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ORIGINAL RESEARCH

Changes in Dental Clinical Practice sequelae to COVID-19 Pandemic: A Cross-Sectional Survey among Indian Dentists

[1]Singh Harneet, [2]Kapoor Vinamrata, [3]Kumar Adarsh, [4]Yadav Vipul, [5]Kumar Arun

[1]Associate Professor, Department of Oral Medicine and Radiology, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India
[2]MDS, [3]Professor, [4]Associate Professor, Department of Public Health Dentistry, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India
[5]Associate Professor, Department of Pedodontics, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India

Corresponding Author
Adarsh Kumar
Professor, Department of Public Health Dentistry, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India
Email: adarsh.pgids@uhsr.ac.in

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ABSTRACT

Background: COVID-19 has led to significant changes in dental practice. To break the chain of infection, several measures are being taken to focus on the transmission mode. **Aims:** This study investigated the changes in clinical practices amongst dental professionals during the COVID-19 pandemic. **Methods and Material:** A closed online survey was conducted among 202 dentists (academicians/practising dentists) selected using systematic random sampling. A 29-item closed-ended, pretested and validated questionnaire was used to assess the changes in clinical practice and compliance with their new protocols. The questionnaire included questions related to changes in personal hygiene, preventive and treatment procedures and personal protective equipment. The data was analysed using SPSS 21 (Statistical Package for Social Sciences) for descriptive and inferential statistics. A p-value of <0.05 was considered statistically significant. **Results:** 92%, 65%, and 41.6% reported changes in hand hygiene, use of personal protective equipment (PPE), and reduction in the use of air rotor and ultrasonic scalers respectively. Few dentists had provision for separate donning, and doffing areas (26%), elbow-operated taps (12%), micromotor (21%), and anti-retraction handpieces (15.8%). **Conclusions:** The findings revealed a substantial improvement in clinical practices irrespective of gender, qualification, experience, and type of practice.

Key-words: COVID-19, SARS-CoV-2, infection control, cross-infection, dental clinics

INTRODUCTION

The devastating waves of several deadly pandemics, with a few hiccups and many tragedies, slowly fade away into the memory. The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2) that lurked among us turned out to be a cataclysm that relentlessly wiped out lives and economies around the world.

Lockdown, social distancing and isolation were the immediate measures to contain the risk of the pandemic. Health services, which are a necessity and one of the essential services, were open, not only to combat the pandemic but also for emergencies and necessary treatment. Healthcare professionals faced an unprecedented challenge in this situation and adapted radically and quickly.Dental care poses a high risk for the transmission of COVID-19.As dentists work in the mouth and throat, this serves as the main route of transmission for the disease. Direct spread through sneezing, coughing, droplet inhalation or contact transmission such as eye contact or via the mucous membranes of the nose and oral cavity can take place.[1] The aerosol-generating procedures (AGPs) result in the production of airborne particles suspended up to one metre in the air, with the highest concentration being within 60 cm even 30 minutes after a procedure.[2] Thus, dentists, dental hygienists, dental assistants and patients are at greater risk of cross-infection.

For the first time in history, dental organisations advocated postponing elective dental procedures to contain the spread of COVID-19.[3] Most dental

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services were closed or limited to emergency treatment due to the lack of adequate guidelines for COVID-19 and the fear and anxiety caused by the pandemic. Emergency and urgent oral health measures were implemented by a few centres. Tele-dentistry, telephone triage, proper hand washing, pre-procedure mouthwash, personal protective equipment and dental dams were some of the recommendations made to prevent the spread of infection.[4,5,6]

COVID-19 has changed practices in dentistry with new protocols, advocating triage development and limiting elective treatments to emergencies. Ahmed et al reported 90% of dentists were aware of newer treatment protocols while only 61% executed the changes.[7] As the risk of COVID-19 is mitigated, dental treatment can be provided according to the newer guidelines. Dental facilities have resumed their work, but the current guidelines require several complex changes. It is therefore necessary to identify the changes made by dentists. Most existing studies have focused on the knowledge, attitude and practice of infection control among dentists during COVID-19.[8,9,10] This study aimed to assess the changes in clinical practice during the COVID-19 pandemic.

METHODS

Ethical Approval

This was a cross-sectional survey conducted following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) from April 2020 to June 2020.[11] The protocol was approved by the Institutional Ethics Committee (PGIDS/BHRC/21/5) dated 03/02/2021. Informed consent was obtained from all participants. The first section of the questionnaire explained the objectives of the study, schedule, confidentiality and anonymous participation. The survey file was stored in an encrypted and password-protected folder with a unique identification number.

Study population and study sample

The study population consisted of dental professionals from Haryana who were either academicians or practising dentists with a minimum experience of three years and who performed elective procedures in their practice. The dentists performing COVID-19 duties or not practising were excluded. A list of dentists was obtained through local dental associations, and dental institutions and by searching Dentists online in all 22 Districts of the state. Participants were then selected using systematic random sampling. The dentists in question were called and informed about the aim of the study before participation. If they refused to participate or did not respond to three calls, they were excluded and the next dentist from the list was selected. The sample size of 256 was calculated using the Paniott formula with an error of 0.7% based on 23,000 dentists and a non-response rate of 30%.

Development of the questionnaire

A 29-item structured questionnaire was developed in English as Google Forms based on interviews with Dental professionals and a literature review. It was broadly developed on the domains of knowledge, attitudes, and compliance with infection control policies among dental health care workers.[12,13]Before the administration, psychometric evaluation of the questionnaire was conducted using face validity and content validity and was found to be good. The questionnaire was then pretested and validated in a pilot study with 15 faculty members and private practitioners to assess feasibility, validity, and comprehensibility. These participants were not included in the final survey. The questionnaire covered the following aspects: Background information, infection control measures, and preventive and practice-related behaviours during COVID-19. The Personal Protective Equipment section included Dentists and Dental Auxiliaries.

Administration of the survey

The questionnaire was emailed, and only a single response from each individual was accepted. A reminder letter via email was sent every week for two weeks to the people who had not responded. If the selected participant did not respond, next in the list was included. Respondents could only submit the form once they had answered all the questions.

Statistical analysis

The data was analysed using SPSS 21 (Statistical Package for Social Sciences). Descriptive analysis was used to determine frequencies and percentages, while chi-square analysis was used for inferential statistics. A p-value > of 0.05 was considered statistically significant.

RESULTS

Survey forms were sent to 288 dentists working in hospitals, private clinics, or academic institutions, of which 202 responded. 59.4% of subjects were males and 66.8% were specialists. The mean age and experience were 36.5 ± 6.3 and 10.5 ± 5.9 years, respectively. The mean duration for clinic closure was 3.08 ± 1.9 months, and this was significantly higher amongst single chairs practice and females.

More than 80% of the dentists improved the frequency, duration, or technique of hand washing, with maximum change in hand washing. Males reported significantly higher use of alcohol-based scrub (95.8%) while females switched to liquid soap (93.9%). Most of the dentists changed their daily routines with 76% reported taking baths daily after clinical hours. Other changes included keeping belongings at a secluded place (56%), and dipping clothes in detergent or hypochlorite (34.1%). [Table1]

75.2% of dentists reported an increase in autoclaving frequency. There was a 95% increase in the frequency of scrubbing post-examination or treatment. Alcohol

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(35.6%) and sodium hypochlorite (59.9%) were the most common agents used for disinfection. There was a 73% increase in hand sanitizer in the chair side area, which was significantly higher among females (82.9%, p=0.015) [Table1]

63.9% of dentists placed marks for social distancing, which was significantly higher in practices with multiple chairs (p=0.043). The provision of a thermal scan facility was significantly higher amongst the most experienced dentists (89.8%, p=0.026)). Mandatory mask for patients and preventing attendants from entering the clinic was reported by 97%, and 57.9% of dentists, respectively. 87.1% of dentists increased the placement of hand sanitizer in the reception area. Dentists had reported changes in the frequency of sanitization, fumigation, and ventilation. Only a few dentists reported changing to elbow-operated taps (12.4%), separate entry and exits (11.4%), or provision of donning and doffing rooms (26.2%). [Table2]

Treatment protocols showed increased use of high-volume suction (47.5%), micromotor (21.3%), and anti-retraction hand-pieces (15.8%) while reduction in AGPs i.e., avoiding air rotor, and ultrasonic scaler (41.6%), Reduced number of instruments and equipment in clinic, and operating single patient at a time was significantly associated with the type of clinical practice (p= 0.049) and experience (p=0.015) respectively. [Table2].

64.9 % of dentists and 53.5% of dental auxiliaries used PPE kits. There was a statistically significant difference in the usage of PPE kits amongst the dental auxiliary working for dentists having 3-5 years of experience (p=0.006). Dentists reported using face shields, gloves, gowns, and head caps by themselves and their auxiliaries. It was significantly higher amongst auxiliaries working in clinics with dentists having experience ranging from 6-9 years.(p=0.019) [Table-3]. The use of gowns among reception staff was significantly related to gender (p= 0.017) and qualification (p= 0.000).

Table- 1:- Changes in personal hygiene, sterilization & disinfection

		Increase in Hand Sanitization Agents Use n(%)	Improvement in Hand washing Technique n(%)	Changes in Daily Routine n(%)			Change in Frequency of Autoclaving n (%)	Increase in Scrubbing of Dental Chair n(%)	Agent used for Scrubbing Chair side area		Hand Sanitizer in Chair side Area n (%)	Disinfection after every patient n (%)	Seal Biomedical Waste Immediately n (%)
				Take bath after returning n (%)	Dipclothesin Detergent/Hypochlorite n (%)	Keep belongings at asepa rateplace n (%)			Use of Alcohol n(%)	Use of Sodium hypochloriten (%)			
Gender	Male	97(80.8)*	109(90.8)	95(79.2)	42(35)	63(52.5)	93(77.5)	115(95.8)	36(43.9)	47(57.3)	81(67.5)	73(60.8)	39(47.6)
	Female	54(65.9)	77(93.9)	59(72)	27(32.9)	51(62.2)	59(72)	77(93.9)	36(30)	74(61.7)	68(82.9)*	55(67.1)	50(41.7)
Qualification	BDS	50(74.6)	60(89.6)	49(73.1)	22(32.8)	41(61.2)	45(67.2)	64(95.5)	23(34.3)	38(56.7)	46(68.7)	46(68.7)	31(46.3)
	MDS	101(74.8)	126(93.3)	105(77.8)	47(34.8)	73(54.1)	107(79.3)	128(94.8)	49(36.3)	83(61.5)	103(76.3)	82(60.7)	58(43)
Experience	3-5years	35(79.5)	40(90.9)	34(77.3)	14(31.8)	26(59.1)	34(77.3)	41(93.2)	16(36.4	29(65.9)	33(75)	31(70.5)	23(52.3)

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	6-9years	38(71.7)	51(96.2)	42(79.2)	25(47.2)	32(60.4)	38(71.7)	51(96.2)	22(41.5)	31(58.5)	38(71.7)	34(64.2)	24(45.3)
	10-14years	43(76.8)	50(89.3)	38(67.9)	15(26.8)	34(60.7)	43(76.8)	53(94.6)	20(35.7)	28(50)	44(78.6)	38(67.9)	25(44.6)
	14+years	35(71.4)	45(91.8)	40(81.6)	15(30.6)	22(44.9)	37(75.5)	47(95.9)	14(28.6)	33(67.3)	34(69.4)	25(51)	17(34.7)
Type ofPractice	AcademicInstitution	32(66.7)	44(91.7)	36(75)	21(43.8)	25(52.1)	37(77.1)	44(91.7)	19(39.6)	27(56.2)	39(81.2)	31(64.6)	16(33.3)
	Multiplechairs	79(78.2)	91(90.1)	76(75.2)	31(30.7)	56(55.4)	75(74.3)	98(97)	33(32.7)	66(65.3)	72(71.3)	65(64.4)	48(47.5)
	Singlechair	40(75.5)	51(96.2)	42(79.2)	17(32.1)	33(62.3)	40(75.5)	50(94.3)	20(37.7)	28(52.8)	38(71.7)	32(60.4)	25(47.2)
	Total	151(74.8)	186(92.1)	154(76.2)	69(34.2)	114(56.4)	152(75.2)	192(95)	72(35.6)	121(59.9)	149(73.8)	128(63.8)	89(44.1)

P values obtained from χ^2test [*Denotes statistically significant($p<0.05$), n: number of study subjects, BDS: Bachelor of Dental Surgery, MDS: Master of Dental Surgery]

Table – 2 Changes in preventive & productive behaviour, and treatment procedures

		Changes in Reception Area					**Changes in Clinical Setup**							**Changes in Clinical Procedures**						
		Marks for social distancing n (%)	**Thermal Scan n (%)**	**Mask mandatory for patients n (%)**	**Prevent attendants n (%)**	**Hand Sanitizer in Reception Area n (%)**	**Ventilation (%)**	**Indoor air cleaning n (%)**	**Elbow operated taps n (%)**	**Separate entry and exits n (%)**	**Donning & Doffing Rooms n (%)**	**Sanitization n (%)**	**Increase in frequency of Fumigation n (%)**	**Pre-procedural Mouth rinse n (%)**	**Increased use of Rubber Dam n (%)**	**Operate one patient at a time n (%)**	**High Volume Suction n (%)**	**Avoid Air rotor/ Ultrasonic Scaler n (%)**	**Use of Micromotor n (%)**	**Anti-retraction Handpieces n (%)**	**Reduced number of items n (%)**
Gender	Male	83 (69.2)	96 (80)	117 (97.5)	75 (62.5)	103 (85.8)	82 (68.3)	49 (40.8)	16 (13.3)	16 (13.3)	35 (29.2)	99 (82.5)	85 (70.8)	106 (88.3)	39 (32.5)	89 (74.2)	55 (45.8)	49 (40.8)	21 (25.6)	14 (17.1)	54 (45)
	Female	46 (56.1)	66 (80.5)	79 (96.3)	42 (51.2)	73 (89)	58 (70.7)	36 (43.9)	9 (11)	7 (8.5)	18 (22)	64 (78)	57 (69.5)	66 (80.5)	37 (45.1)	52 (63.4)	41 (50)	35 (42.7)	22 (18.3)	18 (15)	40 (48.8)
Qualification	BDS	42 (62.7)	49 (73.1)	66 (98.5)	44 (65.7)	58 (86.6)	48 (71.6)	30 (44.8)	9 (13.4)	7 (10.4)	17 (25.4)	56 (83.6)	47 (70.1)	54 (80.6)	18 (26.9)	49 (73.1)	28 (41.8)	29 (43.3)	15 (22.4)	9 (13.4)	36 (53.7)
	MDS	87 (64.4)	113 (83.7)	130 (96.3)	73 (54.1)	118 (87.4)	92 (68.1)	55 (40.7)	16 (11.9)	16 (11.9)	36 (26.7)	107 (79.3)	95 (70.4)	118 (87.4)	58 (43)*	92 (68.1)	68 (50.4)	55 (40.7)	28 (20.7)	23 (17)	58 (43)

Experience	3-5 years	28 (63.6)	38 (86.4)	41 (93.2)	20 (45.5)	40 (90.9)	26 (59.1)	17 (38.6)	4 (9.1)	6 (13.6)	14 (31.8)	37 (84.1)	31 (70.5)	34 (77.3)	20 (45.5)	30 (68.2)	26 (59.1)	15 (34.1)	12 (27.3)	11 (25)	21 (47.7)
	6-9 years	36 (67.9)	42 (79.2)	53 (100)	29 (54.7)	43 (81.1)	38 (71.7)	21 (39.6)	8 (15.1)	3 (5.7)	13 (24.5)	40 (75.5)	36 (67.9)	46 (86.8)	14 (26.4)	31 (58.5)	27 (50.9)	22 (41.5)	13 (24.5)	6 (11.3)	21 (39.6)
	10-14 years	33 (58.9)	38 (67.9)	53 (94.6)	37 (66.1)	50 (89.3)	43 (76.8)	24 (42.9)	8 (14.3)	9 (16.1)	12 (21.4)	48 (85.7)	43 (76.8)	47 (83.9)	21 (37.5)	48 (85.7)*	24 (42.9)	29 (51.8)	12 (21.4)	7 (12.5)	31 (55.4)
	14+ years	32 (65.3)	44 (89.8)*	49 (100)	31 (63.3)	43 (87.8)	33 (67.3)	23 (46.9)	5 (10.2)	5 (10.2)	14 (28.6)	38 (77.6)	32 (65.3)	45 (91.8)	21 (42.9)	32 (65.3)	19 (38.8)	18 (36.7)	6 (12.2)	8 (16.3)	21 (42.9)
Type of Practice	Academic Institution	30 (62.5)	39 (81.2)	47 (97.9)	24 (50)	41 (85.4)	29 (60.4)	19 (39.6)	8 (16.7)	5 (10.4)	9 (18.8)	41 (85.4)	28 (58.3)	39 (81.2)	21 (43.8)	35 (72.9)	27 (56.2)	14 (39.6)	9 (18.8)	7 (14.6)	22 (45.8)
	Multiple chairs	72 (71.3)*	84 (83.2)	98 (97)	60 (59.4)	88 (87.1)	71 (70.3)	46 (45.5)	9 (8.9)	11 (10.9)	29 (28.7)	76 (75.2)	70 (70.3)	87 (86.1)	33 (32.7)	64 (63.4)	41 (40.6)	40 (39.6)	22 (21.8)	15 (14.9)	40 (39.6)
	Single chair	27 (50.9)	39 (73.6)	51 (96.2)	33 (62.3)	47 (88.7)	40 (75.5)	20 (37.7)	8 (15.1)	7 (13.2)	15 (28.3)	46 (86.8)	43 (81.1)	46 (86.8)	22 (41.5)	42 (79.2)	28 (52.8)	25 (47.2)	12 (22.6)	10 (18.9)	32 (60.4)*
	Total	129 (63.9)	162 (80.2)	196 (97)	117 (57.9)	176 (87.1)	140 (69.3)	85 (42.1)	25 (12.4)	23 (11.4)	53 (26.2)	163 (80.7)	142 (70.3)	172 (85.1)	76 (37.6)	141 (69.8)	96 (47.5)	84 (41.6)	43 (21.3)	32 (15.8)	94 (46.5)

P values obtained from $\chi 2$ test [* Denotes statistically significant ($p<0.05$), n: number of study subjects, BDS: Bachelor of Dental Surgery, MDS: Master of Dental Surgery]

Table- 3 Changes in personal protective equipment

		Changes in Personal Protective Equipment worn by the Dentist							**Frequency of Changing Gown**			**Changes in Personal Protective Equipment worn by the Auxiliary**								**Changes in Personal Protective Equipment worn by the Staff**							
			Face Shield n (%)	**Face Mask N95 n (%)**	**Gloves n (%)**	**Gown n (%)**	**Head Cap n (%)**	**Shoe Cover n (%)**	**Complete PPE kit n (%)**	**After every patient n (%)**	**Daily n (%)**	**Goggles n (%)**	**Face Shield n (%)**	**Face Mask N95 n (%)**	**Gloves n (%)**	**Gown n (%)**	**Head Cap n (%)**	**Shoe Cover n (%)**	**Complete PPE kit n (%)**	**Goggles n (%)**	**Face Shield n (%)**	**Face Mask N95 n (%)**	**Gloves n (%)**	**Gown n (%)**	**Head Cap n (%)**	**Shoe Cover n (%)**	**Complete PPE kit n (%)**
Gender	Male	17 (14.2)	37 (30.8)	32 (26.7)	34 (28.3)	30 (25)	29 (24.2)	11 (9.2)	75 (62.5)	39 (32.5)	54 (45)	9 (7.5)	40 (33.3)	30 (25)	39 (32.5)	31 (25.8)	35 (29.2)	7 (5.8)	66 (55)	14 (11.7)	64 (53.3)	44 (36.7)	45 (37.5)	35 (29.5)	49 (40.8)	32 (26.7)	40 (33.3)
	Female	12 (14.6)	20 (24.4)	19 (23.2)	20 (24.4)	17 (20.7)	18 (22)	2 (2.4)	56 (68.3)	24 (29.3)	44 (53.7)	13 (15.9)	27 (32.9)	26 (31.7)	32 (39)	23 (28)	29 (35.4)	12 (14.6)*	42 (51.2)	14 (17.1)	42 (51.2)	34 (41.5)	42 (51.2)	38 (46.3)*	39 (47.6)	22 (26.8)	24 (29.3)

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Qualification	BDS	10 (14.9)	17 (25.4)	15 (22.4)	18 (26.9)	13 (19.4)	16 (23.9)	4 (6)	45 (67.2)	21 (31.3)	30 (44.8)	3 (4.5)	18 (26.9)	18 (26.9)	21 (31.3)	13 (19.4)	15 (22.4)	4 (6)	39 (58.2)	7 (10.4)	27 (40.3)	26 (38.8)	25 (37.3)	11 (16.4)	23 (34.3)	14 (20.9)	26 (38.8)
	MDS	19 (14.1)	40 (29.6)	36 (26.7)	36 (26.7)	34 (25.2)	31 (23)	9 (6.7)	86 (63.7)	42 (31.1)	68 (50.4)	19 (14.1)	49 (36.3)	38 (28.1)	50 (37)	41 (30.4)	49 (36.3)	15 (11.1)	69 (51.1)	21 (15.6)	79 (58.5)*	52 (38.5)	62 (45.9)	62 (45.9)*	65 (48.1)	40 (29.6)	38 (28.1)
Experience	3-5 years	10 (22.7)	13 (29.5)	11 (25)	12 (27.3)	13 (29.5)	13 (29.5)	2 (4.5)	29 (65.9)	12 (27.3)	24 (54.5)	2 (4.5)	6 (13.6)	8 (18.2)	7 (15.9)	5 (11.4)	7 (15.9)	3 (6.8)	31 (70.5)*	7 (15.9)	17 (38.6)	15 (34.1)	12 (27.3)	13 (29.5)	17 (38.6)	11 (25)	19 (43.2)
	6-9 years	10 (18.9)	12 (22.6)	11 (20.8)	12 (22.6)	9 (17)	8 (15.1)	4 (7.5)	39 (73.6)	19 (35.8)	22 (41.5)	10 (18.9)	23 (43.4)*	20 (37.7)	26 (49.1)*	22 (41.5)*	24 (45.3)*	8 (15.1)	22 (41.5)	10 (18.9)	29 (54.7)	26 (49.1)	25 (47.2)	22 (41.5)	26 (49.1)	16 (30.2)	12 (22.6)
	10-14 years	5 (8.9)	17 (30.4)	14 (25)	16 (28.6)	15 (26.8)	16 (28.6)	4 (7.1)	34 (60.7)	12 (21.4)	31 (55.4)	5 (8.9)	23 (41.1)	17 (30.4)	22 (39.3)	17 (30.4)	19 (33.9)	6 (10.7)	24 (42.9)	5 (8.9)	30 (53.6)	19 (33.9)	28 (50)	19 (33.9)	24 (42.9)	11 (19.6)	15 (26.8)
	14+ years	4 (8.2)	15 (30.6)	15 (30.6)	14 (28.6)	10 (20.4)	10 (20.4)	3 (6.1)	29 (59.2)	20 (40.8)	21 (42.9)	5 (10.2)	15 (30.6)	11 (22.4)	16 (32.7)	10 (20.4)	14 (28.6)	2 (4.1)	31 (63.3)	6 (12.2)	30 (61.2)	18 (36.7)	22 (44.9)	19 (38.8)	21 (42.9)	16 (32.7)	18 (36.7)
Type of Practice	Academic Institution	9 (18.8)	15 (31.2)	11 (22.9)	14 (29.2)	12 (29.2)	14 (29.2)	2 (4.2)	31 (64.6)	11 (22.9)	28 (58.3)	8 (16.7)	18 (37.5)	15 (31.2)	18 (37.5)	14 (29.2)	19 (39.6)	7 (14.6)	23 (47.9)	10 (20.8)	28 (58.3)	18 (37.5)	25 (52.1)	19 (39.6)	25 (52.1)	15 (31.2)	11 (22.9)
	Multiple chairs	13 (12.9)	26 (25.7)	25 (24.8)	24 (23.8)	20 (19.8)	19 (18.8)	8 (7.9)	67 (66.3)	37 (36.6)	44 (43.6)	12 (11.9)	30 (29.7)	21 (20.8)	32 (31.7)	27 (26.7)	28 (27.7)	9 (8.9)	59 (58.4)	14 (13.9)	55 (54.5)	40 (39.6)	37 (36.6)	37 (36.6)	40 (39.6)	26 (25.7)	37 (36.6)
	Single chair	7 (13.2)	16 (30.2)	15 (28.3)	16 (30.2)	13 (24.5)	14 (26.4)	3 (5.7)	33 (62.3)	15 (38.3)	26 (49.1)	2 (3.8)	19 (35.8)	20 (37.7)	21 (39.6)	13 (24.5)	17 (32.1)	3 (5.7)	26 (49.1)	4 (7.5)	23 (43.4)	20 (37.7)	25 (47.2)	17 (32.1)	23 (43.4)	13 (24.5)	16 (30.2)
	Total	29 (14.4)	57 (28.2)	51 (25.2)	54 (26.7)	47 (23.3)	47 (23.3)	13 (6.4)	131 (64.9)	63 (31.2)	98 (48.5)	22 (10.9)	67 (33.2)	56 (27.7)	71 (35.1)	54 (26.7)	64 (31.7)	(9.4)	(53.5)	28 (13.9)	106 (52.5)	78 (38.6)	87 (43.1)	73 (36.1)	88 (43.6)	54 (26.7)	64 (31.7)

P values obtained from $\chi 2$ test [* Denotes statistically significant [$p<0.05$], n: number of study subjects, BDS: Bachelor of Dental Surgery, MDS: Master of Dental Surgery, PPE: Personal Protective Equipment]

DISCUSSION

The reported prevalence of COVID-19 was 19% among healthcare workers,[14] 4.75% among dentists and 2% among dental assistants.[15]Healthcare workers, otolaryngologists, anaesthesiologists and dentists are considered to be at high risk. This was the first study conducted to assess changes in infection control practices among dentists following the SARS-CoV-2 pandemic.

Fear of infection and the unavailability of protocols led dentists to close their clinics. Studies by Ahmed et al. (92%) and Duruk et al. (90%) reported dentists concern about infecting themselves and their families.[16,17] The average duration of interruption of dental practice was 3.08 months, which is higher than the duration reported by Wolf TG et al.[18] The closure time was significantly higher among dentists with single chairs and among women, as dentists with individual chairs may have greater autonomy in their practice. While women may experience higher fear and anxiety and any impact on them has a higher consequence on the family.[13] Other factors such as unfamiliarity with the guidelines, financial constraints, and the time required to make the desired changes also had an impact on closure time.

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The Ministry of Health and Family Welfare (MoHFW) has issued guidelines prescribing careful examination of patients before entering the dental clinic.[19] Telephone triage, social distancing, thermal scanning, face masks and hand sanitization were required to minimize the risk of infection. 55% of dentists adhered to the protocol and this was significantly associated with experience and facility. The reason for this could be the availability of sufficient space and manpower in multiple chairs setup and greater financial independence among experienced dentists leading to better adherence.

Hand sanitization remains the most important infection control measure in healthcare settings. Dentists reported significant changes in all aspects of hand hygiene (duration, frequency, and technique). These findings suggest serious lacunae in hand hygiene which remains the cornerstone of infection control protocols. A significant change in the agents used for hand hygiene, confirming the WHO guidelines, i.e. the use of 80% ethanol or 75% isopropyl alcohol was reported.[20] Men reported greater use of alcohol-based scrubs, while women used liquid soap. This could be because many women worked as academics, which limited their flexibility to change. According to Paravaie P et all these changes are also associated with greater patient satisfaction indicating effective dissemination of public information.[21]

The CDC advocates personal protective equipment as a function of low, moderate, or high-risk dental procedures.[19,22] 70% of dentists used N-95 face masks, 50% of which were also required for auxiliaries, and this was significantly related to experience. These results contrast with the studies by Duruk et al. (12%) and Ahmed et al. (10%), who reported much lower use of N-95 face masks due to unavailability. [15,16] 65% of dentists and 55% of auxiliaries used complete PPE kits, indicating stringent infection control measures. However, only 28% had dedicated areas for donning and doffing PPE, which undermines the effectiveness of PPE. The risk of self-contamination when donning PPE is 46-90%.[23] Therefore, healthcare professionals need to be trained in the appropriate donning and doffing procedures. dentists also reported increased use of goggles, face shields, gloves, gowns, headgear, and shoe covers.

AGPs form a dense cloud of aerosols that immediately contaminate the environment. Existing guidelines emphasize the avoidance or reduction of aerosol formation. The measures taken by dentists were the use of a mouthwash before the procedure, high volume suction, rubber dam, a micromotor, avoidance of an air rotor or an ultrasonic scaler. 41.6% avoided AGPs, 21.3% used micromotors and 47.5% used high-volume suction, which is lower than the use of antiseptic irrigation and rubber dam reported by Duruket al.[16] Use of antiseptic irrigation and rubber dam was higher among specialists, suggesting more prudence. It was recommended to provide adequate ventilation with an air change every 5 minutes.[12] 69.3% of dentists made changes to ventilation systems, 42.1% used room air purification systems, and 70% operated on one patient at a time. Settled aerosols on surfaces lead to the risk of indirect infection. SARS-CoV2 has a half-life of up to 72 hours on plastics and stainless steel but can persist for up to nine days.[12] Dentists reduced the objects in the dental treatment room. Alcohol and sodium hypochlorite were the most used disinfectants. Only a few dentists also used hydrogen peroxide, formaldehyde, glutaraldehyde, peracetic acid and iodophor.

70.3% of dentists have increased the frequency of fumigation. The dental unit's water lines can transmit microorganisms by drawing water back from the patient's oral cavity. It is therefore advisable to use valves and handpieces with suck-back protection. Only a few dentists reported the use of handpieces with suck-back protection. The above changes required considerable financial resources. With the closure of dental practices, the decline in attendance and the reduction of treatment to the bare essentials, dentists may be less willing to spend on all the desired changes due to the high costs, especially if clinics are their main source of income.

Disinfection, cleaning, sterilization and maintaining aseptic conditions are the foundations of clinical success. Dentists must understand these critical concepts and consider this a top priority. Dentists in the study reported increased sterilization (75.2%),waste disposal (44.1%), frequency of scrubbing (95%), and autoclaving (75%). This suggests that dentists tend to overlook gaps in infection control protocol that were addressed during a pandemic. The fear of infecting family members during the pandemic was great. Many dentists also changed their daily routine, for example by taking baths, soaking their clothes in detergent, and storing their belongings in a safe place after returning from the clinic.

Most dentists (89.1%) were satisfied with the changes. Some were still working, while few believed that the pandemic would eventually end. The most common reason for dissatisfaction was the inability of patients to pay accordingly. The COVID-19 pandemic had a severe impact on dentistry as the initial lockdown, upgrade expenses, decrease in patient frequency and increased costs for maintenance ultimately led to a decrease in revenue. As dentistry faced these challenges, dentists adopted new policies that impacted their financial stability but strengthened infection control measures so they are better prepared for future challenges.

The strength of our study is that the dentists currently working in different facilities were studied. It is the first study to assess the changes in habits, infrastructure and infection control measures among dentists and their support staff. There are some

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significant findings of this study i.e. despite being trained in infection control measures there is yet the need to train and motivate in basic infection control measures.

Limitations of this study &Prospects

As it wasan online, self-reported survey, there is a possibility that compliance with the infection control protocol may have been different as the respondents could have reported the infection control protocol more frequently as compared to real-time practice. The policies set by institutions, financial dependence on dental practice, and fear of transmission of infection to families that may have influenced changes in the workplace were not assessed. Existing changes in practice, knowledge, training, donning, doffing protective clothing, other protective measures and financial impact were also not assessed.

In the future prospects, policymakers need to develop new protocols to train health professionals up to an optimum level. Personal protective equipment protocol should be well established.[24] Development of newer protocols for clinical judgments and decisions based on the regional infection control measures should be available. The clinical implications of this study include the need to regularly train dentists in infection control measures, training should also include measures required in face on an epidemic.

CONCLUSION

In summary, this study examined the changes made by dentists in terms of compliance with infection control guidelines during the SARS-CoV-2 pandemic. The results show that dentists made significant changes following the recommendations issued with minor impacts based on type of institution, clinical setup, experience, and gender. Yet there is need to continously reinforce dentist in infection control and personal hygiene measures. The results of this study can be used to address and rectify the gaps in existing dental practice. Considering the limitations, it is necessary to conduct future studies with a larger sample size.

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