

**Questionnaire based survey of Knowledge, behaviour and attitude of Dentists in North India about COVID-19 pandemic**

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**Abstract**

**Aim:** To investigate the knowledge, attitudes and behaviour of dentists working in various dental clinics and dental hospitals in various states of North India regarding infection control, specially focusing on the current COVID-19 pandemic.

**Settings and Design:** A self-assessment questionnaire-based survey was carried out among dentist to assess the knowledge, attitude and behaviour towards COVID-19 infection.

**Material and Method:** The questionnaire containing 23 closed-ended questions was distributed to 715 dental practitioners in North India via email and Whatsapp links. Data was collected and analyzed.

**Results:** The questionnaire survey showed that dentists all across North India had a varied range of opinions and answers for the questions in the proforma. There was no unanimous answer regarding their knowledge, behavior and attitude towards the COVID-19 pandemic.

**Conclusion:** The current global scenario seems to imply that the Coronavirus is here to stay and one must learn how to work around it. Thus, it is of utmost importance that dentists keep themselves updated with all the latest information and knowledge released about the virus as well as enforces the highest standards of Personal Protection Protocol and Infection control in their clinics to prevent the further spread of the virus.

**Keyword:** COVID-19, Coronavirus, Survey, Corona awareness.

**Introduction**

COVID-19 is the infectious disease caused by the most recently discovered coronavirus. Coronaviruses are a large family of viruses which may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently

discovered strain of the virus, SARS-CoV-2 causes COVID-19 infection which has now been declared a global health crisis by the WHO as of 11th March 2020. (Refarme) This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019.<sup>1</sup> COVID-19 is thought to have been introduced to human populations from the animal kingdom in November or December, 2019, as suggested by the phylogeny of genomic sequences obtained from early cases.<sup>2</sup> As of 21st April, WHO reports Globally 2, 397, 217 confirmed cases and 1,62, 956 deaths.<sup>3</sup> In medical profession, The rampant spread of SARS-CoV-2 worldwide increases the likelihood that dental health care professionals will treat this subset of the patient population.<sup>4</sup>

The transmission routes, treatments, and outcomes of COVID-19 infection have been continually receiving much research attention recently. The established modes of transmission are through contact and droplet spread, although airborne transmission cannot be ruled out. (H. Guo et al). Dental treatments can lead to the spread of infection since maximum number of dental procedures cause aerosols generation, frequent exposure to saliva, blood and body fluids and the handling of sharp instruments.

Dentists have been recommended to take several personal protection measures and avoid or minimize operations that can produce droplets or aerosols; moreover, the use of saliva ejectors with a low volume or high volume can reduce the production of droplets and aerosols. Taking into consideration the severity of the pandemic COVID-19, and in the light of the massive commitment of several dental associations and the most prestigious dental journals, it is essential to give clear and easy guidelines to manage dental patients and to make working dentists safe from any risk. It is critical to remember that the virus can

survive on hands, objects or surfaces that were exposed to infected saliva in the previous nine days.<sup>6</sup>

The use of procedures to control infection and compliance with universally agreed precautions in dental surgeries are effective in preventing microbial pollution and cross-contamination, and are strongly supported by organizations such as the Centers for Disease Control and Prevention, the American Dental Association, schools of dentistry, and many other health agencies and professional associations. Universal recommendations consider that all patients should be regarded as infectious and that precautions should be applied in all cases. However, some health professionals take routine precautions for granted and may forget both the rationale for and importance of certain basic procedures and practices. This can lead to complacency and a false sense of security. The reasons for this are varied and arise from contexts in which clinicians never see symptomatic patients or experience any sequelae resulting from breaches of infection control, to the extreme context in which clinicians fail to recognize that they may have patients who might transmit infectious pathogens to them or their staff. Clinicians may also fail to realize how much the development and application of appropriate infection control practices have altered and lowered the potential for direct, indirect and aerosolised cross-infection.<sup>7</sup> Therefore, the purpose of this study was to investigate the knowledge, attitudes and behaviour of dentists working in various dental clinics and dental hospitals in various states of North India regarding infection control, specially focusing on the current COVID-19 pandemic.

### **Materials and Methods**

**Study Design:** This study was conducted as a questionnaire based survey among dental practitioners working in dental hospitals and dental clinics in the Delhi-NCR region. This study was approved by the institutional

ethics committee of Institution. The identity of respondents was kept confidential to reduce bias however informed consent was obtained from practitioners before the commencement of survey.

**Sample Size Estimation:** With the help of literature survey the expected awareness about COVID 19, is 73.56%.

Using the following formula, we have found the minimum sample size to be 300. We have kept our sample size as 302 after getting responses from dentists.

$$N = \frac{Z^2 \times P(1 - P)}{d^2}$$

Where N = Sample size

Z=Z statistic for level of confidence =1.96

P=Expected prevalence or proportion = 73.56 %

d=Precision = 5%

**Sample Size Collection:** Data was collected during April 2020 to June 2020. The states included in the study were Bihar, Himachal Pradesh, Punjab, Haryana, Chandigarh, Assam, Delhi and NCR, and a part of Rajasthan and Uttar Pradesh. Surveys were sent by email and social media platforms such as Whatsapp to 715 dental practitioners. Non-returns were followed up by two further items of correspondence.

**Questionnaire:** The self-administered questionnaire was designed to obtain information about general awareness of COVID-19 pandemic, procedures used for the prevention of cross-infection in dental practice and biomedical waste management. The questionnaire was pretested, revised and retested before use.

The questionnaire contained 23 closed-ended questions [Table 1] had been designed. The questionnaire asked respondents regarding their attitude and knowledge of COVID-19 pandemic, infection control measures: use of gloves, protective eyeglasses, disinfection of impression, sterilisation practices, methods of storing instruments, and

methods of disposing of contaminated materials and sharps etc. The survey instrument had been pilot studied through questionnaire with 10 dental undergraduates and 10 postgraduate students from I.T.S Dental College, Muradnagar. Responses from the pilot study were analyzed to assess the clarity and relevance of questions. Necessary modifications were carried out on the feedback from pilot test participants. The Cronbach's alpha was calculated using the SPSS (version 16) for windows (SPSS Inc., Chicago, IL, USA) for the validation of the questionnaire. The Cronbach's alpha value was found to be 0.7 which was found to be satisfactory.

The questionnaire was finally distributed to the dental practitioners in India via email and Whatsapp links. Participants were given no time limit to fill questionnaire (in days) so as to reduce induced error. The accuracy of input data was verified by entering the data twice and comparing the two subsequent datasets. No discrepancies were found in the data.

Questionnaire – Presented in Table 1

### Data analysis

Data from the questionnaire were inserted in Microsoft Excel 2003 for Windows. The data were cleaned and then transferred to SPSS 16.0 (IBM Corp) for their statistical analysis. Descriptive statistical analysis was used to describe items included in the survey. The data were expressed with percentage values for overall variables.

### Results

**Participants' Characteristics :** This study included a total of 308 responses, out of which 6 were removed because of being incompletely or partially filled; forming a response rate of 42.23% (302 responses out of 715 invited dentists). Their age ranged from 19-64 years with a mean of 22.5 (SD 4.27) years.

The demographic information of the participants is presented in Table 2.

The obtained questionnaire data were analyzed, and results were presented in graphical format for ease of understanding [Graphs 1 - 6]

Awareness About the Incubation Period, Symptoms, and Mode of Transmission of the COVID-19 Infection (Q. no 1- 5 – Graph 1)

When asked about the incubation period, most of the dentists (84% ) reported it to be 7-14 days. The majority considered fever (44%) and dry cough (32%) as most common symptoms. Only 27% were able to correctly identify diarrhea, nausea and sore throat as secondary symptoms. When asked about the aspects that should be considered to identify patients at risk of having COVID-19, 58% reported that no age group is exempt from risk of contracting COVID-19. 35% were able to identify blood as a non-route of transmission

Fear of COVID-19 (Q. no. 6 -7 – Graph 2)

25% dentists reported a high fear (on a scale of 1 to 5, with 1 - the lowest and 5 -the highest) contracting COVID-19 from patients and co-workers. About 33% of dentists reported a very low (readiness to treat patients during the COVID-19 pandemic.

Consideration for Running a Dental Clinic during COVID-19 Pandemic (Q. no. 8 -21 – Graph 3, Graph 4 and Graph 5)

Most of the dentists (58%) said that they had taken online courses as a measure to improve their knowledge of COVID-19 pandemic. Only 10% of dentists expressed a high level of confidence in their ability to correctly screen symptomatic patients of COVID-19. A majority of 59% of dentists correctly identified the virus to remain viable on stainless steel and plastic surfaces for 2-3 days. Most of them (47%) said that the virus remains viable in air for 1-3 hours. A majority of 52% dentist identified Acute Dental

Pain as not being included under Emergency Dental Treatment. Only 33% said that non-emergency treatment should be delayed for 2 weeks during the pandemic while A majority of 77% of dentists strongly recommended not to treat COVID-19 positive patients in the same clinical area as COVID-19 negative patients. About 70% of dentists believed it to be better to don the Personal Protection Equipment (PPE) throughout the entire time of treating patients. 60% said that all the PPE components (Face Shield, Medical Overall, Shoe Cover etc) are equally important in proper protection against the virus. 28% of the dentists agreed that surgical masks are not as effective as N95 masks. Majority of them (84%) said that the minimum time for effective sanitation of hands with soap washing/sanitizer is 20-30 seconds. 58% considered Chlorhexidine Gluconate to be the surface disinfectant that is ineffective against the virus. A vast majority of 79% strongly agreed that impressions and other lab materials should be sterilized. 73% strongly condemned disposal of COVID-19 waste together with all other waste. Attitude toward Treatment of Patients with COVID-19 (Q No. 22-23 – Graph 6) 32% dentists were of the opinion that recovered COVID-19 positive patient should be delayed from non-emergency dental treatment, with 25% of them saying that recovered patient should be delayed for 1 month before any non-emergency treatment.

### **Discussion**

Despite having a high standard of knowledge and practice, dental practitioners around the globe are in a state of anxiety and fear while working in their respective fields due to the COVID-19 pandemic impact on humanity. <sup>[9]</sup> In our study, when asked about the incubation period, 84% of dentists believed it to be 7-14 days while almost proportions believed it to be either 0-7 days or 7-21 days (7% and 8% respectively). Lauer et al. <sup>[10]</sup> estimated the median incubation period of COVID-19 to be 5.1 days and

expect that nearly all infected persons who have symptoms will do so within 12 days of infection. Thus, they found that the current period of active monitoring recommended by the U.S. Centers for Disease Control and Prevention (14 days) is well supported by the evidence in their study.

The majority of the dentists surveyed reported fever (44%) as the common symptom while 32% believed dry cough to be the major symptom. When asked about secondary symptoms, only 30% and 28% did not consider nausea and diarrhea as such symptoms. The most common symptoms at onset of illness were found to be fever (98%), cough (76%) and myalgia or fatigue (44%); less common symptoms were sputum production (28%), headache (8%), haemoptysis (5%), and diarrhoea by Huang et al.<sup>[11]</sup>

Almost 58% dentists answered that there was no particular age group that was immune from the risk of contracting the infection. Dong et al.<sup>[12]</sup> found the median age of all children's COVID-19 cases was 7 years, but ages ranged from 1 day to 18 years. This finding suggests that all age groups were susceptible to SARS Cov-2 infection.

About 57% of responding dentists did not consider feces as a route of transmission while only 35% identified blood as a non-transmitter. Gu et al.<sup>[13]</sup> in their review said that a growing number of clinical evidence reminds us that digestive system other than respiratory system may serve as an alternative route of infection.

On enquiring whether dentists feared getting infected with COVID-19 from a patient and/or co-workers, 72% admitted a moderate to very high fear. Ahmed et al.<sup>[9]</sup> reported 87% of participants were afraid of getting infected with COVID-19 from either a patient or a co-worker. Regarding if they felt equipped enough to treat patients during the COVID-19 pandemic, 33% gave a very low score in readiness. In Das et al.<sup>[14]</sup> survey, 27.5% of

dentists felt anxious while treating patients coughing or suspected of having COVID-19 infection

Nearly 58% of the dentists reported of taking online courses as a measure to improve their knowledge of COVID-19 pandemic. Duruk et al.<sup>[15]</sup> said that 96.27% of the dentists in their survey reported that they received information about COVID-19 through physicians' personal websites/ social media accounts while only 22.93% received it through events such as seminars/ meetings/ congresses held by institutions.

On asking whether the dentists knew how to screen symptomatic COVID-19 infected patients, 30% felt a moderate level of ability to do it successfully. In contrast, only a small number of dentists (2%) were confident of avoiding infection in a survey conducted by Cagetti et al.<sup>[16]</sup>

About 59% of dentists believed that the virus remained viable on stainless and plastic surfaces for 2-3 days while 47% believed it remains viable in air for 1-3 hours. Van Doremalen et al.<sup>[17]</sup> found that the virus is viable for up to 72 hours on plastics, 48 hours on stainless steel, 24 hours on cardboard, and 4 hours on copper. It is also detectable in the air for 3 hours.

Regarding emergency dental treatment, 52% did not consider acute dental pain to be an emergency treatment. In the decision guidelines given by Krithikadatta et al.<sup>[18]</sup> they categorized acute dental pain under "Urgent" care which should be first managed with pharmacological intervention while Intra/Extra oral swellings were put under "Emergency" care which required immediate clinical intervention.

When asked about how long non-emergency procedures should be delayed, equal percentages of 33% dentists each said it should be 2 weeks or 1 month respectively. It was recommended that it should be delayed for 2 weeks in the

guidelines given for dental practitioners by Alharbi et al.<sup>[19]</sup>

Nearly 77% of dentists strongly believed that COVID-19 positive patients should not be treated in the same clinical area as other patients. When asked about when to don the PPE, 70% of dentists believed that it should be worn the entire time one is in the clinical area. Meng et al.<sup>[20]</sup> recommended a separate isolation clinic for the treatment of COVID positive patients. They also advised that the PPE be used (disposable mask and caps) even in the Triage and Waiting area of a clinic.

When asked about which PPE component is not mandatory while treating COVID-19 positive patients, 24% dentists considered shoe covers to be non-essential. The Dental Council of India (DCI).<sup>[21]</sup> has released various protocol guidelines regarding patient treatment during the pandemic. They have advised the mandatory donning of face-shields, masks/respirators, surgical gloves, disposable coverall, and shoe covers.

Regarding the effectiveness of regular surgical masks in comparison to the N95 respirator, 55% felt that it was very ineffective in comparison. Mathur et al.<sup>[22]</sup> said that surgical masks are not designed to provide adequate protection against exposure to a droplet nucleus smaller than 5 micrometers. For such purposes, particulate respirators (for example, N-95 masks) must be used especially during the aerosol generating procedures.

Nearly 84% dentists agreed that the hands should be washed for a minimum 20-30 seconds for effective cleaning. The US Centre for Disease Control (CDC)<sup>[23]</sup> recommends the scrubbing for 20 seconds to help prevent the spread of infection.

When asked which chemical is ineffective against COVID-19 virus as a surface disinfectant, 58% correctly named Chlorhexidine Gluconate. The Guideline for the Diagnosis and Treatment of Novel Coronavirus-Infected

Pneumonia (5th edition)<sup>[24]</sup> released by the National Health Commission of the People's Republic of China, it was reported that chlorhexidine, which is commonly used in dental practice, had no effect against COVID-19. Instead, mouth rinses containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone should be preferred. ADA and CDC<sup>[25]</sup> only recommend peroxide to destroy the virus.

75% dentists said that it highly important to sterilize impressions and other lab related materials. When asked about COVID-19 infected bio-waste disposal, 73% strongly felt that they should be segregated from other bio-medical waste. As mentioned by Sammy et al.<sup>25</sup>, dental laboratories should isolate prostheses of high-risk patients from other laboratory work. When handling these materials, one should wear surgical gloves and mask. All instruments and devices that come into contact with a high- risk patient's prosthesis must be sterilized. Peng et al.<sup>26</sup> said that medical and domestic waste generated by the treatment of patients with suspected or confirmed 2019-nCoV infection are regarded as infectious medical waste to separate them from the rest.

There is a lot of debate and confusion in the dental field about treatment of recovered COVID-19. In this study, when dentists were asked if recovered patients should be delayed from non-emergency dental treatment, opinion was divided. A 32% of them strongly felt that they should be delayed while an equal percentage moderately felt that they should be delayed. 53% said that they should be delayed for 2 weeks before being given treatment. As per WHO protocol for severe acute respiratory syndrome (SARS)<sup>27</sup>, clinicians should delay treating convalescing patients for at least one month after they are released from the hospital. As SARS-Cov2 has similar characteristics as SARS, we can consider the same protocols during the COVID-19 pandemic.

## Conclusion

Dentists, who work in close proximity with patient' oral cavity, especially with aerosol production, are some of the most high-risk health care professionals for contracting the COVID-19 viral infection. Thus, it is of utmost importance that dentists keep themselves updated with all the latest information and knowledge released about the virus as well as enforces the highest standards of Personal Protection Protocol and Infection control in their clinics to prevent the further spread of the virus.

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### Legend Table and Graph

Table 1: Questionnaire to assess knowledge of COVID-19 pandemic, attitudes towards and practice of standard infection control measures and biomedical waste management

Demographic Data

Name (Optional) –

Age –

Address (Optional) –

Qualification Level - UG/PG/Staff

Area of Practice – Private Practice/Dental Hospital

1. Incubation period of COVID-19 virus?

- a) 0-7 days
- b) 7-14 days
- c) 7-21 days
- d) >21 days

2. Most common symptom of COVID-19 infection?

- a. Fever
- b. Dry Cough
- c. Shortness of Breath
- d. Myalgia

3. Which of the following is not a secondary symptom of COVID-19 infection?

- a. Nausea
- b. Diarrhea
- c. Sore Throat
- d. None of the above

4. Who of the following is not at risk of contracting COVID-19 infection?

- a. Teenagers
- b. Infants
- c. Healthy adults
- d. None of the above

5. Which of the following is not a route of transmission?
  - a. Blood
  - b. Sputum
  - c. Faeces
  - d. Contact spread
6. Are You Afraid of Getting Infected with COVID-19 from a Patient and Co-Worker? (1 – Lowest to 5 – Highest)
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
7. Do you feel you are equipped enough to treat patients during the COVID-19 pandemic? (1 – Lowest to 5 – Highest)
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
8. Have you taken any online courses regarding the Coronavirus Disease?
  - a. Yes
  - b. No, but planning to
  - c. No, and don't need to
  - d. Not aware
9. Do you know how to screen symptomatic COVID-19 infected patients? (1 – Lowest to 5 – Highest)
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
10. For how long does COVID-19 virus stay viable on stainless steel and plastic surfaces?
  - a. 0-2 hours
  - b. 24 hours
  - c. 2-3 days
  - d. 7-14 day
11. For how long does COVID-19 virus stay viable in the air?
  - a. 30 minutes
  - b. 1-3 hours

- c. 24 hours
  - d. 2-3 days
12. What does not come under emergency dental treatment?
- a. Extraoral/Intraoral Swelling
  - b. Acute Dental Pain
  - c. Maxillofacial Fracture
  - d. Uncontrolled Bleeding
13. For how long non-emergency dental treatments be delayed during the COVID-19 pandemic?
- a. 24 hours
  - b. 1 week
  - c. 2 weeks
  - d. 1 month
14. Should COVID-19 positive patients be treated in the same clinical area as COVID-19 negative patients? (1 – Lowest to 5 – Highest)
- a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
15. When should the PPE be donned while in contact with patients?
- a. Before screening
  - b. After screening
  - c. Only during clinical procedure
  - d. Entire time
16. Which equipment is not mandatory while treating COVID-19 positive patients?
- a. Face shield
  - b. Medical Overall
  - c. Shoe Cover
  - d. None of the above
17. Are surgical masks as effective as N95 masks?
- a. Strongly Agree
  - b. Agree
  - c. Disagree
  - d. Strongly Disagree

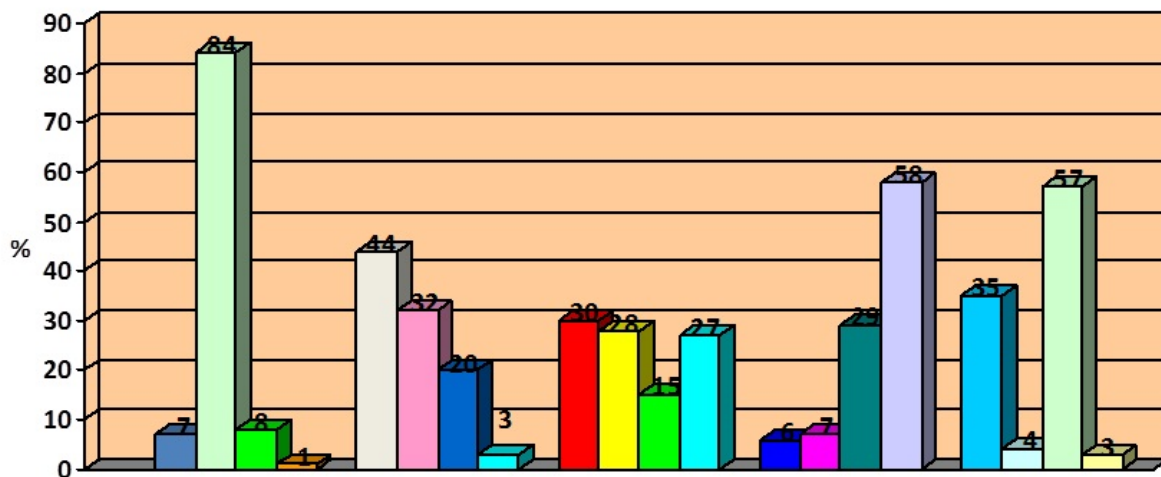
18. Minimum amount of time to effectively wash our hands/apply sanitizer?
- 10 seconds
  - 20-30 seconds
  - 1 minute
  - 3 minutes
19. Which chemical is ineffective against COVID-19 virus as a surface disinfectant?
- Isopropyl Alcohol
  - Sodium Hypochlorite
  - Hydrogen Peroxide
  - Chlorhexidine Gluconate
20. Do you think impressions and other lab related materials should be sterilized as well?
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
21. Should COVID-19 infected bio waste be disposed off together with all other waste?
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
22. Should a recovered COVID-19 patient be delayed from non-emergency dental treatment?
- Strongly Agree
  - Agree
  - Disagree
  - Strongly Disagree
23. If yes, for how long should a recovered COVID-19 patient be delayed?
- 1 week
  - 2 weeks
  - 1 month
  - 6 months

Table 2: Demographic information of dentists

Demographics	Category	Number (%)
Age	Below 20	27 (9)
	20 to 30	269 (89)
	31 to 40	3 (1)
	Above 40	3 (1)
Qualification Level	Undergraduate	251 (83)
	Post Graduate	45 (15)
	Staff	6 (2)
Area of Practice	Dental Hospital	268 (89)
	Private Practice	34 (11)

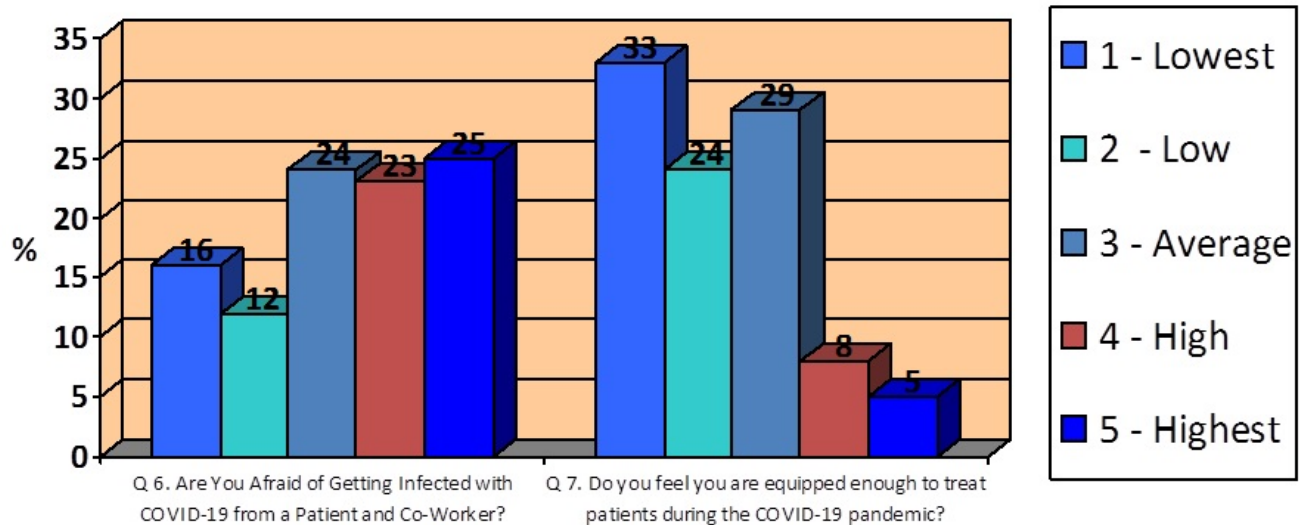
### Graph 1

Awareness About the Incubation Period, Symptoms, and Mode of Transmission of the COVID-19 Infection



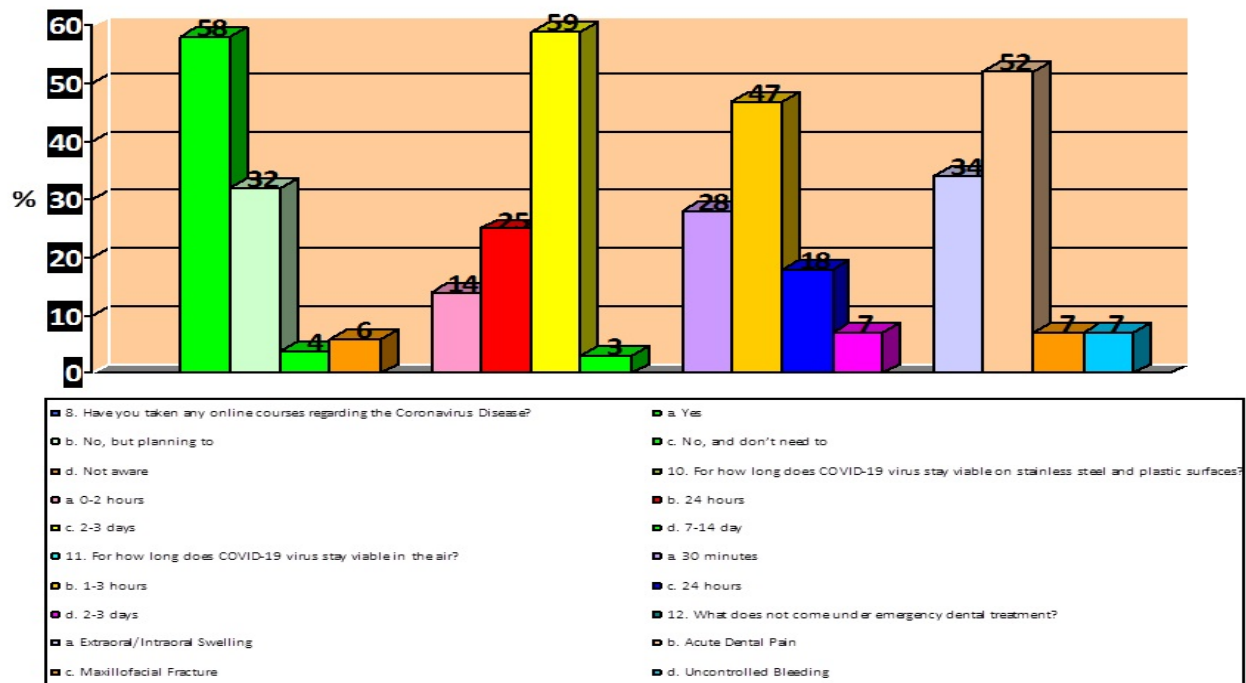
- 1. Incubation period of COVID-19 virus?
- a. 0-7 days
- b. 7-14 days
- c. 7-21 days
- d. > 21 days
- 2. Most common symptom of COVID-19 infection?
- a. Fever
- b. Dry Cough
- c. Shortness of Breath
- d. Myalgia
- 3. Which of the following is not a secondary symptom of COVID-19 infection?
- a. Nausea
- b. Diarrhea
- c. Sore Throat
- d. None of the above
- 4. Who of the following is not at risk of contracting COVID 19 infection?
- a. Teenagers
- b. Infants
- c. Healthy adults
- d. None of the above
- 5. Which of the following is not a route of transmission?
- a. Blood
- b. Sputum
- c. Faeces
- d. Contact Spread

**Graph 2**  
**Fear of COVID-19**



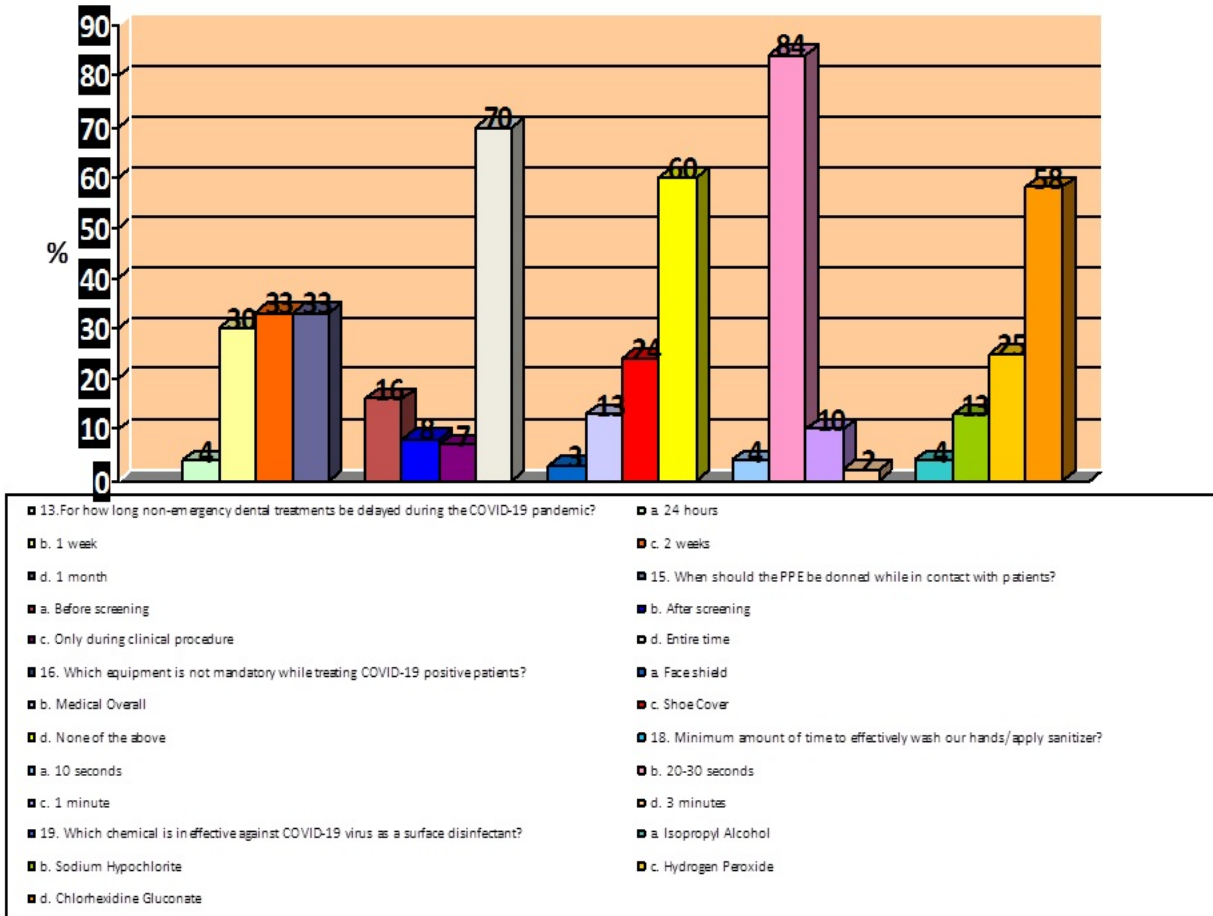
**Graph 3**

**Consideration for Running a Dental Clinic during COVID-19 Pandemic - 1**



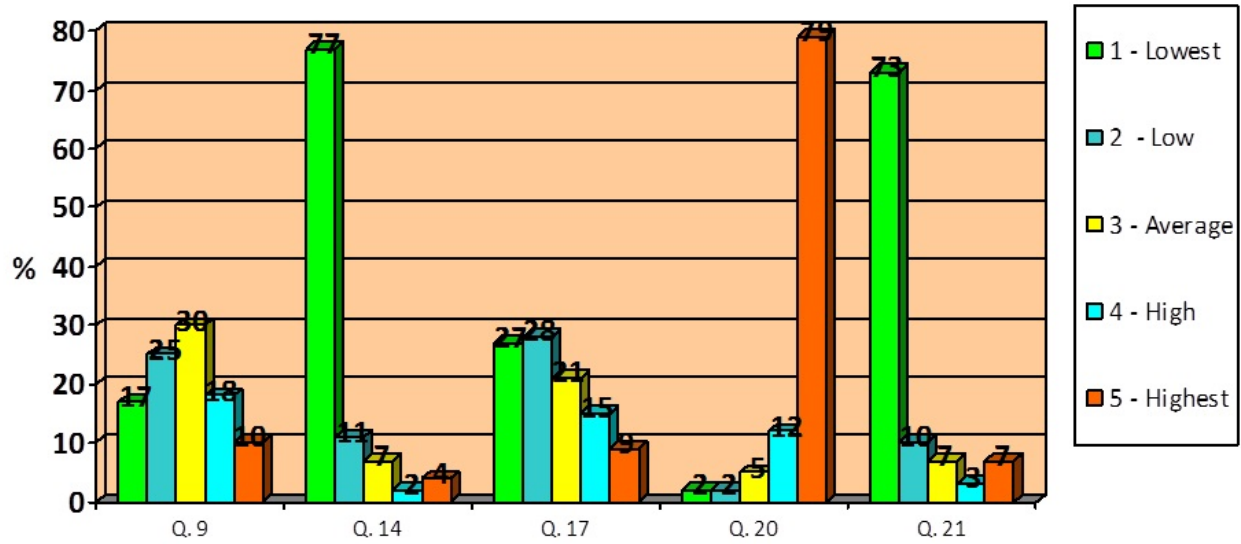
Graph 4

Consideration for Running a Dental Clinic during COVID-19 Pandemic - 2



**Graph 5**

**Consideration for Running a Dental Clinic during COVID-19 Pandemic - 3**



Q. 9 Do you know how to screen symptomatic COVID-19 infected patients?  
 Q. 14 Should COVID-19 positive patients be treated in the same clinical area as COVID-19 negative patients?  
 Q. 17 Are surgical masks as effective as N95 masks?  
 Q. 20 Do you think impressions and other lab related materials should be sterilized as well?  
 Q. 21 Should COVID-19 infected bio waste be disposed off together with all other waste?



Graph 6

