

The Effect of COVID-19 on Senior Dental Students Performance in a Pediatric Dentistry Course

Ayman M Sulimany*

Department of Pediatric Dentistry and Orthodontics, College of Dentistry, King Saud University, Riyadh
11545, Saudi Arabia

ABSTRACT

Introduction: Coronavirus Disease 2019 (COVID-19) has had a huge impact on dental education. Dental schools have developed new strategies to confine its transmission. In this study, we aimed to assess the impact of these strategies on senior dental students' performance in a pediatric dentistry course at King Saud University.

Materials and Methods: We reviewed the records of a pediatric clinical course offered to senior students for three different academic years from before, during, and after the COVID-19 outbreak. The outcome measure was students' performance in the form of average grades and number of dental procedures performed. A one-way Analysis of Variance (ANOVA) was performed to assess the differences in students' performance by academic years. The analysis was also stratified by gender to assess whether the outcome variables differ by gender.

Results: The number of dental procedures performed decreased significantly between the academic year before the COVID-19 outbreak and the academic year after the outbreak (p -value <0.0001). There was a statistically significant reduction in the students' average grades across the academic years (p -value <0.0001). Stratification analysis by gender showed that a significant reduction in grades was only noticed among female students ($p <0.0001$).

Conclusion: The COVID-19 outbreak has caused significant changes in teaching methods, especially for dental students. Our study demonstrates that academic performance was significantly affected by the newly adopted strategies. Our findings highlight the need to develop better teaching modalities that ensure students' preparedness for their future careers while maintaining their safety from infection.

Key words: Academic performance, COVID-19, Coronavirus, Dentistry, Students grades

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Corresponding author: Ayman M Sulimany
e-mail ✉: asulimany@KSU.EDU.SA
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INTRODUCTION

Coronaviruses comprise a group of viruses that infect the human respiratory system. Their effects might range from mild symptoms to respiratory failure [1]. The term "coronavirus" is based on the microscopic features of the virus, which has a unique characteristic of a pointed crown-like structure on the surface [2]. To date, seven coronaviruses have been recognized as causing infections among humans. Severe acute respiratory syndrome coronavirus type (SARS-CoV2) is the latest addition to the list [3].

In December 2019, a novel coronavirus was first recognized in China in a group of patients suffering from severe respiratory symptoms from an unidentified source [1]. At the beginning of 2020, the World Health Organization (WHO) stated the discovery of this new coronavirus and named it 2019-nCoV, which had never been recognized in humans before. The name 2019-nCoV

did not last long and was officially changed to severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) after a very short period. In February 2020, the name coronavirus disease 2019 (COVID-19) was officially given to the respiratory illness originating from this novel coronavirus [4].

The COVID-19 pandemic disturbed the normal way of life around the world. Legal authorities in all countries worked on developing strategies aimed at confining transmission. This viral infection has had huge impacts on the health sector, economy, media, and education [5]. Almost every nation stopped in-class attendance and exams for students. Schools were closed, and traditional classes were substituted with virtual classrooms [5,6]. Like others, dental schools also followed governmental actions, considering that dental personals are considered one of the highest-risk groups for contagion due to the nature of their work. They are highly exposed to blood, saliva, and aerosol from routine dental work [7]. SARS-CoV-2 transmission can easily occur in dental clinics through inhalation of the aerosol generated during a routine examination or dental procedures, as well as direct

contact with blood, saliva, and contaminated surfaces [8-10].

In Saudi Arabia, dental schools were closed during the last few weeks of the 2019-2020 academic year due to a curfew, and all lectures and exams were conducted electronically through distance learning during that period. By the beginning of the 2020-2021 academic year, dental schools were opened again, but there were new strategies, such as providing education through distance learning in form of online lectures and seminars and decreasing the numbers of dental appointments per day, thus reducing the numbers of clinical sessions available for dental students. However, no study has been done to assess the effects of these changes on students' education and performance. Therefore, the aim of this study was to assess the impact of the newly adopted strategies to minimize the spread of COVID-19 on students' education and performance. To achieve this goal, we analyzed senior students' performance at King Saud University in their final pediatric dentistry course during three different academic years from before, during, and after the COVID-19 outbreak.

MATERIAL AND METHODS

Study design

A chart review analysis was performed to measure the effects of the newly adopted strategies to minimize the spread of COVID-19 on students' education and performance. The investigation was conducted in accordance with the Declaration of Helsinki, and approval was obtained from the Institutional Review Board (IRB) at King Saud University.

Data source

We reviewed the records of the pediatric clinical course offered to senior students at King Saud University for three different academic years from before, during, and after the COVID-19 outbreak. All dental students who registered for the course were included in the study. Students who dropped out of the course were excluded. We collected data on students' performance, number of clinical sessions available for each student over the academic year, number of procedures performed, average grades, and students' gender.

Statistical analysis

Data were analyzed using SAS software. Descriptive statistics (frequencies and percentages) are reported for all categorical variables. Quantitative analyses were conducted to determine the means, proportions, and rates of continuous variables before, during, and after the COVID-19 outbreak. A one-way Analysis of Variance (ANOVA) was performed to assess the differences in students' performance by academic years. The analyses were also stratified by gender to evaluate whether the outcome variables differ by gender. All tests were considered significant only if the p-value was less than 0.05.

RESULTS

Table 1 represents the class characteristics by academic year. There were no statistically significant differences between the number of students and gender distribution between the academic years. However, there was a substantial reduction in the number of clinical training sessions across the years.

Table 1: Class characteristics by academic years.

Gender, n (%)	Before COVID-19 Outbreak (2018-2019)	During COVID-19 Outbreak (2019-2020)	After COVID-19 Outbreak (2020-2021)	P value
Male	75 (58.1)	71 (55.9)	72 (56.3)	0.93
Female	54 (41.9)	56 (44.1)	56 (43.7)	
Total	129 (100)	127 (100)	128 (100)	
Number of clinical sessions	27	20	13	<0.0001

The clinical performance of students in the course was assessed by counting the average number of dental procedures performed by the students in each academic year. There was a significant reduction in the number of dental procedures performed between the academic year of 2018-2019 (before the outbreak) and the academic year of 2020-2021 (after the outbreak) (p-value <0.0001). Figure 1 illustrates the total number of dental

procedures broken down by type of procedure in each academic year. There was a significant reduction in all types of dental procedures performed by students from the academic year of 2018-2019 (before the outbreak) to the academic year of 2020-2021 (after the outbreak) except for the numbers of space maintainers and recall procedures.

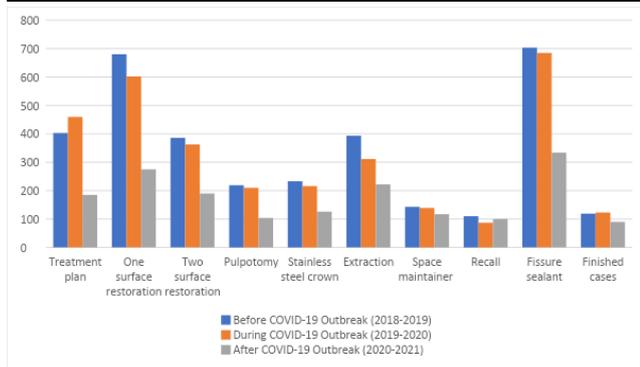


Figure 1: Total number of dental procedures by academic years.

Table 2: Students' average grades by academic years.

Academic Year	Student's Average Grades	P value
Before COVID-19 Outbreak (2018-2019)	93.03	<0.0001
During COVID-19 Outbreak (2019-2020)	89.47	
After COVID-19 Outbreak (2020-2021)	89.09	

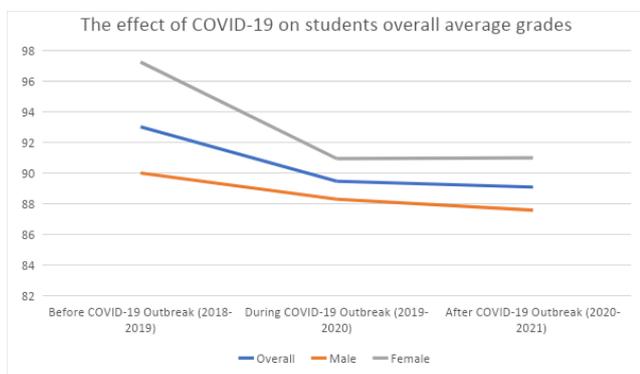


Figure 2: Students' average grades across academic years stratified by gender.

DISCUSSION

The COVID-19 pandemic has profoundly affected the whole world, slowed down the global economy, disrupted businesses, and changed day-to-day life. It has negatively affected people in many aspects, including psychologically, physically, economically, and educationally [11]. The COVID-19 pandemic has also had great impacts on education, resulting in the closures of schools and universities all over the world. Globally, over 1.5 billion students and youths have been out of schools and universities [12]. The closures of schools and universities have resulted in shifts in classroom teaching to distance learning through digital platforms. Dental education has been one of the most affected areas due to the forced suspension of clinical practice, which has affected students' clinical training. The dental school of King Saud University, had to close its clinic and classrooms at the end of the 2019-2020 academic year due to the curfew. Accordingly, the last seven clinical sessions were canceled, and online lectures and exams were provided to students during that period. By the beginning of the 2020-2021 academic year, the school reopened again, but with precautions. The online lectures continued in the same way as during the curfew

Table 2 illustrates the effect of the new strategies employed to minimize the spread of COVID-19 on students' average grades by academic year.

There was a statistically significant difference between average grades across the academic years.

However, when we stratified the analysis by gender, a significant grade reduction was noticed among female students only (p <0.0001) (Figure 2).

period. However, students had to physically attend the exams. Regarding the clinical training, the clinic opened to students at half of its capacity. This led to a decrease in the number of clinical training sessions available to dental students by half compared to the year before the outbreak.

Our data showed that the new strategies had a significant effect on the average grades, which were significantly reduced compared to the period before the outbreak. Our findings are consistent with those of Oducado et al., who found that the academic performance of undergraduate nursing students was significantly affected by COVID-19 [13]. Several studies show that the new learning strategies implemented, including distance learning, less clinical training, and online exams, have been negatively perceived by dental students [14-16]. One study investigated the impact of the COVID-19 pandemic on dental education and practice expectations among dental students at the University of Jordan. The study found that more than half of the students were less interested in distance learning and believed that online assessment is not an ideal method for evaluation [14]. Moreover, 87% of the students found that their clinical training was negatively affected [14]. Similarly, Amir et al. found that only 44% of undergraduate dental students at the Faculty of Dentistry of Universitas Indonesia preferred distance learning during the COVID-19 pandemic [16]. Our results showed a significant reduction in grades among female students during the pandemic. This might have been related to higher stress levels occurring among females than males during the COVID-19 pandemic. Several studies found that stress levels are negatively associated with students' academic performance [17-19]. Moreover, studies from the Middle East and North Africa (MENA), China, and Italy revealed that females were more vulnerable to stress and anxiety than males during the pandemic [20-22].

Our results showed that the number of dental procedures performed by the students was significantly reduced. This was expected as the number of clinical training

sessions available for each student was reduced. Accordingly, this might negatively impact students' competence level in performing some procedures in the future. In support of this, it has been found that senior dental students feel that clinical exposure is the most important factor affecting their preparedness for future jobs [23].

The main limitation of this study is that it was conducted on one undergraduate course in one university. Therefore, the results may not be generalized to other courses in dentistry or other dental schools. Despite this limitation, our findings highlight the urgent need to conduct such studies, which could provide an overview of the impact of the newly adopted strategies to minimize the spread of COVID-19 on dental students' performance and preparedness for their future careers.

CONCLUSION

The COVID-19 outbreak has caused significant changes in teaching methods, especially for dental students. Our study demonstrates that the academic performance of senior dental students was significantly affected by the newly adopted strategies. These changes had a greater impact on female students than males. Our findings highlight the need to develop better teaching modalities that ensure students' preparedness for their future careers while maintaining their safety from infection.

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