communication applications such as Zoom to share and exchange clinical information and images over remote distances facilitates dental consultations regarding diagnosis and treatment planning [5]. Although the risk of data breach and patient confidentiality is present, Telecommunications remain essential in diagnosing and treating oro-dental conditions when antibiotics or corticosteroids, and the patient is distant or - if necessary- triaging and telescreens before the patient comes to the clinics [12].

Bradley, *et al.* used a prototype teledentistry program to establish a teledentistry service in Northern Ireland, using a personal computer and an intraoral camera in the prototype [29]. The research enrolled 37 patients in Belfast. The feasibility of remote diagnosis of oral mucosal diseases was investigated using digital images transmitted to distant consultants via-e-mail and a store-and-forward image system [29]. The authors determined that eight (20%) of the 37 referred patients should be seen in person, while the remaining sixty-five (65%) should be treated or monitored at the primary day-care facility under the supervision of the remote oral medicine specialist.

Additionally, the teledentistry system identified one "harmless lesion" and one case of an inappropriate referral to a specialty [29]. According to the researchers, the system was "especially well-suited for managing referrals of older dependent adults with the oral mucosal disease". They discovered that teledentistry could be a cost-effective method of managing referrals in oral medicine [29].

Different types of management could be applied during the lockdown. Through our search, two main types have come up: Non-pharmacological and pharmacological treatment.

Home remedies can include clove, coconut oil, and warm saline mouthwash. Combining warm saline and coconut oil can effectively relieve dental pain and associated complications until treatment is available [2]. An Indian study [9] showed that some patients apply balm over the painful tooth region, in contrast, others utilize herbal remedies, including placing turmeric (*Curcuma longa*) or neem stick (*Azadirachta indica*) over the affected tooth.

Kumarswamy, 2016 introduced an herbal dental gel which contains clove oil, camphor, menthol, and polymer matrix. All the above-stated components contribute to analgesic, soothing, good flavour, and thick gel, which adapts to the affected tooth structure. The components are explained in the following four paragraphs:

1. Clove oil (primarily eugenol): Clove oil is the major component and provides significant analgesic and anti-inflammatory effects. As known, eugenol is used in a temporary restoration material (Zinc oxide eugenol), which provides the effects mentioned earlier for an extended period. An article by Bley reported that eugenol has an analgesic activity due to its anti-nociceptive capacity via thermo-sensitive transient receptor potential vanilloid (TRPV) [41]. These receptors, upon continuous activation, release Ca^{++} ions intra and extra cellularly. This high calcium concentration will disrupt local nociceptor function, leading to an analgesic or an anesthetic effect [41].
2. Camphor is known for its soothing effect on the skin through creams and ointments, which is the same effect the gel provides. Also, it has a mild anesthetic action which comforts the patient from the sensitivity and relieves the pain [36].
3. Menthol is obtained from mint oils and primarily flavors the gel. A study conducted by Alvarado., *et al.* suggests that the transient receptor, potential Melastatin, a nonselective cation receptor is activated and produces a cooling effect [37].
4. The polymer matrix helps to adhere the components to the affected tooth structure. It also helps to combine the analgesic oils into a stable, even gel [9].

Clinical experience with the herbal dental gel is considered a symptomatic treatment until the proper situation for definitive treatment is available. The herbal dental gel is very effective in managing acute dental pain caused by several dental problems such as caries, pulpitis (reversible and irreversible), erosion, abrasion, and even in cases such as cracked tooth syndrome. Also, efforts should be made to explore other therapeutic areas or clinical conditions to further extend its scope, for example, in the dry socket, etc [9].

The pharmacological approach for conditions found in dental tissues can include paracetamol, the safest analgesic taken up to the recommended doses, on-the-counter (OTC) medication, and the first analgesic patients take. It is recommended to treat mild to moderate pain. However, its dose should not exceed 4 grams daily to prevent severe liver damage [11].

Also, non-steroidal anti-inflammatory drugs such as ibuprofen indirectly exert analgesic effects by reducing inflammation and directly acting on the central nervous system. As ibuprofen is an analgesic and anti-inflammatory agent, they are recommended for moderate to severe dental pain. However, ibuprofen has a common side effect of stomach pain because it stops the production of the stomach's protective coating, which can lead to peptic ulcers. Also, the ibuprofen dose should not exceed 3200 mg/day to prevent cardiovascular adverse effects [13].

Antibiotics can be prescribed for symptomatic relief of dental swelling and abscesses until the dentists can do the definite treatment under an appropriate environment or refer to a specialist [3]. Amber Ather., *et al.* [14] suggest amoxicillin with clavulanic acid (Augmentin) twice a day for five days as a primary management choice.

Many conditions in oral mucosa that need medications are more complicated than dental ones. A specialist should prescribe them, and here lies the importance of telecommunication between the patient and the specialist to thoroughly diagnose and prescribe the appropriate medication. The pharmacological treatment of oral mucosal conditions requiring urgent care can include systemic corticosteroid, the first-line treatment for pemphigus vulgaris. The dose decreases gradually after remission and healing of the lesion; other immunosuppressive drugs may be used to reduce the dose of steroids [38]. The treatment of Mucous membrane pemphigoid depends on the sites involved and the severity of the disease. The oral medicine specialist could guide mild local oral involvement via video conferencing. Severe mucous membrane pemphigoid requires a more aggressive approach, such as prednisolone 1 mg/kg/day or other immunosuppressive drugs combined with systemic corticosteroids [39]. Usually, the management of erythema multiforme is supportive because, clinically, it is a self-limiting disease that resolves within weeks without complications. However, in some cases, it becomes more extensive and requires a high prednisolone dose. Follow up by oral medicine specialist via video conferencing to review and guide the supportive care [40]. The

management of Stevens-Johnson syndrome is similar to significant burns. It includes wound care, fluid and electrolyte management, nutritional support, temperature management, pain control, and monitoring or treatment of infections [4,5].

So, home remedies and quick management of urgent oro-dental conditions could be available information to people through internet searches. However, that could worsen the condition known by most dental patients in Saudi Arabia [16]. This study evaluates the need for structured distant dental consultation and prescription services in Saudi Arabia. In order to find out, the direct aims are:

1. Evaluate the knowledge of dental patients in Saudi Arabia regarding managing everyday common oro-dental urgencies.
2. Determine the most common approaches they used to solve their problems.

Materials and Methods

The study design is a cross-sectional of a survey conducted in May 2021. Online Google forms in English and Arabic languages were used for data collection. The questionnaire consists of a series of questions related to demographic characteristics like age, gender, and employment status (Q1-4), Part 2- asked participants how they maintained their dental health before the pandemic (Q5 and 6). Part 3- recorded patient's experience of Oro-dental problems during the lockdown (Q7-12). Multiple-choice questions (Q1, 4-6, 8-10, 12), dichotomous questions (Q2, 7, 11), open-answer questions (Q3), and multiple-response question (Q13) were used in the questionnaire. A convenience sampling technique was used in this study. Participants were informed about the purpose of the survey and the confidentiality of their responses.

The responses were automatically recorded on a Google sheet, to be transferred to an Excel sheet. Data was then coded and transferred to SPSS software for statistical analysis of this study. Descriptive analysis for most of the questionnaire and multiple response analysis for Q13 were performed to evaluate the main characteristics of the participants in the study.

Results

Overall, 210 respondents completed the survey within seven days of the publication of the questionnaire. Out of the total respondents, 71.4% were male, and 28.6% were female (Table 1). The largest share of respondents, 50%, belonged to the age group 36-50, followed by those aged between 18 and 35, who made up 35.7% of the sample; furthermore, 13.8% were aged 51-70, and 0.5% was 71 years old and above (Table 1). Most of the respondents came from the Western region (Jeddah, Makkah, Taif, Madinah), with a total share of 74.8%, 16.7% from the Central region (Riyadh, Qassim), 5.8% from the Southern Region (Baha) and Villages in the western region (Alkhorma, Adham), 1.9% from Eastern region (Dammam, Khobar, Alaska), and 1% from Northern region (Tabuk) and Villages in the western region (Alkhorma, Adham) (Table 1). In total, 66.2% of participants declared they used to go to dental offices before the pandemic only. In case of emergency, 12.4% twice a year and 11.9% once a year, and 9.5% three and more a year (Table 2).

Out of the total, 27.6% of respondents had oro-dental conditions during the COVID-19 lockdown period, out of which 63.8% experienced dental pain; 13.8% had Dental trauma; 10.3% Painful Ulcerative lesions, 6.9% had other conditions (Caries, Tooth mobility, Gingivitis), while 5.2% with Abscess (Table 3).

From those who experienced oro-dental conditions during the COVID-19 lockdown period, 41.4% used Pain killers to relieve these conditions, 20.7% used mouthwashes, 10.3% went to the dentist, 10.3% used Antibiotics, 8.6% used herbal remedies, and 8.6% they did not know how to manage these conditions (Table 3).

Among 27.6% of the total sample, 36.2% sought advice from a dentist to manage these problems during the COVID-19 lockdown period, 29.3% from relatives and friends, 20.7% from Google search, and 13.8% did not look for advice (Table 3).

		n	%
Age	18-35	75	35.7
	36-50	105	50.0
	51-70	29	13.8
	71 and above	1	0.5
Gender	Male	150	71.4
	Female	60	28.6
City of Residency	Western region (Jeddah, Makkah, Taif, Madinah)	157	74.8
	Central region (Riyadh, Qassim)	35	16.7
	Eastern region (Dammam, Khobar, Alahsaa)	4	1.9
	Northern region (Tabuk)	1	0.5
	Southern Region (Baha)	6	2.9
	Village in central region (Alhomeat)	1	0.5
	Village in western region (Alkhorma, Adham)	6	2.9
Employment status	Employed in a public company	95	45.2
	Employed in a private company	68	32.4
	Student	27	12.9
	Business owner	20	9.5

Table 1: Demographic information of the respondents to the questionnaire (n = 210).

		n	%
Before the pandemic how often did you go to the dentist?	In case of emergency	139	66.2
	Once a year	25	11.9
	Twice/ year	26	12.4
	Three and more/ year	20	9.5
How often do you brush your teeth?	Twice a day	95	45.2
	Once a day	96	45.7
	I don't brush my teeth	19	9.0

Table 2: Respondents' answers regarding their dental care before the pandemic.

17.1% of the total sample contacted a dentist for consultation or prescription; among those, 47.2% went to the dental clinic to contact them, 36.1% contacted them using a mobile phone, and 16.7% used video communication apps (Table 3).

Regarding what we need most in Saudi Arabia to manage Oro-dental problems in such situations, 41.4% of the responses suggested distant dental consultation and prescription services, and 39.5% suggested more oral health education about these approaches. 50.5% suggested Dental emergency clinics, 45.7% suggested Mobile dental clinics, 4.8% suggested we have enough dental services, and 3.3% suggested Others, such as availability of dental clinics at all times, Affordable Prices, and Applying penalties (Table 4).

Discussion

This study evaluates the need for structured distant dental consultation and prescription services in Saudi Arabia by addressing patients' reactions and responses to oro-dental problems during the lockdown period. Many studies have been conducted in Saudi Arabia

		n	%
Have you had any oro-dental problems during COVID-19 lockdown period?	Yes	58	27.6
	No	152	72.4
What kind of oro-dental problems did you have during COVID-19 lockdown period?	Dental Pain	37	63.8
	Dental Trauma	8	13.8
	Abscess	3	5.2
	Painful Ulcerative lesions	6	10.3
	Other	4	6.9
How did you to manage these problems during COVID-19 lockdown period?	Pain killers	24	41.4
	Antibiotics	6	10.3
	Herbal remedies	5	8.6
	Mouthwashes	12	20.7
	I didn't know how to manage	5	8.6
	Other	6	10.3
From where did you have the information to manage these problems during COVID-19 lockdown period?	Google search	12	20.7
	Ask relatives and friends about treatments	17	29.3
	Communicate with your dentist	21	36.2
	I didn't look for solutions	8	13.8
Did you contact a dentist for consultation or prescription?	Yes	36	17.1
	No	174	82.9
How did you contact your dentist?	Video communication applications	6	16.7
	Mobile phone	13	36.1
	Physically face to face	17	47.2

Table 3: Respondents' experience of oro-dental problems during lockdown.

	n	%
Distant dental consultation and prescription services	87	41.4%
More oral health education about these types of approaches	83	39.5%
Dental emergency clinics	106	50.5%
Mobile dental clinics	96	45.7%
We have enough dental services	10	4.8%
Other	7	3.3%

Table 4: Respondents' opinion about what we need more in Saudi Arabia to manage oro-dental problems in such situations.

on treatment considerations for general dental care, guidelines reported for best practice and new clinical recommendations reported for managing dental emergencies. However, none of the studies discuss how patients managed problems during the lockdown before any clinical intervention, which makes this study significant.

This study used a cross-sectional design for the following reasons: Suitable design during a pandemic, is a population-based survey to assess our assumptions about oral dental care, design is cheap and quick, and assesses multiple variables at the same time and could be used as a baseline for other cohort studies. We will be able to understand the prevalence of diseases, and attitudes towards orodental health, attitudes and knowledge among patients regarding oral dental care and teledentistry.

The current study aims to evaluate the Saudi Arabian population's feelings regarding their response to SARS-CoV-2 in resuming and undergoing dental treatments during and after the post-quarantine period.

Natural pandemics often trigger fear and anxiety, especially those with high infection and mortality rates. The Psychological impact, anxiety, and discomfort are reported in both healthcare workers and patients during previous related infectious disease outbreaks, such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) [42].

Surprisingly the majority of this survey did not have any oro-dental conditions, and there was no association between their oral hygiene preservation and regular checkups and experiencing any oral and dental conditions.

That is why there was no surprise that, according to our findings, dental pain was the most common oro-dental condition during the lockdown. Also, the severity of the pain here could range from mild to severe, so the pain threshold factor here is essential as their oral health (in this study) did not have an effect in experiencing dental pain, as mentioned before.

Studies suggest that stress exacerbates dental pain and swelling. During COVID-19 restrictions like lockdowns to avoid death casualties due to worsening infection, ignoring dental help in orofacial pains may lead to chronic pain. Most chronic pains, like temporomandibular Joint pain (TMJ), can only be diagnosed and cured by dental specialists [4].

In our study, the participants suggested that we need more mobile and emergency dental clinics; this may apply to public dental sector clinics as there is a long waiting time in their emergency clinics. According to the survey results, half of those who encountered oro-dental problems during the lockdown period did not contact a dentist. This behaviour indicates that the participants found it challenging to communicate with them; instead, they contacted their relatives or friends. However, the study suggests that people suffering from dental pain and swelling with COVID-19 infection should require urgent dental advice. They are kept on prescribed antibiotics and analgesics to borrow time to formulate a complete plan once the COVID-19 infection is eradicated, offering a little pain relief to the patient and reducing the cross-infection of COVID-19 [3].

Patients are less likely to seek dental advice while suffering from febrile illness with respiratory distress. [3] Self-care largely depends upon the desire and pain expression. People will prefer to self-medicate in severe pain. **Dandi, et al. expressed** that the severity of pain is a deciding factor for the desire to have self-medication. Self-care is the only way out in low Socioeconomic status (SES) areas; where there is rare or no dentist availability due to financial barriers or ignorance towards them. Self-care is the only way out in low SES areas, where there is rare or no dentist availability due to financial barriers or ignorance towards them. **Hastie, et al.** said people should rely on healthcare professional advice and self-care to cope with pain. [8]. There is no possible reason for self-medication. Past studies have suggested the availability of over-the-counter OTC drugs as a significant cause of self-medication [16].

Paracetamol, an OTC, is often recommended as the first analgesic for dental pain. Patients are advised not to take two different formulations containing acetaminophen or paracetamol, which may be ignored or unread in non-prescription self-medications [10]. Non-steroidal anti-inflammatory Drugs (NSAIDs) are believed to have side effects like the risk of Gastrointestinal bleeding in the elderly, ulceration or perforation of the intestines and stomach [7]. Diclofenac and Ibuprofen are safe if taken appropriately with a prescription. However, abuse in these matters may result in gastrointestinal disturbances like nausea, vomiting, diarrhea, etc [13].

Management of non-emergency dental cases avoids the already burdened dental practices and minimizes exposure to infectious [12]. Studies have shown that many dentists are keen on discussing or consulting their cases with dental specialists over teledentistry, allowing practitioners to collect and share the essential details with specialists who have expertise in that area. Previous studies show that Saudi dentists have 68.9% acceptance towards Teledentistry to communicate and construct a reliable diagnosis, further confirmed by clinical visits and a treatment plan formed [43]. Interestingly, the other half of the population contacted a dentist through remote communication applications. As expected, most of them were in the age group 18 - 35 years old. The easy access to technology, fluency in using technology, availability of internet connection and the consumer convenience highly appreciated by the 18 - 35 age group may have been the reason for almost half of our survey population accessing teledentistry. In addition, the population also believed that teledentistry was a reliable, accessible and appropriate option for seeking advice for arising dental issues.

The American Dental Association (ADA) suggests that teledentistry examinations can be an important way to expand the reach of dental practitioners, thus increasing access to health care by limiting the effects of distance barriers [30]. The teledentistry consultation mode will help dentists in remote areas who need an expert opinion in a limited period [43].

The use of telehealth services and methodologies in dentistry is referred to as teledentistry. Telehealth covers various technological applications and approaches for providing interactive care, health, and education services [30]. Teledentistry can also be an ideal method of communication between dentists and patients of low socio-demographic areas, making a comfortable environment to provide consultation [28]. Specialized dental care services are not widely available in rural areas making the need for teledentistry even more [24].

Furthermore, dental malocclusion could also be managed through interceptive orthodontics via consultations between general dentists and specialists through telecommunication. Therefore, in-time access to orthodontic specialists can benefit general dentists in complex skilled cases [24].

Teledentistry includes but is not limited to, the following modalities for patient care and education: A. Synchronous (video in real-time): A live, two-way audio-visual telecommunications contact between an individual (patient, caregiver, or provider) and a provider [30]. B. Asynchronous (store and forward): Transmission of documented health information to a physician through a secure electronic communications system (for example, radiographs, images, video, digital observations, and photomicrographs of patients). The dentist then uses the information, to assess a patient's condition or provide a service outside of real-time or live contact [30]. Remote patient monitoring (RPM) is the collection of personal health and medical data from one person in a location via electronic communication technologies and transmission to a provider (sometimes via a data processing service) in another location for use in treatment and related support of care [30].

Mobile health (mHealth) includes the use of portable communication devices used to communicate information, such as cell phones, tablet computers, Laptops, and personal digital assistants, to promote health care and public health practice and education [30]. Cooper BR and Engeswick LM., *et al.* conducted the course on teledentistry and deduced positive change in students after the course over their knowledge of the effectiveness of teledentistry in underprivileged areas [28].

To practice through teledentistry, dentists should equip themselves with complete knowledge on ethical, legal and technological grounds. Dentists should start by being techno-friendly and gauge the difference their practice will create with digital transformation [28]. Updated infrastructure and modern hardware/software with technical support will avoid any interruptions in clinic operations and support the widespread use of teledentistry. Patients who receive teledentistry care must have their treatment adequately recorded, including an overview of the patient's services [30]. A dentist who uses teledentistry should have sufficient knowledge of the nature and availability of local dental services to offer effective post-teledentistry care for a patient [30]. If referring a patient to an urgent care facility or an emergency room is required for the patient's safety or in the event of an emergency, a dentist must do so [30].

Since the care given is equal to in-person care, insurer reimbursement for services must be made at the same rate as though the services were provided in person, including reimbursement for teledentistry codes as required [30].

Health sciences students constitute a significant part of the public. Didactic teaching methods were heavily affected during the COVID-19 outbreak. Dental students could not attend to patients in clinics due to the risk of cross-infection. Students can master the art of history taking and treatment plans using the virtual patient (VPs) concept by solving clinical scenarios even in the absence of patients. Practicing via teledentistry can come into use when students in their clinical years must communicate with patients and construct a diagnosis with a proper treatment plan [17,32]. It is suggested that teledentistry should be taught as a routine dental practice and that dentists should be trained adequately in dental schools [12].

Teledentistry has advanced over the years. However, some limitations may be accounted for by lack of adequate training in teledentistry, privacy concerns, misinterpretation of messages, pressure for a prompt response, and the possibility of ignoring the message [28]. An increase in telemedicine's parallel growth will help teledentistry grow and overcome these challenges gradually [12]. If implemented with proper training and expertise, teledentistry can be cost-effective for both patients and dentists. It will allow patients to communicate their oral concerns comfortably [43].

The present study has two significant limitations. The non-probabilistic sampling technique, where participants were not randomly selected, may have limited the sample's representativeness. However, the benefit of convenience sampling is its ease of access, geographical proximity and existing contact within the population of interest. Convenience sampling proved to be an efficient tool for collecting data on social media. Moreover, the convenience sampling technique has the advantage of expanding the sample size and reducing the cost and time of research.

Nevertheless, the survey reached almost all the Saudi Regions and a population with a wide range of ages. Limits notwithstanding, the present study allowed us to assess the impact of the coronavirus pandemic on their behaviour toward the oro-dental conditions they experienced during the lockdown of people from different Saudi regions. Moreover, it was possible to define patients' profiles based on their socio-demographics.

Conclusion

Our study showed that the respondents managed a variety of dental conditions like dental pain, dental trauma and bleeding gums during the lockdown. Most attended emergency clinics to seek advice and take medications to alleviate their symptoms. Some asked relatives and friends about treatments, with alternative medicines or self-medicated. However, population samples resorted to teledentistry and found the treatment method effective. The efficacy and effectiveness of teledentistry suggest the need for more structured distance dental services. Further research should include bigger sample size and more cities in Saudi Arabia.

Conflict of Interest

The authors declare that there is no conflict of interest in any part of this study.

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