

The impact of COVID-19 on postgraduate dental students in North Africa

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ABSTRACT

Objective: The aim of this study was to assess the perception and attitude of post-graduate dental students in Tunisia towards the COVID-19 pandemic.

Methods: A cross-sectional study was conducted at the Faculty of Dental Medicine (Monastir-Tunisia) during the period from July 1, 2021 to September 30. All residents (n=191) were included in this survey. Questionnaires were distributed to participants through an online data collection platform (Google forms). They included 26 questions on demographics, psychological well-being, studying and training situation of dental residents during and after the COVID-19 outbreak, and the effects of COVID-19 on senior residents.

Results: A total of 131 postgraduates participated in the study. Over 87% of the respondents felt anxious. Their greatest worries were fear of getting infected, carrying the infection at home, and having COVID-19 affecting their academic future. In addition, 70% of the respondents stated having their academic training affected by the pandemic, 72% had reduced working hours, and 40.5% performed only urgent procedures and medical prescriptions. About 87% of the respondents had no formal training on infection control measures and 68% had no proper personal protective equipment although 85% of them received suspected COVID-19 patients in their clinical practice. As for the new graduates, 86% reported that COVID-19 affected their immediate post-graduation career choices and that their interest in working in public hospitals increased.

Conclusion: COVID-19 has affected dental postgraduates. Dental training programs should therefore be adjusted to ensure optimal training whatever the circumstances.

Key words. Dental education, Online learning, Pandemics, Tunisia.

Introduction

Coronavirus disease 2019 (COVID-19) emerged as an epidemic in Wuhan (China) in December 2019 (1). The virus causing COVID-19 was isolated and it was identified by Chinese researchers as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (2). The symptoms of COVID-19 frequently include sore throat, fever, cough, exhaustion, and dyspnea. The majority of COVID-19 patients have mild or moderate symptoms (3). Yet, up to 5-10% of patients have serious and potentially fatal disorders, and 32% require intensive care. In general, death rates are 3% (3). So far, the US Food and Drug Administration has not approved any medications. So, prevention is the only solution to control the spread of this virus (4).

Due to its higher transmission competence, this virus spread quickly over other Chinese provinces and neighboring East Asian nations and the possibility of a rapid worldwide expansion was foreseen (5). On March 11, 2020, the World Health Organization (WHO) reported that the situation has reached the pandemic stage. In Tunisia, the first case was discovered on March 2, 2020 (6).

According to an assessment of the exposure risk for various categories of healthcare professionals, dental professionals are at high risk for coronavirus infection (7). This is because dental procedures frequently require face-to-face contact with patients and because dental practitioners are exposed to saliva, blood, and other body secretions in a small space (7). Another factor contributing to the elevated risk in dental practice is the possibility of the virus to become aerosolized in bodily secretions, such as the saliva when using high-speed handpieces and ultrasonic equipment (7). Due to these factors, all routine dental appointments including elective surgical operations, students' clinical activities, and postgraduate dental training programs were canceled (8). Therefore, the COVID-19 pandemic might have had an unprecedented impact on postgraduate dental students' education and well-being.

This study aimed to:

- Assess the perception and attitude of postgraduate dental students in Tunisia to/towards the COVID-19 pandemic;
- Evaluate its impact/the impact of the COVID-19 pandemic on their residency training and psychological well-being.

Material and methods

Study design. A cross-sectional study was conducted from July to October 2021 at the Faculty of Dental Medicine of Monastir, Tunisia.

Population. The study population included all postgraduate dental students during 2020 and 2021 (n=191). Postgraduate dental students, also called dental residents, are dentists receiving specialized training. They are those graduating from dental school, awarded a M.D. degree, and are receiving training in a particular specialty, such as pediatrics, oral surgery, orthodontics etc.

Recruitment was conducted through a Facebook platform of different dental groups among the eleven training specialties and the residency training institutions, including Bizerte military hospital, Charles Nicolle university hospital, Dental clinic of Monastir, Farhat Hached university hospital, Fattouma Bourguiba university hospital, Sahloul university hospital, Rabta university hospital, and Tunis military training hospitals (n=2). Postgraduate students were also encouraged to participate in this survey directly via messenger messages and e-mails.

Data collection. A self-administered questionnaire (check annex) was adapted from two studies conducted in Wuhan (9) and Nigeria (Lagos) (10). It was distributed to participants through an online data collection platform (Google forms).

The questionnaire consisted of 26 questions and it was divided into five sections:

- The first one included five questions related to the participants' socio-demographics;
- The second section included five questions investigating the impact of the pandemic on the residents' psychological status;
- The third section consisted of three questions about the attitude toward infection control;
- The fourth section included ten questions assessing the training situation during and after the lockdown;
- The fifth section involved three questions about the effect of COVID-19 on the immediate post-graduation career of senior residents.

Data analysis. Categorical data were expressed as frequency. All the mathematical computations and the statistical procedures were performed using Microsoft excel 2016.

Ethical consideration. This study was a part of a project assessing the impact of COVID-19 on dental education among students and postgraduate students. The research protocol was approved by the Ethical Committee of the Faculty of Dental Medicine of Monastir (approval number 12012022). It was conducted following the Declaration of Helsinki. All the participants were enrolled voluntarily in the study with no direct benefits. They were informed of the anonymous nature of the survey to facilitate data collection. Completion of the questionnaire by each participant was considered as a form of individual consent to contribute to this study.

Results

Of the total number of postgraduate students (191), 131 accepted to take part in the study, accounting for a response rate of 68.5 %. They were from 12 different specialties training and nine different residency training institutions in the country

Table 1 presents the participants' socio-demographic characteristics. Most of them were female (66.4%). Of the total number of respondents, 55.7% were residents practicing at the dental clinic of Monastir.

Table 2 presents the psychological well-being of postgraduate students before, during, and after the lockdown. Its main conclusions were:

- A history of minor psychological disorders was noted in one-fifth of postgraduate students;
- About 88% of postgraduate students felt anxious during and after COVID-19 lockdown in 2020 at different levels;
- The main reasons for anxiety were the worry of carrying the infection at home (71.8%), the fear of getting infected (38.8%), and the worry about studies and the future (38.8%);
- Quarter of postgraduate students (26%) felt more anxious when dental practice was resumed;
- About 7% presented for psychiatric consultation and got medication to deal with their anxiety.

Table 1. General characteristics of the participants

		n	%
Gender	Female	87	66.4
	Male	44	33.6
Residency training program	Prosthodontics	31	23.7
	Endodontics	21	16.0
	Oral surgery	39	29.8
	Orthodontics	16	12.2
	Pediatric dentistry	16	12.2
	Basic sciences	8	6.1
Training institution	Bizerte military hospital	1	0.8
	Charles Nicolle university hospital	3	2.3
	Dental clinic of Monastir	73	55.7
	Farhat Hached university hospital	14	10.7
	Fattouma Bourguiba university hospital	7	5.3
	Sahloul university hospital	18	13.7
	Rabta university hospital	6	4.6
	Tunis military training hospitals (n=2)	9	6.9
Training year	1 st year resident	29	22.1
	2 nd year resident	30	22.9
	3 rd year resident	24	18.3
	4 th year resident	28	21.4
	Graduated in 2020	20	15.3
Accommodation status during the pandemic	Living alone	53	40.5
	Living with roommates	19	14.5
	Living with family members	59	45.0

Table 2. Psychological well-being of postgraduate students

		n	%
Psychological well-being before the pandemic	Psychiatric disorders	26	20.0
	Good well-being	105	80.0
Main reasons of anxiety	Worries about carrying the infection at home	94	71.8
	Worries about the studies and the future	50	38.2
	Fear of getting infected	50	38.2
	Fear of getting quarantined	16	12.2
	Financial pressure	10	7.6
	Other reasons	12	9.2
Anxiety variation after the return to clinical training	Decrease	43	32.8
	Increase	34	26.0
	Stay the same	33	25.2
	Neutral	21	16.0
Psychiatrist consultation/medication consumption during/after the lockdown	Yes	9	7.0
	No	122	93.0

Concerning the attitude of postgraduate students toward infection control, 85% of them confirmed receiving recovering from COVID-19, suspected COVID-19 patients, and patients having close contact with COVID-19 confirmed cases. Moreover, 68% of them declared having no adequate personal protective equipments (PPE) in their institutions. With regard to current infection control measures, 53% reported having a lack of these measures.

Regarding the impact of COVID-19 on postgraduate students' theoretical training, 74.8% of them continued studying during and after the lockdown. The most common studying mode was free online resources (75%), followed by online lessons provided by teachers of the dental school (23%). Among the postgraduate students involved in this study, 12.2% attended paid online resources, 45% continued their research, 6.1% continued hands-on training, and 7.6% discontinued studying (**Figure 1**).

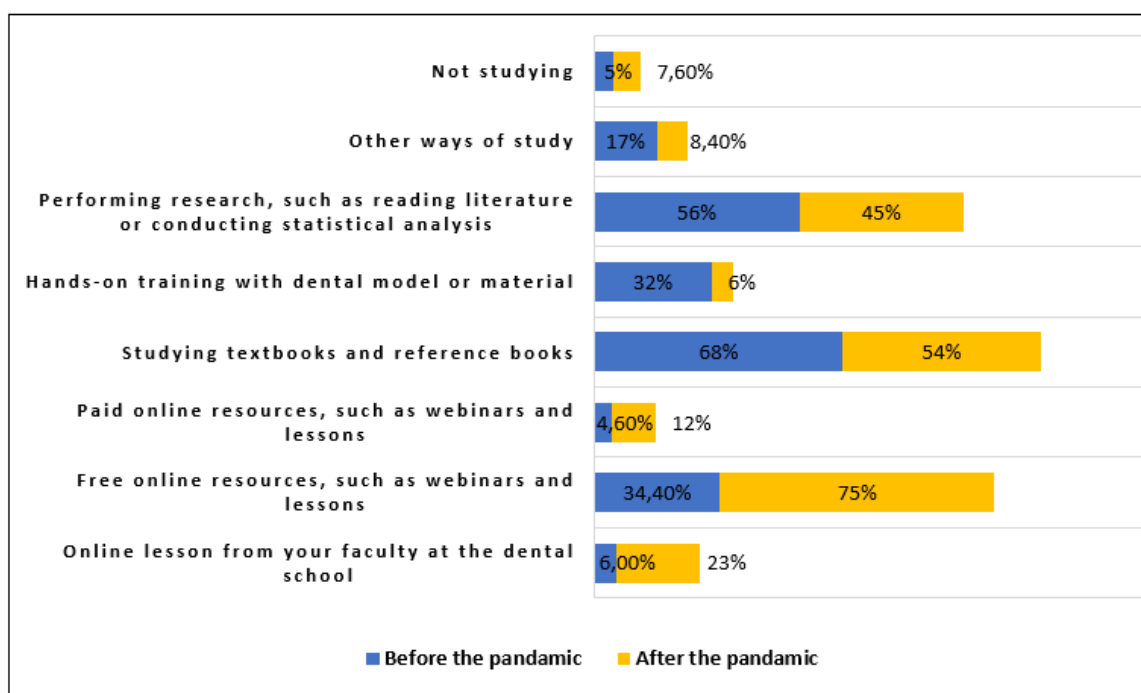


Figure 1. Main way of studying before and after the pandemic

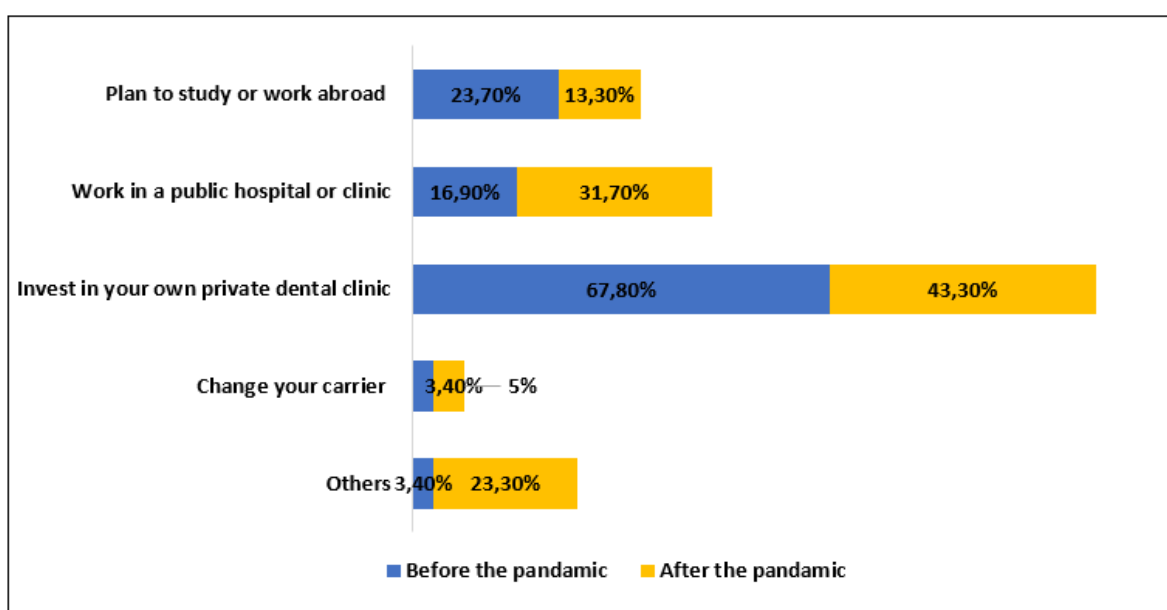
Most postgraduate students (57%) reported that their learning style changed due to COVID-19 such that they would increase the portion of online study in the future even when the pandemic ends. More than 60% of postgraduate students were not satisfied with the current theoretical training in their specialty.

Table 3 summarizes the impact of the COVID-19 pandemic on postgraduate dental practice. The majority of postgraduate dental students (97.7%) reported that their academic training was affected by the COVID-19 pandemic. The working hours were reduced for 72.5% of them. The procedures performed were limited to diagnosis (55%), medical prescription (12.2%), and urgent procedures (37.5%). Only 38.2% of postgraduate students felt an improvement in theoretical knowledge; however, 46.6% reported no change.

Table 3. Working conditions after the lockdown

		n	%
What are the types of procedures you performed after the lockdown?	All specific procedures of the specialty	59	45.0
	Only urgent procedures	49	37.5
	Only diagnosis/medical prescription	161	2.2
	No procedure at all	7	5.3
Has your academic training been affected by the COVID-19 pandemic?	Yes	128	97.7
	No	3	2.3
Were your working hours reduced?	Yes	95	72.5
	No	36	27.5
Has your dental theoretical knowledge changed after the lockdown?	Improved	50	38.2
	Stayed the same	61	46.6
	Worsened	20	15.3
How have your dental didactic skills changed?	Improved	28	21.4
	Stayed the same	82	62.6
	Worsened	21	16.0

As for dental didactic knowledge, postgraduate students reported an improvement after the lockdown (21.4%), no change in their dental clinical skills (62.6%), and worsened clinical skills (16%). Among the respondents, twenty-one students reported a negative impact on their confidence and self-esteem when dealing with patients. With regard to the impact of the COVID-19 pandemic on the 4th year postgraduate students and newly graduated ones, 94% announced that their immediate post-graduation career was affected by the COVID-19 pandemic. More interest in working in public hospitals or clinics was noted compared to investing in private dental offices. Some of them expressed their intention to change their career (**Figure 2**).

**Figure 2: What was your immediate post-graduation career?**

Discussion

The aim of the present study was to investigate the impact of the COVID-19 pandemic on postgraduate dental students in Tunisia. Entirely unexpected changes during the COVID-19 pandemic on the personal and academic level were noted among the included population. Postgraduate students faced daily obstacles regarding their health and long-term worries about their training experience.

Scope of the study.

Since its outbreak in China in 2019, COVID-19 rapidly spread throughout the world, resulting in social, economic, and political changes. The World Health Organization reported at least 200 million cases of infection and over 5.8 million deaths and nearly by mid February 2022. The spread of the infection in Tunisia was slowed down by the strict measures imposed by the national authorities, such as a nationwide lockdown and border closures. Hence, only a very small number of cases and deaths were reported between March and June 2020 (29 cases without deaths and 1087 cases with 49 deaths on March 17, 2020 and June 7, 2020, respectively). However, after the reopening of the borders, the number of COVID-19 cases and deaths dramatically increased, and the country witnessed six COVID-19 waves. This study was conducted at the end of the fourth epidemic wave that peaked on July 7, 2021 with 481.030 cumulative cases and 15.735 COVID-19-related deaths.

COVID-19 has a negative psychological impact on healthcare professionals, particularly dentists, both on the personal and professional levels (11-13). Stress, anxiety, and depression are just some of the side effects associated with COVID-19. Dental students may be affected by this negative impact. Around the world, numerous reports have investigated the impact of the pandemic on undergraduate dental students (14, 15). According to Farrokhi et al. (16), 135 articles related to its impact on students' education were published between 2020 and 2021. However, to the best of the authors' knowledge, only eight papers (9, 10, 17-22) assessing the effects of COVID-19 on postgraduate dental students have been published. None of them was conducted in Tunisia. Thus, this was the first comprehensive study performed in Tunisia, investigating the anxiety levels as well as the theoretical and practical training changes brought to postgraduate dental students during the pandemic. Indeed, conducting such studies among this category of students is important because postgraduate dental programs enable practitioners to deliver high-quality and specialized healthcare.

Discussion of the results

Although multiple invitations and reminders were sent and no time limit to respond to the questionnaire was fixed, the current study involved 131 students, giving a response rate of only 68.5%. It was lower than the response rates reported in similar studies conducted in Wuhan (9), Chongqing (21), Rumania (Cluj-Napoca, Timisoara, and Craiova) (22), and New York (19) with respectively 85%, 97.3%, 92.4%, and 100% response rates. Yet, it is still considerably higher than those reported in some other studies performed in Washington (18), North America (Indianapolis, Ind, Rochester and New York, NY, and Farmington, Conn) (20), and Nigeria (Lagos) (10) with respectively 35.5%, 26.8%, and 33.1% response rates. These discrepancies in results may be explained by the fact that web-based questionnaires are reported to have lower response rates compared to paper-based questionnaires (23).

Female postgraduate students made up 66.4% of the population. The feminization of dentistry has been noticed in previous studies conducted in Monastir (Tunisia) (24) and worldwide (25). Half of them were receiving their training at the Dental Clinic of Monastir. The latter is attached to the faculty of Dental Medicine of Monastir, which is currently the

only institution authorized to train future dentists in Tunisia. Indeed, the Dental Clinic of Monastir is the largest training center dedicated entirely to the practice of dental medicine and the training of both undergraduate and postgraduate students.

During the previous decade, Tunisia faced few epidemics without a significant impact on its healthcare system, economy, agri-food system, and households (26, 27). The 2012 West Nile virus epidemics (26) and the 2013 MERS-COV outbreaks (27) are two examples. However, the COVID-19 pandemic struck at a time when the country was having an economic crisis and political instability, causing the exacerbation of the financial meltdown (28). In this context of a vulnerable healthcare system, Tunisian postgraduate dental students, like all healthcare professionals in the country, found themselves unprepared, both psychologically and logistically, to deal with this fast-expanding contagion (29). This study revealed that more than 80% of the respondents were moderately to severely anxious. Their greatest sources of worry were the risk of contracting COVID-19 at work and carrying the infection to family members since over 45% of them were living with their families at that time. Postgraduate students were also worried about being unable to meet up with their clinical training and to fulfill the requirements for their postgraduate future.

In addition, postgraduate dental students struggled with a high infectious risk in their daily practice during the COVID-19 pandemic (30). They reported having treated COVID-19 patients, COVID-19 suspects, and patients who were in close contact with identified COVID-19 cases without adequate personal protective equipment. The lack of equipment may be explained by the shortage of hygiene supplies and the high cost of adequate personal protective equipment (29), especially for Tunisia which is a low-middle-income country with restricted resources.

Clinical practice was the activity that was most affected by the COVID-19 outbreak. Postgraduate students' elective operations were the first activities to be suspended in teaching hospitals. The results of the current study showed severe restrictions on working hours and on the type of treatments performed. Postponing direct contact with patients is the greatest challenge since it is the key component of the dental curriculum (31). No virtual lessons can replace face-to-face contact with patients. Indeed, dentistry can only be mastered via practice (32). This may be the main reason why newly graduated dentists feared the investment in the private sector.

Scientific events were also affected by the COVID-19 pandemic. Congresses, in person conferences, and meetings were canceled or delayed, which minimized the opportunities for the residents' continuous learning. For these reasons, virtual platforms were developed, making online lectures and teaching sessions possible (33, 34). However, the expectations and objectives of postgraduate students were not fulfilled by the online experience. They expressed dissatisfaction with the current work courses and claimed that the teaching staff did not exert much effort. These outcomes are consistent with similar research findings (34-36). Although technology can be tremendously helpful (37), there is still a learning curve for many preceptors and postgraduate students. The success of e-learning depends on the staff's attitudes and interactive teaching techniques as well as the students' mastery and attitudes toward technology (38).

Another sector affected by this pandemic was dental research due to the obligatory restrictions imposed by the government and the institutions limiting non-essential research activities (39). Laboratory-based dental research projects and postgraduate student research activities were suspended. As a result, some dental researchers turned their attention to electronic and off-campus methodological approaches, such as performing literature reviews and online surveys (39).

Study Limitations

This study has three limitations. The use of a non-standardized questionnaire is a methodological limitation. A validated questionnaire should have been used to measure the level of anxiety in postgraduate students. Although questionnaires are reliable and valuable methods for gathering data, it would have been if anxiety measurement tools were used, such as the Beck Anxiety Index, the Generalized Anxiety Disorder 7-item, and the Depression Anxiety and Stress Scale-21 (11, 16). In addition, English is the third language in Tunisia. Thus, a higher response rate might have been obtained if French and Arabic versions were included (33). Another limitation was the type of experimental design used. The present study was cross-sectional. It would have been worthwhile if the causal associations were studied using a longitudinal design/study (40). Finally, the research was conducted only at the faculty of Dental Medicine of Monastir, which represents another limitation. As a result, the findings may not be generalizable to other postgraduate dental students.

Conclusion

Although the death rate of COVID-19 decreased considerably in 2022 compared to 2020 (8), new variations would continue to appear over the next few years. The endemic conditions may therefore continue to persist. The next step is still very unpredictable. Thus, a comprehensive study on the consequences of the changes caused by COVID-19 on postgraduate students' career progression, mental wellness, and biosafety needs to be conducted, and the dental training program should be adjusted to ensure optimal training whatever the circumstances.

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