

Neuro-psychological impact on dentists in the COVID-19 pandemic

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ABSTRACT

Our survey investigated dentists' perceptions of their activity during the COVID-19 pandemic. We used a ten-question survey on our conception and sent it to 122 dentists via social media; 70 responded. The Cronbach's Alpha coefficient validated our questionnaire. We applied the Shapiro-Wilk test and the Mann-Whitney test. The chosen p-significance threshold was 0.05. The respondents were 61.50% women and 38.50% men; 44.29% were between 23 -30 years old. 44.29% of the respondents were dentists with 1 to 5 years of practice. Of 70 dentists, 51.43% felt stress, 35.71% felt fear, 7.15% anxiety, and 5.71% physical fatigue during the pandemic. 65% of males and 35% of females used some drugs. 80.80% of respondents had no financial problems, 19.20% reported some troubles.

Gloves, masks, and glasses were the principal ways of protection, followed by nebulizers (98%) and UV lamps (52%). 68 declared they had the support of their friends and family, 65 were relaxed by TV programs, 52 by doing sports, and 47 by listening to music. 53% of dentists had COVID-19: 30.58% female and 22.42% male; 96.24% of them managed to treat the infection at home.

Keywords: COVID-19, dentists, protection, psychological impact

INTRODUCTION

On January 12th, 2020, the World Health Organization (WHO) announced a new coronavirus in Wuhan, China. And until October 30th, 2020 (10:00 AM CET), over 45 million new cases were reported worldwide with 1.1 million deaths. The impact of this virus on people's lives and the world as a whole is truly devastating [1]. Genome sequencing has revealed that the virus responsible for COVID-19 belongs to the beta coronavirus subgenus, which is the same subgenus as the viruses that cause the severe acute respiratory syndrome SARS and MERS (Figure 1) [2].

The host receptor for SARS-CoV-2 cell entry is the same as for SARS, which is angiotensin-converting enzyme 2 (ACE2). It appears that SARS-CoV-2 binds to ACE2 through the region of the gene that binds the receptor to its spike protein [3]. Recent studies analyzed amino acid changes, identifying a D614G (glycine to aspartic acid) substitution that became the globally dominant polymorphism.

It is not clear whether the COVID-19 virus is transmitted directly from bats or through another mechanism (through an intermediate host) [4]. The COVID-19 pandemic, triggered by the spread of the SARS-CoV-2 virus, had an impact on society as a

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FIGURE 1. SARS-CoV-2 Spike Proteins

whole, and doctors were at the forefront of the fight against this formidable virus.

The link between blood types and the coronavirus has been highlighted by two studies recently published in the journal *Blood Advances*, which provide further evidence of the potential role of blood types in predicting vulnerability to the infection and the degree of severity of the form of Covid-19 [5]. Group O seems to act as a kind of protective shield against infection, while people with groups A and AB seem to be more susceptible to COVID-19 and develop a more severe form of the disease. Preliminary results of a study in China showed that people with blood type A develop a more severe form of the disease, while those with type O reported milder symptoms of the infection [5,6].

We all have to understand the impact of the COVID-19 pandemic on doctors, not just in terms of physical health but also their mental and emotional well-being. This study intends to shed light on the neuro-psychological effects of the pandemic on doctors, with a focus on their stress levels, anxiety, fatigue, and resilience. The findings of this study can help us better understand the challenges faced by healthcare workers during this unprecedented time and inform strategies to support their mental health [7]. It's interesting to see how dental practices in Europe have been affected by the Covid-19 pandemic. There were changes in dental procedures to protect medical staff and patients. Despite this, dental issues such as dental caries, pulpitis, periodontitis, diseases of the oral/gingival mucosa, and dento-maxillary anomalies continued to be common reasons for patients to visit dental offices. Dentists carefully consider the benefits of treatment against the risk of Covid-19 infection for their patients. It's important to note that treatments were performed with automatic ventilation or natural ventilation (window), and air sterilization must be done with UV lamps to ensure the safety of patients and staff [5-7].

MATERIAL AND METHODS

We surveyed to gather information about dentists' perceptions of their activity during the COVID-19 pandemic. We used Google Forms to develop a

ten-question survey and sent it to 122 dentists via social media. Out of those 122 dentists, 70 responded to the survey. The researchers then used Cronbach's Alpha coefficient to validate the survey and conducted a statistical analysis using descriptive statistics and inferential statistics elements. We applied the Shapiro-Wilk test to determine the distribution of the analyzed data series and used the Mann-Whitney test for median comparison. The chosen p-significance threshold was 0.05, and they used a demo GraphPad Prism for statistical analysis.

The questionnaire

1. **What is your age?**
 - a. 23-30 years
 - b. 31-37 years
 - c. 38-45 years
 - d. Over 45 years
2. **What is your gender:**
F (female) or M (male)
3. **For how long have you been working as a dentist?**
 - a. 1-5 years
 - b. 5-10 years
 - c. Over 10 years
4. **What was the most important psychological impact of the COVID-19 pandemic?**
 - a. Stress
 - b. Fear
 - c. Anxiety
 - d. Physical fatigue
 - e. Emotional fatigue
5. **Did you use some drugs during the pandemic?**
 - a. Sleeping pills
 - b. Antistress pills
 - c. Muscle relaxant pills
 - d. Vitamins
6. **Did you have some financial problems?**
Yes/No
7. **What kind of protection did you use?**
 - a. Mask
 - b. UV sterilization
 - c. Others
8. **What kind of support had you during the pandemic?**
 - a. Sport
 - b. Music
 - c. TV program
 - d. Talking with family and friends
9. **Did you have Covid?**
Yes/ No
10. **Did you treat yourself at home or in the hospital?**

RESULTS

The statistical study results are represented by Figures 2-6.

Question No. 1 What is your age?

The results showed that the largest number of dentists (44.20%) are between 23-30 years old (Figure 2).

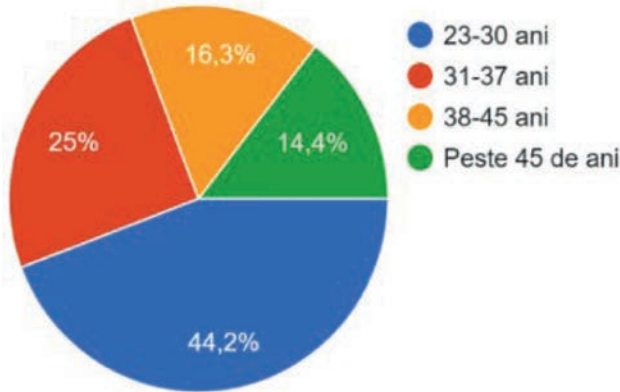


FIGURE 2. The distribution according to the age of doctors

Question No. 2 What is your gender?

As you can see in Figure 3, the largest number of doctors are women: 61.5% and 38.5% are men.

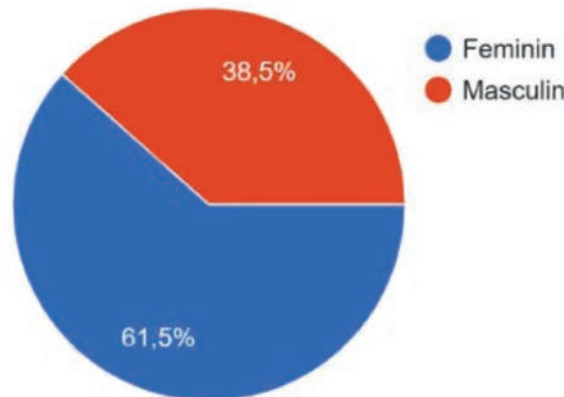


FIGURE 3. The distribution according to the gender of doctors

Question No. 3 For how long have you been working as a dentist?

As shown in Table 1, the largest number of doctors was in the first group with 1-5 years of experience in the profession.

TABLE 1. The distribution according the experience in dental medicine

Question No. 3	Number	Percentage
1-5 years	31	44.29%
5-10 years	22	31.43%
Over 10 years	17	24.298%
Total	70	100.00%

Question No. 4 What was the most important psychological impact of the COVID-19 pandemic?

TABLE 2. The distribution according to the psychological impact of the COVID-19

Question No. 4	Number	Percentage
Physical fatigue	4	5.71%
Stress	36	51.43%
Fear	25	35.71%
Anxiety	5	7.15%
Total	70	100%

The largest number of dentists, 51.43%, felt stress and 35.71% felt fear. The lowest percentages belong to anxiety (7.15%) and physical fatigue (5.71%).

Question No. 5 Did you use some drugs during the pandemic?

A percentage of 65% of male dentists and 35% of female dentists used some drugs. The most used were antidepressants, followed by sleep and immunostimulant drugs: vitamins, and minerals (Figure 4).

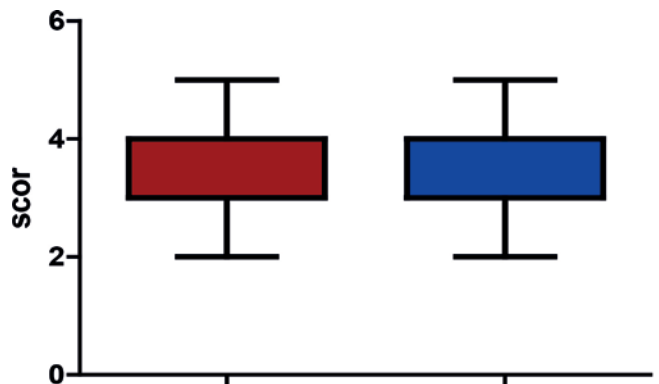


FIGURE 4. Dentists who used drugs during the COVID-19 pandemic

Question No. 6 Did you have some financial problems?

The largest percentage of dentists (80.80%) had no financial problems, even though they were working in a private dental office. A few percent (19.20%) reported some troubles correlated with a high level of anxiety and money spent on drugs.

Question No. 7 What kind of protection did you use?

The statistical results showed that classical gloves, masks, and glasses were the principal ways to protect themselves (100%). The second means of protection were nebulizers (98%) and UV lamps (52%) (Figure 5).

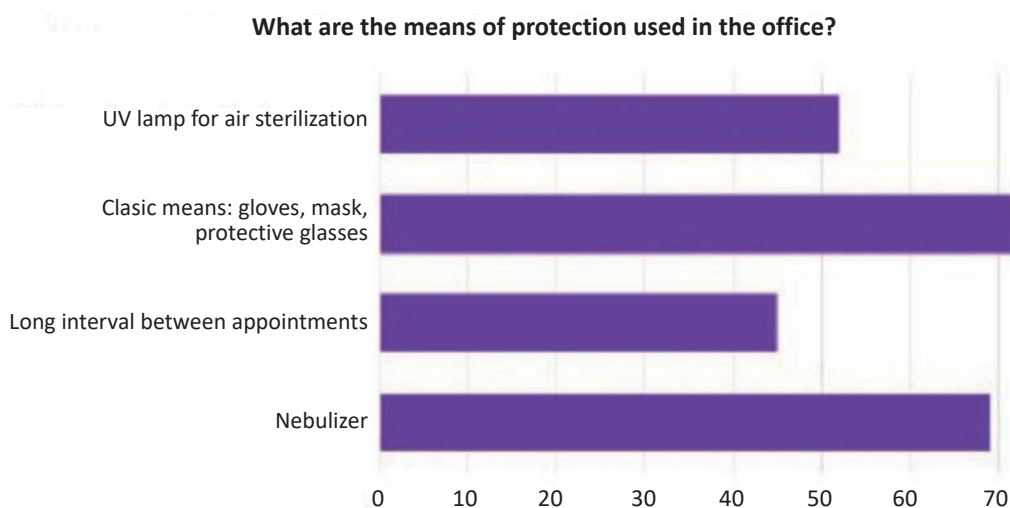


FIGURE 5. The distribution according to the means of protection used in the dental office

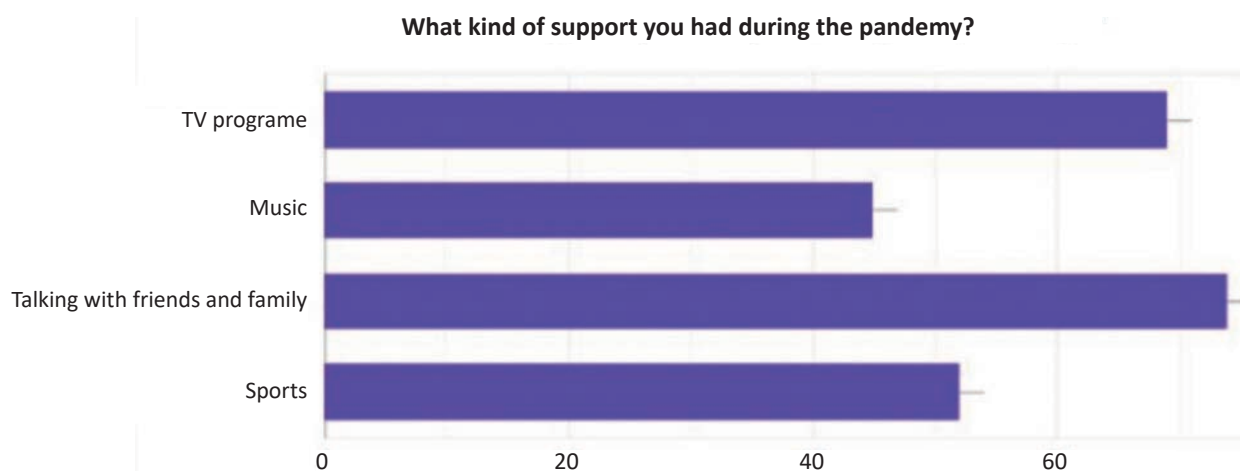


FIGURE 6. The distribution according to the support during the pandemic

Question No. 8 What kind of support had you during the pandemic?

68 respondents declared they had the support of their friends and family, 65 declared they were relaxed by watching TV programs, 52 by doing sports, and 47 by listening to music (Figure 6).

One percent of 53% of dentists had Covid: 30.58% female and 22.42% male. The other dentists (47%) had not a Covid infection. Among those who had the disease, 96.24% managed to treat the infection at home.

DISCUSSIONS

During dentistry treatment, doctors and patients have physical contact with each other. The risk of disease transmission is even higher in contact due to the higher risk of body exposure. Establishing well-designed COVID-19 screening programs was necessary for the return to dental practice in a safe way [8]. 44.29% of the respondents were dentists with 1 to 5 years of practice. Maybe these dentists are more connected with computers and modern

devices, so more responsible for completing our questionnaire.

Doctors and dentists were exposed to high levels of stress and anxiety during the pandemic. Stress factors were the danger of becoming infected, the lack of adequate protective equipment, the overload due to the large number of patients, and the uncertainty related to the treatment of COVID-19. These factors have harmed their mental well-being [9,10]. Symptoms of post-traumatic stress (PST) have been reported among doctors and dentists, including flashbacks, insomnia, and hypervigilance, due to traumatic experiences in treating patients with COVID-19 [11]. Anxiety was frequently present, and dentists faced concerns about their own health and their families' health, but also with the pressure to make critical decisions in a tense work environment [11,12]. Another study [12] included 318 healthcare professionals working in Poland; 87.1% of them felt anxious about their work during pandemic times. In our study, only 7.15% of respondents reported anxiety and the others reported another distress types.

Fatigue was a big problem for pandemic doctors. It has two main categories:

- **Physical fatigue** – Due to an exhausting schedule and high workload, many dentists have experienced physical exhaustion, which impacts their ability to provide quality care.
- **Emotional fatigue** – Daily interactions with patients and their families, sometimes in difficult circumstances, have led to emotional fatigue. Excessive empathy and suffering were additional challenges for doctors' mental health [13].

Due to the strong impact on doctors and the health system during the pandemic, they developed adaptation strategies and sought mutual support and solutions (national and international) to cope with the pressures. Family and friends were reported in our study as the most important distress factor. Social support was a key factor in supporting doctors. The medical community and peer support were crucial in managing stress and anxiety. Regular rest scheduling prevents exhaustion and burn-out. Allocating time for relaxation and recovery has helped to maintain work-life balance. Counseling and therapy were resources for doctors who had difficulty managing stress and anxiety. Trauma therapists have provided support in treating the psychological effects of the pandemic.

It is crucial to pay attention and interest in the neurologic and psychiatric health of dentists and provide them with the support to meet challenges. Physical or mental health is essential for quality medical care. Medical staff is a vital element of the health system. When doctors are affected by mental health problems, syncope (absences, lack of involvement, decreased quality of medical care, fear of possible failure, lack of compassion, and sometimes aggression) can occur. Assessment of the neuro-psychic impact of the pandemic can provide data for hypothetical future public health crises.

Doctors are encouraged to ask for and seek specialized help to share their experiences more easily. Overall, the assessment and understanding of the neuro-psychic impact during the COVID-19 pandemic helps to protect and maintain their health and ensures the quality of medical care. Thus, assessing and addressing the neuro-psychic impact on pandemic doctors requires a closer approach between government authorities, medical organizations, research institutes, and doctors. This approach should improve working conditions and support for doctors to maintain mental health. It is important to recognize these issues and to provide the support and resources needed to meet these challenges.

Ultraviolet radiation is one of the oldest methods for sterilization/decontamination used successfully to inactivate various microorganisms. In dentistry,

ultraviolet radiation is used for both diagnostic and therapeutic purposes. It is an invisible light that is intensively used in modern dentistry. Disinfection and sterilization with the help of ultraviolet light are the oldest among all current techniques, representing one of the most well-known applications related to ultraviolet radiation. The discoveries of researchers from the beginning of the 19th century are related to the bactericidal effects associated with ultraviolet sunlight, the light capable of inhibiting the development and growth of certain types of bacteria. The foundations were laid for the use of ultraviolet light, through ultraviolet irradiation techniques, particularly effective techniques in terms of sterilization and disinfection [17,18].

These techniques have advantages such as increased reliability, low cost of use, lack of harmful effects, and use without other techniques to combine with different chemical compounds. More precisely, irradiation with type C ultraviolet radiation has an extremely high capacity to inactivate pathogenic microbes (over 99.99%), exercised in a very short time (a few seconds) through mechanisms of damage to DNA structures (deoxyribonucleic acid) and interrupting its replication process. Moreover, recent studies confirm that type C ultraviolet radiation can inactivate coronaviruses (humans from the air). One of the advantages of ultraviolet radiation (UV irradiation techniques) is its simplicity and efficiency in combating microbes and infectious diseases to a certain extent. Ultraviolet light irradiation techniques at different wavelengths can inactivate microbes by exercising various mechanisms of action. Type C radiation and a part of type B radiation directly affect microbes, causing damage by interrupting DNA replication in a short time [17,18].

At the same time, it notes an increased efficiency regarding the inactivation of most microbes, even at low doses. In the case of irradiation with type B violet radiation, an innate immune response could be triggered, thus inducing the expression of certain AMPs, a process by which certain types of microbes are eradicated. Type A ultraviolet radiation and part of type B ultraviolet radiation, in association with a photosensitizer, can lead to the generation of reactive oxygen species, thus causing oxidative damage to pathogenic microbes. By comparison with the previously exposed mechanisms, the process of DNA damage following the action of ultraviolet radiation shows an increased performance of microbial inactivation on a varied range of microbes [18]. At the base of the mechanism exerted following ultraviolet irradiation, in the case of photodynamic inactivation, is a mediation of the generation of reactive oxygen species (ROS), responsible for the oxidative damage of a wide range of biomolecules (including proteins, lipids, nucleic acids). When the exogenous

photosensitizer from the microbial level can absorb ultraviolet moonlight photons, the generation of ROS (for example, hydrogen peroxide and hydroxyl radicals) takes place, with two types of energy transfer [19].

Many dentists, 65% males, and 30% females used drugs like antidepressants, sleeping pills, and immunostimulant drugs. Similar results were demonstrated even by other Italian and Spanish large studies [20,21]. The largest percentage of dentists (80,80%) had no financial problems, even though they were working in a private dental office. A few percent (19,20%) reported some troubles correlated with a high level of anxiety and money spent on drugs. Financial consequences of the pandemic Covid 19 could not be determined by 58.6% of the participants in another study performed in Germany, Switzerland, South Tyrol (Italy), and Austria [22].

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CONCLUSIONS

Dentists were among the unseen heroes of the COVID-19 pandemic, but their fight had a price because it brought extraordinary stress and pressure, generating significant neuro-psychological impacts. The largest number of them felt stress, anxiety, fear, and physical fatigue. Many dentists used drugs like antidepressants, sleep, and immunostimulant pills during the pandemic. Classical means like gloves, masks, and glasses were the principal way to protect themselves. UV lamps with antiviral effect did the air sterilization. Many respondents indicated the support of family and friends, followed by TV programs.

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