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**Impact of the COVID-19 pandemic on dental practice in  
Serbia – prospective study**

Утицај пандемије ковида 19 на стоматолошку праксу у  
Србији – проспективна студија

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## Impact of the COVID-19 pandemic on dental practice in Serbia – prospective study

### Утицај пандемије ковида 19 на стоматолошку праксу у Србији – проспективна студија

#### SUMMARY

**Introduction/Objective** The COVID-19, pandemic had a great impact on all spheres of dental practice. Dentists are the most affected category, due to their line of work. Studies conducted worldwide have shown a range of repercussions in dentistry including lockdowns, limited access to dental services, changes in prices, working hours and availability of protective equipment, increased anxiety levels, changes in the protocols and personnel fear of contracting the disease at work.

The aim of this prospective observational survey study was to evaluate the impact of the COVID-19 pandemic on the dental practices in Serbia, as well as the challenges and consequences faced by dentists since the beginning of the pandemic, via an anonymous questionnaire.

**Methods** Multi layered questioner was used divided in to 4 sections: 1. Demographic, 2. Dental office professional experience, 3. Epidemiological professional experience, 4. Personal pandemic experience.

**Results** In total, 459 members of the Serbian Dental Chamber participated, gender distribution was 34.4% men and 65.6% women, age range was 26 to 81 years, of which 76.4% were immunized against COVID-19. Professional, epidemiological and personal experience showed high level of preventive measures, overcoming professional limitations in order to lower the probability of contracting and spreading the disease.

**Conclusion** The COVID-19 pandemic had a large influence on the dental practice in Serbia. Many dentists had to overcome the professional, economic and personal limits. The immunization made all the difference and created a safer environment for dentists and patients.

**Keywords:** pandemic; COVID-19; dental practice

#### САЖЕТАК

**Увод/Циљ** Пандемија ковида 19 имала је велики утицај на све сфере стоматолошке праксе.

Стоматолози су најугроженија категорија, због природе свог посла. Студије спроведене широм света показале су низ последица у стоматологији које укључују затварање ординација, ограничен приступ стоматолошким услугама, промене у ценама, радном времену и доступности заштитне опреме, повећан ниво анксиозности, промене у протоколима и страх особља од заразе на послу. Циљ ове проспективне опсервационе анкете био је да се путем анонимног упитника процени утицај пандемије ковида 19 на стоматолошку праксу у Србији, као и изазови и последице са којима се стоматолози суочавају од почетка пандемије.

**Метод** Вишеслојни упитник је коришћен, подељен у 4 секције: 1. Демографски подаци, 2. Професионално искуство стоматолошкој ординацији, 3. Епидемиолошко професионално искуство, 4. Лично искуство током пандемије.

**Резултати** Учествовало је 459 чланова Стоматолошке коморе Србије, полна дистрибуција била је 34,4% мушкараца и 65,6% жена, узраста од 26 до 81 године, од чега је 76,4% вакцинисано против ковида 19. Професионално, епидемиолошко и лично искуство показало је висок степен превентивних мера и превазилажења професионалних ограничења у циљу смањења вероватноће заразе и ширења болести.

**Закључак** Пандемија ковида 19 имала је велики утицај на стоматолошку праксу у Србији. Многи стоматолози морали су да превазиђу професионална, економска и лична ограничења. Имунизација је направила разлику и створила безбедније окружење за стоматологе и пацијенте.

**Кључне речи:** пандемија; ковид 19; стоматолошка пракса

## INTRODUCTION

The outbreak of the COVID-19 pandemic in December 2019. found the worldwide healthcare providers unprepared. The epidemiological situation in Serbia in the early 2020. was similar. Medical practitioners did not know how to cope with the pandemic, since there was no

conventional therapy or immunization. The only means of prevention was the protective equipment, which was not always available. The scientific data and the epidemiologist recommendations were essential [1, 2, 3].

However, the COVID-19 pandemic had a great impact on all spheres of healthcare, one of which was dental practice. Many studies worldwide showed that dentists were one of the most affected categories, due to their line of work. Dental medicine doctors are at the first line of health risk since they work face to face with every patient. The purpose of this study was to collect data in order to help dentists to cope better with future epidemiological risks [4, 5, 6].

A highly contagious severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), is easily transmitted during dental procedures that commonly generate blood and saliva aerosols that could lead to the infection. The instruments such as turbine and cavitron generate aerosols, the mist formed of micro droplets of saliva and/or blood that float in the air creating a potentially contagious environment [7, 8, 9].

Since the infection rates were high and the resources were limited, many dental practitioners had to close their offices temporarily, change protocols, increase protection and change prices. All of that influenced the dentists from the socio-economic, professional and psychological point of view. Likewise, the studies conducted worldwide showed a range of consequences in dentistry that included lockdowns, limited access to dental services, changes in prices, working hours and availability of the personal protective equipment, increased anxiety levels, changes in dental protocols and personnel's fear of contracting the disease at work [7, 8, 9]. Many dental offices in our country reported significant changes in the number of patients per month before and during the pandemic. They caused changes in income, working hours and standard treatments. The Ministry of Health and the Serbian Dental Chamber gave recommendations on how to change protocols, increase the protection of patients and dental practitioners, and how to organize work in dental practice in a safe manner.

Since they were not mandatory, the question is how many dental practitioners followed these instructions. With the availability of vaccine and the strong anti-vaccine propaganda on the other side, one of the questions is what percentage of dental practitioners was immunized. Dental tourism is a significant source of patients for many dental offices, so one of the questions is if the dentists asked foreign citizens for a valid pandemic-related documentation.

The aim of this prospective observational survey study was to evaluate the impact of the COVID-19 pandemic on the dental practices in Serbia, as well as the challenges and consequences faced by dentists since the beginning of the pandemic, via an anonymous questionnaire.

## METHODS

The structured anonymous questionnaire was distributed to the members of the Serbian Dental Chamber via the e-mail database. The multi-layered questionnaire was divided into 4 sections: 1. Demographic, 2. Dental office professional experience, 3. Epidemiological professional experience, 4. Personal pandemic experience. The questionnaire was created and filled in anonymously via Google services. All the data was sorted in an Excel base, and then the SPSS statistical program was used for further data analysis. The data was statistically analyzed and the variables were cross-referenced. The questionnaire was oriented towards the Serbian private and public dental healthcare sector with a specific regional centre orientation: Belgrade, Novi Sad, Niš, Kragujevac (as major cities), Belgrade region, Central Serbia, Vojvodina, Southern Serbia, Eastern Serbia, Western Serbia, Kosovo and Metohija. In consideration to the level of education and the field of dentistry, there were General dentists, Specialists, PhD/Magister, Primarius, Oral surgery, Prosthetics, Orthodontics, Conservative dentistry, Parodontology, Pediatric dentistry.

The study was approved by the Ethical committee of the School of Dental Medicine, University of Belgrade, no. 36/29.

## RESULTS

The demographic data gave us an insight into the participant structure: a total of 459 members of the Serbian Dental Chamber answered the questions anonymously. The participant gender distribution was 34.4% men and 65.6% women, whose age range was 26 to 81 years with the highest frequency among the dentists 39-40 years old. A majority of the participants were general dentists 70.7%, the other 29.3% were distributed among different specialisations. A majority of them were without any post-graduate levels, 60.8%, specialists 29.8%, PhD 8.3%, Primarius 1.1%. The private sector employees participated with 74.3%, while there were 25.7% from the public sector (Tables 1 and 2.).

The part of the questionnaire titled "Professional experience in dental practice" gave us an insight into the modified approach to a patient in the pandemic circumstances: a majority (84.9%) of all the participants triaged their patients during the first visit and 73.3% had a questionnaire about the pandemic, 65.1% asked if their patients were immunized, and only 8.8% asked for the immunization certificate. Most of them (72%) asked if their patients had travelled to high-risk regions, and 76.8% of the dentists inquired if they had had risky contacts recently. More than a half of the participants (52.1%) measured the patients' temperature before the treatment, 88.8% asked if their patients had flu-like symptoms, and 91.2% postponed the intervention if their patients had any flu-like symptoms. Only 10.1% asked for a valid negative Covid test and 1.5% refused to treat non-immunized patients.

In the personal history anamnesis, 79.8% of the dentists asked if their patients had previously had Covid infection, and 55.1% of dentists stated that their patients had had post-Covid consequences. They emphasized cardiologic issues as dominant consequences in 39.2%,

fatigue was present in 27.8%, multi-system consequences were dominant for 21.9%, and respiratory illnesses in 11%.

Nearly 1/3 of the dental offices in Serbia that participated in this query 31.3% had attended to foreign citizens 84.4% of dentists asked for green certificate or negative test.

The part of the questionnaire referring to “Professional epidemiological experience” gave us an insight into the pandemic influence on dental offices’ business, modified protocols and risk assessment.

According to the participants, an average number of monthly patients in a dental office before the pandemic was 50-100. During the pandemic, this number decreased to an average of less than 50 patients per month. Also, during the pandemic, 64.6% dentists had to close their dental offices temporarily, and 51.9% shortened their working hours. Majority 89.7% of the participants noticed a decrease in the patients’ visits’ frequency, and 81.6% said the pandemic had decreased their amount of work. The prices didn’t change in 67.9% of dental offices. When asked if they had felt safe while working in dental offices, 50.9% of the dentists stated that they had felt endangered at their workplace, and 68.6% were afraid of exposing their families to infection. In general, 77.7% reported that the patients had asked them more for dental advices by phone. When asked about the following of the updates on the epidemiological situation data, 65.3% of the dentists reported that they had followed new scientific information of the pandemic regularly, 26.4% followed them from time to time and 8.4% did not follow them at all.

As far as the risk at the workplace is concerned, 64.6% of the participants evaluated their dental office as high-risk. Over 96.5% increased their level of personal protection. The protective equipment included mask (99.3%), gloves (98.9%), and visor (85.1%), as indispensable, while protective goggles (58%) and disposable paper suits (48.1%) were less in

use. A majority of the participants used epidemiological masks KN95 (73.2%), followed by surgical masks (42.7%), cotton masks (7.5%), while 21.9% combined two masks at once.

The recommendations of the Ministry of Health and the Serbian Dental Chamber were followed by 83.2% of the dentists. A majority (66.2%) of the dentists stated that they had avoided the use of the instruments that generate aerosols, such as turbine and cavitron, and 38.2% said they had rinsed the patients' mouths with hydrogen peroxide and povidone-iodine solution in order to prevent the infection spreading. However, 97.1% disinfected the workplace between the patients, 85.5% changed the protocols in their offices, 89% had longer intervals between the patients, 90.1% received the patients by the level of urgency, and 60.1% tried to do the treatments in fewer sessions.

#### Personal experience during the pandemic:

The dentists in Serbia got immunized against COVID-19 in 76.4% of the cases (which leaves 23.6% of non-immunized dentists). A majority of them (67.6%) have received 3 doses so far, and 28.8% have received only 2 doses, the 4<sup>th</sup> dose has been received only by 2.9%. When it comes to the most applied vaccine among the participants, Pfizer with 46.6% and Sinopharm with 33.5% of the recipients were the brands that instilled most confidence among the dentists. On the other hand, Sputnik (7.2%), Astra Zeneca (1.1%), and Moderna (0.4%) were not so popular among the dentists. The combination of two or more vaccines was received by 10.8% of the dentists (Table 3).

The data on the immunization was cross-referenced with the major cities and regions in Serbia and with the education level. We concluded that the dentists in Belgrade, with 77.8%, and in the major cities Novi Sad, with 73.7%, and Kragujevac, with 81.8%, were the most immunized, however Niš is one of the major cities with slightly lower immunization rate (66.7%). When it comes to the regional distribution, wide Belgrade region and Vojvodina had

the highest immunization rates, 72.7% and 86.9%, respectively, while Kosovo and Metohija region was among the least immunized parts of the country with 33.3%. In relation to the post-graduate level, the immunization was mostly conducted among the dentists with a higher level of education, PhD and specialists were immunized in the percentage of 84.2% and 82.4%, respectively. However, 80% of primarius doctors were immunized, while general dentists were slightly less immunized (72.3%). (Table 4, Figure 1)

When it comes to the Covid testing, 82.9% of the dentists were tested, of which 21.8% were tested only once, 27.7% twice and 22.8% thrice. Only 4.3% were tested 10 times. However, when it comes to the contraction of the disease, 68.6% of dentists had Covid infection, of which 67.7% were infected only once, 24.9% twice and only 6.7% were Covid positive three times (Tables 5 and 6).

As far as the clinical picture is concerned, a majority (50.9%) reported mild symptoms, while 42.5% had moderate, and 6.6% had severe symptoms. Post-Covid consequences were present in 26.4%, of which 44.3% had mild, 47.4% had moderate, and 8.2% had severe consequences. Inquired dentists state that post-Covid consequences like fatigue 28.3% had been one of the dominant manifestations, 29.3% had cardiologic, 12% respiratory, and 30.4% had multi-system issues (Table 6).

Finally, when asked about the professional risk level, the participants estimated the health risk in dentistry as: high (41.9%), moderate (32.1%), and low (26%).

## DISCUSSION

The global COVID-19 pandemic influenced all spheres of healthcare [10]. To what extent it had affected dentists and their practice in Serbia was a logical question that needed to be answered, in order to help the professionals to better face the future epidemiological threats.



In order to help the professionals face the future similar situations and draw conclusions from this pandemic, we designed this prospective consultative study based on the anonymous structured questionnaire. The response of the dentists was satisfactory, women were more involved in this study since they made nearly 2/3 of the participants (65.6%). The age of the participants varied from 26 to 81 with the major frequency between 39-40 years old. This means that a wide span of dentists were interested in this topic and that professionally most active individuals were among the ones that engaged the most in this study. A majority of the participants belong to private sector general dentists, so we assume that, as a majority of dentists in Serbia work in private sector, a majority of them are general dentists, however they were most exposed to the pandemic and had to modify protocols on their own based on their business strategy. They were the ones who felt the influence of the pandemic in all of the aspects. Some of them had to temporarily close their dental offices or at least to shorten their working hours. That is just one of the reasons that affected their socio-economical aspects. A majority of them noticed a decrease in the patients' visits, the amount of work and the average number of patients per month, however many of them did not change prices. Many of them made longer intervals between the patients, so they could not treat as many patients daily as usual. The result of taking all this into account was a lower income of the private dental sector. Nevertheless, their expenses increased, having in mind the increase of prices of the dental materials, protective equipment and sanitary materials.

The pandemic found many professionals all over the world unprepared, nevertheless a majority of the dentists in our country were resourceful [11]. They triaged the patients, had a questionnaire about the pandemic, asked if their patients had been immunized, they often asked for the immunization certificate and some of them even refused to treat non-immunized patients. Nearly a half of the dentists measured the patients' temperature, asked if they had flu-like symptoms and postponed the intervention if they had. Some asked for negative COVID

test. This suggests that a significant percentage of the dentists took all the precautions to work in a Covid-free environment, to protect their patients and themselves.

Some of the questions asked by the dentists regarded the patients' health at the time. More than a half of the dentists stated that their patients had had post-COVID consequences. A majority of them listed cardiovascular problems, fatigue, multi-system consequences, respiratory issues. This was of great importance because the dentists had to modify the therapy and the treatment in order not to compromise the patients' already impaired health [12].

The dentists mostly followed the instructions of the Ministry of Health and the Serbian Dental Chamber. They scheduled the patients with longer intervals between them, received the patients by the level of urgency, and also rinsed the patients' mouths with hydrogen-peroxide and povidone-iodine solution prior to the intervention, in order to lower the probability of generating contagious aerosols; many of them avoided using Cavitron and turbine or other instruments that generate aerosols, and disinfected their workplace between the patients.

Most of the dentists were aware of the threat and they increased the level of personal protection. They stated that they had felt endangered at their workplace and evaluated their offices as high-risk, a majority of them used personal protection equipment such as masks, gloves, and visors, and some of them used protective goggles and disposable paper suits. Most of them used epidemiological KN95 masks, surgical and cotton masks, and some even used a combination of two masks at once. They followed the new scientific data and tried to be informed about the situation at the time. On top of that, they were afraid of exposing their families to the infection. This suggests that dental professionals did most of what was available to protect themselves and the patients, still not knowing entirely in what ways the disease was transmitted. Subsequently, they tried to protect their families by not exposing themselves to the infection by lowering the risk level in the dental offices [12, 13].

Since the immunization is one of the pillars of the modern medicine, one of the main questions was what percentage of dentists in Serbia was immunized. In spite of strong anti-vaccine propaganda, we saw that this percentage was relatively high, but also that it could be much higher: 76.4% immunized, 23.6% non-immunized. By cross-referencing the data, we concluded that the immunized dentists were more committed to the protection of their patients, followed the preventive instructions and made a safer environment for the patients and themselves. A majority of the dentists were immunized with three doses received, nearly one-third received only two doses, and just a small percentage received the fourth dose (Table 3). This indicates that a majority of the dentists were cautious in the beginning of the vaccination in Serbia, many of them contracted infection in the meantime (before or after the vaccination) and did not find it necessary to continue the immunization process. Since the immunity to the infection lasts for a limited period of time, a continuous immunization is necessary and the dentists in Serbia should be encouraged via the positive propaganda towards the vaccination. Pfizer and Sinopharm were the brands that instilled confidence in most participants. Other brands did not arouse that much interest among the dentists. The interest in certain vaccine brands depended also on their availability, so there are dentists who received a combination of two or more vaccines. In addition, the dentists who were most immunized were the ones in the big cities, more prosperous regions and with a higher level of education. This suggests that the dentist in the capital and the major cities were the ones who were more informed of the pandemic risks and the immunization benefits in this particular situation, however the dentists with a higher level of education had an easier access to the scientific information and had a better knowledge of how to protect themselves and their patients.

Most of the dentists in our study were tested for COVID-19 up to three times, however there was a small percentage of those who had been tested up to 10 times. A majority of the dentists who were positive had COVID up to three times, and they stated that their symptoms

had been mild to moderate, and some of them had severe symptoms. However, mild to moderate post-COVID consequences were often reported, and some had severe consequences. Cardiologic consequences were dominant, and multi-system issues, fatigue and respiratory symptoms, were often noted (Tables 5 and 6). This indicates that COVID-19 is a disease which can be professionally limiting, leaving the consequences that can be hardly treated. The pandemic influenced dentists in such way that many of them could not work for some period of time even after the recovery from the disease because of the long-lasting post-COVID consequences. Some dentists have not been fully functional professionally to this day [14].

## CONCLUSION

The COVID-19 pandemic had a large influence on the dental practice in Serbia. Many dentists had to overcome the professional, economic and personal limits. The immunization made all the difference in the dental practice and created a safer environment for dentists and patients.

**Conflict of interest:** None declared.

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**Table 1.** Participant structure

Male	159/34.4%							
Female	300/65.6%							
Total	459/100%							
Age	Range 26–81	Highest frequency 39–40						
Sector	Public 25.7%	Private 74.3%						
Years of practice	< 10 30.4%	> 10 33%	> 20 16.8%	> 30 15.1%	>40 4.6%			
Post- grad. level	None 60.8%	Spec. 29.8%	PhD 8.3%	Prim. 1.1%				
Field of dentistry	General 70.7%	Oral surg. 6.3%	Prosthetics 5.5%	Conservative 7.7%	Orthodont 6.8%	Parodont 1.8%	Maxilla 1.3%	Pediatric 0%

**Table 2.** Regional participant distribution

<b>Regional participant distribution</b>	
Belgrade	37.4%
Novi Sad	8.3%
Niš	5.3%
Kragujevac	2.4%
Belgrade county	2.4%
Vojvodina	13.3%
Western Serbia	7.2%
Eastern Serbia	4.4%
Southern Serbia	7.2%
Central Serbia	10.7%
Kosovo and Metohija	1.3%

**Table 3.** Immunization parameters

<b>Immunization parameters</b>					
Immunized	76.4%				
Non-immunized	23.6%				
Number of doses	1 = 0.3%	2 = 28.8%	3 = 67.6%	4 = 2.9%	5 = 0.3%
Pfizer	46.6%				
Sinopharm	33.5%				
Sputnik	7.2%				
Moderna	0.4%				
Astra Zeneca	1.1%				
Sinovac	0.4%				
Johnson & Johnson	0%				
Combination	10.8%				



**Table 4.** Regional distribution of dental healthcare workers immunization

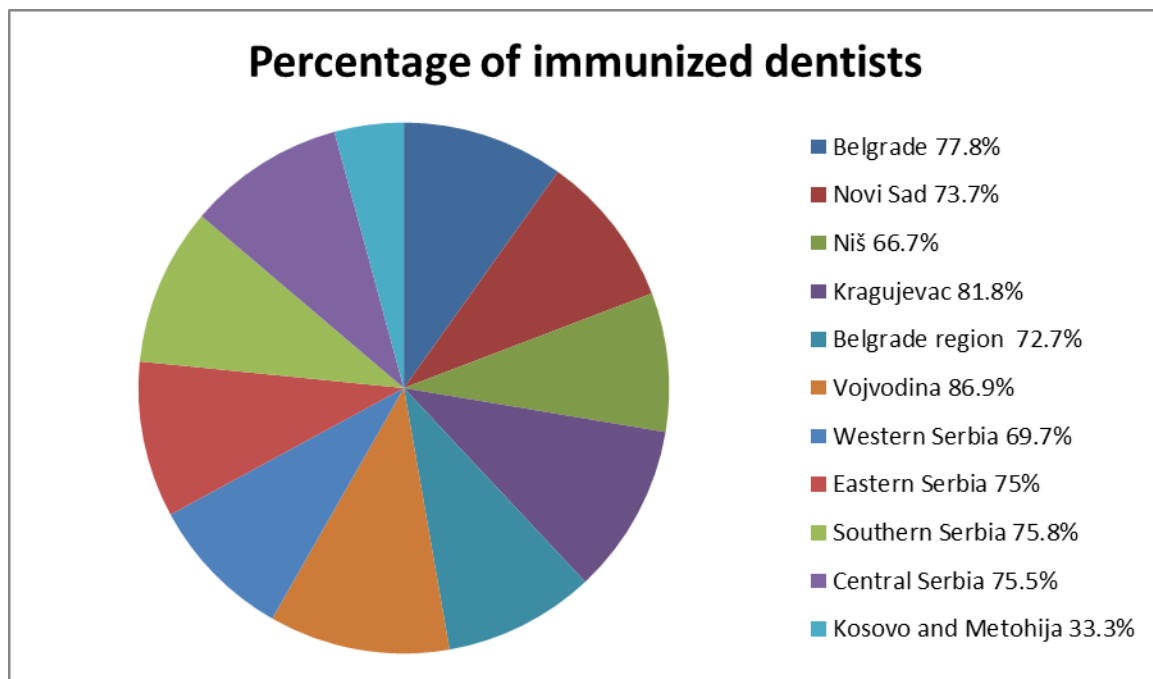
City/region	Percentage of immunized dentists
Belgrade	77.8%
Novi Sad	73.7%
Niš	66.7%
Kragujevac	81.8%
Belgrade region	72.7%
Vojvodina	86.9%
Western Serbia	69.7%
Eastern Serbia	75%
Southern Serbia	75.8%
Central Serbia	75.5%
Kosovo and Metohija	33.3%

**Table 5.** Screening for COVID-19

Screening	
Tested	82.9%
Non-tested	17.1%
Tested 1	21.8%
Tested 2	27.7%
Tested 3	22.8%
Tested 4	6.2%
Tested 5	9.4%
Tested 10	4.3%
Tested > 10	1.6%

**Table 6.** Epidemiological parameters

<b>Epidemiological parameters</b>	
Had COVID	68.6%
Did not have COVID	31.4%
COVID positive once	67.7%
COVID positive twice	24.9%
COVID positive thrice	6.7%
COVID positive four times	0.6%
Mild symptoms	50.9%
Moderate symptoms	42.5%
Severe symptoms	6.6%
Post-COVID consequences	26.4%
No consequences	73.6%
Mild consequences	44.3%
Moderate consequences	47.4%
Severe consequences	8.2%
Fatigue	28.3%
Cardiologic	29.3%
Respiratory	12%
Multi-system	30.4%



**Figure 1.** Percentage of immunized dentists