



THE APPROACHES OF TURKISH PEDIATRIC DENTISTS TO THE USE OF CONE BEAM COMPUTED TOMOGRAPHY

TÜRKİYEDE ÇOCUK DIŞ HEKİMLERİNİN KONİK IŞINLI BİLGİSAYARLI TOMOGRAFİ KULLANIMINA YAKLAŞIMI

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ABSTRACT

Aim: The use and indications of methods that require more radiation dose than conventional imaging methods such as Cone Beam Computed Tomography (CBCT) are still controversial. In this article, it is aimed to evaluate the frequency of the use of CBCT among Turkish pedodontists, their indications and to understand the need for training.

Materials and Methods: Two-part questionnaire in an electronic environment was applied to 210 pedodontists to evaluate sociodemographic characteristics and CBCT usage. One part of the questionnaire included questions about the demographic characteristics of pedodontists such as gender and age. In the other section, there were questions about the use of CBCT. The results of the survey were evaluated with the chi-square test. Data analysis was performed using Statistical Package for the Social Sciences version 23.0 (SPSS Inc., Chicago, IL, USA).

Results: 95.4% reported that panoramic radiography and periapical radiographs were the initial radiologic methods applied in children. 75.2% of Turkish pedodontists reported that CBCT was necessary for a pediatric patient. CBCT was reported to be used most commonly in cases with cyst-tumor. 84.8% of pedodontists reported that they needed more training on CBCT.

Conclusions: Turkish pedodontists consider that CBCT is absolutely necessary and they need training on this topic. They often prefer a small FOV area in pediatric patients. They most commonly prefer CBCT in cases of cyst and tumour.

Keywords: Cone Beam Computed Tomography, Pedodontics, Child

ÖZ

Amaç: Konik Işınli Bilgisayarli Tomografi (KIBT) gibi konvansiyonel görüntüleme yöntemlerine göre daha fazla radyasyon dozu gerektiren yöntemlerin çocuklarda kullanımı ve endikasyonları hala tartışmalıdır. Bu makalede, Türk pedodontistleri arasında KIBT kullanım sıklığı, endikasyonlarını değerlendirmek ve eğitim ihtiyacının anlaşılması amaçlanmıştır.

Materyal ve Metod: Elektronik ortamdan 210 pedodontiste sosyodemografik özellikleri ve KIBT kullanımını değerlendiren, iki kısımdan oluşan anket uygulandı. Anketin bir bölümünde pedodontistlerin cinsiyet ve yaş gibi demografik özellikleri ile ilgili sorular vardı. Diğer bölümde, KIBT kullanımı ile ilgili sorular vardı. Tamamlanan anketler incelendi, sonuçlar ve ki-kare testi kullanılarak istatistiksel olarak analiz edildi. Veri analizi, Statistical Package for the Social Sciences 23.0 versiyonu (SPSS Inc., Chicago, IL, ABD) kullanılarak gerçekleştirildi.

Bulgular: %95,4'ü çocuk hastada ilk başvurduğu radyografi yönteminin panoramik radyografi ve periapikal radyografi olarak bildirdi. Türk pedodontistlerin % 75,2' si çocuk hastada KIBT' nin gerekli olduğunu bildirdi. KIBT' ye en sık kist tümör vakalarında başvurulduğu bildirildi. Pedodontistlerin %84,8'i KIBT konusunda daha fazla eğitime ihtiyacı olduğunu bildirdi.

Sonuç:

Türk pedodontistler KIBT' yi kesinlikle gerekli görmekte ve bu konuda eğitime ihtiyaç duymaktadır. Çocuk hastada sıklıkla küçük FOV alanı tercih etmekte. En sık kist tümör vakalarında KIBT' ye başvurmakta.

Anahtar Kelime: Konik Işınli Bilgisayarli Tomografi, Pedodonti, Çocuk

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INTRODUCTION

Although CBCT was originally used in dentistry for implants, it is increasingly used in all branches of dentistry, including pediatric practices.^{1,2}

On the other hand, the high radiation dose of CBCT compared to conventional dental radiography limits its use in pediatric dentistry.^{3,4} Pediatric cases are more sensitive to the risk of ionizing radiation, so more attention should be paid to imaging techniques.^{5,6} The pediatric patient is more likely to be harmed owing to rapid tissue growth, the possibility of DNA harm and a longer life expectancy compared to an adult of 50 years of age. It is, therefore, necessary to follow the three basic principles of radiation protection, namely the rationale principle, the limitation principle, and the optimization principle.⁷

For example, the use of thyroid protection around the anterior neck reduces the radiation dose received by the thyroid gland and esophagus by up to one-third, regardless of large, medium and small FOVs.⁸ In a study, it was reported that the radiation dose to the brain and thyroid is quite high when the FOV area is large.⁹ There are disparate FOV areas in CBCT can be divided into large, medium and small sizes that differ from machine to machine.^{10,11}

When imaging with CBCT in children and adolescents, the limited choice of FoV is the appropriate choice.¹²

Furthermore, the most important advantage of CBCT in pediatric patients arises from reduced dose, less screening time and requirement of less complex equipment. This reduces the anxiety in the child patient.¹³

When the literature is reviewed, the use of CBCT in a pediatric patient is still controversial. In this article, it is aimed to investigate the frequency of conic beam computed tomography among Turkish pedodontists, to evaluate its indications and to understand the need for training.

MATERIALS AND METHODS

The study was directed by Helsinki Declaration and ethical permission was taken from the Local Ethical Committee of Kahramanmaraş Sütçü İmam University For Non-invasive Clinical Trials (Registration No:18). With reference to the similar study conducted previously, the sample size was calculated as minimum 176, with an error margin of 0.05 and a confidence interval of 90%.¹³

The questionnaire was modified based on previous studies to suit pediatric dentistry by a pedodontist and a dentomaxillofacial radiologist, and the questionnaire created using Google forms was sent to participants electronically.^{14,15}

A questionnaire consisting of two parts, which evaluated sociodemographic characteristics and CBCT usage in 210 pedodontists, was applied electronically. One part of the questionnaire included questions about the demographic characteristics of pedodontists such as gender and age. In the other section, there were questions about the use of CBCT and radiography. The sample of the questionnaire is shown in Table 1.

The completed questionnaires were examined; the results were evaluated and analyzed using the chi-square test. Data analysis was performed using the 23.0 Statistical Package for Social Sciences (SPSS Inc., Chicago, IL., USA). The probability level for statistical significance was considered as $p=0.05$.

Table-1. Questionnaire form

Demographic features
Age.....
1. Gender?
a) Female
b) Male
2. Professional Experience?
a) Less than 10 years
b) More than 10 years
3. Which institution do you work for?
a) State Hospital & FDHC (Family Dental Health Center)
b) Private Practice
c) University
CBCT Usage
4. Is there any imaging method available in your institution?
a. Yes
b. No
5. If yes, which imaging method would you prefer first in a pediatric patient?
a) Bitewing radiography
b) Panoramic radiography
c) Periapical radiography
d) CBCT
6. Which is more important in the method that you prefer for your patients?
<input type="checkbox"/> <input type="checkbox"/> Low radiation dose
<input type="checkbox"/> <input type="checkbox"/> Short duration
<input type="checkbox"/> <input type="checkbox"/> Low cost
<input type="checkbox"/> <input type="checkbox"/> Archiving
<input type="checkbox"/> <input type="checkbox"/> Child compliance
<input type="checkbox"/> <input type="checkbox"/> Image detail
7. In which situations would you rather prefer periapical radiography in a pediatric patient?
a) In the diagnosis of caries
b) Routine endodontic treatment
c) Trauma patients
d) In case of cyst-tumor
8. Have you had any experience of using CBCT during your residency training?
a) Yes
b) No
9. Do you think CBCT is necessary for pediatric patients?
a) Yes
b) No
10. Where did you get the training to use CBCT?
a) Internet
b) University
c) Special Course



11. In which situations would you rather prefer CBCT in a pediatric patient?
a) Orthodontic patient
b) Trauma patients
c) Congenital absence of teeth
d) During advanced endodontic treatment
e) In case of cyst-tumor
f) Cases with a syndrome (apert, cherubism, etc.)
g) Cases of cleft lip and palate
h) I do not prefer CBCT
12. Would you like to receive further training on CBCT?
a) Yes
b) No
13. Is it necessary to extend the use of CBCT in specialist training?
a) Yes
b) No
14. Which FOV area do you use in a pediatric patient?
a) FOV≤5 cm (e.g. dentoalveolar, temporomandibular joint)
b) FOV=5-7 cm (e.g. maxilla or mandible)
c) FOV=7-10 cm (e.g. area containing inferior nasal concha with mandible)
d) FOV=10-15 cm (e.g. area containing nasion with mandible)
e) FOV:15cm (e.g. area from the lower edge of the mandible to the vertex of the skull

Table 2. Distribution of Turkish Pedodontist (n=210) according to gender, experience, workplace

Demographical Properties	Factor	N	%
Gender	Female	184	%87,6
	Male	26	%12,4
Experience	<10 years	178	%84,1
	>10 years	32	%15,2
Workplace	Public	30	%14,3
	Private	36	%17,1
	University	144	%68,6

95.4% reported that panoramic radiography and periapical radiographs were the initial radiologic methods applied in children. 75.2% of Turkish pedodontists reported that CBCT was necessary for a pediatric patient. CBCT was reported to be used most commonly in cases with cyst-tumor. The second most common indication was found as orthodontic reasons. 84.8% of pedodontists reported that they needed more training on CBCT.

42.9% of Turkish pedodontists reported that they had experienced CBCT use during their specialty training. 80% reported that they received CBCT training at university. 84.8% expressed that they needed more training on CBCT and 85.7% stated that this training should be expanded in university education.

RESULTS

Of the 210 pedodontists included in the study, 184 (87,6%) were female and 26 (12,6%) were male. 178 (84,7%) pedodontists had less than 10 years of professional experience, while 32 (15,3%) had more than 10 years. According to the institution, the number of pedodontists working at the university was 144 (68,5%), 36 (17,1%) pedodontists were working in private practice, and the number of pedodontists working in public hospitals was 30 (14,2%). (Table-2)

Table 3. (Pearson's χ^2 tests)

Questions	Answers	Gender		p-value	Experience		p-value	Workplace			p-value
		Male	Female		<10	>10		State	Private	University	
Q4	Yes	11.5%	88.5%	0.055	85.6%	14.4%	0.057	14.4%	17.3%	68.3%	0.63
	No	0.0%	100.0%		0.0%	100%		0.0%	0.0%	100%	
Q5	Periapical radiography	6.3%	93.8%	0.06	85.4%	14.6%	0.65	18.8%	14.6%	66.7%	0.31
	Panoramic radiography	16.7%	83.3%		85.4%	14.6%		12.5%	20.8%	66.7%	
	Bitewing radiography	12.4%	75.0%		75.0%	25.0%		0.0%	12.5%	87.5%	
Q7	In the diagnosis of caries	7.1%	92.9%	0.36	75.0%	25.0%	0.06	10.7%	17.9%	71.4%	0.10
	Routine endodontic treatment	14.8%	85.2%		88.9%	11.1%		11.1%	13.0%	75.6%	
	Trauma patients	13.0%	87.0%		87.0%	13.0%		26.1%	26.1%	47.8%	
Q8	Yes	13.3%	86.7%	0.07	84.4%	15.6%	0.91	24.4%	17.8%	57.8%	0.21
	No	11.7%	88.3%		85.0%	15.0%		6.7%	16.7%	76.7%	
Q9	Yes	15.2%	84.8%	0.06	86.1%	13.9%	0.35	16.5%	12.7%	70.9%	<0.00
	No	3.8%	96.2%		80.8%	19.2%		7.7%	30.8%	61.5%	
Q10	University	10.3%	89.7%	0.065	85.9%	14.1%	0.74	15.4%	15.4%	69.2%	<0.03
	Internet	27.3%	72.7%		81.8%	18.2%		18.2%	18.2%	63.6	
	Special Course	0.0%	100.0%		100.0%	0.0%		100.0%	0.0%	0.0%	
Q12	Yes	10.1%	89.9%	0.07	88.8%	11.2%	<0.001	13.5%	12.4%	74.2%	<0.03
	No	20.0%	80.0%		16.7%	83.3%		33.3%	50.0%	16.7%	
Q13	Yes	12.2%	87.8%	0.67	86.7%	13.3%	0.06	14.4%	15.6%	70.0%	0.055
	No	0.0%	100.0%		50.0%	50.0%		50.0%	50.0%	0.0%	
Q14	FOV≤5 cm	6.1%	93.9%	0.055	84.8%	15.2%	0.74	6.1%	24.2%	69.7%	<0.03
	FOV=7-10 cm	8.3%	91.7%		91.7%	8.3%		8.3%	16.7%	75.0%	
	FOV=5-7 cm	11.5%	88.5%		82.7%	17.3%		21.2%	13.5%	65.4%	
	FOV=10-15 cm	66.7%	33.3%		83.3%	16.7%		0.0%	16.7%	83.3%	
	FOV=15cm	12.4%	87.6%		100.0%	0.0%		50.0%	0.0%	68.6%	



49.5% preferred FOV=5-7 cm (eg. maxilla or mandible) and 31.4% preferred FOV≤%5 cm (eg. dentoalveolar, temporomandibular joint).

It was determined that 70.9% of the pedodontists who think that is necessary for a pediatric patient was employed in a university. ($p<0.00$) It was found that 69.2% of the pedodontists, who received specialty training from a university worked in a university. ($p<0.003$)

There was a significant difference between CBCT training needs and years of professional experience. ($p<0.001$) 88.8% of those who stated that they needed more training on CBCT had less than 10 years of professional experience. A significant difference was found between the need for CBCT training and the institution worked. It was found that 70% of those who stated that they needed more CBCT training worked in a university.

There was a significant difference between the preferred FOV area and the institution worked. ($p<0.003$) It was found that 83% of those who prefer FOV=10-15 cm worked in a university.

DISCUSSION

There are studies on the use of radiology applications in children and adolescents in different countries. However, there are few studies in the literature investigating the use of CBCT in the pediatric population.^{11,16,17,18,19} In this article, it is aimed to investigate the frequency of conic beam computed tomography among Turkish pedodontists, to evaluate its indications and to understand the need for training.

It was determined that 68.5% of the pedodontists included in the study worked at the university and 87.6% were women. This can be explained by the fact that the pedodontists working in universities are more sensitive about scientific studies and that the pedodontics department is often preferred by women.

In our study, 74.3% of pedodontists reported that CBCT was necessary for a pediatric patient. The fact that 70.9% of pedodontists who believe that CBCT is necessary in a pediatric patient work in a university is explained by the treatment of advanced cases in these institutions. ($p<0.00$) In a similar study, it was reported that 87.1% of pedodontists resorted to three-dimensional imaging. A study conducted in the USA reported that 80.3% of endodontists, 85.7% of orthodontists, and 78.7% of surgeons used CBCT.²⁰

The indications for CBCT vary according to general dentistry and subspecialties. In a study conducted by Carter et al. on CBCT indications of oral surgeons, it was reported that jaw-facial pathologies and dental implants (95%), evaluation of supernumerary teeth (91.9%) and sinus lifting planning (81.4%) were among the most common indications.²¹

Some studies have shown that dental surgeons use CBCT most frequently during the implant planning stage.¹⁵

In another study evaluating the attitudes of orthodontists towards CBCT, it was reported that this method was used for the detection of impacted teeth (80.9%) and for evaluation of oral and craniofacial anomalies such as cleft lip and palate (57.4%).¹⁴

In an additional study evaluating CBCT indications in pediatric and adolescent cases, the most common indication was found to be canine and adjacent tooth resorption in an abnormal location. However, when they categorize children by age, it is stated that the second most common indication is cyst and tumour, especially in the 16-18 age group.¹⁷ In some similar study on the pediatric patient group, CBCT has been used most frequently to evaluate tooth localization and tooth resorption.^{11,16}

In this study, it was reported that pedodontists most commonly used CBCT in cases of the cyst and/or tumor. We think that different results were obtained due to age distribution differences, age distribution and in the pediatric patients included in the study and differences in the indication contents in the questionnaires applied.

In this study, 42.6% of Turkish pedodontists reported that they had experience of using CBCT during their specialty training. 85.1% reported that they needed more training on CBCT.

88.8% of those who stated that they needed more training on CBCT had less than 10 years of professional experience ($p < 0.001$). This can be explained by the fact that those with less professional experience are more willing to improve themselves.

On the other hand, 70% of those who stated that they needed more training on CBCT are employed in a university. This can be explained by the fact that universities are education and research centers. In another study conducted among endodontists, it was reported that scientific meetings and congresses organized by associations and universities helped to encourage further training. The Internet was also



considered another resource for updating information.²¹

In another study among endodontists, scientific meetings and congresses organized by associations and universities were reported to help promote further education. The Internet was also considered as another resource used by endodontists to update their knowledge.²¹

In this study, it was reported that pedodontists in Turkey most commonly gained information on CBCT from universities as well as through the Internet and private courses.

In a studies on the use of CBCT in pediatric dentistry, the smallest FOV (5x5,5) was the most commonly used FOV in clinics.^{16,18,19}

In this study, however, 48.5% of pedodontists preferred FOV=5-7 cm (eg. maxilla or mandible) and 30.7% preferred FOV≤5 cm (eg. dentoalveolar region or temporomandibular joint). There was a significant difference between the preferred FOV area and the institution worked. ($p<0.003$). Jacop et al reported that the big FOV is preferred for surgical planning and follow-up.¹⁶

It was found that 83% of those who prefer FOV=10-15 cm are employed in a university. The possible reason that pedodontists generally prefer a small FOV area in a pediatric patient can be explained by the fact that they seek to take images using a lower radiation dose. In universities that are centers of education and research, a larger FOV area may be needed.

CONCLUSIONS

Turkish pedodontists consider that CBCT is absolutely necessary and they need training on this topic. They often prefer a small FOV area in pediatric patients. They most commonly prefer CBCT in cases of cyst and tumour.

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Conflicts of interest statement

The authors declare no conflict of interest.

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