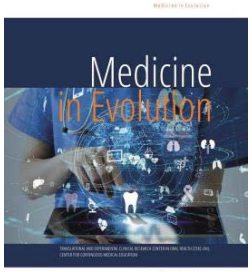
Dental emergencies during the COVID-19 pandemic in Oradea, Romania: patients' gender and living environment, and the location of affected teeth



Moca A.E.[1], Ţig I.A.[1], Moca R.T.[2], Matei R.I.[1], Iurcov R.[1]

[1]*Department of Dentistry, Faculty of Medicine and Pharmacy, University of Oradea, 410073 Oradea, Romania*
[2]*Doctoral School of Biomedical Sciences, University of Oradea, 410087 Oradea, Romania*

Correspondence to:
Name: Ţig Ioan Andrei
Address: 10 Piaţa 1 Decembrie Street, 410073 Oradea, Romania
Phone: +40 744796738
E-mail address: nelutig@yahoo.com

Abstract

Aim and objectives. The aim of this study was to investigate the location of the affected teeth in patients who were treated in the Dental Emergency Department from Oradea, during the lockdown period (2020), and to compare the characteristics identified during the lockdown with those identified in the pre-lockdown year (2019) and post-lockdown year (2021). Material and methods. This retrospective study was conducted on patients who were treated for a dental emergency in the Department of Dental Emergency from Oradea, in the following time periods: March-May 2019, March-May 2020 and March-May 2021. The investigated variables were patients' gender, patients' living environment and the location of the affected teeth. Results. 634 patients were treated in 2019, 784 in 2020, and 560 in 2021. In all investigated time periods, the most affected teeth were located in the lower posterior area of the dental arches (from 38.8% to 55.7%). In most of the investigated months, patients' gender was not statistically significant associated with the location of the affected teeth, but in April 2020, it was observed that female patients were more frequently associated with treated teeth located in the lower posterior area (54.4%) than in the upper posterior area (37.8%), while male patients were more frequently associated with treated teeth located in the upper posterior area (62.2%) than in the lower posterior area (45.6%). In most of the investigated months, there were no associations between patients' living environment and the location of affected teeth, but in April 2021, it was observed that patients from the rural environment were more frequently associated with treated teeth located in the upper anterior area (54.2%) than treated teeth located in the lower anterior area (0%) while patients from the urban environment were more frequently associated with treated teeth located in the lower anterior area (100%) than treated teeth located in the upper anterior area (45.8%). Conclusions. Preventive programs that address male and female patients, as well as rural and urban patients would be helpful.

Keywords: COVID-19, dental emergency, Romania

INTRODUCTION

The 2019 coronavirus disease or COVID-19 was caused by a new type of coronavirus, SARS-CoV-2 [1], a virus that has spread rapidly at a global level [2]. The COVID-19 disease is manifested by various symptoms such as fever, cough, dyspnea, fatigue, but it can also be accompanied by atypical neurological, dermatological [3] or even oral [4] symptoms. The evolution of the disease can be negative and can rapidly cause the death of the affected individuals [5], especially in patients with associated systemic diseases [6]. Arterial hypertension, diabetes and cardiovascular diseases are among the most common systemic diseases associated with a high death rate in patients with COVID-19 [6].

The disease is highly contagious and can be transmitted through direct and indirect contact. It can be transmitted through saliva droplets, direct contact between people, contaminated objects or through air [7]. In order to limit the spread of the virus and to control the disease, the World Health Organization (WHO) declared a global pandemic of COVID-19 and recommended a global lock-down [8]. Apart from the lockdown, a series of preventive measures were instituted, all very useful in limiting the spread of the virus. Social distancing, mandatory wearing of face masks, and closing national borders were some of the measures instituted during this period [9].

In Romania, the lockdown caused by the COVID-19 pandemic was instituted on March 21, 2020 and was suspended on May 15, 2020 [10]. The lockdown had a strong impact on people's mental health, negatively influenced people's social life, but also impacted the economic system and the health system [11]. During the lockdown, the oral health of the patients was also affected, considering the fact that dental offices were closed for routine dental procedures and only dental emergencies could be treated [10]. In Romania, the following dental pathologies could be treated as emergencies during the lockdown period: post-extraction hemorrhages, acute pulpitis, acute apical periodontitis, pericoronitis, post-extraction alveolitis, abscesses, cellulitis, mandibular fractures, dislocations of the temporomandibular joint, and ulceronecrotic gingivostomatitis and only these could be treated [12]. They could only be managed in centers that were authorized by the state [10].

Considering that globally the prevalence of caries is high among both the pediatric and adult population [13], the lack of routine dental treatments during the COVID-19 lockdown could have led to a higher rate of complications. Among the most frequent carious complications are pulpitis, apical periodontitis and abscesses [14]. In addition, the reduction in the number of functional dental offices during the lockdown period could have excessively increased the number of patients who were treated in dental emergency centers, this having a negative impact on the overburdened medical staff [15].

Aim and objectives

The purpose of this study was to investigate the location of the affected teeth in patients who were treated in the Dental Emergency Department from Oradea during the lock-down period (2020), and to compare the characteristics identified during the lockdown period with those identified in the pre-lockdown year (2019) and with those identified in the post-lockdown year (2021), according to gender and living environment.

MATERIAL AND METHODS

The study was designed as a retrospective research and was based on the analysis of the medical records belonging to patients who were treated for dental emergencies at the Oradea County Emergency Clinical Hospital. The emergency dental service is located in the

building of the Faculty of Medicine and Pharmacy of the University of Oradea. Three periods were analyzed: the pre-lockdown period (1 March 2019 – 31 May 2019), the lockdown period (1 March 2020 – 31 May 2020) and the post-lockdown period (1 March 2021 – 31 May 2021).

Initially, all patients who came to the dental emergency service during the previously mentioned periods were included in the study, but later, patients who did not have complete information in the medical records, or who did not sign the informed consent, were excluded.

In order to carry out this research, the following variables were investigated: the gender of the patients (male, female), the living environment of the patients (rural, urban), as well as the area on the dental arches where the dental emergency was treated (upper anterior, upper posterior, lower anterior, lower posterior). To establish these areas, the following aspects were taken into account: the upper anterior area (UA) was represented by upper incisors and upper canines (deciduous or permanent), the upper posterior area (UP) was represented by upper premolars and upper deciduous or permanent molars, the lower anterior area (LA) was represented by lower incisors and lower canines (deciduous or permanent), and the lower posterior area (LP) was represented by lower premolars and lower deciduous or permanent molars.

The study was approved by the Ethics Committee of the Oradea County Emergency Clinical Hospital (IRB No. 22143/06.07.2022) and complied with the principles stated in the Declaration of Helsinki from 2008, as well as the principles stated in the amendments added later to the Declaration of Helsinki. All participants signed an informed consent in which they agreed to the anonymous use of the data obtained as a result of the treatment carried out in the dental emergency service, and for those who were under the age of 18 years, the informed consent was signed by parents or legal guardians.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics 25 and Microsoft Office Excel/Word 2013. Qualitative variables were expressed in absolute form or as percentages, and were compared using Fisher's Exact or Pearson Chi-Square tests. Z-tests with Bonferroni correction were performed to detail the results after obtaining the contingency tables.

RESULTS

The final sample included a number of 1978 patients, of which 634 were treated between March and May 2019, 784 were treated between March and May 2020, and 560 were treated between March and May 2021 [16]. In the investigated period of 2019, a number of 301 female patients (March - n=85; April - n=119; May - n=97) and 333 male patients (March - n=112; April - n=124; May - n=97) were treated. In 2020, 421 female patients (March – n=129; April – n=177; May – n=115) and 363 male patients (March – n=108; April – n=205; May – n=124) were treated. In 2021, 292 female patients (March – n=111; April – n=95; May – n=86) and 268 male patients (March – n=104; April – n=80; May – n=84) were treated (Figure 1).

Depending on the living environment, in 2019, between March and May, 302 patients from rural areas (March – n=100, April – n=100; May – n=102) and 332 from urban areas (March – n=97; April – n=142; May – n=92) were treated. In the same investigated period, in 2020, 343 patients from rural areas (March - n=106; April - n=153; May - n=84) and 441 from urban areas (March - n=131; April - n=229; May - n=155) were treated. In 2021, 235 patients from rural areas (March – n=94; April – n=79; May – n=62) and 325 from urban areas (March – n=121; April – n=96; May – n=108) were treated (Figure 2).

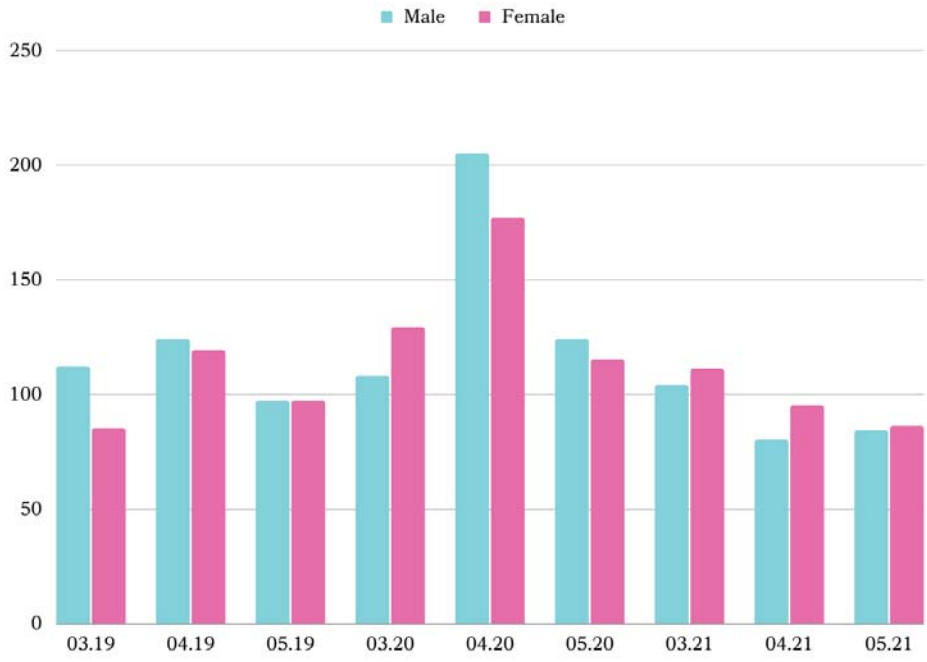


Figure 1. Distribution according to gender

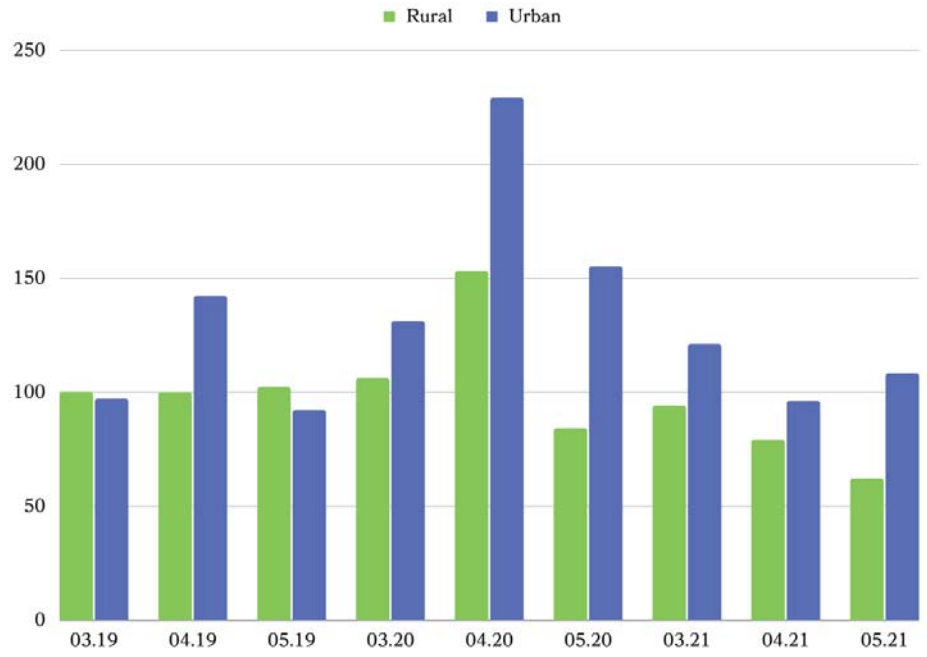


Figure 2. Distribution according to living environment

The data regarding the topography of the teeth treated during the investigated periods are shown in Table I. In all 3 years, the teeth that were treated were most frequently located at the level of the lower posterior arch, and the least treated teeth were those in the lower anterior arch.

Table I. Location of treated teeth

PERIOD	UA	UP	LA	LP
2019				
MARCH	24 (12.2%)	68 (34.5%)	8 (4.1%)	97 (49.2%)
APRIL	33 (13.6%)	85 (35%)	11 (4.5%)	114 (46.9%)
MAY	21 (10.8%)	63 (32.5%)	9 (4.6%)	101 (52.1%)
2020				
MARCH	24 (10.1%)	71 (30%)	10 (4.2%)	132 (55.7%)
APRIL	47 (12.3%)	143 (37.4%)	21 (5.5%)	171 (44.8%)
MAY	22 (9.2%)	86 (36%)	10 (4.2%)	121 (50.6%)
2021				
MARCH	27 (12.6%)	85 (39.5%)	16 (7.4%)	87 (40.5%)
APRIL	24 (13.7%)	56 (32%)	8 (4.6%)	87 (49.7%)
MAY	29 (17.1%)	65 (38.2%)	10 (5.9%)	66 (38.8%)

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior

The data in Table II represent the distribution of patients observed in 2019 according to the location of the teeth and gender. According to the Fisher's Exact test and Pearson Chi-Square tests, the associations between teeth location and gender were not significant in any of the studied months.

Table II. Distribution according to topography and gender for 2019

	UA	UP	LA	LP	p*
March 2019					
Female	12 (50%)	25 (36.8%)	6 (75%)	42 (43.3%)	0.182
Male	12 (50%)	43 (63.2%)	2 (25%)	55 (56.7%)	
April 2019					
Female	16 (48.5%)	40 (47.1%)	6 (54.5%)	57 (50%)	0.959
Male	17 (51.5%)	45 (52.9%)	5 (45.5%)	57 (50%)	
May 2019					
Female	9 (42.9%)	34 (54%)	1 (11.1%)	53 (52.5%)	0.089
Male	12 (57.1%)	29 (46%)	8 (88.9%)	48 (47.5%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

In 2020, the data obtained showed that there were no significant associations between the location of teeth and gender in the months of March and May, but for the month of April it was observed that female patients were more frequently associated with treated teeth located in the lower posterior area (54.4%) than in the upper posterior area (37.8%), while male patients were more frequently associated with treated teeth located in the upper posterior area (62.2%) than in the lower posterior area (45.6%) according to the Fisher's Exact test (p=0.030) (Table III).

Table III. Distribution according to topography and gender for 2020

	UA	UP	LA	LP	p*
March 2020					
Female	12 (50%)	44 (62%)	8 (80%)	65 (49.2%)	0.120
Male	12 (50%)	27 (38%)	2 (20%)	67 (50.8%)	
April 2020					
Female	21 (44.7%)	54 (37.8%)	9 (42.9%)	93 (54.4%)	0.030
Male	26 (55.3%)	89 (62.2%)	12 (57.1%)	78 (45.6%)	
May 2020					
Female	13 (59.1%)	46 (53.5%)	4 (40%)	52 (43%)	0.305
Male	9 (40.9%)	40 (46.5%)	6 (60%)	69 (57%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

The data in Table IV represent the distribution of patients observed in 2021 related to the location of the teeth and gender. According to the Fisher's Exact test and Pearson Chi-Square test, the associations between teeth location and gender were not significant in any of the studied months.

Table IV. Distribution according to topography and gender for 2021

	UA	UP	LA	LP	p*
March 2021					
Female	14 (51.9%)	40 (47.1%)	10 (62.5%)	47 (54%)	0.654
Male	13 (48.1%)	45 (52.9%)	6 (37.5%)	40 (46%)	
April 2021					
Female	12 (50%)	30 (53.6%)	3 (37.5%)	50 (57.5%)	0.690
Male	12 (50%)	26 (46.4%)	5 (62.5%)	37 (42.5%)	
May 2021					
Female	13 (44.8%)	34 (52.3%)	6 (60%)	33 (50%)	0.843
Male	16 (55.2%)	31 (47.7%)	4 (40%)	33 (50%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

The data in Tables V and VI represent the distribution of patients observed in 2019 and 2020, related to the location of the teeth and the living environment of the patients. According to the applied statistical tests, no statistically significant associations were identified.

Table V. Distribution according to topography and living environment for 2019

	UA	UP	LA	LP	p*
March 2019					
Rural	11 (45.8%)	30 (44.1%)	4 (50%)	55 (56.7%)	0.410
Urban	13 (54.2%)	38 (55.9%)	4 (50%)	42 (43.3%)	
April 2019					
Rural	20 (60.6%)	20 (35.3%)	5 (45.5%)	46 (40.4%)	0.092
Urban	13 (39.4%)	55 (64.7%)	6 (54.5%)	68 (59.6%)	
May 2019					
Rural	13 (61.9%)	35 (55.6%)	2 (22.2%)	52 (51.5%)	0.238
Urban	8 (38.1%)	28 (44.4%)	7 (77.8%)	49 (48.5%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

Table VI. Distribution according to topography and living environment for 2020

	UA	UP	LA	LP	p*
March 2020					
Rural	8 (33.3%)	37 (52.1%)	3 (30%)	58 (43.9%)	0.297
Urban	16 (66.7%)	34 (47.9%)	7 (70%)	74 (56.1%)	
April 2020					
Rural	15 (31.9%)	60 (42%)	7 (33.3%)	71 (41.5%)	0.578
Urban	32 (68.1%)	83 (58%)	14 (66.7%)	100(58.5%)	
May 2020					
Rural	7 (31.8%)	28 (32.6%)	4 (40%)	45 (37.2%)	0.881
Urban	15 (68.2%)	58 (67.4%)	6 (60%)	76 (62.8%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

Regarding the associations between the location of the teeth and the living environment of the patients in 2021, they were statistically insignificant for the months of March and May, but significant for the month of April, where it was observed that patients from the rural environment were more frequently associated with treated teeth located in the upper anterior area (54.2%) than treated teeth located in the lower anterior area (0%) while

patients from the urban environment were more frequently associated with treated teeth located in the lower anterior area (100%) than treated teeth located in the upper anterior area (45.8%) (Table VII).

Table VII. Distribution according to topography and living environment for 2021

	UA	UP	LA	LP	p*
March 2021					
Rural	10 (37%)	40 (47.1%)	7 (43.8%)	37 (42.5%)	0.824
Urban	17 (63%)	45 (52.9%)	9 (56.2%)	50 (57.5%)	
April 2021					
Rural	13 (54.2%)	25 (44.6%)	0 (0%)	41 (47.1%)	0.042
Urban	11 (45.8%)	31 (55.4%)	8 (100%)	46 (52.9%)	
May 2021					
Rural	13 (44.8%)	27 (41.5%)	3 (30%)	19 (28.8%)	0.325
Urban	16 (55.2%)	38 (58.5%)	7 (70%)	47 (71.2%)	

UA – upper anterior; UP – upper posterior; LA – lower anterior; LP – lower posterior; *Fisher's Exact Test, **Pearson Chi-Square

DISCUSSIONS

The COVID-19 pandemic has placed an enormous burden on the global health system, and the lockdown caused by the pandemic had negative and unwanted consequences on the general health and oral health of the population [17]. Certain population groups were more intensely affected, these being mainly people with chronic diseases [17], or elderly people, on whom the pandemic had a particularly strong physical, mental and emotional impact [18]. In dentistry, during the lockdown period, only the emergency treatment of dental problems was permitted, and the use of hand tools was preferred, in order to reduce the production of aerosols [19]. Moreover, in Romania, during the lockdown period, dental emergencies could only be treated in certain authorized centers [16]. This explains the increased number of patients who were treated between March and May 2020 in the emergency dental service, as it emerged from this study. Overcrowding in dental emergency departments can have a strong negative impact on the medical staff, increasing the level of stress and fatigue [20].

The aim of this study was to investigate the topography of the teeth treated for dental emergency in the three analyzed periods, depending on the gender of the patients and the living environment of the patients. The gender of the patients was chosen as a variable because it was observed that there are differences between men and women in terms of the level of knowledge about oral health [21], in terms of the prevalence of dental caries [22], or in terms of dental visits [22]. In this study, the patients who were treated most frequently for dental emergency, during the lockdown period (2020) were female patients, but in the other investigated years (2019 and 2021) male patients prevailed. This aspect is probably also due to the fact that female patients go to the dentist more frequently and choose to go to the dentist even for minor problems [23], compared to male patients who tend to ignore their oral health issues [24].

Concerning the living environment of the patients, in all the analyzed periods, the patients came mainly from the urban environment, but the number of patients from the rural environment was also high. The higher proportion of patients from the urban environment could also be due to the fact that the dental emergency service in which the study was carried out was located in the urban environment. At the same time, the small number of dental offices in rural areas [16], but also the high costs of dental treatments can make rural residents more reluctant to access dental services [25]. Other obstacles that can negatively impact access to dental services, both in rural and urban areas, are the lack of time, the need to travel to other doctors or to other offices for specialized treatments, and fear [26].

A final variable that was considered in this study was the location of the teeth that required treatment. In all 3 investigated periods, the most affected teeth were located in the lower posterior area of the dental arches. The high prevalence of caries for the mandibular first molars (lower posterior area), was also identified by other authors. Sadeghi Mostafa (2007) identified a slightly higher prevalence of caries at the level of mandibular first molars in a group of 12-year-old children from Iran [27], and Que et al. (2021) identified a higher prevalence of caries at the level of mandibular first molars in a group of children from São Tomé Island [28]. Apart from the known etiological factors of dental caries [29], another explanation for the higher prevalence of caries at the level of mandibular first molars could be the faster eruption and at a young age of the lower first permanent molars [30]. However, there are also authors who have identified a higher prevalence of dental pathology at the level of the maxillary arch. Demirci et al. (2010) identified a higher prevalence of caries in the maxillary and mandibular molars compared to incisors, and a higher susceptibility to caries for the maxillary teeth than for the mandibular teeth [31].

We believe that this study brings valuable information regarding the influence of gender and the living environment on the topography of the teeth treated in the dental emergency service from Oradea. It is necessary to implement dental prevention programs that address rural and urban patients. Increasing the number of state centers that offer emergency dental services, would be helpful. Obtaining similar information from other emergency dental centers in the country would be useful for creating an overall picture at the national level.

CONCLUSIONS

In this study sample, the number of patients treated in 2020 (during lockdown) was higher than in the other investigated periods. Most of the treated teeth were located in the lower posterior area. If in 2019 and 2021 no significant associations were identified between gender and the topography of the affected teeth, in April 2020, it was observed that female patients were more frequently associated with treated teeth located in the lower posterior area, while male patients were more frequently associated with treated teeth located in the upper posterior area. It was observed that in April 2021, patients from the rural environment were more frequently associated with treated teeth located in the upper anterior area than treated teeth located in the lower anterior area, while patients from the urban environment were more frequently associated with treated teeth located in the lower anterior area, than treated teeth located in the upper anterior area.

REFERENCES

1. Baloch S, Baloch MA, Zheng T, Pei X. The Coronavirus Disease 2019 (COVID-19) Pandemic. Tohoku J Exp Med. 2020; 250(4):271-278.
2. World Health Organization. Novel Coronavirus—China. 2020. https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/ (Accessed on 16 May 2020).
3. da Rosa Mesquita R, Francelino Silva Junior LC, Santos Santana FM, Farias de Oliveira T, Campos Alcântara R, Monteiro Arnozo G, Rodrigues da Silva Filho E, Galdino Dos Santos AG, Oliveira da Cunha EJ, Salgueiro de Aquino SH, Freire de Souza CD. Clinical manifestations of COVID-19 in the general population: systematic review. Wien Klin Wochenschr. 2021; 133(7-8):377-382.
4. Moca AE, Juncar RI, Moca RT, Bota T, Sabău DT, Juncar M. Oral Manifestations in Children Diagnosed with COVID-19: A Narrative Review. Healthcare (Basel). 2023; 11(3):288.

5. COVID-19 Excess Mortality Collaborators. Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020-21. Lancet. 2022; 399(10334):1513-1536.
6. Djaharuddin I, Munawwarah S, Nurulita A, Ilyas M, Tabri NA, Lihawa N. Comorbidities and mortality in COVID-19 patients. Gac Sanit. 2021;35 (Suppl 2):S530-S532.
7. Lotfi M, Hamblin MR, Rezaei N. COVID-19: Transmission, prevention, and potential therapeutic opportunities. Clin Chim Acta. 2020; 508:254-266.
8. Kharroubi, S.; Saleh, F. Are Lockdown Measures Effective Against COVID-19? Front Public Health. 2020; 8:549692.
9. Ayouni I, Maatoug J, Dhouib W, Zammit N, Fredj SB, Ghammam R, Ghannem H. Effective public health measures to mitigate the spread of COVID-19: a systematic review. BMC Public Health. 2021; 21(1):1015.
10. Moca AE, Iurcov R, Ciavoi G, Moca RT, Şipoş LR. Pediatric Dental Emergencies during the COVID-19 Pandemic in Romania: A Retrospective Study. Children. 2023; 10(5):807.
11. Panneer S, Kantamaneni K, Akkayasamy VS, Susairaj AX, Panda PK, Acharya SS, Rice L, Liyanage C, Pushparaj RRB. The Great Lockdown in the Wake of COVID-19 and Its Implications: Lessons for Low and Middle-Income Countries. Int J Environ Res Public Health. 2022; 19(1):610.
12. National Executive Office of the Romanian College of Dentists. Recommendations for Preventing the Spread of COVID-19 in Emergency Dental Activity. Available online: https://cmdr.ro/download-zone preview/0/1585254764/3114/7c1a06790c87eb490b59e77515bababd (accessed on 5 April 2023).
13. Qin X, Zi H, Zeng X. Changes in the global burden of untreated dental caries from 1990 to 2019: A systematic analysis for the Global Burden of Disease study. Heliyon. 2022; 8(9):e10714.
14. Shay K. Infectious complications of dental and periodontal diseases in the elderly population. Clin Infect Dis. 2002; 34(9):1215-23.
15. Izdebski Z, Kozakiewicz A, Białorudzki M, Dec-Pietrowska J, Mazur J. Occupational Burnout in Healthcare Workers, Stress and Other Symptoms of Work Overload during the COVID-19 Pandemic in Poland. Int J Environ Res Public Health. 2023; 20(3):2428.
16. Moca AE, Ţig IA, Ciavoi G, Iurcov R, Şipoş LR, Todor L. The Impact of the COVID-19 Pandemic on the Dental Emergency Service from Oradea, Romania: A Retrospective Study. Healthcare (Basel). 2022; 10(9):1786.
17. Al-Raddadi R, Harakeh S, Alamri T, AlRaddadi Z, Alzahrani S, Al-Rabia M, Bakarman M. Burden of COVID-19 infection and lockdown measures on individuals with chronic diseases in Saudi Arabia: A national population-based study. J Infect Public Health. 2022; 15(12):1531-1539.
18. Cocuzzo B, Wrench A, O'Malley C. Effects of COVID-19 on Older Adults: Physical, Mental, Emotional, Social, and Financial Problems Seen and Unseen. Cureus. 2022; 14(9):e29493.
19. Goriuc A, Sandu D, Tatarciuc M, Luchian I. The Impact of the COVID-19 Pandemic on Dentistry and Dental Education: A Narrative Review. Int J Environ Res Public Health. 2022; 19(5):2537.
20. Westgarth D. Dentistry, COVID-19 and stress: Seeking light at the end of the tunnel. BDJ In Pract. 2021; 34(2):10–14.
21. Rajeh MT. Gender Differences in Oral Health Knowledge and Practices Among Adults in Jeddah, Saudi Arabia. Clin Cosmet Investig Dent. 2022; 14:235-244.
22. Su S, Lipsky MS, Licari FW, Hung M. Comparing oral health behaviours of men and women in the United States. J Dent. 2022; 122:104157.
23. Michalak E, Łoboda J, Chomyszyn-Gajewska M. Reasons for patients' visits in the dental offices of Cracow in the years 2005-2006 and 2013-2014. Przegl Epidemiol. 2015; 69(4):787-94, 913-8. English, Polish.
24. Lipsky MS, Su S, Crespo CJ, Hung M. Men and Oral Health: A Review of Sex and Gender Differences. Am J Mens Health. 2021; 15(3):15579883211016361.
25. Qi X, Qu X, Wu B. Urban-Rural Disparities in Dental Services Utilization Among Adults in China's Megacities. Front Oral Health. 2021; 2:673296.
26. Castillo KB, Echeto L, Schentrup D. Barriers to dental care in a rural community. J Dent Educ. 2023; 87(5):625-630.
27. Sadeghi M. Prevalence and bilateral occurrence of first permanent molar caries in 12-year-old students. J Dent Res Dent Clin Dent Prospects. 2007 Summer; 1(2):86-92.

28. Que L, Jia M, You Z, Jiang LC, Yang CG, Quaresma AAD, das Neves EMAA. Prevalence of dental caries in the first permanent molar and associated risk factors among sixth-grade students in São Tomé Island. BMC Oral Health. 2021; 21(1):483.
29. Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, Tagami J, Twetman S, Tsakos G, Ismail A. Dental caries. Nat Rev Dis Primers. 2017; 3:17030.
30. Ekstrand KR, Christiansen J, Christiansen ME. Time and duration of eruption of first and second permanent molars: a longitudinal investigation. Community Dent Oral Epidemiol. 2003; 31(5):344-50.
31. Demirci M, Tuncer S, Yuceokur AA. Prevalence of caries on individual tooth surfaces and its distribution by age and gender in university clinic patients. Eur J Dent. 2010; 4(3):270-9.