

İNCELEME / REVIEW ARTICLE

Fissure and Pit Sealant Practices in Preventive Dentistry: ODHC and ODHH Samples in Turkey

Koruyucu Diş Hekimliğinde Fissür ve Pit Örtücü Uygulamaları: Türkiye'deki ADSM ve ADSH Örnekleri

Dilek Öztaş¹  Kemal Özgür Demiralp²  Sevilay Karahan³  Nilgün Sarp⁴ 

- 1 Tıp Fakültesi, Halk Sağlığı Anabilim Dalı, Bilkent, Ankara, Türkiye / Yıldırım Beyazıt University, Faculty of Medicine, Department of Public Health, Yıldırım Beyazıt Üniversitesi, Ankara, Turkey, doztas@hotmail.com
- 2 Sağlık Bakanlığı, Ankara, Türkiye / Turkish Institute of Public Hospitals, Ankara, Turkey, dtkemal.ozgur@gmail.com
- 3 Sağlık Bilimleri Fakültesi Dekanı, İstanbul, Türkiye / Bilgi University, Dean, Faculty of Health Sciences, Bilgi Üniversitesi, İstanbul, Turkey, sevilaykarahan@gmail.com
- 4 Hacettepe Üniversitesi, Biyoistatistik Anabilim Dalı, Ankara, Türkiye / Hacettepe University, Faculty of Medicine, Department of Biostatistics, Ankara, Turkey, nilgünsarp@gmail.com

Abstract

Purpose: The main aim of this study was to evaluate the data of fissure and pit sealant practices in Turkey, which are important elements of preventive oral and dental health. This kind of evaluation is important for the organization of effective services related to oral and dental health.

Materials and methods: This study includes retrospective cross-sectional analyses of 81 provinces in Turkey between 2012 and 2014. The study evaluated the data of fissure and pit sealant practices carried out in oral and dental health centres and oral and dental health hospitals of Turkish Republic, operated by the Ministry of Health's Turkish Institute of Public Hospitals.

Data of fissure and pit sealant practices carried out in Oral and Dental Health Centres (ODHC) and Oral and Dental Health Hospitals (ODHH) obtained from the Ministry of Health Public Hospitals Administration of Turkey were evaluated for this study which contains retrospective cross-sectional analyses involving 81 provinces in Turkey between 2012 and 2014.

In accordance with the data collected from these years and regions, a situation analysis and evaluation of the performed fissure and pit sealant practices was carried out.

Findings and conclusion: It is obvious that treatment expenses can be decreased through developing social oral and dental health programmes to reach more individuals and develop oral and dental health in Turkey. Evaluation of the data with regard to preventive and therapeutic service needs will play an important role in helping the policymakers of oral and dental health plan appropriately for the effective use of oral and dental health services.

Keywords: Turkey; fissure and pit sealant practices; oral and dental health services; preventive dentistry.

Bu makaleden şu şekilde alıntı yapınız / Cite this article as: Öztaş D., Demiralp K. Ö., Karahan S., Sarp N., Fissure and Pit Sealant Practices in Preventive Dentistry: ODHC and ODHH Samples in Turkey: Chj 2020; 1(1):32-47

Sorumlu Yazar / Corresponding Author:
Dilek Öztaş, Tıp Fakültesi, Halk Sağlığı Anabilim Dalı, Bilkent,
Ankara, Türkiye.
E-mail: doztas@hotmail.com



Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Özet

Amaç: Bu çalışmanın temel amacı, koruyucu ağız ve diş sağlığının önemli unsurları olan fissür ve pit örtücü uygulamalarındaki Türkiye verilerini değerlendirmektir. Bu tür bir değerlendirme, ağız ve diş sağlığı ile ilgili etkin hizmetlerin düzenlenmesi açısından önemlidir.

Gereç ve yöntem: Bu çalışma, 2012-2014 yılları arasında Türkiye'deki 81 ilin retrospektif kesitsel analizlerini içermektedir. Çalışmada Türkiye Cumhuriyeti Ağız Ve Diş Sağlığı Merkezleri ile Ağız Ve Diş Sağlığı Hastanelerinde yapılan fissür ve pit örtücü uygulamalarına ait veriler değerlendirilmiştir. Retrospektif kesitsel analizleri içeren çalışmada, Sağlık Bakanlığı'ndan alınan Ağız ve Diş Sağlığı Merkezleri (ADSM) ve Ağız ve Diş Sağlığı Hastanelerinde (ADSH) yapılan fissür ve pit örtücü uygulamalarına ait veriler değerlendirilmiştir. 2012 ve 2014 yılları arasında Türkiye'deki 81 ili kapsamaktadır. Bu yıllar ve bölgelerden toplanan veriler doğrultusunda, yapılan fissür ve pit örtücü uygulamalarının durum analizi ve değerlendirmesi yapılmıştır.

Bulgular ve sonuç: Türkiye'de daha fazla bireye ulaşmak ve ağız ve diş sağlığını geliştirmek için sosyal ağız ve diş sağlığı programları geliştirilerek tedavi giderlerinin azaltılabileceği açıktır. Verilerin koruyucu ve tedavi edici hizmet ihtiyaçlarına ilişkin değerlendirilmesi, ağız ve diş sağlığı hizmetlerinin etkin kullanımı için ağız ve diş sağlığı konusunda politika yapıcıların uygun şekilde planlamasına yardımcı olmada önemli bir rol oynayacaktır.

Anahtar Kelimeler: Türkiye; Fissür Ve Pit Örtücü Uygulamaları; Ağız Ve Diş Sağlığı Hizmetleri; Koruyucu Diş Hekimliği.

Introduction

Nowadays, it is observed that disregarding their development levels, national health systems face a range of difficulties because of increasing demands, limitations in resources[1], inequalities in health services and a lack in the number and quality of medical personnel. To counter these issues, national health systems attempt to develop several strategies [2].

Today it is observed that no matter what their development level is, all countries try to cope with many problems such as gradually increasing demands of national health systems, limitation of sources [1], inequalities in delivery of health service and deficiencies in number and quality of healthcare manpower and they try to develop a series of strategies accordingly.

While planning a new system, both the philosophy of the developed world and the development priorities of a country should be taken into consideration [1, 2].

Although health requirements and resources are varied, the main purpose of health systems is to optimise individuals' level of health as much as possible and to decrease the differences in status among individuals and groups as much as possible [3]. Modern health systems should provide health services for "everybody, all the time, and in anywhere" [4].

Unrealistic or insufficient health plans decrease the productivity of the system and increase expenses and cause an unequal distribution of resources. In summary, poor health plans significantly damage the system's operation. As a result of these issues, it becomes hard for a society to receive the health service they deserve whenever or wherever they need to access it [5].

It is not possible to argue that completely effective and rational health service planning is undertaken either in Turkey or around the world [6].

Health indicators

Turkey is one of the most important countries in its region with its expansive geography and population of 77,695,904. The population living in the countryside (towns and villages) is 6,409,722 (8.2%). Turkey's health status is listed among countries with medium-level healthcare.

When it is analyzed in terms of health level, Turkey ranks among the medium level countries.

The infant mortality rate is 11 per thousand; the country's population between the ages of zero and 14 is 23%; and the country's population over the age of 65 is 9% [7].

The most important target of health policies is to decrease health service inequalities between regions. It is necessary to improve health policies in order to provide effective health services for all dwelling units[8].

Oral and dental health services

Within the scope of the “Health Transformation Program” Turkey’s Ministry of Health has carried out many studies with the aim of enhancing health services, generalizing the patient-oriented service approach, making access to services easier and abolishing inequalities between regions. For this purpose, the target is defined as helping individuals gain better access to family-and society-based health services, which are in turn supported by a flexible and sensitive health system[9]. The issue of comprehensiveness comes to the fore in services for oral and dental health, as it does in all areas of health services. Health, hence oral and dental health, is a fundamental human right. Among the preventable diseases in the field of oral and dental health, dental cavities and gingival diseases negatively affect oral health and such diseases can create problems for an individual’s general state of health. In societies where cost-efficient preventive oral and dental health services are practiced to protect oral and dental health, those countries see oral and dental health improve and they experience a decrease in the possible negative effects on the general state of health and health expenses. Oral and dental health services in Turkey are offered as therapeutic services with a rate of 98%.

98% of the oral and dental health services offered in our country are therapeutic services and the remaining 2% is offered as preventive services.

Unfortunately, a national preventive oral and dental health programme that covers the entire country has not yet been implemented. In Turkey, as is the case around the world, the oral and dental health practices that have been recently encouraged, the flexibility with regard to how these services will be provided is offered and more resources are promised to strengthen oral and dental health [8].

In our country as in the whole world, sufficient flexibility is offered regarding how these services will be provided in preventive oral and dental health practices and more resources are promised to strengthen preventive oral and dental health services [10].

Until 2002, individuals usually paid for oral and dental health services in Turkey. In 2005, oral and dental health services were, for the most part, transferred to public healthcare under the “Health Transformation Program”.

In 2002 in health expenses, the resources reserved for oral and dental health services was 4.8%; in 2013, this increased to 5.3%. Between 2002 and 2013, funding for oral and dental health services increased by 0.8% [11]. When the “Health Transformation Program” was in operation during 2002 to 2013, at least one oral and dental health centre (ODHC) was opened in every province. In 2002, the number of ODHCs was 14, increasing to 127 in 2013. The number of oral and dental health hospitals (ODHH) increased from one to six. The employment rate of dentists increased more than one-fold [12].

Institutions that offer oral and dental health services and work that depend on the Turkish Institute of Public Hospitals provide service in 753 dental units with 6 ODHHs, 4832 dental units with 237 ODHMs, 1784 units with 546 hospitals and oral and dental health polyclinics, meaning a total of 7369 units and 689 different institutions.

The institutions affiliated to the Public Hospitals Administration of Turkey offering dental and oral health service in our country are as follows: the service is offered in a total of 689 separate institutions with a total of 7369 units composed of the oral and dental health polyclinics in 6 ODHHs with 753 dental units, 237 ODHMs with 4832 dental units and 546 general hospitals with 1784 units.

Additionally, universities with 45 institutions composed of 3167 units and 551 private institutions with 5575 units provide oral and dental health services [13].

Social oral and dental health programmes around the world share several specific principles and aims in order to be successful. Oral and dental diseases, which frequently occur and are the cause of decreases in individuals’ quality of life, play an important role in a number of health problems such as diabetes, cardiovascular disease, growth deficiency and preterm labour [14]. These diseases can be easily and effectively prevented and there is a big difference between treatment expenses and prevention expenses [15]. In 1999, the World Health Organization (WHO), the World Dental Federation (FDI) and the International Association for Dental Research determined the oral and dental health targets for the period between 2000 and 2020 [16]. The WHO’s 2003 World Oral Health Report revealed that oral and dental health charge could be observed the most in developing countries and in the lower social classes of these countries [33].

The WHO's 2003 World Oral Health Report revealed that oral and dental health burden could be observed the most in developing countries and in the lower social classes of these countries [16].

According to the report, poor children in cities are the group that is most affected by oral and dental diseases. In the literature, which evaluated the relationship between oral and dental health with socioeconomic variables, researchers observed that there is more inequality in health compared to other domains [34].

In studies indicated in the references which evaluated the relationship between oral and dental health and socioeconomic variables, more inequalities are observed in comparison to other domains of health [15].

Oral and dental health problems are more frequent among poor and uneducated people; however, only the socioeconomically advantaged population of a country can access dental services [15,16]. According to the 2006 WHO report, although there have been major developments in oral health, the report emphasizes that global problems continue. Problems are more common in populations that have fewer social rights than in high income or low-middle income populations [16]. Dental cavities affect 60-90% of children and adults around the world and they continue to be an important health problem even in the highest income countries. The main reason for this increase is malnutrition, such as excessive sugar consumption and the rarity of preventive dentistry practices such as flour, fissure and pit sealant [17].

Fissure and pit sealant practices

Fissures and pits on tooth surfaces are generally too deep to reach [18]. In other words, most of the time, fissures and pits on molar surfaces cannot be cleaned effectively even with toothbrushes and other materials. Children and individuals who do not know brushing techniques, in particular, cannot clean these surfaces well enough. Even toothpicks and dental floss used by adults are not sufficient for cleaning. Therefore, food that remains in fissures and pits produces bacteria. Hence, these areas become appropriate surfaces for the creation of dental cavities [19].

The cavities that begin in fissures and pits rapidly spread and begin to threaten oral and dental health. Although the

fissured and pitted surfaces of a permanent tooth's molar parts comprise 12.5% of all teeth, 80% of dental cavities seen in school-age children are observed on these surfaces [20]. In addition, tooth cavities start in these areas and spread and deepen.

To fix fissures, practitioners first used amalgam fillings, and fissure sealants have been used in various methods. These methods are resin-based fissure sealants, glass ionomer cements, composites, ormocer-based fissure sealants, fissure sealants including fissure and pit sealant and resin-modified glass ionomer cements. Uncommon in previous times, fissure sealants spread in use because of their physical and antibacterial features and they are now used in many countries in different practices. In countries where the struggle with dental cavities and oral and dental health is very important this method has been used as an effective preventive dental service [19].

The result acquired from a study(Elbury at all, 2005) that compared fissure practices in schools and clinics in terms of cost and time is that fissure practices carried out for one tooth in school during a six-year period costs \$65 and the same practice costs \$42 in a clinic.

In the study conducted by Elbury et al. in 2005, when the fissure practices performed in schools and clinics are compared in terms of cost and time it is observed that while fissure practice performed in school to protect a tooth from decays for a six-year period costs 65 dollar on average, the same practice costs 42 dollar in clinic on average [21].

In addition, the same study revealed that fissure practice carried out for one surface takes 18 minutes in school while it takes 12.5 minutes in a clinic [21]. These numbers were recorded in 2000 and have since decreased. However the study did not take into consideration transportation expenses and the cost of time taken off from work. In addition, the study disregarded the waiting period in clinics. Therefore, if these disregarded issues are taken into consideration, it can be seen that there is not a big difference between fissure practices in schools and clinics. Otherwise, it can be said that fissure practices carried out in schools are 35% more costly compared to those carried out in clinics.

Practiced in different ways, fissure sealants decrease the rate of dental cavities through filling fissures and pits

and protecting these areas, especially in children and teenagers. There is an increased risk in using fissure sealants, which prevent food remains and bacteria from remaining on the surface of the teeth, protecting teeth against dental cavities when the treatment is provided on time and in clinics. There are many studies that examine the currency and efficiency of fissure sealants. Within this scope, as a result of a systematic study, it has been noted that fissure practices prevent dental cavities in the first five-year period with a rate of 60% [22]. Another study carried out on the efficiency of fissure sealants was conducted in North Carolina. In this study, 15,438 children were given fissure sealants between 1985 and 1992 and the children were monitored after the treatment. As a result, the study showed that fissure sealants are highly effective in preventing dental cavities. In addition, the same study revealed that the most appropriate and effective time for preventing dental cavities is the time fissure sealants are practised after teeth maintain [].

In addition, the same study revealed that the most appropriate and effective time for preventing dental cavities is the time fissure sealants are placed after teeth have fully erupted [23].

At this point, it was observed that the average age for maintaining permanent teeth was six for the first molar tooth and 12 for the second molar tooth.

Another study carried out in Ireland observed that for the first molar teeth on which resin-based fissure sealants were used, 78% had less cavities in the first two-year period and 60% had less cavities in the first five-year period compared to the teeth on which no sealant was used [24]. The French government carried out a study for the French National Authority of Health (Haute Autorité de Santé) to research the efficiency of fissure sealants. Researchers examined 13 financial studies that had been carried out in the US, Canada and Australia [25]. Especially for the first 10 years, the most effective one among the fissure sealant practice studies carried out with regard to cost effectiveness and with the options “fissure sealant practice on all teeth”, “risk based study”, and “no practice of sealant” are the fissure sealants which were carried out as a result of risk based studies. Although fissure sealant used on all teeth is the most effective in terms of protection, it is expensive.

Especially for the first 10 years, the most effective one

among the fissure sealant practices carried out in terms of the cost effectiveness including the options of “fissure sealant practice on all teeth”, “risk based study”, and “no practice of sealant” is the fissure sealants carried out as a result of risk based studies. Although this fissure sealant practice applied on all teeth is the most effective one in terms of protection, it is expensive.

As can be understood from the French study mentioned above, a cavity risk map of the society in question should first be drawn. Later, within the frame of this map, fissure sealants should be used, starting with an individual's permanent teeth. The practice of risk-based fissure sealants is economical in terms of cost. A study carried out in Finland discovered that the use of risk-based fissure sealants is 21% more economical compared to the use of fissure sealants on all teeth. The same study indicated that a fissure sealant used on a molar tooth derived a profit of \$15.21 compared to a molar tooth that was not given a fissure sealant [26]. In addition to this financial profit there are significant positive effects in terms of health, physical and social aspects from which it is hard to measure financial profit. Various similar studies in which the efficiency of fissure sealants was researched have been conducted and, in accordance with the results, the use of fissure sealants was initiated in the field of preventive oral and dental health. Fissure sealants have been successfully used in many countries as a preventive oral and dental health service in order to prevent dental cavities. Malaysia and Finland are the primary countries that use the sealants. Fissure sealants are also successfully used in European countries such as Ireland and Hungary, as well as in other countries such as the US and Canada [27].

Being 6.9 in the age group of 12 in Finland in 1975, the decayed, missing, filled teeth index (DMFT) remounted with the rate of 1.2 in twenty years as a result of practices fissure sealants. In 1994, there was around an 82% decrease in cavities. In 2007, the DMFT rate in 12-year-olds was 0.7 [24].

While the rate of DMFT (this index indicates the total decayed, missing and filled teeth) was 6.9 in the age group of 12 in Finland in the year 1975, this rate dropped to 1.2 within the twenty years after the practice of fissure sealants. In 1994, there was around an 82% decrease in cavities. In 2007, the DMFT rate in 12-year-olds was 0.7 [18].

Behind this success is the fact that preventive oral and dental health services started to be covered under the health insurance law at the end of 1970s; within the scope of this law, the use of fissure sealants was accepted in preventive oral and dental health services in the 1970s. Neither Scandinavian countries nor the US, where fissure sealants were developed, use fissure sealants as much as Finland.

In Finland, oral and dental health services are provided in both public and private institutions. Citizens under 19 do not pay for any public oral and dental health services. In this context, people aged under 19 can be given fissure sealants in public health centers without paying [18]. Within the frame of the law accepted in Finland, fissure sealants have been used in different ways and studies have examined their cost efficiency. In this context, glass ionomer cements and resin-based fissure sealants were compared and it was found that resin-based fissure sealants are more effective [28].

It was found that fissure sealant practices in Finland are more effective in children, who are the group at highest risk in fissure sealant [32].

It has been found that fissure sealant practices in Finland are more effective in children who are among the “group of high-risk cavity” in fissure sealant. An old cavity or an active cavity at free two percent level or more are considered as “high-risk cavity” [28].

In addition to the countries mentioned above, fissure sealants are used as a preventive oral and dental health service in many countries. Many regional or local studies and research have been conducted in this field. For example, according to a study conducted in Ireland’s Meath province, in the first two-year period after a fissure sealant was used there was no deterioration in 56% of the sealants and only 12% of sealants completely suffered from erosion.

The remaining 27% of them continued its existence to a large extent.

The remaining 27% of the sealants continued their existence to a large extent.

The same study also observed that the DMFT rate in children whose four permanent teeth were given fissure

sealants was significantly less than the children who were not given fissure sealants. The DMFT rate in children who were given fissure sealants was 0.33% while the DMFT rate was around 0.7% in children who were not given fissure sealants [29]. Similarly, a study carried out in Slovenia in 1998 found that 86% of 12-year-old children had fissure sealant in at least one tooth.

The sequels resulted from disease, labour loss and high treatment costs generated a preventative approach in dealing with diseases before they occur and a desire to improve the health status of societies to enable individuals to enjoy both socially and economically productive lives. The approach in which countries make policies with regard to preventive services and organise preventive health programmes was accepted (NUTS, 2015).

The sequels resulted from disease, labour loss and high treatment costs generated a preventative approach in dealing with diseases before they occur. Countries must develop the policies related to protective services and prepare protective healthcare programs in order for societies to reach a health level in which they sustain a socially and economically productive life [30].

Oral and dental diseases (dental cavities) are issues that affect individuals, their families, their social environments and society as a whole. As with all other diseases, preventive health service plays an important role in oral and dental diseases. It is significantly important to start preventive health services in the field of oral and dental health as soon as possible. Within this context, starting with pregnant women, oral and dental health services should be widely provided for children during their teething period and in the years ahead.

Materials and methods

Scope of the research

Dentistry practices such as fissure and pit sealants are fundamentally the duty of the Ministry of Health. For this reason, working under the Ministry of Health and forming the basic structure of oral and dental health, ODHCS and ODHHs are considered within the scope of this research. There were 18,070 dental units in Turkey in 2014. Of these, 7,659 (42.39%) belong to the Ministry of Health. ODHCS have 4,872 units in total and ODHHs have 846 units in total. Dental polyclinics in hospitals and other sector

units (university, private sector and other institutions) are included in the Ministry of Health and predominantly provide therapeutic dental services. But healthy results cannot be obtained from these places and thus they are not included in this research. In 2014, 37,925,956 polyclinic services were provided in Turkey. Of these services, 24,204,277 were provided in ODHCs and ODHHs. As a result, forming the population of the research, ODHCs and ODHHs comprise 42.39% of all dental units and 63.82% of dentistry ambulatory care services. The whole population is taken into the scope of the research and a sample choosing method has not been used.

Data collection

The data collection process from the ODHCs and ODHHs began in 2010 and data were collected monthly for five years. Data collected from the data pool began to be analysed in 2015. Data were collected during 2010, 2011, 2012, 2013 and 2014 from 137 ODHCs and six ODHHs, which provide services in 81 provinces. No significant data were found concerning fissure and pit sealants before 2012.

The necessary permission for the research was authorised by the Ministry of Health's Turkish Institute of Public Hospitals.

The research permission was given by the Ethical Committee of Yıldırım Beyazıt University on 28 August 2015, with session/item no. 04/18 and decree decision no. 107.

The research permission was obtained from the Ministry of Health's Public Hospitals Administration and the Ethical Board of Yıldırım Beyazıt University.

Since fissure and pit practices are systematically provided for patients aged under 18, the population of Turkey aged under 18 and patients aged under 18 who consulted ODHCs and ODHHs were included in this research.

This study was designed by taking the nomenclature of units for territorial statistics (NUTS) into consideration. The main aim of NUTS, which was founded in the mid-1970s by Eurostat (the statistical office of the European Union [EU]) to present detailed information to the EU, is to collect region-based statistics, provide socioeconomic

analyses and create a frame for the regional policies related to society.

Formed in accordance with the similar specifications of the regions with the aim of creating a single database across the EU, as well as standardising regional statistics and forming a comparisons between regions, NUTS was accepted as the sample region unit practice in Turkey and, in 2002, it was accepted by the State Planning Organization (SPO) with the support of the Turkish Statistical Institute (TSI).

In order to create a single database across the EU, to standardize regional statistics and to form a comparable table at the same time, NUTS created by the similar qualifications of regions was accepted as the sample region unit practice in Turkey and it was completed by the State Planning Organization (SPO) with the support of the Turkish Statistical Institute (TSI) in 2002.

A hierarchical NUTS was made in the classification of NUTS: cities are defined as level three; neighboring cities, which show similarities in terms of economic, social and geographical aspects, are grouped as level one and level two by taking their regional development plans and population sizes into consideration. Within the scope of level three each city defines one statistical territorial unit (STU) and, in total, there are 81 cities. Level two STUs are defined through the classification of neighboring cities within the scope of level three and there are 26 level two STUs.

Level one STUs are defined through the classification of level two STUs and there are 12 level one STUs. In all region-based studies carried out in the public sphere NUTS is taken as the basis of STUs [28].

Level 1 STUs are defined through the classification of level 2 STUs and there are 12 level one STUs. NUTS is based on in all region-based studies carried out in the public sphere [31].

Table 1. Nomenclature of units for territorial statistics (NUTS).

NUMBER	LEVEL 1	LEVEL 2	LEVEL 3
1	Istanbul	Istanbul subregion	Istanbul
2	Western Anatolia	Ankara subregion	Ankara
		Konya subregion	Konya, Karaman
3	Eastern Marmara	Bursa subregion	Bursa, Eskişehir, Bilecik
		Kocaeli subregion	Kocaeli, Sakarya, Düzce, Bolu, Yalova
4	Aegean	İzmir subregion	İzmir
		Aydın subregion	Aydın, Denizli, Muğla
		Manisa subregion	Manisa, Afyon, Kütahya, Uşak
5	Western Marmara	Tekirdağsubregion	Tekirdağ, Edirne, Kırklareli
		Balıkesir subregion	Balıkesir, Çanakkale
6	Mediterranean	Antalya subregion	Antalya, Isparta, Burdur
		Adana subregion	Adana, Mersin
		Hatay subregion	Hatay, Kahramanmaraş, Osmaniye
7	Western Blacksea	Zonguldak subregion	Zonguldak, Karabük, Bartın
		Kastamonu subregion	Kastamonu, Çankırı, Sinop
		Samsun subregion	Samsun, Tokat, Çorum, Amasya
8	Central Anatolia	Kırıkkale subregion	Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir
		Kayseri subregion	Kayseri, Sivas, Yozgat
9	Eastern Blacksea	Trabzon subregion	Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane
10	Southeastern Anatolia	Gaziantep subregion	Gaziantep, Adıyaman, Kilis
		Şanlıurfa subregion	Şanlıurfa, Diyarbakır
		Mardin subregion	Mardin, Batman, Şırnak, Siirt
11	Mideastern Anatolia	Malatya subregion	Malatya, Elazığ, Bingöl, Tunceli
		Van subregion	Van, Muş, Bitlis, Hakkari
12	Northeastern Anatolia	Erzurum subregion	Erzurum, Erzican, Bayburt
		Ağrı subregion	Ağrı, Kars, Iğdır

This study was designed by taking the NUTS-1 classification into consideration.

Statistical method

Data processed by the computer are presented through one-dimensional and two-dimensional tables; statistical analyses were completed using IBM-SPSS for Windows Version 22.0 packaged software. Results are summarized in tables and graphics. Application percentages were calculated through the use of each region's population aged under 18 and the number of people aged under 18 who applied to ODHCs and ODHHs. The distribution of this application number calculated by years and regions was ascertained. Fissure and pit sealant practices for years and regions are stated in the totals. Changes in fissure and pit sealant practices were calculated with regard to years, regions, population, application

number, the number of dentists and the number of units. The number of fissure and pit sealant practices per dentist, per unit and per population is given on average. The distribution of the number of dentists per 100,000 people and the number of fissure and pit sealants per dentist is given in terms of years and regions. Changes in population per dental unit and fissure and pit sealant practices per dental unit are demonstrated in years and regions. Since the acquired data are mass data, which means there was no sample choosing method, no hypothesis test was practiced for the acquired data and no comparison was made. Results were evaluated as to whether they increased or decreased compared to the previous year.

The values in the tables are ranked from the highest to the lowest.

Findings

In 2012, the population aged under 18 who applied to ODHCs and ODHHs was 12.50%; in 2013, this rate increased to 19.29%; in 2014, this rate increased to 19.55% (Table 2).

Table 2. Distribution of the number of applications to ODHCs and ODHHs and of the number of applications to dentists in accordance with years and NUTS-1.

REGIONS	2012			2013			2014		
	Population	Number of applications	%	Population	Number of applications	%	Population	Number of applications	%
Western Black Sea	1,011,716	166,828	16.49	986,959	283,511	28.73	964,011	279,419	28.99
Western Anatolia	1,712,850	317,259	18.52	1,716,624	457,387	26.64	1,730,266	467,832	27.04
Western Marmara	632,652	91,291	14.43	630,526	159,418	25.28	633,008	158,510	25.04
Central Anatolia	992,664	146,703	14.78	976,007	229,746	23.54	961,063	230,963	24.03
Eastern Marmara	1,601,653	269,272	16.81	1,607,435	386,620	24.05	1,622,078	388,953	23.98
Eastern Black Sea	581,580	83,000	14.27	565,592	127,538	22.55	552,938	122,916	22.23
North-eastern Anatolia	701,742	99,712	14.21	689,217	130,941	19.00	676,462	149,260	22.06
Central East Anatolia	1,210,643	136,512	11.28	1,202,679	218,524	18.17	1,193,353	239,389	20.06
Aegean	2,075,844	287,642	13.86	2,060,181	453,452	22.01	2,056,769	396,778	19.29
Mediterranean	2,506,473	292,687	11.68	2,502,560	451,137	18.03	2,505,986	444,225	17.73
Southeastern Anatolia	2,841,318	324,669	11.43	2,854,122	498,328	17.46	2,880,999	534,152	18.54
İstanbul	3,234,632	172,636	5.34	3,264,400	280,398	8.59	3,288,790	315,794	9.60
Total	19,105,779	2,388,211	12.50	19,058,315	3,677,000	19.29	19,067,737	3,728,191	19.55

Population and patients were aged under 18.

The ratio of fissure and pit sealants given to the population aged under 18 was 0.49% in 2012, 1.75% in 2013 and 2.07% in 2014. In 2012, 3.86% of the population aged under 18 who applied to ODHCs and ODHHs was given fissure and pit sealants; this rate increased to 9.07% in 2013 and to 10.58% in 2014 (Chart 1 and Table 3).

Chart 1. Year-based fissure and pit sealant practices in terms of population and application numbers.

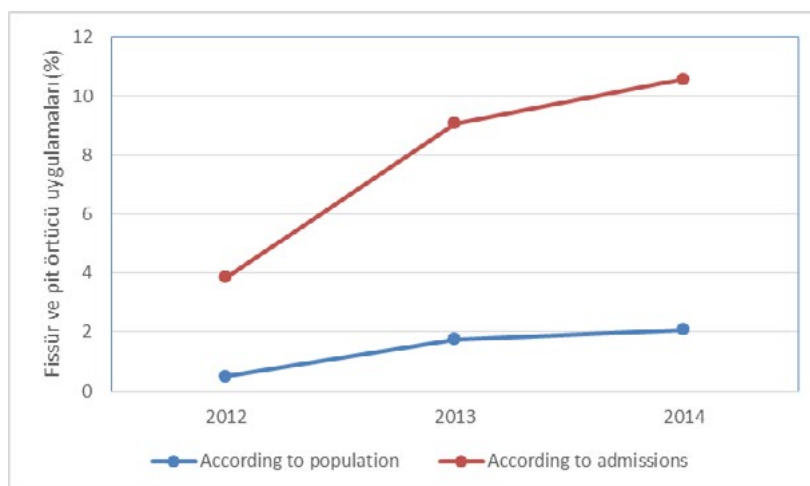


Table 3. Distribution of population and fissure and pit sealant practices given to individuals who applied to ODHCs and ODHHs in terms of years and NUTS-1.

REGIONS	2012		2013		2014	
	By population %	By applications %	By population %	By applications %	By population %	By applications %
Mediterranean	5.38	5.38	3.06	11.49	5.84	15.33
W. Blacksea	0.21	3.38	1.31	12.00	0.96	13.79
W. Anatolia	1.07	4.15	2.02	9.17	2.63	12.16
NE. Anatolia	0.67	3.49	1.64	9.00	1.91	10.51
SE. Anatolia	1.15	5.12	2.59	11.00	2.41	10.40
Aegean	0.64	3.21	2.33	9.22	3.08	10.20
E. Marmara	1.01	3.50	1.50	8.62	1.54	9.01
W. Marmara	9.12	2.78	2.21	7.69	4.23	8.97
E. Blacksea	0.37	2.92	1.42	7.86	1.05	8.96
Istanbul	1.14	4.11	1.99	8.28	1.89	8.45
ME. Anatolia	0.46	1.87	0.93	4.89	1.42	7.81
C. Anatolia	0.84	5.69	1.35	5.97	1.90	6.40
Total	0.49	3.86	1.75	9.07	2.07	10.58

Population and patients were aged under 18.

The number of dentists per 100,000 people was 25.3 in 2012, 26.3 in 2013 and 28.0 in 2014. The number of fissure and pit sealants given per dentist was 11.20 in 2012, 54.74 in 2013 and 58.70 in 2014 (Table 4).

Table 4. Distribution of the number of dentists per 100,000 people and the number of fissure and pit sealants given per dentist in terms of years and NUTS-1.

REGIONS	2012		2013		2014	
	Number of dentists per 100,000 people	Fissure and pit sealants given per dentist	Number of dentists per 100,000 people	Fissure and pit sealants given per dentist	Number of dentists per 100,000 people	Fissure and pit sealants given per dentist
Mediterranean	12.2	18.56	14.9	133.00	15.4	118.69
W. Blacksea	12.1	22.16	19.0	85.20	20.2	92.14
W. Anatolia	15.2	12.72	17.6	57.70	23.1	85.88
NE. Anatolia	48.3	11.23	43.5	51.60	47.7	69.87
SE. Anatolia	22.4	7.87	22.3	52.36	23.3	61.66
Aegean	17.9	7.65	18.2	46.00	21.3	53.64
E. Marmara	37.6	6.59	43.6	42.96	41.2	50.85
W. Marmara	31.9	9.54	34.6	44.19	34.3	49.08
E. Blacksea	34.2	12.37	32.8	36.04	34.3	41.41
Istanbul	39.1	8.05	38.1	40.06	40.1	40.71
ME. Anatolia	26.6	11.57	28.4	48.90	30.6	39.08
C. Anatolia	25.1	13.96	29.3	32.66	31.8	36.94
Total	25.3	11.20	26.3	54.74	28.0	58.70

Population and patients were aged under 18.

In Turkey, the population per dental unit in ODHCs and ODHHs was 3,674 in 2013 and 3,425 in 2014. The number of fissure and pit sealants given per dental unit was 49.37 in 2013 and 51.13 in 2014 (Table 5).

Table 5. Distribution of population per dental unit and fissure and pit sealants given per dental unit in terms of years and NUTS-1

REGIONS	2013		2014	
	Units per population	Fissure and pit sealants given per unit	Units per population	Fissure and pit sealants given per unit
Mediterranean	6.385	123.20	5.638	97.76
W. Blacksea	5.032	75.31	4.698	87.01
W. Anatolia	5.261	46.15	4.150	64.30
NE. Anatolia	2.295	48.77	2.040	60.57
SE. Anatolia	5.291	45.98	4.916	55.80
Aegean	4.583	51.64	4.291	53.80
E. Marmara	2.182	40.51	2.302	43.82
W. Marmara	2.725	40.71	2.627	42.82
E. Blacksea	2.889	33.35	2.763	38.63
İstanbul	2.182	40.51	2.302	43.82
ME. Anatolia	3.470	31.86	3.291	36.00
C. Anatolia	3.221	38.69	3.032	32.19
Total	3.674	49.37	3.425	51.13

Population and patients were aged under 18. No data for dental units were found for the period before 2013.

Discussion

In our study, the total number of applications to ODSCs and ODSHs by applicants aged under 18 was found to have increased in recent years, from 2,388,211 in 2012 to 3,677,000 in 2013 and to 3,728,191 in 2014. Individual applications made to dentists were found to be 12.50% in 2012, 19.29% in 2013 and 19.55% in 2014 for ODSCs and ODSHs. Western Black Sea, Western Anatolia and Western Marmara were the regions with the most individual applications in 2013 and 2014. Istanbul, Mediterranean and South-eastern Anatolia were found to be the regions with the lowest applications.

According to data from the Ministry of Health, when sectors providing oral and dental health services and total population were taken into consideration, application numbers were 5,462,923 in 2002, 22,786,281 in 2009, 25,177,013 in 2010, 29,910,473 in 2011, 34,939,584 in 2012 and 37,760,696 in 2013[13]. Universities and the private sector were not included in the data before 2012.

Individual applications made to dentists in 2013 were 0.49% taking into account the population. Regions with the highest numbers of individual applications were Western Black Sea, Western Anatolia and Eastern Marmara. Regions with the lowest number of individual applications were Istanbul, Southeastern Anatolia and Middle East Anatolia. Of those with the highest number—Western Black Sea and Western Anatolia—and of those with the lowest number—Istanbul and Southeastern Anatolia—were suitable for ODSC and ODSH data obtained through this study.

In the population and all sectors, applications made to dentists per person were 0.49% in the year 2013. The regions with the highest number of applications per person were Western Black Sea, Western Anatolia and Eastern Marmara. The regions with the lowest number of applications per person were İstanbul province, Southeastern Anatolia and Central East Anatolia. Western Black Sea and Western Anatolia among the highest ones and İstanbul province and Southeastern Anatolia among the lowest ones are suitable for the ODHC-ODHS data.

Individuals for whom fissure and pit sealant was used constituted 0.49%, 1.75% and 2.07% of the population aged under 18 in 2012, 2013 and 2014, respectively.

Fissure and pit sealant was used for 3.86%, 9.07% and 10.58% of the population aged under 18 who applied

to ODSCs and ODSHs ADMS in 2012, 2013 and 2014, respectively.

Fissure and pit sealant was used for 3.86%, 9.07% and 10.58% of the population aged under 18 who applied to ODSCs and ODSHs in 2012, 2013 and 2014, respectively.

Fissure and pit sealant was not used before 2012 and there were no data obtained due to the fact that statistical data were not recorded. Between the years 2012 and 2014, fissure and pit application continuously increased every year. Western Anatolia, Istanbul and Aegean were the leading regions in fissure and pit sealant use. Eastern Black Sea and Northeastern Anatolia were the regions with the lowest rate of fissure and pit sealant use. Leading regions have socioeconomically better conditions compared to regions with lower rates. Supply and demand for preventive dental applications like fissure and pit sealants are higher in regions with higher socioeconomic levels. Istanbul was among the leading regions in fissure and pit sealant use but in the group of regions with a lower number of applications to ODSCs and ODSHs. This is because of dental services in the private sector. Therefore fissure and pit sealant use in this region had, quantitatively, the highest rate countrywide.

An obvious increase in fissure and pit sealant use began in 2013 and continued in 2014. Like Turkey, in the regions where oral and dental health services are provided as therapeutic and prosthetic oral and dental health services and where systematic applications covering the population of the country in preventive oral and dental health services are not yet completely stable, these numbers can be regarded as highly positive progress. In this view, the Delegated Legislation About Organization and Functions of Ministry of Health and its Subsidiaries (no. 663) is considered to have contributed greatly. This legislation came into force when it was published in the official gazette of 2 November 2011 and then in the General Directorate of Public Hospitals that became operative with the new entity, and the Secretariat General that has been in force since 2 November 2012. The affiliation between the General Directorate of Turkish Public Hospitals and the Ministry of Health, which is responsible for opening, operating, monitoring, evaluating and inspecting hospitals, oral and dental health centers and similar healthcare organizations that provide secondary and tertiary healthcare services and provide health services for diagnosis, cure and rehabilitation, was established with

Delegated Legislation (no. 663). The General Directorate of Turkish Public Hospitals has the authorization and responsibility to establish and operate affiliated healthcare organizations, unite, separate and close down healthcare organizations, carry out performance evaluations, appoint personnel and carry out transfer, entity, wage and retirement processes as well as direct the purchase, rent, maintenance and repair services required for the services of the organization. The Union of Public Hospitals as bound to the General Directorate of Turkish Public Hospitals has been established at the province level [32].

The total number of dentists per 100,000 individuals aged under 18 at ODSCs and ODSHs was 25.3 in 2012, 26.3 in 2013 and 28.0 in 2014.

Fissure and pit sealant use per dentist was 11.20 in 2012, 54.74 in 2013 and 58.70 in 2014.

The best regions in 2014 in terms of ODHCs and ODHHs were Western Anatolia, Western Marmara and Western Black Sea. The worst regions were Southeastern Anatolia, Central Anatolia and Istanbul. The best regions in terms of fissure and pit sealant use per dentist were Southeastern Anatolia, Central Eastern Anatolia and Northeastern Anatolia. The worst regions were Eastern Black Sea, Central Anatolia and Eastern Marmara. It seems quite contradictory that although Southeastern Anatolia and Central Eastern Anatolia were at a low level in terms of dentists, they were at a high level in terms of fissure and pit sealant use; however, such a situation makes us think that to increase the number of preventive dental practices such as fissure and pit sealant use, instead of increasing the number of dentists, dentists should be made conscious about the importance of preventive dentistry and made eager to use such practices, and individuals should be demanding and conscious of the service they receive.

According to the data from the Ministry of Health, the number of dentists per 100,000 people was 24.7 in 2002, 26.4 in 2003, 26.3 in 2004, 26.4 in 2005, 26.3 in 2006, 27.3 in 2007, 27.9 in 2008, 28.4 in 2009, 29.1 in 2010, 28.2 in 2011, 28.3 in 2012 and 29.1 in 2013. When the NUTS-1-based interregional distribution of the number of dentists per 100,000 people was analyzed, it was noted that Istanbul and Western Anatolia were in the first ranks with 41 dentists; on the other hand, Central Eastern Anatolia and Southeastern Anatolia were in the worst position. Istanbul tolerates its low level of dentists in ODHCs and ODHHs because of the number of dentists working in the private sector, and the region takes first place in Turkey in terms

of the number of dentists. While the number of dentists per 100,000 people was 29 in Turkey in 2013, it was 27 in the world, 68 in the EU, 58 in high-level income groups, 50 in WHO's European zone and 37 in middle-high-level income groups.

The population per dental units in ODHCs and ODHHs in Turkey was 3,674 in 2013 and 3.45 in 2014. In 2014, the best regions in terms of the population per dental units were Western Anatolia, Western Marmara and Western Black Sea. The worst regions were Southeastern Anatolia, Istanbul and Central Anatolia. This statistic is directly parallel to the statistic concerning the number of dentists.

According to the data from the Ministry of Health, the population per all dental units in Turkey was 61,632 in 2002, 14,309 in 2009, 12,775 in 2010, 12,113 in 2011, 10,730 in 2012, and 10,575 in 2013 [13].

Fissure and pit sealant use per dental unit was 49,37 in 2013 and 51,13 in 2014. The regions that had high levels of fissure and pit use per dental unit were Southeastern Anatolia, Central Eastern Anatolia and Northeastern Anatolia. The worst regions were Central Anatolia, Eastern Black Sea and Western Black Sea. Southeastern Anatolia and Western Black Sea were the best and the worst in terms of population per unit and fissure and pit sealant use per unit. Such a situation shows that in preventive dentistry, high numbers in units are not important but comprehension of the importance of this and the spread of this awareness are important.

Although in our country school-based fissure sealant programmes or similar programmes have not been practised so far, fissure sealant use has increased in recent years.

Although in Turkey school-based fissure sealant programmes or similar programmes have not been practiced so far, fissure sealant use has increased in recent years.

In 2012, 17,270 children aged six were given 82,831 fissure sealants. According to the data of the address-based population registration system (ABPRS), the number of children aged six in Turkey on 31 December 2012 was 1,245,676. Therefore, the rate of use of fissure and pit sealant was 1.3%. As a result, when the present data with regard to the field of oral and dental health were compared, it was observed that Western European countries in particular reach the targets indicated by WHO. On the other hand, it was clearly seen that Turkey is far from reaching WHO's

targets in both oral and dental healthcare indicators and DMFT rates. In addition, the education and teeth cleaning habits promoted by preventive oral-dental healthcare, as well as fluorine and fissure pit sealant use and information, show that Turkey has significant deficiencies in preventive oral and dental healthcare services [29]. The pit and fissure sealants used are reported to close the cavities and slits by filling the surfaces of teeth, decreasing cavities at a rate of 80%. It is thought that this application is far more effective than fluorine because this can only be used on a smooth surface [33,34].

Pit and fissure sealants, along with fluorine, are used with huge success in many parts of the world, including the US, European countries, Canada, Ireland, Hungary, Malaysia and Finland, in order to prevent dental cavities. These applications are used in several programmes that are offered by WHO. Fissure sealants are generally applied on the first and second big molar teeth and generally on people aged between six and 12 [34].

As a result, as preventive oral and dental measurements, pit and fissure sealants are given to schoolchildren. Sealants are a part of advised school programmes in most countries [35,36].

For instance, as a school programme in the UK, 6,804 students aged between six and 18 were given pit and fissure sealant in 2001[36]. Similarly, pit and fissure sealants have been used in oral-dental healthcare in Malaysia for 25 years. Between 1987 to 1988 in the federal state of Kuala Lumpur, pit and fissure sealants were used for the first time and this treatment spread to other regions. By 1999 the Malaysian Ministry of Health adopted the programme and the programme spread throughout the country as a school-based programme [27]. For this programme, first graders with their first big molar tooth and 12-year-old children with their second big molar tooth are taken into consideration. At this point, it is accepted as logical to apply pit and fissure sealant to teeth that are at risk of dental cavities, rather than all teeth. Each year, the amount of teeth that are treated has increased and, thus, preventive healthcare services have also spread. For instance, 54% of children underwent pit and fissure sealant application in 2004 while this rate increased to 88.5% in 2008. In Malaysia, in 1988, for children aged 12, the level dropped to 1.1% in 2007 because of the effect of DMFT programmes.

While the rate of DMFT was 2.4 for children aged 12 in Malaysia in 1988, this rate dropped to 1.1 in 2007 thanks to the programs applied [27].

The rate of change is approximately 81%. 40% decrease has been seen in dental cavities after 10 years of pit and fissure sealant school-based programmes being spread throughout the whole country by the Ministry of Health.

Conclusion and suggestions

Oral and dental diseases can be prevented before they occur and are a part of general health in Turkey, just as they are in many parts of the world. Dental health is important to an individual's quality of life and their body's vital functions.

Around the world, the reasons for increases in dental care are considered to be changes in lifestyle, the effective use of oral and dental services, the application of preventive programmes, individual preventive plans, the use of toothpastes with fluorine and the application of pit and fissure sealants [28,37].

Around the world, the reasons for the positive changes in oral and dental care are considered to be the changes in lifestyle of societies, effective use of oral and dental services, the application of protective programs, individual protective methods, use of toothpastes with fluorine and practices of pit and fissure sealants.

An inability to proceed with preventive programmes in developing countries delays the oral and dental indicators to heal [25].

An inability to proceed with protective programmes in developing countries leads to a delay in healing of oral and dental indicators [18].

Developed countries have success in planning and presenting health services based on a preventive level.

We can clearly say that even though the use of pit and fissure sealant increased considerably in 2012 to 2014, it is still far below expectations. Its use should be supported with the introduction of more effective methods.

Alma-Ata Notice argued in 1978 that "health for everyone" played a significant role in developing new health policies and defining priorities in the health sector. Thus, it is accepted that we prioritise general health services.

Since the Alma-Ata Notice in 1978, the thought of "health for everyone" has played an important role in developing health policies and determining the priorities of health systems; therefore, prioritization of basic health services has been generally accepted.

Notice wants in the whole world and especially in developing countries to make effective studies to be developed and places the general health in technical cooperation soul to a new economical level in a rush and effectively[33].

The notice utters that an urgent and effective work must be done in order to develop and embed basic health system within the spirit of technical cooperation and in accordance with the new economic level in the whole world and especially in developing countries [48].

Preventive oral and dental healthcare services are inseparable from general health services and good oral and dental health is a basic right for everyone. For this reason, preventive oral and dental healthcare services are among the most important healthcare services on which the government should place importance in the field of health. Preventive healthcare services should be seen as preferable when compared to therapeutic services because of their low costs and positive effects on the general state of health. In Turkey, oral and dental healthcare services are based more on therapeutic services and prosthetics. There is no systematic application of preventive oral and dental healthcare. It is necessary to provide preventive oral and dental healthcare services because of their cost efficiency and the fact that they offer more benefits in the long run [10].

According to WHO, dental cavities are one of the most common oral and dental diseases. According to data of WHO, dental cavities being one of the oral and dental health problems rank among the leading health problems.

Dental cavities affect schoolchildren and adults at rates of 60% and 90%, respectively, even in industrialized countries. It is obvious that in Turkey there is a similar situation and schoolchildren in particular face oral and dental problems. According to Turkey Health Research completed in 2010, oral and dental problems are in first place with a rate of 23.9% in children aged between 7 and 14. On the other hand, the fact that the cost of oral and dental healthcare is quite high within total general healthcare costs remains a huge pressure. In OECD countries, oral and dental healthcare costs comprise 5% of total healthcare costs and 16% of private healthcare costs in 2009.

In OECD (Organization for Economic Co-operation and Development) countries, oral and dental healthcare costs comprise 5% of total healthcare costs and 16% of private healthcare costs in 2009.

In Turkey, according to the Social Security Institution (SSI), the cost of oral and dental healthcare financed by the SSI was more than 1.7 billion TRY in 2012. This comprises 4% of SSI's healthcare costs. In view of people's general state of health, social health and countries' economic state, Preventive healthcare services gain in importance especially oral and dental healthcare and this induces a large financial burden. As a result, in many countries Preventive healthcare services are increasing daily. In this respect, learning to brush one's teeth at an early age, along with education, fluorine applications, pit and fissure sealant, placeholders, implants, fillings and avoiding cavities, are some of the methods that can be used in preventive oral and dental healthcare services. Among all these applications, the most effective is gaining the habit of brushing one's teeth at an early age, as well as education, fluorine applications and pit and fissure sealants that are also used on a large scale [24].

All these issues indicate that Preventive precautions are far more important for therapeutic applications in the field of oral and dental healthcare. The prevalence and severity of diseases can be prevented by creating habits among people, increasing knowledge in oral and dental healthcare, as well as encouraging regular dentist visits during pregnancy and puberty, starting with future mothers. So, by increasing the age at which therapeutic dentistry begins, people's quality of life can be increased. Also, just as in other cases, in oral and dental healthcare it is a fact that early diagnosis can increase success rates. At this point, it should also be pointed out that in therapeutic actions, the treatments used for dental cavities that destroy oral and dental health may not return teeth to a completely cured state. This situation reveals the importance of Preventive oral and dental healthcare services.

Citizens should be informed of the importance of oral and dental care by cooperating with other institutions and organizations led by the Ministry of Health. A trustworthy database should be created related to oral and dental healthcare. The use of pit and fissure sealant should be spread. Training for healthy diets and brushing teeth should be spread. The use of additional cleaning materials should be extended [24].

It is clear that with the suggestions provided above, along with cooperation, policies and strategies, a desirable level in oral and dental healthcare will be reached. People will also reach a desired level of health within the oral and dental healthcare field. The cost of oral and dental healthcare financed by SSI will decrease. As a result, cooperation will result in huge savings in oral and dental Preventive healthcare.

The targets determined by WHO will be reached and the times lost in regard to the problems about oral and dental diseases will be substituted and a healthier society will be built [22].

The targets determined by WHO will be reached and the times lost regarding the problems about oral and dental diseases will be substituted and a healthier society will be built [24].

References

- Şahin, B., Top, M. Bigger Expectations at the Smaller World: Future Health Systems, *Health and Community* 2002, 12: 3.
- Figueroa, J., Menabde, N., Busse, R. The Road of Freedom, *BMJ* 2005, 331:170-1.
- Boelen, C., Haq, C., Hunt, V., Rivo, M., Shahaday, E. Improving Health Systems: The Contribution of Family Medicine. *A Guidebook. Wonca* 2002. 11:142.
- Hamzaoglu, O. The Interpretation of Health of Turkey. *STED*, 2008, 17: 6.
- Üstü, Y., Ugurlu, M., Sanisoğlu, S. Evaluation of Primary and Secondary Care Health Services in Erzurum Region between 2002 and 2008. *Balkan Med* 2011, 28:55-61.
- Gümrükçüoğlu, F., Tosun, N., Yol, S., Septioğlu, A., Zırh, H., Solak, A., Ceylan, D. Report of the Ratio of Health Workers to Population in Turkey. Ankara, Published by the Uyum Agency 2008:11.
- Turkish Statistical Institute, Population Census Results, 1935-2000 and Results of address-based population registration system between 1935 and 2000-2014.
- Korukoğlu, S., Üstü, Y., Kasım, İ., Doğrusan, A., Hacımamoğlu, A. Family Medicine, The Turkish Model. 2006 Ankara: Published by the Ministry of Health of Turkey, 1st ed. Çetin offset, Ankara 2006.
- Health Transformation Program, Ministry of Health of Turkey, <http://www.saglik.gov.tr/TR/belge/1-2906/saglikta-donum-programi.html>
- Akar, Ç., Strategy Evaluation of Oral and Dental Health Services in Turkey, *Turkish Dental Association Publications Research*, Series:9.
- Atasever, M. Financing of Health Care Services and Analysis of Health Expenditures in Turkey, 2002-2013 Period, ISBN:978-975-590-521-1, Ministry Publication No:983, Ankara, 2014:163.
12. Health Education and Health Manpower Status Report on Turkey, 2014, <http://sbu.saglik.gov.tr/Ekutuphane/kitaplar/insangucu.pdf>
- Ministry of Health (2013). Health Statistics Yearbook 2014, *General Directorate of Health Statistics, Ministry of Health, Public Hospitals Association*, Ankara, http://ekutuphane.sagem.gov.tr/kitaplar/saglik_istatistikleri_yilligi_2014.pdf
- Johnston, L., Vieira, A. Caries Experience and Overall Health Status. *Oral Health Prev Dent* 2014, 12: 163-170.
- Guay, A. The Differences Between Dental and Medical Care. *The Journal Of The American Dental Association* 2006, 137: 801-806.
- World Health Organisation (WHO), (2003, 2006). World Oral Health Report.
- Yazıcıoğlu, B., Basic Information on Oral and Dental Health and Public Health. *Basic Public Health*, 3rd volume, ISBN No : 978-975-491-344-6, Editors: Güler, Ç., Akın, L. Ankara: Hacettepe University Publication, 2013.
- Leskinen, K. Fissure Sealants In Caries Prevention; A Practice-Based Study Using Survival Analysis. (2010). University Of Oulu: 7-31.
- Haisch M.A., Pit and Fissure Sealants: The Added Link in Preventative Dentistry, *Continuing Education Course*, Revised June 3, 2010. p:4-11.
- Grignon, M., Hurley, J., Wang, L. & Allin, S. Inequity in a Market-Based Health System: Evidence from Canada's Dental Sector, *Health Policy* 2010, 98: 81-90.
- Elbury, R., Raadal, M. & Lygidakis, N. EAPD Guidelines For the Use Of Pit And Fissure Sealants. *European Journal of Pediatric Dentistry* 2005, 3: 179.
- Botsali, M.S., Research on the Amount of Residual Monomer Liberated Following the Polymerization of Resin-based Fissure Sealants with Different Sources of Light, on Surface Hardness and Strength in Binding. *Selcuk University Institute of Health Sciences, Department of Pediatric Dentistry PhD Thesis*, Konya, 2008: 12.
- Department of Health And Human Services, National Cancer Institute Services, What You Need To Know About Oral Cancer, 2009:1, Department of Health and Human Services, Oral Health Preventing Cavities, Gum Disease, Tooth Loss, And Oral Cancers, At A Glance, 2011:14-23.
- Ağralan, E., The Role of Protective Health Services in Reducing Health Expenditures: Oral and Dental Health, *Social Security Institution Unpublished Thesis*, Ankara, 2013.
- Simonsen, R.. Pit and Fissure Sealant: Review of the Literature. *Pediatric Dentistry*, 2002. 24: 5.
- Richard J. Simonsen, D., Pit and Fissure Sealant: Review of the Literature. Mesa, Ariz. *Pediatric Dentistry* 2002, 24:5,393,413.
- Oral Health Database 2011. According to Alphabetical Order: 3 -11 Ministry of Health Malaysia, Malaysia's Health, 2008:11-19.
- Lavonius, E., Kerosuo, E., Kervanto, S., et al., 13-Year Follow-Up Of A Comprehensive Program Of Fissure Sealing And Resealing In Varkaus, Finland. 2002 ;60:174-179.
- Irish Oral Health Services Guideline Initiative 2010. Pit and Fissure Sealants: Evidence-based Guidance on the Use of Sealants for the Prevention and Management of Pit and Fissure Caries:8, http://www.dentalhealth.ie/download/pdf/fs_guideline_online_final_v_2.pdf
- Oral Health Information Systems-Towards Measuring Progress in Oral Health Promotion and Disease Prevention. *Policy And Practice, Bulletin Of The World Health Organization*, 2005, 83:9
- State Planning Organization, Units for Territorial Statistics of Turkey, (NUTS). Accessed: <http://www.planlama.org/index.php/tuerkiyede-boelgesel-kalknma-ajanslar/tuerkiyedeki-statistiksel-boelge-birimleri-bb>, date of access: 08.07.2019.
- Lamba, M., Altan, Y., Aktel M., Kerman U. Sağlık Bakanlığı'nda Yeniden Yapılanma: Yeni Kamu Yönetimi Açısından Bir Değerlendirme, *Amme İdaresi Dergisi* 2014, 47,1:53-78.
- Çolak, H., Yıldırım, D., Dülgergil, Ç.H., Ercan E. Evaluation of "On-brush Fissure and pit sealant gel" as a Preventive Application Method in Dentistry. *Turkish Dental Journal*, 2010:79.
- Dülgergil, T. Evaluation of Different Preventive Practices in Children Living in Rural Areas of Southeastern Anatolia: Results of the 24-Month Field Study. *Ankara University Faculty of Dentistry Journal*, 2016, 16: 26.
- Simonsen, R.J. Pit and Fissure Sealant: Review of the Literature. *Pediatric Dentistry*, 2002, 24(5): 393-401.
- Laurence, W., Sarah, H., Fissure Sealant Programme for Schoolchildren in Wales, UK., 2009:1-14. <https://www.mah.se/CAPP/Country-Oral-Health-Profiles/EURO/United-Kingdom-UK/Information-Relevant-to-Oral-Health-and-Care/Special-project-of-interest/Fissure-Sealant-Programme/>