



Change in hospital admissions in dental diseases before and during the COVID-19 pandemic

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Abstract

In this retrospective cross-sectional study, it was aimed to evaluate the negative effects of the pandemic process in the field of oral health by revealing the characteristics of applications made to a hospital related to oral health before and during the pandemic. Patient records who applied to Cyprus Science University Dentistry Hospital between October 2019 and March 2021 were included in the study. Gender, age, applied unit, applying frequency and procedure records were evaluated. Ethical approval was taken from Cyprus Science University. Patient records were divided into two groups as before pandemic ($n=338$) and during pandemic ($n=1517$). Results of the study showed that gender, age and applied unit distributions were not significantly different between before and during pandemic ($p>0.05$). Female and prosthesis applied patients were more common before and after COVID-19 pandemic. Detertrage, tooth extraction, night plaque, temporary crown, metal supported porcelain crown on implant, compomer filler and orthodontic diagnosis rates were decreased during pandemic, compared to before pandemic. Panoramic X-ray was the most common process before and during the pandemic. The differences between before and during pandemic were statistically significant ($p<0.05$). The results of the research show that the pandemic process in terms of oral health caused significant differences in the reasons for application, even in the population aged 34–36, the majority of whom are women.

Keywords Pandemic · COVID-19 · Dental diseases · Hospital admission

Introduction

Although oral health remains secondary in the struggle against the pandemic, it is an important issue that affects the daily life and quality of life of individuals. Issues including acute pain in oral health constitute medical conditions that require acute intervention (Yang et al. 2016; Timmerman and Parashos 2020; Kumarswamy 2016). On the other hand, complaints such as cosmetic reasons and bad breath are considered as elective medical processes that do not require acute intervention (Heaton et al. 2017; Alsumait et al. 2019; Hadler-Olsen and Jönsson 2021).

Changes in elective health services during the pandemic process have been the subject of many studies. Studies in this area show that at the beginning of the pandemic process, elective health services almost came to a standstill; however,

with the gains made in the fight against the pandemic over time, elective procedures are increasingly being performed. As the level of knowledge against COVID-19 contamination increases during the pandemic process, more active performance is demonstrated with fewer units in the fight against the disease (Assadian et al. 2021; Kulle et al. 2021; Chen and Ray 2021; Mallah et al. 2021; Kaye et al. 2020). In this way, other elective health services are also provided (Abu-Rumman 2021; Abu-Rumman et al. 2021; Matsuyama et al. 2021).

In this study, it was aimed to reveal the negative effects of the pandemic process in the field of oral health by revealing the characteristics of applications made to a hospital related to oral health before and during the pandemic (Brian and Weintraub 2020).

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Methods

Patient records who applied to Cyprus Science University Dentistry Hospital between October 2019 and March 2021 were included in the study. Gender, age, applied unit, applying frequency and procedure records were evaluated. Ethical approval was taken from Cyprus Science University.

Patient records were divided into two groups as before pandemic ($n = 338$) and during pandemic ($n = 1517$). In addition to before and during groups, patient records were also evaluated based on their application year. Applied units were classified as pedodontics, surgery, radiology, prosthesis, restorative and endodontology, periodontology, and orthodontics.

Statistical methods

Nominal and ordinal data were presented by frequencies, whereas scale parameters were presented by means and standard deviations. Kolmogorov–Smirnov Test was used for normality distribution of scale parameters. Since age and frequency parameter distributions were non-normal (Alhayani and Abdallah 2020; Alhayani and Ilhan 2021; Alhayani et al. 2021), Kruskal–Wallis and Mann–Whitney U tests were used for difference analysis. SPSS 17.0 for windows program was used for statistical analysis at 95% confidence interval with 0.05 significance level (Al-Hayani and Ilhan 2020; Kwekha-Rashid et al. 2021; Hasan and Alhayani 2021; Yahya et al. 2021).

Table 1 Gender, age and unit distribution of patients according to year

	2019/3 ($n = 338$)	2020 ($n = 1037$)	2021/3 ($n = 480$)	p
Gender, n (%)				
Female	187 (55.3)	565 (54.5)	273 (56.9)	0.684 ^a
Male	151 (44.7)	472 (45.5)	207 (43.1)	
Age, mean \pm SD	35.15 \pm 18.04	34.63 \pm 17.42	36.05 \pm 18.38	0.360 ^b
Unit, n (%)				
Pedodontics	49 (14.5)	134 (12.9)	57 (11.9)	
Surgery	45 (13.3)	147 (14.2)	70 (14.6)	
Radiology	55 (16.3)	179 (17.3)	79 (16.5)	0.381 ^a
Prosthesis	79 (23.4)	271 (26.1)	111 (23.1)	
Restorative and endodontology	39 (11.5)	114 (11.0)	75 (15.6)	
Periodontology	30 (8.9)	103 (9.9)	45 (9.4)	
Orthodontics	41 (12.1)	89 (8.6)	43 (9.0)	

SD standard deviation

^a χ^2 Test

^bKruskal–Wallis test

Bold values represent $p < 0.05$

Results

Gender, age and applied unit distributions were not significantly different between 2019, 2020 and 2021 ($p > 0.05$). Female and prosthesis applied patients were more common in 2019, 2020 and 2021 (Table 1).

Similar to year differences, female and prosthesis applied patients were more common before and after COVID-19 pandemic. Gender, age and applied unit distributions were

Table 2 Gender, age and unit distribution of patients before and during pandemic

	Before COVID-19	During COVID-19	p
Gender, n (%)			
Female	187 (55.3)	838 (55.2)	0.513 ^a
Male	151 (44.7)	679 (44.8)	
Age, mean \pm SD	35.15 \pm 18.04	35.08 \pm 17.74	0.881 ^b
Unit, n (%)			
Pedodontics	49 (14.5)	191 (12.6)	
Surgery	45 (13.3)	217 (14.3)	
Radiology	55 (16.3)	258 (17.0)	0.504 ^c
Prosthesis	79 (23.4)	382 (25.2)	
Restorative and endodontology	39 (11.5)	189 (12.5)	
Periodontology	30 (8.9)	148 (9.8)	
Orthodontics	41 (12.1)	132 (8.7)	

SD standard deviation

^aFischer's exact test

^bMann–Whitney U test

^c χ^2 test

Bold values represent $p < 0.05$

not significantly different between before and during pandemic ($p > 0.05$, Table 2).

Difference analysis results showed that operation and procedure differences were significant between 2019, 2020 and 2021 ($p < 0.05$). Panoramic X-ray was the most common procedure for 2019, 2020 and 2021. Fluoride application was common in 2020 and 2021, whereas not recorded in 2019. Compomer filler was common in 2019, and replaced by implant surgery in 2020 and 2021 (Table 3).

Detertrage, tooth extraction, night plaque, temporary cron, metal supported porcelain crown on implant, compomer filler and orthodontic diagnosis rates were decreased during pandemic, compared to before pandemic. Panaromic X-ray was the most common process before and during the pandemic. The differences between before and during pandemic were statistically significant ($p < 0.05$, Table 4).

Prosthesis, restorative and endodology, and periodontology were less applied units during pandemic, compared before pandemic (Fig. 1).

Discussion

In terms of oral health, it is not possible to state that there is a significant difference between men and women according to gender. However, it can be stated that there may be differences between the samples in men and women due to the working environment, cosmetic reasons, vitamin D structure in the body and similar reasons. In other words, it is possible to state that the effect or difference of gender in oral health may occur within the framework of the research subject and sample (Alsumait et al. 2019; Silva et al. 2016; Soldani et al. 2018; Tynan et al. 2020).

Table 3 Operation type distributions and difference analysis results according to year

	2019/3 ($n = 338$)	2020 ($n = 1037$)	2021/3 ($n = 480$)	p
Amputation			24 (5.0)	0.000 ^a
Angle anomaly		39 (3.8)		
Glass ionomer filler		31 (3.0)		
Detertrage	30 (8.9)	23 (2.2)	40 (8.3)	
Devital bleaching		6 (0.6)	17 (3.5)	
Tooth extraction	45 (13.3)	33 (3.2)		
Fluoride application		112 (10.8)	57 (11.9)	
Frenectomy			10 (2.1)	
Full metal cron	24 (7.1)	103 (9.9)	33 (6.9)	
Night plaque	4 (1.2)	13 (1.3)	3 (0.6)	
Temporary cron	2 (0.6)	4 (0.4)	3 (0.6)	
Gingivectomy		21 (2.0)		
Embedded tooth extraction		70 (6.8)		
Implant surgery			55 (11.5)	
Metal supported porcelain crown on implant	29 (8.6)			
Metal supported porcelain crown on implant simante	5 (1.5)	11 (1.1)		
Skeleton part prosthesis	2 (0.6)	46 (4.4)	29 (6.0)	
Canal filling	5 (1.5)	34 (3.3)		
Complicated dental surgery		44 (4.2)	5 (1.0)	
Compomer filler	49 (14.5)	24 (2.3)		
Composite filler	34 (10.1)			
Root canal treatment renewal		42 (4.1)		
Crown bridge removal	10 (3.0)	8 (0.8)	1 (0.2)	
Cap (kuafaj)			34 (7.1)	
Orthodontic diagnosis	41 (12.1)	46 (4.4)	43 (9.0)	
Panoramic X-ray	55 (16.3)	177 (17.1)	79 (16.5)	
Subgingival curettage		59 (5.7)	5 (1.0)	
Basic metal weight porcelain crown		10 (1.0)	4 (0.8)	
Total prosthesis	3 (0.9)	29 (2.8)	15 (3.1)	
Zirconium		52 (5.0)	23 (4.8)	

^a χ^2 Likelihood ratio

Bold values represent $p < 0.05$

Table 4 Operation type distributions and difference analysis results before and during pandemic

	Before COVID-19	During COVID-19	<i>p</i>
Amputation		24 (1.6)	0.000 ^a
Angle anomaly		39 (2.6)	
Glass ionomer filler		31 (2.0)	
Detertrage	30 (8.9)	63 (4.2)	
Devital bleaching		23 (1.5)	
Tooth extraction	45 (13.3)	33 (2.2)	
Fluoride application		169 (11.1)	
Frenectomy		10 (0.7)	
Full metal cron	24 (7.1)	136 (9.0)	
Night plaque	4 (1.2)	16 (1.1)	
Temporary cron	2 (0.6)	7 (0.5)	
Gingivectomy		21 (1.4)	
Embedded tooth extraction		70 (4.6)	
Implant surgery		55 (3.6)	
Metal supported porcelain crown on implant	29 (8.6)		
Metal supported porcelain crown on implant simante	5 (1.5)	11 (0.7)	
Skeleton part prosthesis	2 (0.6)	75 (4.9)	
Canal filling	5 (1.5)	34 (2.2)	
Complicated dental surgery		49 (3.2)	
Compomer filler	49 (14.5)	24 (1.6)	
Composite filler	34 (10.1)		
Root canal treatment renewal		42 (2.8)	
Crown bridge removal	10 (3.0)	9 (0.6)	
Cap (kuafaj)		34 (2.2)	
Orthodontic diagnosis	41 (12.1)	89 (5.9)	
Panoramic X-ray	55 (16.3)	256 (16.9)	
Subgingival curettage		64 (4.2)	
Basic metal weight porcelain crown		14 (0.9)	
Total prosthesis	3 (0.9)	44 (2.9)	
Zirconium		75 (4.9)	

^a χ^2 Likelihood ratio

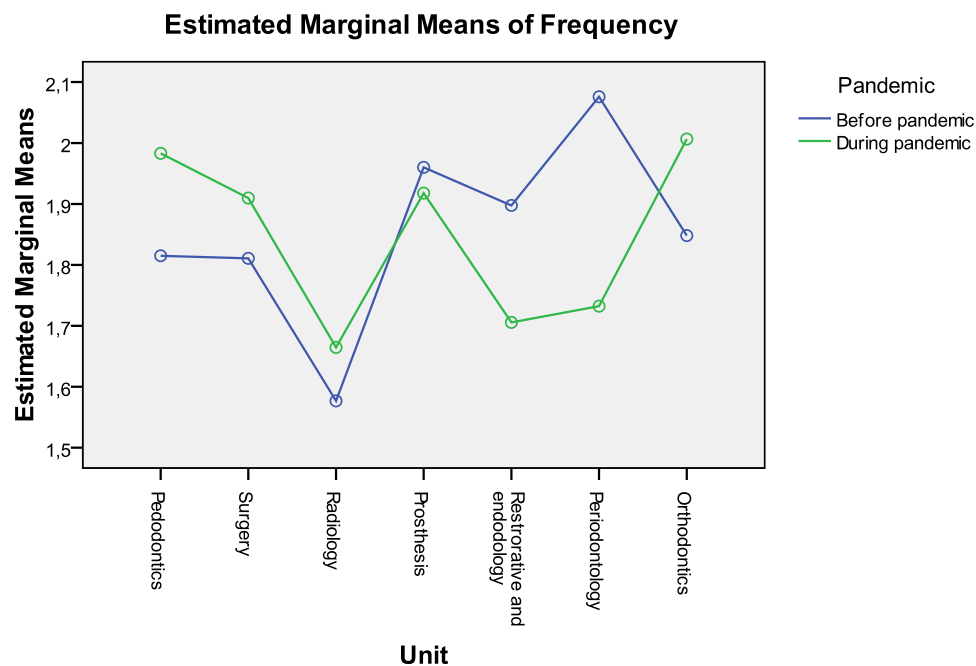
In our study, before and after the pandemic, female patients were in the majority compared to men. The gap in favor of women in 2020 was lower than in 2019 and 2021. In other words, it was reported that women applied more than men in 2019 and 2021. Since the last three months of 2019 and the first 3 months of 2021 were taken, it can be stated that the majority of the applicants is not related to the seasonal effect. In the research findings, there may be a relationship between the majority of applications for cosmetic and prosthetic purposes and the fact that women are in the majority compared to men.

Studies and researches on the pandemic in the first period reported that COVID-19 is fatal over a certain age group, and age is the most important prognostic factor. Later studies and recorded death rates also showed that deaths due to COVID-19 develop in older ages (Sharma et al. 2021; Dhama et al. 2020; Safiabadi Tali et al. 2021).

In our study, the mean age range of the sample was between 34 and 36, which was well below the COVID-19 risk age. In the last 3 months of 2019, in 2020 and in 2021, the average age of the applicants did not differ significantly. It can be stated that studies showing a milder course of the disease at younger ages have an effect on the average age of the applicants, and that older individuals are, therefore, more hesitant to apply. Although there was a decrease in the average age in 2020 compared to the pre-pandemic period, the average increased in 2021. However, the average age in all three time periods is to cover the young population.

In studies on oral health, prosthesis is one of the most needed health services and referral units. While the use of prostheses in older ages was more common in the past, nowadays, with the developments in prosthetic technologies, applications of prosthesis for cosmetic purposes have

Fig. 1 Applied units before and after COVID-19 pandemic



Covariates appearing in the model are evaluated at the following values: Age = 35,09

increased at younger ages (Candel-Marti et al. 2015; Fernández-Ruiz et al. 2021; Health and (Quality) 2019).

In our study, prosthesis was the unit with the highest number of applications in all three time periods and during the pre-pandemic and pandemic period. Application rates did not differ significantly over time in pedodontics, surgery, radiology, periodontology, orthodontics, restorative and endodontology units. In general, it can be stated that the young population constitutes the application profile for prosthetic and cosmetic purposes. Therefore, it can be argued that the level of anxiety about pandemic or COVID-19 transmission is lower than that of the elderly population.

In dental diseases and cosmetic interventions, many issues such as the state of the patient's oral health, its psychological effect on the patient, new emerging technologies and alternatives, the experiences of the patients and the referrals of other patients are important factors in the selection of the intervention. In addition, the development of more than one alternative to many oral health problems may cause the type of operation performed to differ. In the research, only the difference between the pre-pandemic and the pandemic process is not significant. At the same time, there was a statistically significant difference between the distribution of the type of transaction made between 2020 and 2021 during the pandemic process. For this reason, it is not a correct approach to directly associate the significant differences in terms of the operation performed with the pandemic.

In the research, all applications within the specified time period were received, and no age or gender limits were set.

For this reason, the most important limitations of the study are that the majority of patients in the middle age group are in the majority, the study is single-centered and does not include different categories such as advanced age or young age. Again, due to the fact that patients apply to very different units and the procedures show different characteristics, the common parameters of the patients are quite limited. This situation leads to the conclusion that there is no parameter suitable for multivariate analysis in the research. In further studies, evaluations can be made on the basis of multicenter and more specific units.

The contribution of the research to the literature is that when the risk for advanced age is announced during the pandemic process, it reveals the importance of health communication, since the elderly group sees oral health as elective and does not apply. At the same time, there was no significant difference in terms of oral health applications before and after the pandemic in the young age group, which is described as having a low risk level. Again, the research points out that during the pandemic process, the applications of the older age group about oral health are missing and they should receive support in this regard. In a pandemic process, besides elective and compulsory services, oral health services should be offered to all ages more effectively according to age groups and risk factors.

Conclusion

The results of the research show that the pandemic process in terms of oral health caused significant differences in the reasons for application, even in the population aged 34–36, the majority of whom are women. In addition, the fact that patients in the COVID-19 risk group did not apply to our hospital during the period under review indicates that the pandemic process will cause serious problems in the future regarding oral health in the older age group. For this reason, it is necessary to develop ancillary health services where individuals in the COVID-19 risk group will also receive support for their oral health problems.

Declarations

Conflict of interest This study was self-funded. All authors declare that they have no conflict of interest.

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