ISSN NO: 2770-2936
Date of Publication:26-04-2022

Analysis of the Reasons for Visits to the Dentist in Young Children During the Covid-19 Pandemic.

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Abstract—COVID-19 pandemic significantly affected dentistry due to high coronavirus infectivity and dangerous consequences. Special recommendations were developed for dentists to limit the infection of staff and patients. to study the reasons for children visiting dental clinics during COVID-19 pandemic and give the characteristics of the patients and provided dental treatment. The cross-sectional study was conducted in four dental clinics, which worked for dental emergency in the cities of Volgograd and Volzhky during the peak of COVID-19 pandemic. The data about 166 paediatric dental patients aged 1-17 years were collected. The reasons for children's dental visits, age and behavior of the children, the tooth types, and the types of provided treatment were analyzed. The children's behavior was assessed according to Frankl's Behavior Rating Scale. Proportions (%), 95% Confidence Interval (CI), mean-value with standard error (M±m) were calculated. The differences were assessed by Pierson's Chi-square test at p-value 0.05. Microsoft-office Excel-2019 programs were used for the statistic analysis. The majority (98.8%, 95% CI 95.7-99.7%) of the children visited dental clinics due to acute toothache. The primary teeth needed urgent treatment significantly more often than permanent teeth: 83.7% (95% CI 77.8-88.3%) and 16.3% (95% CI 11.7-22.2%) respectively, $x^2 = 172.171$, $p < 0.0001$. Among the primary teeth the most affected ones were the first and second molars, among the permanent teeth – the first molar. The common reasons for urgent dental treatment in children were caries consequences: apical periodontitis (51.6%, 95% CI 44.5-58.6) or pulpitis (35.3%, 95% CI 28.8-42.3). The other reasons were dental trauma, caries, periostitis, physiological primary tooth mobility. Acute pain in the primary teeth was caused mainly by apical periodontitis, in the permanent teeth by pulpitis. The applied treatment methods were aimed at limiting the use of aerosol generating procedures, reducing the duration of the treatment and preventing the patients' hospitalization. Almost all the primary teeth with apical periodontitis were extracted; the number of extracted and endodontically treated permanent teeth was approximately equal. The current methods of pulpitis treatment (pulp capping, pulpotomy and pulpectomy) were applied along with the pulp necrotizing agent use. Many (39.7%, 95% CI 32.6-47.4%) children demonstrated negative behavior. Behavior management techniques were used, including tell-show-do (54.5%, 95% CI 42.6-66.0%), sedation (3.0%, 95% CI – 0.8-10.4%), general anesthesia (3.0%, 95% CI – 0.8-10.4%), passive restraint (39.4%, 95% CI 28.5-51.4%). In the limitation of this study we can conclude that COVID-19 pandemic changed the profile of paediatric dental patients and dentist's treatment options. In 1-17-year-old children the main reason for an emergency dental visit was acute dental pain due to caries consequences. The primary teeth needed urgent dental treatment significantly more often than the permanent teeth. The children often demonstrated negative behavior and required behavior management. The applied treatment methods were aimed at limiting the use of aerosol generating procedures, decreasing the duration of the treatment and avoiding the patients' hospitalization.

Key words: COVID-19**,** dentistry, children, emergency, dental treatment.

1. Introduction

World Health Organization (WHO) confirmed new coronavirus infection as pandemic COVID-19 on 11 March, 2020 [1]. By the date of 12.06.2020 there were more than 7.5 million people infected and more than 420 thousand died [2]. This infection is very contagious and is easily transmitted with droplets and aerosols [3]. The specific feature of dentistry is working in the area of patients' breath, often in contact with blood and saliva. Thereby, dentistry was recognized as the professional activity with dangerous environment regarding virus transmission from patients to dental staff, from staff to patients or cross-infection among the patients [4]. A lot of dentists concern about themselves and their families' infection but do not follow current protective recommendations completely [5]. In many countries during the peak of COVID-19 pandemic dental offices were closed except emergency. The rationale for this decision was the attempt to prevent unnecessary coronavirus infection of dental staff and dental patients and to avoid the overloading of the healthcare system [6,7].

The concept of dental emergency includes the following conditions. Actually dental emergency has been designed for the immediate treatment of dental diseases which are life threatening (uncontrolled bleeding, aggravated bacterial inflammation, severe soft tissue and bone trauma, etc.). Urgent dental care aimed at relieving severe dental pain, alleviating the risk of inflammation increase which could lead to emergency hospitalization [8]. Acute pulpitis,

ISSN NO: 2770-2936
Date of Publication:26-04-2022

periapical periodontitis, dental trauma, oral and maxillofacial infections have been recognized as emergency situations which force parents to take children to dental clinics [9].

The recommendations have been developed for dental offices which continue to work as dental emergency clinics during COVID-19 pandemic [10]. Main organizational aspects have been described: patients and staff examination for timely revealing coronavirus infection, protective equipment, patients' management, decision-making process, staff educating and training [11]. According to dental treatment methods it has been recommended: to restrict the use of high speed burs, ultrasonic scalers, intraoral radiographs; to prefer simple restorative materials (i.e. glass ionomer cements), tooth extraction rather than endodontic treatment; to use hand instruments and non-invasive methods where it is possible, to limit the operative time and to finish treatment in one appointment [12,13,14].

Self-isolation mode for citizens and the information through mass-media about new rules in dental clinics for patients (admission only for emergency including acute pain) have led to the decrease of dental patients' number. However, every day many children visit a dentist with emergency and urgent needs. Acute dental pain per se in children forces parents to take them to emergency dental clinics [15, 16].

The aim of our study was to analyze the reasons for children visiting dental clinics during COVID-19 pandemic and to give the characteristics of applied dental treatment methods.

2. Materials and methods

The cross-sectional study was conducted in four dental clinics from 20.03.2020 to 24.02.2022 (one week in each clinic), which worked for dental emergency in the cities of Bukhara during the peak of COVID-19 pandemic. All the clinics organized their work according to the current recommendations for the prevention of coronavirus spreading among the population. According to the Uzbekistan law the parents of the children under 15 years of age and adolescents older than 15 years gave written informed consents for dental examination and treatment.

Results

In the circumstances of COVID-19 pandemic restrictions the majority of the children (164 of 166) visited dental clinics due to acute toothache and only 2 children due to acute oral mucosa disease (herpetic gingivostomatitis): 98.8% (95% CI 95.7-99.7%) and 1.2% (95% CI 0.3-4.3%) respectively. There were no cases of dental emergency due to periodontal disease.

An emergency visit to a dentist was the first dental visit in the current year for the majority of the children: 116 of 166 cases – 69.9% (95% CI 62.5-76.3%). However, approximately one of three children visited a dentist 1-3 months earlier due to toothache or routine caries treatment.

The number of boys and girls were similar: 85 and 81 cases – 51.2% и 48.8% respectively, $p>0.05$. The age of the children was from 1 to 17 years, mean-value 7.6±0.3 years (table 1). The children with acute pain in primary teeth were aged 1-12 years (n=133), in permanent teeth – 7-17 years (n=31).

The children with acute pain in primary teeth were aged 4-7 years (82 cases, 61.6%, 95% CI 53.2-69.5%) more often, than 8-10 years (28 cases, 21.0%, 95% CI 15.0-28.7%), 1-3 years (19 cases, 14.3%, 95% CI 9.3-21.2%), or 11-12 years (5 cases, 3.8%, 95% CI 1.6-8.5%).

The majority of the children with permanent teeth problems were older than 11 years: the same number (13 cases) in 11-14 and 15-17 year olds – 41.9% (95% CI 26.4-59.2%). Some children (4 cases) were in the age of 7-10 years: 12.9% (95% CI 5.1-28.8%).

One hundred and ninety teeth which needed therapeutic treatment or extraction were revealed in the children (table 2). The number of primary teeth (n=159) in need of urgent dental treatment was significantly higher than the number of permanent teeth (n=31): 83.7% (95% CI 77.8-88.3%) and 16.3% (95% CI 11.7-22.2%) respectively, $x^2 = 172.171$, $p < 0.0001$.

The first (n=71) and the second (n=64) primary molars were the most frequent teeth with acute pain among all primary teeth: 44.6% (95% CI 37.1-52.4%) and 40.2% (95% CI 32.9-48.0%) respectively. The numbers of incisors (n=22) and canines (n=2) were lower: 3.8% (95% CI 9.3-20.1%) и 1.3% (95% CI 0.3-4.5%). In total, the children complained of pain in upper primary teeth more often than in lower teeth: 92 and 67 cases, 57.9% (95% CI 50.1-65.3%) and 42.1% (95% CI 34.7-49.9%) respectively, $x^2 = 7.914$, $p = 0.0049$. However, the differences in every type of teeth were not significant statistically.

Acute toothache in the first permanent molars occurred more often than in other types of permanent teeth: in the first molars – 19 cases, 61.3% (95% CI 43.8-76.3%); the incisors – 5 cases, 16.1% (95% CI 7.1-32.6%); the second molars – 4 cases, 12.9% (95% CI 5.1-28.8%); premolars – 3 cases, 9.7% (95% CI 3.3-25.9%). The differences between the frequencies of children's complaints about pain in upper and lower permanent teeth were not significant statistically.

The most common reasons for urgent dental treatment in children were caries consequences (table 3). The majority of the cases were caused by apical periodontitis or pulpitis: 98 and 67 cases, 51.6% (95% CI 44.5-58.6%) and

ISSN NO: 2770-2936
Date of Publication:26-04-2022

35.3% (95% CI 28.8-42.3%) respectively. Less often acute pain was caused by trauma – 12 cases, 6.3% (95% CI 3.6-10.7%); periostitis – 3 cases, 1.6% (95% CI 0.5-4.5%), primary tooth mobility due to natural root resorption – 9 cases, 4.7% (95% CI 2.5-8.8%) or deep caries – 1 case, 0.5% (95% CI 0.1-2.9%).

All (n=9) the primary teeth with pain due to their mobility were extracted.

Dental trauma was the cause of acute pain in 10 primary teeth and 2 permanent teeth. All the permanent teeth and 5 primary teeth required only conservative treatment. Every second primary tooth was extracted.

Intensive pain which accompanied pulpitis was revealed among permanent teeth significantly more often than among primary teeth: 17 of 31 teeth, 54.8% (95% CI 37.8-70.8%), and 50 of 159 teeth, 31.4% (95% CI 24.7-39.0%) respectively, $x^2 = 6.067$, $p = 0.0138$.

In contrast, apical periodontitis was more common among primary teeth than among permanent teeth: 89 of 159 teeth 56.0% (95% CI 48.2-63.5%), and 9 of 31 teeth, 29.0% (95% CI 16.1-46.6%) respectively, $x^2 = 7.695$, $p = 0.0055$.

In the outpatient clinic pulpitis treatment was impossible to provide in 2 of 67 (3.0%, 95% CI 0.8-10.2%) primary teeth due to lack of cooperation of the young patients. These patients were referred on the treatment under general anesthesia. In 2 cases (3.0%, 95% CI 0.8-10.2%) pulpitis treatment was performed with conscious sedation use. The applied pulpitis treatment methods were the following: 1) one-appointment vital therapy – direct pulp capping, pulpotomy, pulpectomy; 2) non-vital therapy with the application of a pulp necrotizing agent at the first appointment. Vital methods of pulpitis treatment were used more often than the methods with the use of a pulp necrotizing agent: 38 and 27 cases, 58.5% (95% CI 46.3-69.6%) and 41.5% (95% CI 30.4-53.7%) respectively. However, the difference was not significant statistically, $x^2 = 3.728$, $p = 0.0535$ (table 4). Local anesthesia was used in all cases of vital pulp therapy and in the most cases of non-vital pulp therapy (22 of 27 cases, 81.5%, 95% CI 63.3-91.8%).

Pulpotomy was applied in the primary teeth significantly more often than in the permanent teeth: 29 of 48 cases, 60.4% (95% CI 46.3-73.0%), and 2 of 17 cases, 11.8% (95% CI 3.3-34.3%) respectively, $x^2 = 11.703$, $p = 0.0006$. Pulpectomy in the primary teeth was significantly less common than in the permanent teeth: 1 of 48 cases, 2.1% (95% CI 0.4-10.9%), and 4 of 17 cases, 23.5% (95% CI 9.6-47.3%), respectively, $x^2 = 7.968$, $p = 0.0048$.

Almost all the primary teeth with apical periodontitis were extracted – 88 of 89 cases, 98.9% (95% CI 93.9-99.8%), (table 5). Apical periodontitis in the permanent teeth developed to periostitis in 3 of 12 cases (25.0%, 95% CI 8.9-53.2%). The endodontic treatment was performed in 5 permanent teeth (41.7%, 95% CI 19.3-68.0%), extraction – in 4 teeth (58.3%, 95% CI 31.9-80.7%) which were non-restorable.

Many children, who visited a dentist during COVID-19 pandemic, had negative behavior – 66 of 166 cases, 39.7% (95% CI 32.6-47.4%). The children with acute pain in the primary teeth had non-cooperative behavior significantly more often than the children with acute pain in the permanent teeth: 61 of 135 cases and 5 of 31 cases, 45.2% (95% CI 37.0-53.6%) и 16.1% (95% CI 7.1-32.6%) respectively, $x^2 = 10.603$, $p = 0.0011$. Different behavior management techniques were used for these 66 children: tell-show-do (54.5%, 95% CI 42.6-66.0%), sedation (3.0%, 95% CI – 0.8-10.4%), general anesthesia (3.0%, 95% CI – 0.8-10.4%), passive restraint (39.4%, 95% CI 28.5-51.4%). Treatment with passive restriction, sedation or general anesthesia was provided only for children aged from 2 to 7 years.

3. Discussion

COVID-19 pandemic due to high rate of mortality and transmission has changed the mode of dental service [17]. The dental procedures have been provided in the close contact with patients, can produce airborne particles and aerosols and place dental care workers in the high risk to coronavirus exposure [18,19]. In many countries routine dental care was suspended and only emergency and urgent dental care were allowed during the period of coronavirus pandemic peak [20,21,22]. High priority was given to relieving dental pain and to eliminating acute infection [23]. Many articles described the problems and new rules for dentistry which aimed at preventing infection spreading [24,25,26]. Special attention was paid to organization of children's appointments in dental setting and the implementation of minimally invasive concept in dental treatment [27,28]. However, there is lack of data about patients' characteristics and provided dental treatment in current circumstances of dental offices' work.

Before arising COVID-19 pandemic, dental pain and decayed teeth were the common reasons for the first children's visit to a dental clinic [29,30,31]. Rogers et al. examined 177 children from deprived families aged 4-18 years and revealed that 45% of children experienced dental pain. However, despite 95% caries prevalence, dmft=3.88 and DMFT=3.44, the children had low "Care index" (mft/dmft=0.1), which reflected a low level of oral care [32]. Slade GD showed that the rate of reported dental pain prevalence in children was connected with caries prevalence and varied from 5% to 33% in different countries [33]. Among paediatric patients of dental emergency clinics the main complaint (82-96.7%) was dental pain [34,35].

ISSN NO: 2770-2936
Date of Publication:26-04-2022

In our research we also revealed that the main reason for children to visit a dentist during coronavirus pandemic was dental pain (98.8%). It was found that the number of the children with acute dental pain in the primary teeth were significantly higher than in the permanent teeth. The most affected among the primary teeth were molars, among the permanent teeth – the first molar. These findings corresponded to high caries prevalence in primary dentition in Volgograd children [36], confirmed insufficient level of prevention and treatment of early childhood caries [37], low parents' care of their children's primary teeth [38]. On the other hand, these findings could be connected with asymptomatic caries development, rapid primary teeth destruction, quick spread of infection from dentine to pulp, and from pulp to periodontium. The lower number of urgent situations which was associated with caries complications in the permanent teeth could be explained by well-established school dentistry in the Volgograd region [39].

Martens at al. revealed that dental pain in emergency paediatric patients was caused by caries and its consequences (50.2%) or dental trauma (26.7%) [34]. Wong et al. reported about 74-75% of paediatric dental emergency which developed due to caries problems [40]. In our research the majority (88.4%) of the patients felt pain due to caries consequences and only 6.3% due to trauma. The decreased proportion of dental trauma could be connected with the prohibition of outdoor games, sport trainings and competitions for children during the self-isolation period caused by COVID-19 pandemic.

Among paediatric dental emergency patients 8-11% was preschoolers, which were referred for treatment under general anesthesia [40]. We revealed that among all the patients the number of children aged 1-3 years was 11.6%, 4-7 years – 50.6%. The majority of the children received dental treatment in outpatient clinics; only 2 children (1.2%) were referred to hospital for treatment under general anesthesia and the same number of the children was treated under conscious sedation with nitrous oxide. We suppose that the recommendations to reduce aerosol dental procedures and to prevent children's hospitalization during coronavirus pandemic could increase the number of children treated without sedation or general anesthesia.

The choice of the method of pulpitis or apical periodontitis treatment is left to the judgment of a clinician because of many factors affecting the decision-making process. All current pulpitis treatment methods (pulp-capping, pulpotomy, pulpectomy) have sufficient clinical and radiographical results [41,42]. Our study revealed that dentists applied not only these methods but also the method with pulp-necrotizing agent use. The reason for this fact might be connected with the recommendations to limit the aerosol generating procedures and the duration of the treatment which could lower the probability of coronavirus infection. This reason could also explain the high level of primary teeth extraction due to apical periodontitis which was found out in our study. Meanwhile, apical periodontitis per se is the main reason for primary teeth extraction [43,44].

Dental fear and anxiety prevalence in children varies from 10% to 29% in different countries [45]. Wogelius et al. revealed high level (37.2%) of the history of behavior management problems in Danish 6-8 year old children who had dental treatment, although the anxiety prevalence in this population was only 5.7% [46]. In our study negative behavior at dental appointments was demonstrated by 39.7% children. This fact confirmed that the majority of pediatric patients during COVID-19 pandemic may be categorized as the patients with dental fear and anxiety who typically visit a dentist only when acute dental pain arises.

In anxious children different techniques of behavior problem management are usually applied: tell-show-do, nitrous-oxide sedation, passive restraint, oral premedication, handover-mouth, voice control, active restraint, and general anesthesia [47]. Luis de León et al. considered tell-show-do technique as the most acceptable by the parents and handover-mouth technique as the least acceptable one [47]. However, Al Zoubi at al. defined nitrous-oxide sedation as the most permissible technique (68.2% parents' answers) and passive restraint as the least acceptable technique (37.8% parents' answers) in emergency situations [48]. We found that in coronavirus pandemic circumstances the dentists used tell-show-do technique for behavior management in paediatric patients most often (54.5%), followed by passive restraint (39.4%).

4. Conclusions

In the limitation of this study we can conclude that COVID-19 pandemic changed the profile of paediatric dental patients and dentist's treatment options. In 1-17-year-old children the main reason for an emergency dental visit was acute dental pain due to caries consequences, pulpitis (35.3%) or apical periodontitis (51.6%). Every second patient was at the age from 4 to 7 years. The primary teeth needed urgent dental treatment significantly more often than the permanent teeth (83.7% and 16.3%, $p<0.0001$). The children often demonstrated negative behavior and required behavior management. The applied treatment methods were aimed at limiting the use of aerosol generating procedures, decreasing the duration of the treatment and avoiding the patients' hospitalization.

ISSN NO: 2770-2936
Date of Publication:26-04-2022

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Date of Publication:26-04-2022

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Table 1. Age distribution of the children who visited dental clinics with acute toothache in primary or permanent teeth

Age, years	The number of visits due to acute pain in:					
	primary teeth		permanent teeth		total	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
1	1	0.7 (0.1-4.1)			1	0.6 (0.1-3.4)
2	5	3.8 (1.6-8.5)			5	3.0 (1.3-6.9)
3	13	9.8 (5.8-16.0)			13	7.9 (4.7-13.1)
1-3	**19**	**14.3 (9.3-21.2)**			**19**	**11.6 (7.5-17.4)**
4	18	13.5(8.7-20.4)			18	11.0 (7.1-16.7)
5	22	16.5 (11.2-23.8)			22	13.4 (9.0-19.5)
6	23	17.3 (11.8-24.6)			23	14.0 (9.5-20.2)
7	19	14.3 (9.3-21.2)	1	3.2 (0.6-16.2)	20	12.2 (8.0-18.1)
4-7	**82**	**61.6 (53.2-69.5)**	**1**	**3.2 (0.6-16.2)**	**83**	**50.6 (43.0-58.2)**
8	9	6.8 (3.6-12.4)	2	6.4 (1.8-20.7)	11	6.7 (3.8-11.6)
9	11	8.3 (4.7-14.2)	1	3.2 (0.6-16.2)	12	7.3 (4.2-12.4)
10	8	6.0 (3.1-11.4)	0	0.0 (0.0-11.0)	8	4.9 (2.5-9.3)
8-10	**28**	**21.0 (15.0-28.7)**	**3**	**9.7 (3.3-24.9)**	**31**	**18.9 (13.6-25.5)**
11	3	2.3 (0.8-6.4)	4	12.9 (5.1-28.8)	7	4.3 (2.1-8.5)
12	2	1.5 (0.4-5.3)	2	6.4 (1.8-20.7)	4	2.4 (0.9-6.1)
13			3	9.7 (3.3-24.9)	3	1.8 (0.6-5.2)
14			4	12.9 (5.1-28.8)	4	2.4 (0.9-6.1)
11-14	**5**	**3.8 (1.6-8.5)**	**13**	**41.9 (26.4-59.2)**	**18**	**11.0 (7.1-16.7)**
15			2	6.4 (1.8-20.7)	2	1.2 (0.3-4.3)
16			6	19.3 (9.2-36.3)	6	3.6 (1.7-7.7)
17			5	16.1 (7.1-32.6)	5	3.0 (1.3-6.9)
15-17			**13**	**41.9 (26.4-59.2)**	**13**	**7.9 (4.7-13.1)**
Total	133	100	31	100	164	100
	133	**81.1 (74.4-86.3)**	**31**	**18.9 (13.6-25.6)**	**164**	**100**

Table 2. Types of teeth with acute toothache

Types of teeth	The number and percentage of the cases					
	Upper teeth		Lower teeth		Total	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Primary teeth	92	57.9 (50.1-65.3)	67	42.1 (34.7-49.9)	159	100
incisors	20	12.6 (8.3-18.6)	2	1.3 (0.3-4.5)	22	13.8 (9.3-20.1)
canines	2	1.3 (0.3-4.5)	0	0.0 (0.0-2.4)	2	1.3 (0.3-4.5)
first molars	43	27.0 (20.7-34.4)	28	17.6 (12.5-24.3)	71	44.6 (37.1-52.4)

ISSN NO: 2770-2936
Date of Publication:26-04-2022

second molars	27	17.0 (11.9-23.6)	37	23.3 (17.4-30.4)	64	40.2 (32.9-48.0)
Permanent teeth	17	54.8 (37.8-70.8)	14	45.2 (29.2-62.2)	31	100
incisors	4	12.9 (5.1-28.8)	1	3.2 (0.6-16.2)	5	16.1 (7.1-32.6)
canines	0	0.0 (0.0-11.0)	0	0.0 (0.0-11.0)	0	0.0 (0.0-11.0)
premolars	2	6.4 (1.8-20.7)	1	3.2 (0.6-16.2)	3	9.7 (3.3-25.9)
first molars	7	22.6 (11.4-39.8)	12	38.7 (23.7-56.2)	19	61.3 (43.8-76.3)
second molars	4	12.9 (5.1-28.8)	0	0.0 (0.0-11.0)	4	12.9 (5.1-28.8)

Table 3. The reasons for urgent dental treatment in children

Reasons for treatment	The number and percentage of the cases							
	Primary teeth		Permanent teeth		Chi-square test		Total	
	n	% (95% CI)	n	% (95% CI)	x^2	p-value	n	% (95% CI)
Caries	1	0.6 (0.1-3.6)	0	0.0 (0.0-11.0)	NA*		1	0.5 (0.1-2.9)
Pulpitis	50	31.4 (24.7-39.0)	17	54.8 (37.8-70.8)	6.193	0.0128	67	35.3 (28.8-42.3)
Apical periodontitis	89	56.0 (48.2-63.5)	9	29.0 (16.1-46.6)	7.533	0.0061	98	51.6 (44.5-58,6)
Acute periostitis	0	0.0 (0.0-2.4)	3	9.7 (3.3-24.9)	NA*		3	1.6 (0.5-4.5)
Acute dental trauma	10	6.3 (3.4-11.2)	2	6.4 (1.8-20.7)	NA*		12	6.3 (3.6-10.7)
Primary teeth mobility	9	5.7 (3.0-10.4)	x	x	x	x	9	4.7 (2.5-8.8)
Total	159	100	31	100	-	-	190	100
	159	83.7 (77.8-88.3)	31	16.3 (11.7-22.2)	172.171	<0.0001	190	100

*NA – not applicable

Table 4. The methods of pulpitis treatment

Methods	The number and percentage of teeth				Chi-square test		Total	
	primary		permanent					
	n	% (95% CI)	n	% (95% CI)	x^2	p-value	n	% (95% CI)
Vital therapy	31	64.6 (50.4-76.6)	7	41.2 (21.6-64.0)	2.787	0.0950	38	58.5 (46.3-69.6)
pulp capping	1	2.1 (0.4-10.9)	1	5.9 (1.0-27.0)	NA*		2	3.1 (0.8-10.5)
pulpotomy	29	60.4 (46.3-73.0)	2	11.8 (3.3-34.3)	11.703	0.0006	31	47.7 (36.0-59.6)
pulpectomy	1	2.1 (0.4-10.9)	4	23.5 (9.6-47.3)	7.968	0.0048	5	7.7 (3.3-16.8)
Pulp-necrotizing agent application	17	35.4 (23.4-49.6)	10	58.8 (36.0-78.4)	2.787	0.0950	27	41.5 (30.4-53.7)
Total	48	100	17	100			65	100
	48	73.8 (62.0-83.0)	17	26.1 (17.0-37.9)	29.351	< 0.0001	65	100

*NA – not applicable

Table 5. The methods of apical periodontitis treatment

Methods	The number and percentage of teeth				Chi-square test		Total	
	primary		permanent					
	n	% (95% CI)	n	% (95% CI)	x^2	p-value	n	% (95% CI)
Endodontic treatment	1	1.1 (0.2-6.1)	5	41.7 (19.3-68.0)	30.967	< 0.0001	6	5.9 (2.7-12.4)
Extraction	88	98.9 (93.9-99.8)	7	58.3 (31.9-80.7)	30.967	< 0.0001	95	94.1 (87.6-97.2)
Total	89	100	12	100			101	100
	89	88.1 (80.4-93.1)	12	11.9 (6.9-19.6)	116.709	< 0.0001	101	100