Original Research

Dentists' stress level during the COVID-19 pandemic and their opinion on the oral health status of their patients

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DOI: 10.15386/mpr-2764

Manuscript received: 15.06.2024
Accepted: 08.07.2024

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Abstract

Background and aims. "Severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2) is the name of the etiological agent of the pandemic Corona Virus Disease (COVID-19) which was declared on March 11, 2020 by the WHO and which affected all countries of the world, including Romania. Our study aimed to evaluate the psycho-affective implications and economic consequences for dentists in Romania during the COVID-19 (Corona Virus Disease) pandemic state of emergency and their opinion on the patients' oral health impact.

Methods. A cross-sectional observational and analytical study based on a questionnaire was conducted. Dentists who work in Romania affiliated in 2020 to the Romanian College of Dental Practitioners was the target population.

Results. Three hundred and seventy-three dentists participated in this survey. The age of the respondents ranged from 24 to 70. Men and women have the same expectation regarding the lockdown effect of worsening the oral health of the general population (worst, 79.5% of women and 81.3% of men, P=0.8842).

Conclusions. The anxiety regarding the bank rates, supplementary investments, risk of COVID-19 infection and exposure to COVID-19 related mass-media information proved to be significantly higher among young dentists.

Keywords: pandemic COVID-19 (Corona Virus Disease), oral health status, dentists' stress level

Background and aims

"Severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2) is the name of the etiological agent of the pandemic Corona Virus Disease (COVID-19) which was declared on March 11, 2020 by the WHO and which affected all countries of the world, including Romania [1]. The novel b-coronavirus (SARS-CoV-2) was first detected in Wuhan, Hubei province, China. Structurally, COVID-19 is an ss-RNA, enveloped virus with a size of ~350 kilobase-pair (kbp) [2]. COVID-19 has the potential to cause severe acute respiratory tract infection among infected humans and is commonly transmitted from person to person via hands, saliva, nasal droplets, and surface contacts [3,4].

Dentists, due to the specificity of dental activity, which involves many saliva drops and aerosols are considered to be at the forefront, in what proves the risk of cross-infection with patients, respectively getting infected and further spreading the virus [5,6].

The first case of COVID-19 in Romania was confirmed on February 26, 2020. Between February and April 2020, over 1.3 million Romanian citizens came to Romania from the red areas

of COVID-19 (especially Italy and Spain), putting the country's government in a great health challenge. Among the reasons for the return to Romania of this large number of Romanian citizens are the loss of jobs and the fear of contagion in the red areas (where they worked) and the approach of the Easter holidays [7].

Due to the COVID-19 pandemic, in Romania was declared a state of emergency on March 16, 2020 for two months, followed by a state of alert. On March 21, 2020, the temporary suspension of the activity in the dental offices was ordered by a Military Ordinance [8], except for the emergency dental interventions. Thus, at the level of each county, state emergency offices were organized, to serve the dental emergencies in the territory. Along with these state emergency offices, private dental offices that have expressed the option to serve dental emergencies during the pandemic, have been approved to work only if they met certain criteria for this infection such as having the necessary PPE (personal protective equipment) requirements in place (N95, FPP2 or FPP3). Apart from those private dental offices and emergency centers, all private dental offices were closed between 16 March 2020 and 18 May 2020.

During the emergency state period (16 March - 18 May 2020), only 7.7% (39 offices) of the assessed dental offices provided dental treatments [9].

Emergency dental care refers only to the treatment of pain, infection, or bleeding. Aerosol-producing dental procedures (such as ultrasonic scaling, use of the high-speed handpieces etc.) were not accepted.

On 18 May 2020 a state of alert was declared. The dental offices could offer routine dental care following the new recommendations for the dental offices regarding the protective measures for patients and the dental staff. Dentists are more exposed to SARS-CoV-2 infection than other medical specialties because they work in direct contact with the patient's oral cavity, salivary droplets being the main route of transmission of the virus (by inhalation, ingestion, or direct mucosal contact) [10,11].

Khader et al. showed that Jordanian dentists had limited comprehension of the extra precautionary measures that protect the dental staff and other patients from COVID-19 even if they knew COVID-19 symptoms, mode of transmission, infection control, and standard measures in dental clinics [12]. During the initial phase of the COVID-19 outbreak in China, more than half of 1210 respondents from Wang et al. [13] rated the psychological impact as moderate-to-severe, and about one-third reported moderate-to-severe anxiety. Elevated psychological distress was found among dentists who had background illness, fear of contracting COVID-19 from patients, and a higher subjective overload. Lower psychological distress was associated with being in a committed relationship and having higher scores for self-efficacy. Given these results, gathered during times of an infectious disease outbreak, exploring psychological distress among dental staff is warranted as the effects may be long-term [14]. The COVID-19 emergency had a highly negative impact on the activity of dentists practicing in Modena and Reggio Emilia. All respondents reported practice closure or strong activity reduction. The perception of this negative impact was accompanied by feelings of concern (70.2%), anxiety (46.4%) and fear (42.4%). The majority (89.6%) reported concerns about their professional future and the hope for economic measures to help dental practitioners [15]. For German residents, the subjective level of information regarding COVID-19 is positively associated with increased COVID-19-related fear. Providing appropriate psychological interventions for those in need and access to transparency and comprehensible information is crucial during the COVID-19 pandemic [16].

The pandemic has also resulted in the loss of livelihoods due to prolonged shutdowns, which have had a rippling effect on the global economy. The prognosis of COVID-19 depends mainly on various factors that include the patient's age, the severity of illness at presentation, pre-existing conditions, how quickly treatment can be implemented, and response to treatment. There should be closed-loop communication between the clinical providers, pharmacists, and nursing staff while managing patients with COVID-19 [17].

Dentists in North Italy adopted several precautionary measures, recognized as valid by the scientific community, those working in the highest prevalence COVID-19 area reported adopting several measures less frequently than dentists in low prevalence area. The same unexpected finding was disclosed regarding the COVID-19 risk perception: dentists in the highest prevalence area were more confident in avoiding the infection than others.

Only one-third of the dentists report to have followed a Continuous Educational Course on COVID-19, but the majority of the sample believes to have enough knowledge on the disease and the protective measures to avoid infection [18].

The **aim of the** present research was to evaluate the psycho-affective implications and economic consequences for dentists in Romania during the COVID-19 pandemic state of emergency and their opinion on the patients' oral health impact.

Methods

Ethical committee approval was obtained from the Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, Romania (approval no 25 / 27.02.2020). Written informed consent was obtained from all participating adults when completing the questionnaire and no minors were involved in this study

1. Study Design and Settings

A cross-sectional observational and analytical study was conducted to reach the study aim. Dentists who work in Romania affiliated in 2020 to the Romanian College of Dental Practitioners represented the target population. The survey was conducted from May 17 to June 14, 2020.

2. Instrument and Data Collection

The survey aimed to estimate the changes that will occur on the economic and social level in the dental offices, psycho-emotional changes that occur in dentists, and the potential impact of this period of isolation, quarantine on the oral health of patients from the dentist's point of view.

The questionnaire is structured in 3 parts and investigated:

a. the opinion of dentists regarding the potential impact of this period of isolation COVID-19 on the oral health of patients, the attention paid by patients to oral hygiene during the period of isolation, quarantine – First part.

b. the perception of dentists about the economic and social impact of this pandemic on dental activity – Second part.

c. the possible states of anxiety of the dentists related to possible bank rates, the possibility of contracting COVID-19 disease, the psychological impact of the information in the media, due to isolation, and the ways to relax. Called dentists during this period – Third part.

Several demographic characteristics were also collected (age, sex, and the year of graduating from the Faculty of Dental Medicine).

The survey questions were in the Romanian language and were administered electronically (http://brain-amn.org/present/stomatologi/) to facilitate data collection. The answers were collected anonymously, and the responses were stored on a private server.

3. Data analysis

Absolute and relative (%) frequencies were used to report qualitative data. Comparisons between proportions were tested with Chi-squared family tests. Median and interquartile range (Q1 to Q3), where Q is the value of the first (Q1) and third (Q3) quartile, along with the minimum and maximum values, were reported for age and years of practice. The analysis on sub-groups was done for sex and age classes (generations: Z for respondents younger than 26 years, Y for respondents with age between 26 and 40, X for respondents with age between 41 and 55 and baby boomer for respondents older than 55 years) under the hypotheses that differences exist between these sub-groups. The significance level was set to 0.05 for comparisons between two groups and Bonferroni correction (19) for comparisons between more than two groups.

Statistica software (v. 13.5, TIBCO Software Inc, Palo Alto, CA, USA) was used to perform the analysis.

Results

1. Participant's characteristics

Three hundred and seventy-three dentists participated in this survey, with a response rate of 2.017% of the dentists working in Romania. The age of the respondents ranged from 24 to 70, and most respondents were women and belonged to the Y generation (Table 1). We observed a distinct pattern of physical activity according with sex, with more women than men reporting no physical activity (23.0% vs.). 14.9%) or with physical activity in the house (45.6% vs. 30.6%). In comparison, more men did physical activity outside (54.5% vs. 31.4%, $\chi 2 = 19.1$, P=6.96*10-5). Forty-four percent of respondents own a dog. Over 90% of respondents did not work as usual, and the majority offered teleconsultation (Table I).

Table I. Dentists enrolled in the study: main characteristics.

Variable	Value
Sex, no. (%)	
Female	239 (64.1)
Male	134 (35.9)
Age (years), median (Q1 to Q3)	40 (32 to 47)
Generation, no. (%)	
Baby boomer (56-76 years)	44 (11.8)
X (41-55 years)	124 (33.2)
Y (26-40 years)	198 (53.1)
Z (<26 years)	7 (1.9)
Years of practice	
{Min to Max}	{1 to 46}
Median (Q1 to Q3)	14 (7 to 22)
Did you respect the lockdowns?	
Yes	362 (97.1)
No	11 (2.9)
Physical activity during lockdowns	
In house	150 (40.2)
Closed to the house	148 (39.7)
None	75 (20.1)
Worked as usual, no. (%)	
Yes	26 (7.0)
No	347 (93.0)
Teleconsultation, no. (%)	
Yes	255 (68.4)
No	118 (31.6)

2. Dentists' perception on oral health during COVID-19 lockdown

Regardless of the generation, most respondents believe that the lockdown negatively impacted the population's oral health (Table II, P>0.10). Men and women have the same expectation regarding the lockdown effect on the oral health of the general population (worst, 79.5% of women and 81.3% of men, $\chi 2=0.25$, P=0.8842). We also observe the same pattern regarding oral hygiene, with no differences among women and men ($\chi 2=4.00$, P>0.05).

Table II. Respondent's perception on oral health and hygiene during COVID-19 lockdown.

Perception	Generation no. (%)			
	Baby boomer	X	Y	Z
Oral health …				
unchanged	6 (13.6)	16 (12.9)	39 (19.7)	0 (0)
worst	38 (86.4)	104 (83.9)	150 (75.8)	7 (100)
better	0 (0)	4 (3.2)	9 (4.5)	0 (0)
Oral hygiene …				
neglected	21 (47.7)	44 (35.5)	93 (47)	3 (42.9)
increased	10 (22.7)	39 (31.5)	38 (19.2)	0 (0)
I do not know	13 (29.5)	41 (33.1)	67 (33.8)	4 (57.1)

Data are expressed as numbers (percentage)

Table III. Respondent's expected changes of practice after COVID-19 lockdown: social and economic.

	Generation no. (%)			
	Baby boomer	X	Y	Z
Economic impact …, no. (%)				
Smaller no. of subjects	12 (27.3)	43 (34.7)	72 (36.4)	3 (42.9)
Investments	30 (68.2)	79 (63.7)	123 (62.1)	4 (57.1)
Others	2 (4.5)	2 (1.6)	3 (1.5)	0 (0)
Social changes …, no. (%)				
No changes	29 (65.9)	84 (67.7)	122 (61.6)	2 (28.6)
Cutting down auxiliary staff	4 (9.1)	19 (15.3)	31 (15.7)	4 (57.1)
Hiring auxiliary staff	4 (9.1)	5 (4)	10 (5.1)	1 (14.3)
I did not think	7 (15.9)	12 (9.7)	31 (15.7)	0 (0)
Others …	0 (0)	4 (3.2)	4 (2)	0 (0)

Data are expressed as numbers (percentage)

Table IV. Respondent's anxieties.

Anxiety	Generation no. (%)				P-value
	Baby boomer	X	Y	Z	
Bank rates					
Yes	9 (20.5)	36 (29.0)	49 (24.7)	6 (85.7)	<0.001
No	35 (79.5)	88 (71.0)	149 (75.3)	1 (14.3)	
Supplementary investments					
Yes	31 (70.5)	64 (51.6)	101 (51.0)	6 (85.7)	<0.003
No	13 (29.5)	58 (46.8)	77 (38.9)	1 (14.3)	
Not applicable	0 (0.0)	2 (1.6)	20 (10.1)	0 (0.0)	
High risk of COVID-19 infection					
Yes	31 (70.5)	58 (46.8)	108 (54.5)	7 (100)	<0.0001
No	13 (29.5)	66 (53.2)	90 (45.5)	0 (0.0)	
COVID-19 related mass-media information					
Yes	30 (68.2)	60 (48.4)	116 (58.6)	5 (71.4)	<0.0001
No	14 (31.8)	64 (51.6)	82 (41.4)	2 (28.6)	

Data are expressed as number (percentage)

3. Dentists' perception on socio-economic changes after lockdown

The youngest dentists look more inclined to reduce the number of treated subjects after lockdown, while the dentists with more experience are keener to make investments in protection materials, but the difference does not reach the significance threshold (P>0.10) (Table III).

4. Dentists' self-assessed anxieties

Three of the respondents were diagnosed with COVID-19 infection (0.8%). The anxiety regarding the bank rates, supplementary investments, risk of COVID-19 infection (dentists' perception regarding the risk of infection) and exposure to COVID-19 related mass-media information proved significantly higher among younger dentists (Table IV).

More women perceived COVID-19 anxiety related with mass-media information than men (61.5% vs. 47.8%; $\chi^2 = 6.60$, P=0.0102). No other differences among women and men regarding anxieties were observed (P>0.10).

Discussion

The study was carried out after the final days of the lockdown in Romania and the starting of the alert state, when the dentists were allowed to return to their practices. The respondents of the questionnaire represent a sample of different regions in Romania of different age ranges. Three of the interviewed dentists were tested positive for Sars-Cov-2 (0.8%). A high percentage of Romanian dentists (54.69%) are considered to be at increased risk for COVID-19 infection due to the specifics of their jobs, in close contact with the saliva, blood and respiratory tract of their patients. This data is in accordance with other studies about similar infectious diseases (SARS, CoVID-19) like the study of psychological impact of the COVID-19 pandemic on dental health personnel in Norway, most of the respondents agreed or completely agreed that dentists, dental hygienists and dental assistants are at high risk of contracting COVID-19. This fear of infection in the early phase of the COVID-19 OUTBREAK was regardless of whether respondents worked clinically with patients or not during the lockdown period [20].

1. Dentists' perception on population's oral health during COVID-19 lockdown

Regardless of generation and sex, most respondents in our study believed that the lockdown would negatively affect the population's oral health (Table II). The same pattern is also observed regarding oral hygiene, without differences among genders. Our results were similar to the findings of Gotler et al. [21] who concluded that during the lockdown, many children changed their eating, drinking, and tooth brushing habits and, thus, increased their risk of developing caries. Higher safety standards for patients during dental treatments increase the cost of dental treatments [22], which can reduce access to dental treatments.

2. Dentists' perception on socio-economic changes after lockdown

The youngest dentists look more inclined to reduce the number of treated subjects after lockdown, while the dentists with more experience are keener to make investments in protection materials, but the difference does not reach the significance threshold (P>0.10) (Table III).

Martina et al. [23] reported that most dentists thought they would increase the number of working hours during the week, due to the higher amount of time needed to perform disinfection procedures, the chair time between two patients will increase, and the number of patients that is possible to see in one day, obviously will decrease, forcing the dentists to work more days per week.

All dental practitioners closed or reduced their activity to urgent procedures, 38.2% prior to and 61.8% after the Italian national administrative order of 10 March 2020. All reported routine use of the most common protective personal equipment (PPE), but also admitted that the use of PPE had to be modified during COVID-19 pandemic. A high percentage of patients canceled their previous appointments after the Italian national administrative order of 10 March 2020. Almost 85% of the dentists reported being worried about contracting the infection during the clinical activity. The results of the GAD-7 (General Anxiety Disorder-7) evaluation showed that 9% of respondents reported severe anxiety. To conclude, the COVID-19 emergency is having a highly negative impact on dentists practicing in Modena and Reggio Emilia, Northern Italy. All respondents reported practice closure or strong activity reduction [15].

The WHO's current estimate of the global case fatality rate for COVID-19 is 2.2%. However, the case fatality rate is affected by age, underlying pre-existing conditions, and severity of illness. Until most of the world's population gets completely vaccinated (including booster shots), COVID-19 will remain a threat to global public health with the emergence of potentially treatment-resistant variants [17].

3. Dentists' self-assessed anxieties

The rapid spread of COVID-19, which affected millions of people worldwide, the prolonged period of incubation of coronavirus (as long as 14 days), which made it almost impossible to pinpoint an individual's exposure to the virus, no vaccine or approved treatment, lack of protective equipment contributed to the fear and anxiety in the examined period [6,24].

Regarding self-assessed anxiety in the immediate aftermath of the lockdown caused by the COVID-19 pandemic, dentists in Italy who do not consider themselves at risk for contracting the SARS-CoV-2 virus are in a percentage of only 7.7% [23], compared to the Romanian dentists who consider that they are not at risk in a percentage of 45.31%.

The SARS-CoV-2 pandemic puts pressure on all healthcare professionals and has affected the delivery of healthcare services globally. Uhlen at el. (20) study showed an important psychological impact of COVID-19 on dental personnel in Norway regardless of working clinically with patients or not. Working with patients increased the insecurity about their own infection status and infecting people close to them. A safe working environment and adequate infection control measures are associated with less fear of infection and feeling of instability [20].

Almost fifty-four of 1210 respondents from 194 cities in China rated the psychological impact of the outbreak as moderate or severe; 16.5% reported moderate to severe depressive symptoms; 28.8% reported moderate

to severe anxiety symptoms; and 8.1% reported moderate to severe stress levels. Most respondents spent 20–24 h per day at home (84.7%); were worried about their family members contracting COVID-19 (75.2%); and were satisfied with the amount of health information available (75.1%). Female gender, student status, specific physical symptoms (e.g., myalgia, dizziness, coryza), and poor self-rated health status were significantly associated with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression (13). Generalized anxiety (44.9%), depression (14.3%), psychological distress (65.2%) and COVID-19-related fear (59%) had been reported by German residents (16). Females and younger people reported a higher mental burden. Trust in governmental actions to face COVID-19 and the subjective level of information regarding COVID-19 are negatively associated with mental health burden [16].

Our study is consistent with literature studies conducted during the similar period of SARS-COV-2 pandemic in other countries, which consider that dental staff's sex and work experience have a decisive effect on the psychological and social impact of the pandemic [20,23].

Our study noticed differences in the perception of anxiety depending on age, respectively professional dental experience and sex (Table IV). Thus, the women and younger dentists in the surveyed group represent the most vulnerable categories, which showed more anxiety and stress caused by the pandemic context with the SARS-CoV-2 virus. Bäuerle et al. [16] found a greater psychological impairment in females and young people in the early days of the COVID-19 pandemic conducted on the general population.

The psychological reaction of dentists in facing this extraordinary infectious danger given by the COVID-19 pandemic, varied according to age, respectively the experience dictated by years of medical practice. This could be explained by the fact that dentists with more dental experience are aware that by the profession, that they are exposed to patients with various contagious diseases (such as hepatitis, human immunodeficiency virus infection, tuberculosis, etc.), and required to follow infection control protocols [23,25].

As a strategy to address the infectious danger posed by this pandemic, in Romania, younger dentists prefer to reduce the number of patients treated per day, while doctors with years of experience behind, with experience, prefer to invest in additional protective equipment.

A significantly higher percentage of the younger dentists proved to be more anxious about bank rates, supplementary investments, risk of COVID-19 infection, and exposure to COVID-19 related media information. A significantly higher percentage of women perceived COVID-19 related anxiety to the related mass-media information than men (61.5% vs. 47.8%; P=0.0102).

Most respondents in our study were part of generation Y, being mostly women, women having a distinct pattern than men, in terms of physical activity, with more women than men without any physical activity or with physical activity in the house (Table I). In comparison, more men did physical activity outside (P<0.0001). Wang et al. [13] findings identify factors associated with a lower level of psychological impact and better mental health status that can be used to formulate psychological interventions to improve the mental health of vulnerable groups during the COVID-19 epidemic. Forty-four percent of respondents from our study own a dog. Dog ownership may have provided people with a stronger sense of social support, which may have helped buffer some of the negative psychological impacts caused by the COVID-19 pandemic [26].

Over 90% of our respondents did not work as usual, and the majority offered teleconsultation (Table I). Martina et al. [23] reported that the dentists who were more fearful tried to solve any potential emergency by using telemedicine to avoid meeting patients. It must be underline that the dentists' fear may also be due to the lack of availability of proper PPE.

Another noteworthy aspect is that even though the incidence of COVID-19 disease in the studied period was low in Romania, aspects of psychosocial, emotional, and economic stress occurred. Thus, during the lockdown period, it was between 28 and 165 daily new cases and in the alert state, in which the dentists completed the questionnaire, it was between 167 and 320 daily new cases.

The reported levels of fear among dental professionals are in accordance with most previous studies, showing fear of the unknown as the most prominent stressor among healthcare workers during or following a virus outbreak [20,27]. Cawcutt et al. [28] observed that the fear of infection with Sars-Cov-2 was lower for frontline health workers than the hospital staff not caring for infected patients. They considered that fear might be mitigated by direct communication with health care workers and direct education on infection control measures [28]. A similar result was also reported by Martina et al. [23].

Despite the limitations of our study, like the small sample of the studied group and the brief period in which the impact of the pandemic was analyzed, relevant data could be collected that is similar to studies from other countries. To be more accurate, the study should be extended for long term impact evaluation of the COVID-19 pandemic on the medical staff and combined with clinical studies to assess the oral health status evolution properly for the patients.

Conclusions

Independently of the gender and age, most Romanian dentists surveyed considered their patients' oral health would be worse after the lockdown period.

The anxiety about the bank rates, supplementary investments, risk of COVID-19 infection, and exposure to COVID-19 related mass-media information proved significantly higher among the youngest dentists.

The only difference between genders regarding anxieties was observed in women in case of anxiety related to the COVID-19 related mass-media information: a significantly higher percentage of women than men perceived COVID-19 anxiety related to mass-media information.

Acknowledgments

This paper is part of the doctoral research of AGEP, Department of Public Health and Management, Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, Cluj-Napoca, Romania.

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