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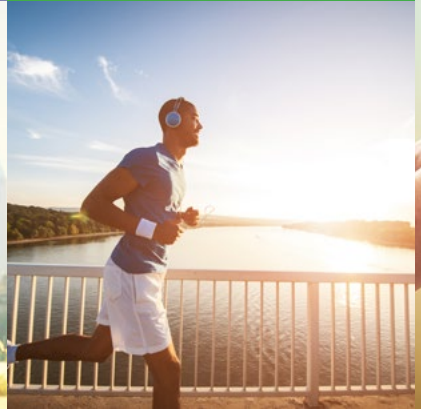

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City Health Journal
Şehir Sağlığı Dergisi

İÇİNDEKİLER
TABLE OF CONTENTS

City Health Journal
Şehir Sağlığı Dergisi
Şehir Sağlığı Dergisi / City Health Journal
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Covıd-19'Un İklim Değişikliği ve Cinsiyet Perspektifinden Değerlendirilmesi

Evaluation of Covid-19 From Climate Change And Gender Perspective

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Özet

COVID-19 ilk kez 31 Aralık 2019'da Çin'in Hubei Eyaleti, Wuhan şehrinde ortaya çıkarak hızlı bir şekilde tüm dünyaya yayılmış ve DSÖ (Dünya Sağlık Örgütü) tarafından pandemi olarak ilan edilmiştir. COVID-19 pandemisi de hala yaşanmakta olan iklim krizi gibi küresel çapta bir etki yaratmış ve yaratmaya devam etmektedir. Bu iki krizin birbiriyle ve cinsiyet üzerinden farklı etkileri olabilir. Bu derlemede, COVID-19'un biyolojik cinsiyet açısından mevcut durumu ve toplumsal cinsiyet açısından etkileri, COVID-19 virüsünün iklim değişikliği ile ilişkisi ve iklim değişikliğinin cinsiyet ile ilişkisi ele alınmıştır ve literatüre katkı sağlamak amaçlanmıştır.

Anahtar Kelimeler: COVID-19, İklim Değişikliği, Cinsiyet.

Abstract

First appearing in the Wuhan city of Hubei Province, China on December 13, 2019, the COVID-19 spread rapidly all over the world. The virus has been declared as a pandemic by WHO (World Health Organization). As the climate crisis that is still-continuing today, the COVID-19 pandemic has created global impacts. While these two crises can interact with each other, they may have different effects on gender. In this review, the current status of COVID-19 in terms of sex and effects on gender and the relationship of the virus with climate change are addressed. In addition, it is aimed to contribute to the literature by revealing the relationship between climate change and gender.

Keywords: COVID-19, Climate Change, Gender.

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Giriş

Dünyanın iklim tarih boyunca değişim göstermiştir. Büyük ölçüde artan karbondioksit ve atmosfere atılan insan kaynaklı emisyonların neden olduğu iklim değişikliği, son 35 yılda artan etkileriyle dikkat çekmektedir. Artan küresel ısınma, yoğun ısı dalgaları, kuraklık, aşırı yoğun yağışlar, güçlü kasırgalar, erozyonlar, yangınlar ve salgınlarla insan yaşamını etkilemektedir(NASA, 2020).

COVID-19 ilk kez 31 Aralık 2019'da Çin'in Hubei Eyaleti, Wuhan Şehrinde, etiyolojisi bilinmeyen pnömoni vakaları olarak bildirilmiştir. Balık ve canlı hayvan satılan pazar çalışanlarında kümelenme olduğu belirtilmiştir(Huang vd., 2020)China, was caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV. Hızlı bir şekilde tüm dünyaya yayılmış ve pandemi olarak DSÖ (Dünya Sağlık Örgütü) tarafından ilan edilmiştir(WHO, 2020).

İklim değişikliği ve COVID-19 pandemisi küresel çapta kriz yaratmaktadır. Bu iki krizin birbirleriyle ve cinsiyet üzerinde farklı etkileri olabilir. Bu derlemede; COVID-19 pandemisi; iklim değişikliği ve cinsiyet farklılıkları açısından incelenmiştir.

Covıd-19 ve Cinsiyet İlişkisi

Kadın ve erkeklerin bağışıklık sisteminde farklar olduğu bilinmektedir ve bağışıklık sisteminin bulaşıcı hastalıklara karşı farklılık göstermesi açısından biyolojik cinsiyetin rol oynadığı kesindir. Buna karşın, salgın hastalıklardaki farklı cinsiyet etkileri sadece biyolojik cinsiyet ile açıklanamaz. Cinsiyete göre ayrıştırılmış COVID-19 ölüm verileri ışığında yaşam davranışları, beklentiler ve hastalık sonuçları erkekler için daha karamsar bir tablo sergilemektedir. Dünya üzerinde daha önce ortaya çıkmış olan koronavirüs kaynaklı hastalıklar cinsiyet bazında incelendiğinde; erkeklerin SARS virüsünde daha kötü klinik tabloya sahip ve MERS virüsünde ise ölüm riskinin daha yüksek olduğu tespit edilmiştir. COVID-19 virüsü komorbit hastalığa sahip olan kişilerde daha ölümcül etkiler göstermektedir. Komorbit hastalıklara neden olan yüksek riskli davranışların (tütün ve alkol tüketimi gibi) erkek nüfusta kadınlara göre daha fazla olduğu bilinmektedir. Bahsedilen komorbit hastalıkların kardiyovasküler hastalıklar, hipertansiyon ve kronik akciğer hastalıklar olduğu göz önünde bulundurulursa dünya genelinde komorbit hastalıkların kadınlara nispeten erkeklerde daha yaygın olduğunu ve COVID-19 virüsünün erkekleri bu nedenle daha çok etkileyebileceği söylenebilir(Purdie A. vd 2020). Salgının erken dönemlerinde yapılan bir araştırmada erkek hastaların sayısı, kadınlardan yüksek olarak saptanmıştır(Guan vd., 2020). Bu yükseklik salgının ilerleyen dönemlerinde devam etmektedir(50/50, 2020).

Cinsiyet ayrıştırılarak açıklanan mevcut verilere bakıldığında tanı alan erkeklerde daha fazla mortalite görülmektedir(50/50, 2020).Ancak salgınların başlangıç aşamalarında vaka ölüm oranının gerçek mortaliteyi gösterdiği söylenemez. Burada göz önünde bulundurulması gereken şey, koronavirüs salgınlarında cinsiyet bazında nasıl ve neye göre farklılık gösterdiğini belirlemektir.

COVID-19 vakaları Çin'in Bulaşıcı Hastalık Bilgi Sistemi'nden alınan bilgiler doğrultusunda 11 Şubat 2020 tarihine kadar elde edilen verilere göre, 44.672 vakanın %51,4'ünün (22.981) erkek hasta olduğu bildirilmiştir. COVID-19 tanısı alan hastalar içinde erkekler için vaka ölüm oranı %2,8 (653 ölüm) kadınlar için vaka ölüm oranı %1.7 (370 ölüm) olarak hesaplanmıştır(Yanping Zhang, 2020).

Virüs hücre içine girmek için hedef hücrelerde anjiotensin dönüştürücü enzimini(ACE) kullanmakta ve bu enzim akciğer epitel hücreleri yanısıra bağırsak, böbrek ve kan damarlarında bulunmaktadır.

Spesifik organlarda ACE2 reseptörünün ekspresyonunun hastalığın şiddetiyle ilişkili olduğu bilinmektedir. ACE2 reseptörü X kromozomu üzerinde bulunmaktadır. Diyabet veya kardiyovasküler hastalıklara sahip erkeklerde ACE2 seviyesinin daha yüksek olduğu gösterilmiştir, bu nedenle erkek hastalar hastalığın şiddetiyle karşı karşıya kalmakta ve ölüm daha çok görülmekte olabilir. COVID-19'un morbidite ve mortalitesinde cinsiyet farklılığını ortaya koyan ilk çalışmada ölen hastalarının çoğunun yaşlı ve üçte ikisinin erkek olduğu saptanmıştır(Jin vd., 2020)·(Chen vd., 2020)·(Corley & Ndhlovu, 2020).

Mevcut verilere göre, cinsiyet bağımlı bağışıklık sistemi, sigara içme alışkanlığı erkeklerin kadınlardan daha sık etkilendiğini göstermektedir(Wenham vd., 2020). Ayrıca sigara kullanımı ACE2 ekspresyonu azaltarak hastalığın şiddetini artırmaktadır. Erkek popülasyonunda sigara kullanımının fazla olması hastalığın daha fazla ve şiddetli seyretmesine neden olabilmektedir(Biswas vd., 2020) resulting in millions of death throughout the world. The 21st century appears no longer an exception, with the trend continued with escalated fear of SARS coronavirus in 2002 and further concern of influenza H5N1 in 2003. A

novel influenza virus created the first pandemic of the 21st century, the pandemic flu in 2009 preceded with the emergence of another deadly virus, MERS-CoV in 2012. A novel coronavirus \"SARS-CoV-2\" (and the disease COVID-19.

COVID-19 salgınında hastalığa yakalanan insanlarda antikor üretimleri üzerine yapılan bir araştırmada, erkek hastalarla karşılaştırıldığında, kadın hastalarda hastalığın ağır seyretmesinin, yüksek düzeyde COVID-19 IgG antikoru üretmeyle ilişkili olduğu saptanmıştır. Ek olarak, kadınlarda IgG antikoru üretimi, hastalığın erken evresindeki erkek hastalardan daha güçlü olma eğilimindedir. Buna göre, hastalığa yakalanma ve antikor üretiminin tutarsızlığına bakılarak kadın ve erkek cinsiyeti arasında hastalığın farklı sonuçlar doğurabileceği söylenebilir(Fanfan Z.vd 2020). İzlanda'da yapılan bir çalışmada, viral yük açısından PCR testlerinde erkeklerde daha yüksek pozitiflik oranı çıkmıştır(Gudbjartsson vd., 2020).

Çin Wuhan'daki bir hastaneye 16 Aralık 2020 - 6 Ocak 2020 tarihleri arasındaki başvurulara bakıldığında enfekte hastaların %73'ünün erkek olduğu saptanmıştır(Huang vd., 2020)China, was caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV. 26 Mart 2020 tarihli güncellenmiş verilere göre, İtalya'da COVID-19 enfeksiyonu nedeniyle gerçekleşen 6801 ölümün %70,4'ü (4788) erkek, %29,6'sı (2012) kadındır(Giulia, 2020).

Cinsiyete göre ayrıştırılmış tanı verilerini paylaşan 112 ülkede erkek hastaların oranı %56, kadınların oranı %44; cinsiyete göre ayrıştırılmış ölümle sonuçlanan vaka verilerini paylaşan 70 ülkenin ise %62'si erkek %38'i kadındır. Ancak hala cinsiyete bağlı vaka verilerini açıklamayan ülkeler bulunurken, bazı ülkelerin bu bilgileri kısmen açıkladığı görülmektedir. Sınırlı verilerin ışığında hastalığın görülme sıklığı ve ölümle sonuçlanan vakalar daha çok erkek cinsiyette ortaya çıkmaktadır(50/50, 2020).

Covıd-19 Ve Toplumsal Cinsiyet

COVID-19 ve cinsiyet kapsamında yapılan araştırmalara göre literatürde cinsiyet kavramı iki farklı şekilde incelenmiştir. Bunlardan ilki biyolojik anlamdaki cinsiyettir. Diğeri ise, toplumsal olan sosyolojik, politik, hukuki, kültürel ve ekonomik sistemlerde, evde, toplumda, çalışma ortamı gibi yerlerde *'gücün eşit olarak dağıtılmadığı erkek veya kadın kişi'* olarak değerlendirilmiştir(Purdie A. vd 2020).

Erkek olmak, katı toplumsal cinsiyet normları nedeniyle güçlü olmak ve bunun sonucunda daha az sağlık hizmetine başvurmakla sonuçlanmaktadır. Ayrıca salgının yarattığı işsizlik ve ekonomik baskıyı erkek daha çok hissetmekte, bu da eve gerginlik ve ev içi çatışma sonucu şiddet olarak yansımasına neden olmaktadır(Birleşmiş Milletler,TR,2020). Bununla beraber kadın olmak ise, daha düşük söz sahibi olmak, artan ev bakımları nedeniyle ihtiyaçlarının (sağlık ve ekonomik) sağlanamamasıyla karşımıza çıkmaktadır.

COVID-19 ayrımcılık yapmaz ancak bireysel özelliklere göre yaş, kilo, komorbit hastalık varlığı, özellikle de cinsiyet açısından hastalığın seyri değişebilmektedir. Hastalık oluşumu dışında hastalığın oluşmaması, kontrollü bağışıklık amacıyla yapılan '*karantina*' ve '*izolasyon*' cinsiyet açısından her bir grubu özellikle kadınları farklı şekillerde etkilemektedir. Toplumsal cinsiyet bakışıyla zaten hassas ve korunması gereken kadınların bu durumda daha fazla desteklenmesi gerekmektedir. Evde geçirilen zamanın artması evdeki iş yükünün artması (çocuk bakımı, yaşlı bakımı ve ev işlerinin daha fazla kadın tarafından karşılanması nedeniyle), aile içi şiddete daha fazla maruz kalma gibi sonuçları doğuracağı aşikardır. Kadınların erkeklere oranla güvencesiz ve resmi olmayan işlerde çalışma oranı daha yüksektir. Ayrıca kadınların cinsel ve üreme sağlığı hizmetleri ile doğum öncesi ve doğum sonrası bakımı kesintiye uğramaktadır. Erkeklerin ve kadınların sağlık ihtiyaçlarını eşit olarak ele almak, toplumların gelecekteki insan trajedilerini iyileştirmelerine ve direnmelerine yardımcı olacaktır(The Lancet, 2020).

Aile içi şiddet uzmanları sağlık önlemleri nedeniyle uygulanan karantina ve sosyal izolasyon esnasında kadınların fiziksel alanlarda tutulmasının ekonomik stres ve hane halkı stresini artırdığını, bunun aile içi şiddette artma ile sonuçlandığını belirtmişlerdir. Hubei Eyaletindeki bir polis merkezinin Şubat tarihli raporlarına göre COVID-19 karantina günleri sırasında aile içi şiddetin 3 kat arttığı saptanmıştır. Ayrıca Amerika Birleşik Devletleri'nin (ABD) Oregon kentinde de benzer durumlar nedeniyle aile içi şiddet hatları hizmetlerinin kullanımının arttığı bildirilmiştir(John vd., 2020)such as gender-based violence (GBV.

Türkiye Kadın Dernekleri Federasyonu Başkanlığının yaptığı açıklamada, önceki yıla kıyasla fiziksel sığınma evi talebi %78, şiddet %80, psikolojik şiddet %93 artmıştır(Yavaş, 2020). Pandemi sürecinde yapılan bir araştırma raporuna göre ise kadına yönelik şiddetin %27.8 oranında arttığı belirtilmiştir(*COVİD-19 KARANTİNASINDAN KADININ ETKİLENİMİ İLE KADIN VE ÇOCUĞA YÖNELİK ŞİDDETE İLİŞKİN TÜRKİYE ARAŞTIRMA RAPORU*).

Dünya Sağlık Örgütü'nün Nisan 2020 tarihli raporunda da kadına yönelik şiddet riskinin salgınlarda arttığı vurgulanmıştır("WHO | World Health Organization", 2020).

İklim Değişikliği ve Cinsiyet İlişkisi

İklim değişikliği bölgesel, sosyal ve ekonomik duruma bağlı olarak her iki cinste farklı etkiler gösterebilmektedir. Gelişmemiş ülkelerde sağlık etkileri cinsiyete göre adaletsizlik gösterebilmektedir(Haines vd., 2006). İklim yıkımlarının sonucunda kadınların yaşam süresi kısalmış, orantısız ölümler meydana gelmiştir. Bu durum kadın cinsiyetinin hassaslığıyla açıklanmıştır(Neumayer & Plümper, 2008). Bu hassas grup iklim değişikliği ile ilişkilendirilen hastalıklarda daha fazla tehdit altında kalmıştır(İKLİMİN:ORG, 2019).

Hayvanlarda sıcaklık, cinsiyetin belirlenmesinde çevresel bir faktördür. Bu durumun insanlarda da değişiklik gösterebileceği farklı araştırmacılar tarafından belirtilmiştir(Mclachlan & Storey, 2003)·(Lerchl, 1999). Sıcak yıllarda doğumların erkek cinsiyetinde yoğunlaşması, bir derece sıcaklık artışının yılda %1 fazla erkek doğumuna sebep olabileceği, erkek cinsiyetinin sıcak bölgelerde yaygın olduğuna dair çalışmaların olması sıcaklık (dolaylı yoldan iklim değişikliği) ve cinsiyet arasında bir ilişki olduğunu göstermektedir(Helle vd., 2009)·(Mclachlan & Storey, 2003).

Yapılan bir çalışmaya göre ise, sıcaklık artışı olduğunda X kromozomu içeren spermlerin arttığı görülmüş, Y kromozomu içeren spermlerin hassas yapısı nedeniyle sıcaklık artışına dayanamadığı belirtilmiştir(Ibukun PO, 2017). Gebeliğin erken dönemlerinde erkek fetüs kaybının artması, kadın popülasyonunun artmasına neden olmuş, bu durum iklim değişikliği ile ilişkilendirilmiştir(Fukuda vd., 2014).

Covıd-19 ve İklim Değişikliği İlişkisi

İklim değişikliği ile COVID-19 hastalığının ortaya çıkması veya bulaşması arasında doğrudan bir bağlantı olduğuna dair kanıt yoktur. İklim değişikliği sağlığın çevresel belirleyicilerini etkileyerek ve sağlık sistemleri üzerinde ek yük oluşturarak dolaylı olarak pandemiyi etkileyebilir. Neredeyse tüm pandemilerin vahşi yaşamdan kaynaklandığı düşünüldüğünde, doğal çevre üzerinde yıkıcı insan etkilerinin bu durumu ortaya çıkardığı aşikardır. ABD Hastalık Kontrol ve Önleme Merkezi, bu tür hastalıkların dörtte üçünün hayvanlardan kaynaklanacağını ve bunun hayvanların yaşam alanlarına insanların girmesi nedeniyle olduğunu tahmin etmektedir(Figueres C, 2020).

DSÖ; iklim değişikliği sonucu artan aşırı hava olaylarının sıtma, dang gibi vektör kaynaklı hastalıkların genişlemesine, yayılmasına neden olacağını ifade etmiştir. Isınan gezegen, bulaşıcı hastalıkların sıklığını artırabilir. Taşkınlar, artan sıcaklık ve nem nedeniyle hastalıkları taşıyan böcekler havanın daha soğuk olduğu bölgelere giderek hastalığın yayılımına neden olacaklardır(WHO, 2020). Ayrıca buzulların erimesiyle milyonlarca yıldır havada dolaşmayan hastalıkların ortaya çıkacağı öngörülmektedir. Nature'da yayınlanan başka bir araştırmaya göre, bozulmuş habitatlar insanları enfekte edebilecek virüslerin çoğunu barındırıyor. Bunun nedeni, biyolojik çeşitlilik kaybının kalan türlerdeki viral enfeksiyonları arttırması olabilir.

Ön çalışmalar COVID-19 hastalarında hava kirliliği ile mortalite oranları arasında korelasyon olabileceğini bunun da hava kirliliğinin insanları solunum yolu hastalıklarına duyarlı hale getirerek yaptığını ifade etmişlerdir(Cui vd., 2003). Benzer şekilde başka bir çalışmada havadaki partikül madde (PM10) düzeyi ile toplam COVID-19 enfeksiyon sayısı arasında da korelasyon saptanmıştır(MC, 2020).

İki acil durum birbirine benzemektedir. İkisi de yıkıcı ve ölümcül sonuçlara neden olmaktadır. İklim değişikliğinin etkilerine verilen bireysel ve toplumsal yanıtlar, COVID-19'a verilen yanıtların destekleyicisi olmalıdır(Kolinjivadi V, 2020). COVID-19 süreci sona ererken ortaya çıkan rahatlama dönemleri ve sürecin unutulmaya başlandığı anlarda iklim değişikliği kendini hissettirebilir. İklim değişikliği sürekli çaba ve geliştirilmiş bakış açıları gerektirecektir.

COVID-19 pandemisi ile iklim değişikliğinin ortak noktası 'insan eliyle değiştirilmiş çevrelerden kaynaklanması' olmalarıdır. Aralarındaki temel fark; pandemiye verilen ani küresel yanıtın hızlı ve bireysel, toplumsal gücün üstünde bir gayretle çare aranmasına rağmen; *'iklim değişikliğinin soyut doğası ve buna karşı hissedilen çaresizlik ve durmak ve hiçbir şey yapmamak'tır*(The conversation.com. 2020). İklim krizi de COVID-19 pandemisi gibi bir halk sağlığı sorunudur. Halkın sağlığını korumaya yönelik önlemler COVID-19 sürecinde, karbondioksit emisyonlarında yıllık en büyük düşüşü de sağlamıştır. Ancak bu azalma küresel dengeyi sağlamak için yeterli değildir. Sistematik olarak bu düşüşün devam ettirilmesi gereklidir(Reynolds M, 2019).

Sonuç

Bu derleme, cinsiyet özelinde, pandeminin geleceğe yönelik etki ve kapsamının net anlaşılmasının, toplumsal gelişimde önemini ortaya koymuştur. COVID-19 pandemisi diğer krizlere paralel olarak yerel-küresel tepki ve uzun vadeli düşünme gerektirmektedir. Kriz anları her zaman yeni fırsatlar yaratmaktadır. Elde edilen deneyimler, yanıt verme hızı ve geliştirilen teknikler yüzyılın en büyük halk sağlığı tehdidi olan iklim kriziyle de başa çıkmada yardımcı olabilir.

COVID-19 pandemisi, insanlığın bir küre içinde olduğunu, küresel ölçekte bağların daha iyi anlaşılması gerektiğini ve insan eliyle yaratılan her değişimin bir sonucu olabileceğini, sağlığın her politikanın merkezine alınmasının önemini ve kaynakların iyi yönetimiyle sağlık hizmetlerinin sürdürülebileceğini hatırlatmıştır. Bu gibi krizlerin ortak noktası, insanlar arası paylaşılan insanlık duygusunu geliştirmesidir. İnsanlar sevdiklerinin, toplumların sağlık ve güvenliğini küresel çapta düşünmektedirler(WHO, 2020).

Politika yapıcı ve karar vericiler tarafından salgın hastalıkların cinsiyet bazında değerlendirilmesinin öneminin farkına varılmadığı, politikalar ve halk sağlığı çabalarının cinsiyet açısından yetersiz kaldığı görülmektedir. Salgın hastalıkların cinsiyet faktörü açısından etkisini bilmek; salgının birincil ve ikincil etkilerini anlamada, politika geliştirmede ve müdahaleler oluşturmada önemli bir adımdır(Yanping Z, 2020).

Pandemi sonrası gelişen '*sosyal mesafe*'nin bir kazanım olarak çevre üzerinde olumlu etkilere yol açabileceği düşünülmektedir(Bocconi, 2020). Şehir planlamalarında '*nüfus yoğunluğu*'nu göz önünde bulunduran çevre düzenlemeleri ve yönetimi geleceğin konusu olacaktır.

COVID-19 sonrası Dünya'da cinsiyet farkı gözetmeksizin tüm insanlığın gücüne ihtiyaç duyulacaktır. Ancak, nüfusun kompozisyonu hayata sağlıklı başlamayı, geleceğin insan kaynakları planlamalarını, teknolojik gelişimleri, bireysel ve toplumsal sorumluluk dağılımlarını, sosyal dengeyi, dünya ekonomisini, sağlık göstergelerini, hizmet modellerini etkileyecektir. Politikalar nüfus yoğunluğu ve nüfus kompozisyonlarına göre şekillenecektir.

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İNCELEME / REVIEW ARTICLE

The Evaluation of Dental Imaging Services in Turkey Between Years 2010-2013

2010-2013 Yılları Arasında Türkiye'de Dental Görüntüleme Hizmetlerinin Değerlendirilmesi

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Abstract

Background: Radiolological monitoring is especially important for the effective planning of services related to oral and dental health care. The aim of this study is to evaluate the national data of radiological imaging methods in Turkey which are used for diagnostic and therapeutic purposes.

Methods: For this retrospective, cross-sectional study, the radiological imaging data from Oral and Dental Health Centers and Hospitals affiliated to the Institution of Public Hospitals in all 81 cities of Turkey between years 2010-2013 were evaluated. The data were presented with one and two-dimensional tables, the statistical analysis was carried out using SPSS for Windows, Version 22.0 package program.

Results: Increasing by years, the number of radiological imagings have been; 2,964,713, 3,972,361, 4,830,532 and 5,829,750 in years 2010, 2011, 2012 and 2013, respectively. Of the total population, 4.02, 5.32, 6.39 and 7.60% have been applied any kind of dental radiography in the same years, respectively.

Conclusions: This situation is in compliance with the increasing population as well as the increasing service delivery in the content of "Health Transition Program". Treatment needs play a major role in the effective planning of oral and dental health services by policymakers.

Keywords: Radiography, Dental, Dental Health Services, Turkey.

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Özet

Giriş: Radyololojik izlem, ağız ve diş sağlığı ile ilgili hizmetlerin etkili bir şekilde planlanması için önemlidir. Bu çalışmanın amacı, Türkiye'de tanı ve tedavi amaçlı kullanılan radyolojik görüntüleme yöntemlerinin ulusal verilerini değerlendirmektir.

Yöntem: Bu retrospektif, kesitsel çalışma için, 2010-2013 yılları arasında Türkiye'nin 81 ilindeki Kamu Hastaneleri Kurumuna bağlı Ağız ve Diş Sağlığı Merkezleri ve Hastanelerinden alınan radyolojik görüntüleme verileri değerlendirilmiştir. Veriler tek ve iki boyutlu tablolarla sunulmuştur. İstatistiksel analizler SPSS for Windows Sürüm 22.0 paket programı kullanılarak yapılmıştır.

Bulgular: Yıllar içinde artan radyolojik görüntülemelerin sayısı; 2010, 2011, 2012 ve 2013 yıllarında sırasıyla 2.964.713, 3.972.361, 4.830.532 ve 5.829.750'dir. Aynı yıllarda toplam nüfusun% 4.02, 5.32, 6.39 ve 7.60'ına her türlü diş radyografisi uygulanmıştır.

Sonuç: Bu durum, 'Sağlıkta Dönüşüm Programı' içeriğinde artan nüfus ve artan hizmet sunumuyla uyumludur. Politika yapıcılar tarafından ağız ve diş sağlığı hizmetlerinin etkin bir şekilde planlanmasında tedavi ihtiyaçları önemli bir rol oynamaktadır.

Anahtar Kelimeler: Radyografi, Diş, Diş Sağlığı Hizmetleri, Türkiye.

Background

Health service is a concept which involves protecting health, facilitating the treatment of the sick and wounded and also serving for rehabilitation when required [1-3].

Oral and dental health services involve the preventive and protective services for dental, gingival patterns and other related tissues as well as the the diagnosis and treatment of abnormalities [4]. World Oral Health Report 2003 from WHO has noted that those belonging to the lower socioeconomic ranks of developing countries are more prone to oral and dental diseases [5]. Studies on this issue have shown deeper inequalities compared with other health areas and marked that socioeconomically advantaged groups have access to dental services more efficiently [6-8]. According to WHO Report in 2006, global problems are still present although some countries have had.great improvements on the subject [9].

It is observed that; national health systems, independent from the development level, try to handle and improve strategies against increasing demands, limited sources, inequalities in delivery of health care and lack of number and quality in labor force in health, today. Planning and revising national health systems require close scrutiny of those belonging to the developed world as well as national progress priorities [2, 10, 11].

The Turkish Republic is a country important in the region it is located with a population of 77,695,904 and 8.2% of this population lives in the countryside. Turkey is among the midscale countries in a ranking of health levels. Neonatal mortality rate is 11.1 per thousand, 23% of the population falls within the 0-14 years of age group and 9% is older than 65 [12].

Ministry of Health, a leading participant within the Health Transition Programme in Turkey, carries out studies on highly improved, patient oriented, easily reached, nondiscriminating health service for health policies to be improved. New implementations on oral/dental health in Turkey promise new resources and more flexibility [13-16].

The oral and dental health services in Turkey have been financed mainly privately until 2003. In 2002, there were 16,371 dentists in Turkey, and only 20% of this number was employed by Ministry of Health [17]. This situation has changed parallel to the Health Transition Project and payment is mainly by national assistance today.

Together with the Health Transition Program conducted during the 2002-2013 period in Turkey, at least one Oral and Dental Health Center (ODHC) has been opened in each city and the number 14 in 2002 has increased to 137 in 2013. The breakdown of the units offering oral and dental health services and working as affiliated with the Institution of Public Hospitals is given as; 6 ODHHs, 237 ODHCs and 546 hospital polyclinics of oral and dental health with 753, 4832 and 1784 dental units, respectively. Within the scope, 689 institutions render service with 7369 dental units today. Moreover, 45 institutions with 3167 units and 511 private corporation serve for dental care [18-19].

Imaging Services in Dentistry

The art of dentistry is a versatile profession which necessitates knowledge and skill in medicine as well as affinity to artistry and technology. Radiology is the main helper of clinical examination and it is continuously making progress to increase imaging quality and to decrease the radiation dose exposed [20]. The improvements in material and laboratory technologies provide many advantages to the dentists like reduced treatment time and standard dental care. Patient comfort has increased by intraoral optical scanners developed. The personnel health protection owing to computer (CAD/CAM) and laser technologies for laboratory productions is another pleasing aspect [20, 21].

Imaging methods used in dentistry are [18];

Conventional Methods (Extraoral, intraoral)

Digital Imaging

Cone Beam Computed Tomography (CBCT)

Ultrasonography

Magnetic Resonance Imaging

Radiology units are needed in all facilities giving oral/dental health and data of dental imaging services between 2010-2014 are given in Table 1. According to the table, the number of dental imagings has doubled since 2010 to 2014. By the end of 2014, dental imaging service is given in 340 of all 589 ODHC/ODHHs, moreover CBCT is performed in 8 ODHCs [18].

Table 1 Dental Imaging Data in Turkey According to Years

Year	Number of patients radiographed in ODH units
2010	3121037
2011	4229244
2012	5079783
2013	6192472
2014	6214408

The oral and dental health services implemented should be analysed carefully in order to plan the future in an accurate and effective way. Our aim in this study was to evaluate data of radiological imaging services used both for diagnostic and therapeutic purposes in Turkey and thus contribute to the effective planning of healthcare services in that area.

Methods

Content of the study

ODHCs/ODHHs affiliated to the Ministry of Health were recruited for the research. In 2014, there are 18,070 dental units of which 7,956 belong to the Ministry of Health in Turkey. Also, a total of 37,925,956 polyclinic admissions were reported [19]. Of this, 24,204,277 is to ODHCs/ODHHS. The included ODHCs/ODHHs, which form the universe of the study, had a total capacity of 4872 and 846 dental units, respectively, and stand for 42.39% of the total dental units and for 63.82% of polyclinic admission numbers in Turkey. The universe of the study is the whole population admitted to these institutions. Other service units like universities, private practice etc. from which data could not be gathered were excluded. All of the universe was included for the study, so no sampling was performed.

Data collection and evaluation

Data gathered monthly for five years for this retrospective, cross-sectional study beginning from 2010 were obtained from the Public Hospitals Institution of Ministry of Health.. Data from 137 ODHCs and 6 ODHHs in all 81 cities in Turkey were gathered in a data pool till the beginning of analyses in 2015. No healthy information could be reached for the term before 2012 and year 2014 was also excluded because of insufficient data related to dental imaging.

The regions in this study were selected according to the Nomenclature of Territorial Units for Statistics-1 (NUTS-1) classification, as defined in Table 2. Cities were classified as "Level 3" in NUTS, neighbour cities similar to each other socially and geographically were grouped as "Level 1" and those similar to each other in development and population sizes as "Level 2", thus hierarchical NUTS was formed. Each one of the 81 cities was designated as a statistical region unit with regard to Level 3. Twenty-six Level 2 NUTs were defined by grouping Level 3 neighbour cities and twelve Level 1 NUTs were defined by grouping Level 2 NUTs. In all regional studies in govermental sector, NUTS study is taken as a basis [19].

Table 2 Nomenclature of Territorial Units for Statistics and Provinces

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	Tekirdağ Subregion	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, Erzincan, Bayburt
		Ağrı Subregion	Ağrı, Kars, Iğdır

Statistical Method

The computerised data were presented as one and two-dimensional tables. The statistical analysis was carried out using SPSS for Windows, Version 22.0 package program. The results were summarized by tables and figures. Admission numbers to ODHCs/ODHCs were calculated by analyzing polyclinic numbers. Radiological imaging numbers for regions and years were noted as a sum. Radiological imaging application numbers per dentist, dental unit and per capita were given as means. These means were obtained by proportioning each NUTS' radiological imaging application number to that region's dentist, dental unit numbers and number of population. ODHCs in our country are divided into four groups according to the number of dental units as; below 40, between 40-70, between 71-100 and above 100. Neither hypothesis testing was applied nor comparisons were made because the data were mass data. The results were interpereted as an 'increase' or 'decrease' compared to the previous year.

Results

Table 3 shows the percentages of admission numbers to ODHCs and ODHHs according to years and NUTS-1.

Table 3 Percentages of admissions to ODHCs and ODHHs according to years and NUTS-1

REGIONS	2010 (%)*	2011 (%)	2012 (%)	2013 (%)	2014 (%)
Western Anatolia	15.57	27.70	27.80	42.59	42.01
Western Blacksea	12.27	28.09	26.85	44.18	41.22
Eastern Marmara	19.96	29.26	25.59	39.78	38.41
Western Marmara	9.85	19.48	23.38	40.86	37.47
Central Anatolia	11.69	19.22	21.73	35.55	35.78
Northeastern Anatolia	13.16	25.03	22.34	29.17	34.96
Mideastern Anatolia	13.73	22.27	17.34	31.61	33.07
Aegean	11.87	21.82	20.58	32.74	31.06
Southeastern Anatolia	10.79	19.11	17.51	27.48	28.66
Eastern Blacksea	11.57	18.09	17.30	29.37	28.47
Mediterranean	8.66	16.91	17.56	28.74	27.04
Istanbul	7.49	14.30	12.10	18.98	19.64
Total	**11.71**	**20.93**	**19.81**	**31.63**	**31.15**

**(Percentages given according to the population)*

The rates of dental imaging applications in ODHCs and ODHHs according to population and admission numbers are given in Table 4.

Table 4 Dental imaging numbers and percentages per capita and per admission in ODHCs/ regarding years and NUTS-1

REGIONS	2010			2011			2012			2013		
	Number	%pop	%adm	Number	%pop	%adm	Number	%pop	%adm	Number	%pop	%adm
Western Anatolia	556713	7.93	68.23	728879	10.18	45.40	905025	12.47	53.61	1056233	14.35	37.63
Western Blacksea	230928	5.11	41.67	308953	6.90	24.56	489627	10.92	40.68	565209	12.66	28.44
Northeastern Anatolia	140331	6.37	12.84	181220	8.13	9.13	204092	9.17	10.12	205123	9.29	6.54
Central Anatolia	191655	4.98	66.13	248258	6.46	44.47	307896	7.99	61.91	352405	9.10	54.72
Eastern Blacksea	177623	7.06	21.69	207639	8.26	13.90	201531	7.92	14.46	186311	7.30	8.37
Aegean	298685	3.31	25.97	397507	4.10	18.81	508284	5.20	25.26	567536	7.30	17.51
Mideastern Anatolia	129215	3.54	9.46	223069	6.01	10.96	228883	6.09	12.67	271808	7.20	9.49
Mediterranean	345874	3.67	111.03	468851	4.94	74.99	568288	5.91	74.83	637012	6.52	47.55
Southeastern Anatolia	249626	3.29	85.74	354236	4.53	77.91	429634	5.40	97.57	463717	5.73	61.83
Western Marmara	61780	1.95	6.22	86060	2.68	4.42	126179	3.89	7.53	172231	5.25	6.41
Eastern Marmara	352695	5.16	70.40	479385	6.90	58.02	537221	7.61	82.46	667688	4.83	55.96
Istanbul	229588	1.73	51.03	288304	2.11	39.02	323872	2.34	38.68	684477	4.83	49.70
Total	2964713	4.02	34.34	3972361	5.32	25.40	4830532	6.39	32.24	5829750	7.60	24.04

The numbers of dental imaging applications per dentist and per dental unit according to the grouping regarding unit numbers are given in Table 5 and Table 6, respectively.

Table 5 Dental imaging numbers per dentist regarding grouping of unit numbers

REGIONS	Unit numbers	2010	2011	2012	2013
Mediterranean	<40	1478.92	1952.47	2100.78	2391.35
	40-70	2521.80		2839.47	2981.86
	71-100	972.80	996.75	927.18	1012.29
	Total	**1483.30**	**1713.54**	**1899.72**	**2120.40**
Western Blacksea	<40	912.20	1485.52	1412.51	1536.86
	40-70	3831.60		4904.82	6181.17
	Total	**1204.14**	**1485.52**	**1761.74**	**2001.29**
Western Anatolia	40-70	3427.15	4412.45	5421.48	5967.82
	71-100	6827.07	7029.91	8319.67	10307.86
	Total	**5127.11**	**5721.18**	**6870.58**	**8137.84**
Northeastern Anatolia	<40	1015.45	987.92	1360.77	1641.32
	40-70	951.03	1232.73	1069.96	1013.35
	Total	**1006.25**	**1022.8896**	**1319.22**	**1551.61**
Southeastern Anatolia	<40	544.70	873.69	1371.01	1452.20
	40-70	1489.84	1855.95	2062.41	2177.76
	>100	1032.54	1329.17	1239.17	844.87
	Total	**1019.45**	**1298.97**	**1613.81**	**1648.37**
Aegean	<40	1685.09	2148.26	2759.19	3002.83
	40-70	918.86	1169.17	1382.89	1453.36
	71-100	813.50	715.14	729.69	809.40
	Total	**1384.58**	**1724.35**	**2161.43**	**2341.29**
Eastern Marmara	<40	1200.91	1365.50	1556.51	1718.13
	40-70	1416.73	1869.05	1625.32	2051.35
	>100	1220.26	1627.75	1641.86	1987.91
	Total	**1284.26**	**1587.11**	**1592.98**	**1876.81**
Western Marmara	<40	876.96	837.12	1202.01	1628.11
	Total	**876.96**	**837.12**	**1202.01**	**1628.11**
Eastern Blacksea	<40	1170.62	1244.43	1137.27	1115.89
	40-70	1202.99	1505.03	2208.85	1634.44
	Total	**1176.02**	**1287.86**	**1315.86**	**1202.31**
Istanbul	40-70		3916.95		
	71-100	3052.62		4246.52	8824.05
	Total	**3052.62**	**3916.95**	**4246.52**	**8824.05**
Mideastern Anatolia	<40	769.38	935.54	1068.14	906.31
	40-70	1136.02	1699.74	1538.41	1606.45
	Total	**906.87**	**1222.12**	**1244.49**	**1168.86**
Central Anatolia	<40	795.25	873.47	926.60	933.54
	40-70	103.00	1096.09	1248.36	1574.01
	Total	**908.62**	**984.78**	**1087.48**	**1253.77**
Total	<40	1054.03	1319.58	1498.60	1640.97
	40-70	1499.40	1792.85	1994.11	2224.40
	71-100	2527.76	2434.64	3030.05	4393.18
	>100	1126.40	1478.46	1440.52	1416.39
	Total	**1272.97**	**1496.12**	**1722.33**	**1961.23**

Table 6 Dental imaging numbers per dental unit according to the grouping regarding unit numbers

REGIONS	Unit numbers	2010	2011	2012	2013
Mediterranean	<40	1187.64	1743.23	2026.32	2404.57
	40-70	1703.78		2239.12	2168.63
	71-100	569.41	798.58	999.28	1104.12
	Total	**1097.60**	**1507.067**	**1796.16**	**2049.97**
Western Blacksea	<40	563.57	1030.68	1227.84	1309.27
	40-70	2216.93		4216.95	5653.51
	Total	728.90	1030.68	1526.75	1743.70
Western Anatolia	40-70	2356.17	3901.75	5299.13	5625.92
	71-100	5451.52	6099.05	7995.91	9661.31
	Total	**3903.84**	**5000.40**	**6647.52**	**7643.61**
Northeastern Anatolia	<40	862.17	1001.73	1255.43	1323.51
	40-70	584.29	1063.53	993.04	824.59
	Total	**822.48**	**1010.56**	**1217.95**	**1252.24**
Southeastern Anatolia	<40	137.56	376.61	802.22	1172.62
	40-70	1145.12	1654.52	1889.36	1832.93
	>100	500.96	605.45	655.47	712.41
	Total	**560.82**	**884.43**	**1191.55**	**1362.71**
Aegean	<40	1063.0540	1494.0599	2097.9582	2367.42
	40-70	673.5330	961.0355	1194.0727	1295.84
	71-100	698.0971	639.2955	660.5909	744.25
	Total	**920.0542**	**1253.9583**	**1692.3159**	**1896.63**
Eastern Marmara	<40	778.7672	1083.4279	1292.3496	1584.61
	40-70	1090.1127	1521.9825	1376.4519	1851.023
	>100	730.8839	1144.5089	1392.6518	1569.32
	Total	**889.5363**	**1255.5210**	**1336.4257**	**1682.61**
Western Marmara	<40	484.9347	731.9338	1061.8078	1485.62
	Total	**484.9347**	**731.9338**	**1061.8078**	**1485.62**
Eastern Blacksea	<40	859.4925	991.6686	878.6193	940.50
	40-70	1009.8293	1379.6098	1957.4390	1501.56
	Total	**884.55**	**1056.33**	**1058.42**	**1034.08**
Istanbul	40-70		4401.59		
	71-100	3130.75		4416.44	9333.78
	Total	**3130.75**	**4401.59**	**4416.44**	**9333.78**
Mideastern Anatolia	<40	417.43	544.40	638.81	686.43
	40-70	551.41	1124.26	1059.57	1328.81
	Total	**467.67**	**761.85**	**796.60**	**927.32**
Central Anatolia	<40	420.27	549.69	656.24	676.20
	40-70	699.18	891.03	1132.43	1351.64
	Total	**559.73**	**720.36**	**894.34**	**1013.92**
Total	<40	689.60	998.00	1216.51	1399.91
	40-70	1018.74	1533.42	1729.98	1940.54
	71-100	2083.84	2083.88	3014.30	4389.52
	>100	615.92	874.98	1024.06	1140.87
	Total	**861.48**	**1180.95**	**1458.48**	**1723.53**

Discussion

In our study, all data of dental imaging applications performed in ODHCs and ODHHs between 2010 and 2013 revealed from the Public Hospitals Institution of Ministry of Health have been regarded for evaluation. The data include numbers for all dental imaging methods, because the institutions examined in this study report their total dental imaging numbers without any distinction.

Of the total population, 11.71, 20.93, 19.81, 31.63 and 31.15 % have been admitted to the institutions in question in years 2010, 2011, 2012, 2013 and 2014, respectively. This shows an increasing trend especially in years 2013 and 2014, which is valid both for the whole country and for the regions.

The Decree Law Concerning the Organization and Duties of the Ministry of Health numbered 663, published and came into force in 2011, Institution of Public Health which became functional together with the new formation afterwards and the structuring of General Secretary have altogether a great role in this picture. With the legislative decree numbered 663, the ministerial Turkish Institution of Public Health was established to open, run, evaluate and control hospitals, ODHCs and likewise health institutions, furthermore it was authorized to supervise the affiliated units to give preventive, diagnostic, restorative and rehabilitative health services in these hospitals in order to render secondary and tertiary health services.

The regions using the oral and dental health institutions in question most have been Western Anatolia, Western Blacksea together with Eastern and Western Marmara. This picture is in agreement with the reality that; factors like health service demand, presentation and transportability are much more developed in western regions. Istanbul, surprisingly, has the lowest rate of application regarding its population. This is an indicator of the oral and dental health structuring of that region in favor of private sector [22].

In our study, dental imaging numbers have increased from 2,964,713 in 2010 to 5,829,750 in 2013. This increase is parallel to the increase in population and service delivery within the scope of 'Health Transition Programme'. In a comprehensive study published lately, the number of dental imagings was reported as 3,121,037 in 2010, while it has doubled to 6,214,408 in 2014 [18].

When we look at the dental imaging numbers in comparison to the population; dental imaging numbers have apparently increased in all regions within the following years except for Eastern Marmara in 2013 and Eastern Blacksea in 2012 and 2013. Even when population increase is eliminated, this increase seems still remarkable.

Western Anatolia, Eastern Blacksea and Northeastern Anatolia are the leaders for 2010 and 2011. In 2012 and 2013; Western Anatolia and Western Blacksea, Northeastern and Central Anatolia are prominent for radiologic imaging numbers. Western and Northeastern Anatolia have kept their leadership in all years. In addition, Eastern Blacksea also stands out for 2012 and 2013. In this regard, Istanbul has been in the last place for all years evaluated. When we generally look at the regions with the highest numbers of dental imaging performances, we see that these overlap with regions having the highest admission numbers.

In our study, dental imaging numbers per dental unit have increased within years except for the decrease in Eastern Blacksea in 2013. Western Anatolia and Istanbul have been the leaders each year in this regard. In other words, Istanbul has been the leader regarding dental imaging numbers per dental unit and dentist for all years considered, while it has brought up the rear considering admission rates and dental imaging numbers per capita. This situation reveals the notable fewness of dentist and dental unit numbers in ODHCs/ODHHs in Istanbul compared to other regions.

When evaluated within Western Anatolia Region, Istanbul is naturally among the leaders regarding admission and imaging numbers per capita as well as imaging numbers per unit or dentist.

ODHCs /ODHHs with 71-100 dental units come in the first order regardingimaging numbers per unit and dentist, followed by the group with 40-70 units.

In our study, dental imaging numbers per dentist have always been higher than dental imaging numbers per unit. This is an indicator of the fewer dentist numbers than dental unit numbers.

Conclusions

Oral and dental health is essential for continuity of general health [9, 20]. In developing countries, the inability of bringing preventive programs into action and also the inability of bringing the level of oral and dental health services to the desired level of delivery, demand and accessibility delays the progression of oral and dental indicators. The effective planning and actual high level implementation of these preventive health services are key to success in developed countries [5, 22].

As a healthy and strong basis for the planning stage in our country, current condition should be evaluated thoroughly and then, together with the increase in the level of consciousness, the number of institutions, personnel numbers, services should be revised and increased on demand in order to minimize interregional inequalities.

Using widely accepted current technical facilities for diagnosis and therapy in oral and dental health services with maintained accessibility for everyone, are the goals of health suppliers and the rights for citizens.

We think that future researches with larger persectives, including private sector, university and public hospitals and focused on the qualitative and quantitative analyses of radiology technicians and devices are needed. In that way, a thorough view will appear by ''completing the missing parts of the puzzle''.

Declarations

Abbreviations:

ODHC(s): Oral and Dental Health Center(s) **ODHH(s):** Oral and Dental Health Center(s)

CBCT: Cone Beam Computed Tomography

NUTS-1: Nomenclature of Territorial Units for Statistics-1

Ethics approval: The permission to use the aforementioned national database was provided by the Public Health Institution, Ministry of Health, Republic of Turkey and the mandatory research ethics committee approval was received from the Ethics Committee of Yildirim Beyazit University (Date: 28th August, 2015, number 107- 04/18).

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Authors' contributions

KÖD, DÖ, GBG, YÜ, MU initiated the study conception and designed the study. SK assisted with the study design and data analysis. GBG drafted the manuscript. All authors contributed to the revision and final approval of the manuscript.

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İNCELEME / REVIEW ARTICLE

Profile of Preventive Dental Care in Turkey With Regard to Topical Fluoridation Implementations

Topikal Flor Uygulamalari İle Türkiye'de Koruyucu Diş Hekimliği Profili

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Abstract

Fluoride applications are very important in preventive oral health services. The aim of this study is to evaluate the national data of topical fluoride applications in Turkey for the effective planning of services related to oral and dental health care. This study includes a retrospective cross-sectional analysis, between the years 2012 and 2014, covering 81 provinces in Turkey. For the study, data were taken from The Ministry of Health Public Hospitals, Oral and Dental Health Centers and Dental Hospitals and data evaluation and status analysis of fluoride applications, classified according to years and regions, were carried out. According to the results, the admission rates per capita were 0.13, 0.19 and 0.20% while the prevalence of fluoride application was 0.97, 2.81 and 2.17% of the overall population for the years 2012, 2013 and 2014, respectively. Of the admissions, 7.7, 14.55 and 11.12% were topically fluoridated for years 2012, 2013 and 2014, respectively. The number of dentists per 100,000 people was 25.30, 26.30 and 28.00, corresponding to years 2012, 2013 and 2014. The number of fluoride applied patients per dentist was 20.14, 90.68 and 63.50 for the years 2012, 2013 and 2014. The fluoride application numbers per dental unit were 81.24 in 2013 and 54.62 in 2014, while the numbers of people per dental unit were 3.674 and 3.425 for the same years. In conclusion, more people could be reached and treatment costs could be decreased by proper planning and the effective use of oral and dental health services.

Keywords: Fluorides, Topical, Dental Health Services, Preventive Dentistry, Turkey

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Özet

Koruyucu ağız sağlığı hizmetlerinde flor uygulamaları çok önemlidir. Bu çalışmanın amacı, ağız ve diş sağlığı ile ilgili hizmetlerin etkin bir şekilde planlanması için Türkiye'deki topikal florür uygulamalarının ulusal verilerini değerlendirmektir. Bu çalışma, 2012-2014 yılları arasında Türkiye'de 81 ili kapsayan retrospektif bir kesitsel analizi içermektedir. Çalışma için Sağlık Bakanlığı Kamu Hastaneleri, Ağız ve Diş Sağlığı Merkezleri ve Diş Hastanelerinden veriler alınmış, florür uygulamalarının yıllara ve bölgelere göre sınıflandırılmış veri değerlendirmesi ve durum analizi yapılmıştır. Sonuçlara göre 2012, 2013 ve 2014 yıllarında kişi başı başvuru oranları sırasıyla% 0,13,% 0,19 ve% 0,20 iken florür uygulaması yaygınlığı toplam nüfusun% 0,97, 2,81 ve% 2,17'sidir. Başvuruların % 7.7, 14.55 ve 11.12'si sırasıyla 2012, 2013 ve 2014 yılları için topikal olarak florlanmıştır. 100.000 kişiye düşen diş hekimi sayısı 2012, 2013 ve 2014 yıllarına karşılık gelen 25,30, 26,30 ve 28,00 olmuştur. Diş hekimi başına florür uygulanan hasta sayısı 2012, 2013 ve 2014 yılları için 20,14, 90,68 ve 63,50 olmuştur. Florür uygulama sayıları Ünite başına düşen kişi sayısı 2013 yılında 81,24, 2014 yılında 54,62 iken aynı yıllar için ünite başına kişi sayısı 3,674 ve 3,425 olmuştur. Sonuç olarak, ağız ve diş sağlığı hizmetlerinin doğru planlanması ve etkin kullanımı ile daha fazla kişiye ulaşılabilir ve tedavi maliyetleri azaltılabilir.

Anahtar Kelimeler: Florür, Topikal, Diş Sağlığı Hizmetleri, Koruyucu Diş Hekimliği, Türkiye

1. Introduction

Planning and revising national health systems requires close scrutiny of those belonging to the developed world as well as national progress priorities (Üstü et al., 2011; Figueras, Menabde & Busse, 2005.). The basic aim of health systems is to optimize the health level and to minimize the health status differences among individuals (Boelen et al., 2002; Hamzaoğlu, 2008). Labor force planning in healthcare encompasses the employment of an adequate number of highly qualified health workers distributed uniformly across a wide field of specializations and with appropriate timing (Hogarth, 1975). Unrealistic or insufficient planning disrupts the system's functioning by decreasing productivity within the system, increasing the costs and causing improper distribution of the resources and this prevents the population to get the desired health services (Üstü et al., 2011).

1.1. Health Indicators

Turkey is among the midscale countries in a ranking of health levels. The neonatal mortality rate is 11.1 per thousand, 23% of the population falls within the 0-14 years age group and 9% are older than 65 years.

The Ministry of Health, a leading participant within the Health Transition Program in Turkey, carries out studies on highly improved, patient oriented, easily reached, non-discriminating health services for health policies to be improved. Being in the preventable disease group, dental caries and periodontal diseases negatively affect both dental and general health. Unfortunately, 98% of the time, oral and dental health services are provided as restorative treatments in our country, whereas in countries where low-cost preventive dentistry is available, general health status improves and health-related expenditure decreases gradually. Despite the fact that no rational, fully effective health service planning with national oral and dental health programs have been put into place in our country, new implementations promise new resources and more flexibility (Öztek, et al., 2001).

The resources spent on oral and dental health services represented 4.8% of health expenses in 2002, while it has increased to 5.3% in 2013. The number of Oral and Dental Health Centers (ODHCs) was 127 in 2013 whereas it was only 14 in 2002. Likewise, the number of Oral and Dental Health Hospitals (ODHHs) has increased to 6 from only 1 in 2002, with the introduction of the Health Transition Program in Turkey. The employment numbers for dentists has increased from 16,000 in 2002 to 22,000 in 2013. Excluding universities and private practice, the number of dentists has increased from 3,211 in 2002 to 7,997 in 2013 (Aydın, 2006; Atasever & Demiralp, 2014).

In Turkey, the breakdown of the units offering oral and dental health services and working in affiliation with the Institution of Public Hospitals is given as; 6 ODHHs, 237 ODHCs and 546 hospital polyclinics of oral and dental health, with 753, 4832 and 1784 dental units, respectively. Within this scope, 689 institutions render service with 7369 dental units. Moreover, 45 institutions with 3167 units and 511 private corporations provide dental care (Başara, Güler, & Yentür, 2014).

Frequently observed oral and dental diseases play a role in many health conditions which can easily be controlled by prevention and the associated costs are quite different from treatment costs (Kim & Amar, 2006; Guay, 2006). WHO, FDI and IADR have specified the goals of oral and dental health for the period of 2000-2020 in the year 1999 (Kim & Amar, 2006; Johnston & Vieira, 2014). The World Oral Health Report 2003 from WHO has noted that those belonging to the lower socioeconomic ranks of developing countries are more prone to oral and dental diseases (Petersen, 2003). Studies on this issue have shown deeper inequalities in oral and dental health services compared with other health areas and concluded that socioeconomically advantaged groups have access to dental services more easily (Holst, Sheiham & Petersen, 2002; Yazıcıoğlu, 2006). Dental caries remains a public health issue in the world, affecting 60-90% of the population even in the richest countries. This is mainly due to exposure to excess sugar thorough routine diet and the rarity of preventive dentistry implementations like topical fluorides (Kohn et al., 2001).

1.2. Fluoride Applications

The importance of fluorides in preventing caries has been emphasized in the World Health Council Decisions and the World Health Report 2003. In various countries with medium or low income levels, it is hard for the individuals to access oral and dental health services. The Oral Health Programs of WHO, FDI and IADR act in synergy to focus on the disadvantaged population in this realm. The Global Counselling Center`s focus on 'oral health with fluoride' is the main component of this project (Petersen, 2003).

Fluoride is the mineral that provides the highest resistance against acid attacks. Due to the associated slowing of demineralization and the promotion of remineralization processes in the oral medium, dentists prefer fluoride applications in healthy individuals and caries-prone patients, in erosion and sensitivity treatment and for groups in need of special care (Kohn et al., 2001; Wefel & Donly, 1999). More than eight-hundred studies have revealed that fluoride is the most effective agent in caries protection (Grignon et al., 2001). Fluoride strengthens enamel structure, decreases plaque formation rates, rematerializes initial caries lesions, prevents dentine hypersensitivity and can be applied either systemically or topically (Holst, Sheiham & Petersen, 2002; Orchardson & Gillam, 2006).

Systemic fluoride applications include drinking water fluoridation, adding fluoride to salt or milk, using fluoride supplements or chewing fluoridated gum (Ölmez, 1998; Grignon et al., 2001; Özperk, 1997).

Fluorides can be applied topically in the form of toothpaste, mouthwash, gel, solution, varnish or chewing gum (Ölmez, 1998; Kohn et al., 2001). The efficiency is about 15-20%, 20-50%, 30-40% for toothpastes, mouthwashes and in-office solutions or gels, respectively (Kohn et al., 2001; Ölmez, 1998). Being the most widely used agent against caries prophylaxis, fluoridated toothpaste use should be combined with the use of other agents in high-risk cases (Yazıcıoğlu, 2006).

Despite a marked reduction in the prevalence of dental caries formation in developed countries, an increase is observed in developing countries. By promulgating social dental health programs to improve oral and dental health, it is possible to reach more people and to lower the costs, but WHO has reported that only an estimated 20% of the world population benefits from the anti-cariogenic effect of fluorides (Petersen et al., 2005:686-693; Petersen, 2008).

The aim of this study is to evaluate the data of topical fluoride applications in our country to facilitate future preventive care planning.

2. Materials and methods

2.1. Content of the study

In Turkey, the responsibility of preventive dentistry belongs to the Ministry of Health. Due, in the main, to this fact, the affiliated ODHCs/ODHHs were recruited for the research. In 2014, there were 18,070 dental units, of which 7,956 (42.39%) belong to the Ministry of Health in Turkey. Also, a total of 37,925,956 polyclinic admissions were reported. The included ODHCs/ODHHs, which form the universe of this study, had a total capacity of 4872 and 846 dental units, respectively, and represent 42.39% of the total dental units (Bora Başara, Güler & Yentürk, 2015). These institutions also represent 63.82% of polyclinic admission numbers in Turkey. Other service units working intensively as restorative dentistry centers (such as universities, private practice and other institutions), from which data could not be gathered, properly were excluded. All of the universe for the study was included, so no sampling was performed.

2.2. Gathering and evaluating data

Data were gathered monthly for five years, beginning from 2010. Data from 137 ODHCs and 6 ODHHs in all 81 cities in Turkey were gathered in a data pool until the beginning of analyses in 2015. No related and organized health information could be reached for the term before

2012. The permission to use the aforementioned national database was provided by the Public Health Institution, Ministry of Health, Republic of Turkey and the mandatory research ethics committee approval was received from the Ethics Committee of Yildirim Beyazit University (Date: 28th August, 2015, number 107).

The population of the research consisted of patients under the age of 18 who received fluoride applications in ODHCs/ODHHs between the years 2012-2014, because topical fluoride application is only allowed for patients under 18 by regulations in our country.

The regions in this study were selected according to the Nomenclature of Territorial Units for Statistics-1 (NUTS-1) classification, as defined in Table 1. Cities were classified as "Level 3" in NUTS, neighbor cities similar to each other socially and geographically were grouped as "Level 1" and those similar to each other in development and population sizes as "Level 2", thus hierarchical NUTS was formed. Each one of the 81 cities was designated as a statistical region unit with regard to Level 3. Twenty-six Level 2 NUTs were defined by grouping Level 3 neighbor cities and twelve Level 1 NUTs were defined by grouping Level 2 NUTs. In all regional studies in the governmental sector, the NUTS study is used as a basis (Bora Başara, Güler & Yentürk, 2013).

Table 1. Nomenclature of Territorial Units for Statistics (NUTS)

NUMBER	LEVEL 1	LEVEL 2	LEVEL 3
1	Istanbul	Istanbul Subregion	İstanbul
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	ZonguldakSubregion	Zonguldak, Karabük, Bartın
		KastamonuSubregion	Kastamonu, Çankırı, Sinop
		Samsun Subregion	Samsun,Tokat,Çorum, Amasya
8	Central Anatolia	KırıkkaleSubregion	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

2.3. Statistical Method

The computerized data were presented as one and two-dimensional tables and the statistical analysis was carried out using IBM-SPSS for Windows, Version 22.0 package program. The results were transferred to tables and a graph. Admission rates per capita were calculated by using the population under 18 and the number of their admissions to ODHCs/ODHHs for that region. Fluoride applications for years and regions were reported as a sum. The change in fluoride application numbers according to years, regions, population, together with admission, dentist and dental unit numbers were calculated. Fluoride application numbers as per dentist, dental unit and population were noted as a mean. The distribution of dentist numbers per 100,000 people and number of fluoride applications per dentist regarding years and regions and also the changes in patient and fluoride application numbers per dental unit were also reported.

No hypothesis testing or comparisons were used because no sampling was performed and the data were mass data. The results were interpreted as an increase or decrease compared to another year.

3. Results

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

When we examine the percentages of fluoride applications according to population and patient admissions; the percentages of fluoride applied patients in the whole population are 0.97, 2.81 and 2.17% for years 2012, 2013 and 2014, respectively. Of the admitted population under 18 years of age, 7.77, 14.55 and 11.12% corresponding to the years 2012, 2013 and 2014, were topically fluoridated (Table 3).

Table 3. The distribution of fluoride applications according to population and patients admitted regarding years and NUTS-1.

REGIONS	2012		2013		2014	
	According to population (%)	According to admissions (%)	According to population (%)	According to admissions (%)	According to population (%)	According to admissions (%)
Mediterranean	0.64	5.51	1.73	9.62	1.05	5.94
W. Blacksea	0.82	4.99	4.16	14.49	4.23	14.59
W. Anatolia	3.12	16.84	7.10	26.64	5.84	21.60
NE Anatolia	0.46	3.22	1.76	9.29	1.42	6.43
SE Anatolia	1.01	8.84	2.32	13.27	1.54	8.30
Aegean	1.07	7.73	3.69	16.77	2.63	13.65
E. Marmara	1.14	6.80	2.66	11.08	1.89	7.86
W. Marmara	0.64	4.42	3.20	12.65	3.08	12.31
E. Blacksea	0.84	5.91	2.06	9.13	1.90	8.54
İstanbul	0.21	3.88	0.95	11.02	0.96	10.02
ME Anatolia	0.67	5.96	2.43	13.36	1.91	9.52
C. Anatolia	1.15	7.80	4.05	17.19	2.41	10.03
Total	**0.97**	**7.77**	**2.81**	**14.55**	**2.17**	**11.12**

(W.=West, E.= East, NE=North-Eastern, SE=South-Eastern, ME=Mid-Eastern, C.=Central)

Table 4 shows us the distribution of dentists per 100,000 people and number of fluoride applications per dentist according to years and regions. The numbers of dentists per 100,000 people are; 25.30, 26.30 and 28.00 for the years 2012, 2013 and 2014, respectively. In 2012, the number of fluoride applied patients per dentist is 20.14, while the numbers are 90.68 for 2013 and 63.50 for 2014.

Table 4. The distribution of dentists per 100,000 people and fluoride applications per dentist according to years and NUTS-1.

REGIONS	2012		2013		2014	
	Dentist per 100,000 people	Fluoride application per dentist	Dentist per 100,000 people	Fluoride application per dentist	Dentist per 100,000 people	Fluoride application per dentist
Mediterranean	22.40	12.64	22.30	55.16	23.3	38.83
W. Blacksea	39.10	12.55	38.10	64.45	40.1	62.05
W. Anatolia	48.30	34.90	43.50	115.04	47.7	88.38
NE Anatolia	15.20	27.26	17.60	172.09	23.1	79.87
SE Anatolia	12.20	47.50	14.90	179.40	15.4	105.19
Aegean	31.90	13.13	34.60	73.58	34.3	50.80
E. Marmara	34.20	21.28	32.80	64.18	34.3	70.73
W. Marmara	37.60	8.34	43.60	60.83	41.2	63.08
E. Blacksea	25.10	15.86	29.30	127.00	31.8	62.94
İstanbul	17.90	7.75	18.20	40.86	21.3	37.92
ME Anatolia	12.10	27.86	19.00	109.00	20.2	71.76
C. Anatolia	26.60	17.21	28.40	89.39	30.6	49.45
Total	**25.30**	**20.14**	**26.30**	**90.68**	**28.0**	**63.50**

(W.=West, E.= East, NE=North-Eastern, SE=South-Eastern, ME=Mid-Eastern, C.=Central)

The distribution of the population per dental unit and numbers of fluoride applications per dental unit are given in Table 5. Population per dental unit is; 3,674 and 3,425 for 2013 and 2014, respectively. The fluoride application numbers per dental unit are; 81.24 in 2013 and it reduces to 54.62 in 2014 (Table 5).

Table 5. The distribution of population per dental unit and number of fluoride applications per dental unit according to years and regions.

REGIONS	2013		2014	
	Population per unit	Fluoride application per unit	Population per unit	Fluoride application per unit
Mediterranean	4.583	53.77	4.291	33.29
W. Blacksea	2.518	52.16	2.357	55.58
W. Anatolia	2.295	102.27	2.040	77.16
NE Anatolia	5.261	129.05	4.150	60.15
SE Anatolia	6.385	165.63	5.638	86.33
Aegean	2.725	70.35	2.627	43.25
E. Marmara	2.889	60.80	2.763	68.02
W. Marmara	2.182	57.04	2.302	53.29
E. Blacksea	3.470	118.17	3.291	49.75
İstanbul	5.291	41.09	4.916	38.61
ME Anatolia	5.032	99.05	4.698	69.40
C. Anatolia	3.221	76.42	3.032	37.65
Total	**3.674**	**81.24**	**3.425**	**54.62**

(W.=West, E. =East, NE=North-Eastern, SE=South-eEastern, ME=Mid-Eastern, C.=Central)

4. Discussion

Despite many local reports, this is the very first study in our country reporting Turkey's profile of preventive topical fluoride use, which is extremely important for caries prevention. We strongly think that, this study will therefore be important or national and international data comparisons.

Our study showed an increasing trend in the number of admissions to ODHCs/ODHHs of patients under 18 years of age and also in the admission rates per dentist, in the evaluated years. In 2013, Western Blacksea, Western Anatolia and Western Marmara Regions had the highest admission rates, while Istanbul and Southeastern Anatolia had the lowest.

Regarding all sectors providing oral and dental health services and all populations, the numbers of applications were 5,462,923, 2,278,6281, 25,177,013, 29,910,473, 34,939,584 and 37,760,696 in the years 2002, 2009, 2010, 2011, 2012 and 2013, respectively, according to the data provided by the Ministry of Health. The universities and private sector were not included in data before 2012 (BoraBaşara, Güler & Yentürk, 2013). Admission rates per dentist are 0.49% for all sectors. The regions with highest rates were Western Blacksea, Western Anatolia and Eastern Marmara, while the lowest rates were for Istanbul, South-Eastern Anatolia and Mid-Eastern Anatolia regions. These highest and lowest rates are in agreement with our results representing ODHCs/ODHHs.

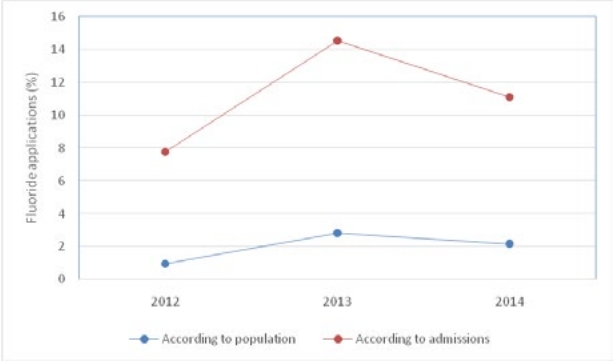
In our study, Western Anatolia, Western Blacksea and Egean Regions were the leaders regarding fluoride application rates for the population under 18 years of age, while Mediterranean, North-Eastern Anatolia and Eastern Marmara were again at the bottom of the ranking.

Fluoride applications were available in Turkey before 2012, but no statistical recordings were taken, so it is impossible to give exact numbers before 2013. An obvious uptrend is observed beginning in 2013 and ongoing in 2014. This uptrend could be interpreted as a positive development signal in a country like Turkey in which oral and dental health services are mainly provided as part of restorative and/or prosthetic dentistry fields and preventive services are still not offered population-wide, systematically. The Decree Law, numbered 663, regarding the organization and duties of the Ministry of Health and its associated organizations, was published and came into force on November 2nd 2011. The Public Hospitals Institution and the attached General Secretariat which are direct results of the aforementioned law are thought to have played a great role in this positive change.

With the legislative decree numbered 663, the Turkish Institution of Public Health was established under the Ministry of Health to open, run, evaluate and control hospitals, ODHCs and similar health institutions. Furthermore it was authorized to supervise the affiliated units to give preventive, diagnostic, restorative and rehabilitative health services in these hospitals in order to render secondary and tertiary health services. It was also tasked with carrying out personnel assignments, transfers, transactions of benefits, pay scale determinations and procurement activities, renting, upgrading, fixing institute properties, etc.

The increase in the number of dentists per capita has positively affected fluoride application rates from 2012 up to 2013 (Figure 1).

Figure 1. Fluoride application percentages according to population and admissions



In contrast, the relative decrease in fluoride application rates between 2013 and 2014 is thought to be related to the regulations which limit overtime hours and additional payments for the health facility staff affiliated with the Turkey Public Health Institution. Also the campaign process against fluoride use with high media coverage, beginning at the end of 2013, could have affected parents' ideas and decisions when they are offered topical fluorides for their children. The increase in 2013 could not be sustained as a result.

In our study, the regions with highest number of dentists per 100,000 people in ODHCs/ ODHHs in 2014 were Western Anatolia, Western Marmara and Western Blacksea, while South-Eastern Anatolia, Mid-Eastern Anatolia and Istanbul had respectively the lowest numbers.

Regarding topical fluoride application rates per dentist; South-Eastern,Anatolia, Western Anatolia and North-Eastern Anatolia were the leaders, while Istanbul, Mediterranean and Central Anatolia showed the worst rates.

It is contradictory that South-Eastern Anatolia has a high level for fluoridation with the least number of dentists. This finding tells us that, in order to increase the number of preventive applications like topical fluorides, it is essential that dentists be eager and aware of the concept of preventive dentistry and that the patients be demanding of it. This, rather than a mere increase in dentist numbers, is the most effective measure found here.

According to the data gathered by the General Directorate of Health Research in Turkey, dentist numbers per 100,000 people in all sectors are 24.7, 26.4, 26.3, 26.4, 26.3, 27.3, 27.9, 28.4, 29.1, 28.2, 28.3 and 29.1 for the years 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013, respectively. Istanbul and Western Anatolia regions had the highest percentages while Mid- and South-Eastern Anatolia had the lowest. When we compare this with the international counterparts in 2013; against Turkey's 29 dentists per 100,000 people, the world, the European Union, high-income countries, the WHO European Region, the WHO Asian Region and upper-middle income group countries have, in the same order, 27, 68, 58, 58, 50 and 37 dentists per 100,000 (Bora Başara, Güler & Yentürk, 2014). In this regard, Turkey equaled the world's mean but lagged behind the developed nations.

In Turkey, the population per dental unit in ODHCs/ODHHs was 3,674 in 2013 and 3,425 in 2014. The numbers of fluoride applications per dental unit was 81.24 in 2013 but, surprisingly, 54.62 in 2014; in other words, the increase in dental unit numbers has not been reflected on the number of fluoride applications, suggesting causes other than the dental unit numbers affecting the prevalence of fluoride use.

In 2014, the regions with the highest levels of population per unit were Western Anatolia, Western Marmara and Western Black sea while those with the lowest levels were South-East Anatolia, Istanbul and Central Anatolia; the situation is the same with the number of dentists.

Populations per unit affiliated with the Ministry of Health were 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.

The leading regions for fluoride applications per dental unit are; South-Eastern, Western and Central Anatolia. Mediterranean, Istanbul and Aegean regions are, in this respect, the last. This pattern is also seen with fluoride applications per dentist. It is contradictory that; South-Eastern and Central Anatolia regions are good in fluoride application rates, while they have the fewest number of dental units.

A recent study, run by the National Academy for State Health Policy in America, Medicaid/SCHIP, American Dental Association and American Academy of Pediatric Dentists, details the content and quality of local fluoride applications in these regions. The Medicaid programs cover the cost of services provided through the first step doctors, by making families share the responsibility of oral and dental healthcare with the government and, thus, decrease oral and dental diseases. Some states like North Carolina have observed fewer dental caries cases and more utilization of oral and dental services in the young population. The struggle against early childhood caries necessitates the cooperation of dental and medical communities (Cantrell, 2008).

Another study, assessing the use of caries prevention services by Northwest Precedent dental network practitioners, compared the numbers of patients experiencing caries who had and had not received preventive services in the last 12 months. A total of 1,877 patients aged 3-92 years were eligible and, of those, 87% had received fluoride varnish or gel application in the 1-17 years age group. Briefly, one third of the patients had received preventive services (either sealants or any kind of topical fluoride treatment) in private dental practices (Ferracane et al., 2011). In our study, we used the data of ODHCs/ODHHs in which preventive services are given, from all 81 cities of Turkey from our national database. Other service units such as universities and private practice in which mainly restorative services are administered and from which healthy data could not be gained, were excluded.

In Turkey, gel or varnish forms of topical fluorides, which are routinely purchased by the formal dental institutions in question, are used. Topical fluoride applications are financed by the Social Security Institution only up to the age of 15 although it is possible to make this application far beyond (Atasever & Demiralp, 2015). In the mid-nineties, there was a significant shift in the understanding and practice of dentistry in Germany, from that of a restorative to a preventive nature. Firstly, the German Institute of Dentists presented an article entitled 'Prophylaxis for a Lifetime' and developed logical lifetime prophylaxis layouts including fluoridation for eight different age groups in 1995. In 2004, fluoridation agents including tablets, gels or varnishes were made available for 793,350 children and adolescents. From the institutions or schools in the activity, about 12% of the children were protected by fluoridation (Akar, 2014).

By preventive dental care, together with the support given through national campaigns for oral hygiene and healthy nutrition, many countries like Denmark have reached much better levels in oral and dental health care. In a literature study run in three different Scandinavian countries, it was announced that different dental personnel used different preventive strategies and, moreover, choices of fluoride vehicles (fluoride toothpastes, tablets, varnishes or even lozenges) also varied in public dental healthcare. The study also focused on the fact that, based on today's evidence-based dentistry, no evidence for the perfect choice of caries prevention exists, highlighting the need for further research and data providing evidence at the population level (Fathalla, 2011).

The ''Health for everybody'' concept, as introduced in the Alma-Ata Manifest (1978), which prescribes carrying on with urgent and effective studies, has played a major role in improving health policies (Gökalp & Doğan, 2006; GüçizDoğan & Gökalp, 2008). In Turkey, dental

services are offered mainly in the form of restorative or prosthodontic dentistry and no systematic population-wide implementations are tried (Topaloğlu, Eden, & Frencken, 2009). Nevertheless, the budgetary allocations from limited resources of the country should be directed to preventive oral and dental health services with lower costs and better benefits (Akar, 2014).

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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

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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 fort his 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.

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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 çalışmasında, 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 seperate 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 sealents. 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.

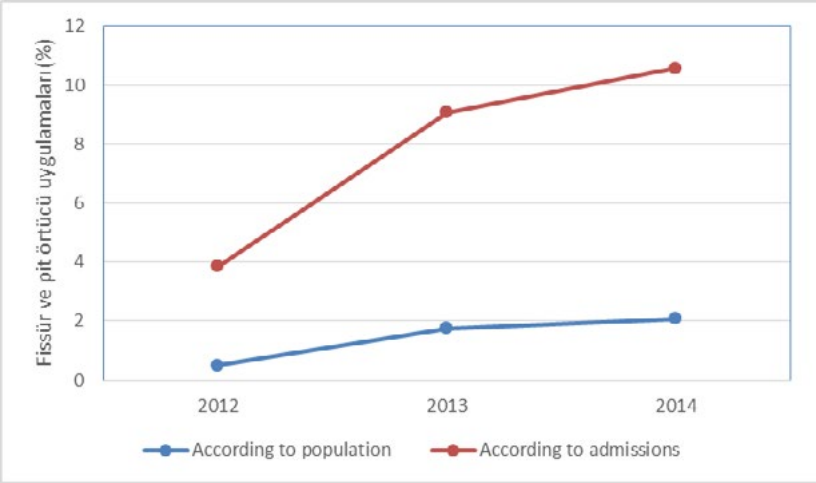

Table 3. Distribution of population and fissure and pit sealant practices given to individuals who applied to ODHCs and ODHHs in terms of years and NUTS-1.

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	4291	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 ADSM 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].

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DERLEME / LITERATURE REVIEW

İleri Yaşta Pandemi

Pandemic in Aging

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Özet

Çin'in Wuhan kentinde 2019 yılının sonlarına doğru ortaya çıkan ve kısa sürede tüm dünyaya yayılan Covid-19 virüs salgını Dünya Sağlık Örgütü (DSÖ) tarafından pandemi olarak ilan edilmiştir. Çocuk, genç yaşlı, kadın erkek tüm insanlığı etkileyen covid-19 virüs salgını henüz çok yeni ve araştırılmaya çok açık bir konudur. Oldukça bulaşıcı olan Covid-19, özellikle yaşlanan nüfusta nispeten yüksek ölüm oranlarına neden olmaktadır. İleri yaştaki bireylerin Covid-19' a yakalanma riskleriyle birlikte aynı zamanda uzun vadede herhangi bir patoloji olmaksızın iyileşmelerinin nasıl mümkün kılınacağının da araştırılması gerekmektedir. İleri yaştaki Covid-19 hastalarının ölüm oranı genç hastalara oranla tüm dünyada daha yüksektir. Elbette bunda ileri yaşta kronik hastalıkların fazla olmasının, immün sistemin daha savunmasız olmasının etkisinin olduğu bilinmektedir. Uzun vadede, öncelikle hastalığa özgü araştırmaya yatırım yapmaktan, eşzamanlı olarak yeterli kaynakları hedefleyerek, özellikle dünyanın en savunmasız nüfusu için, insan bağışıklık sistemini deşifre etmeye geçmemiz gerekmektedir. Ancak böyle bir çaba yeni aşıların, teşhislerin ve tedavilerin geliştirilmesini hızlandırabilir ve elbette sadece Covid-19 için değil, aynı zamanda gelecekte ortaya çıkması mümkün patojenler ve başlıca küresel salgınlar için de bu gereklidir. Literatür bilgilerinden yola çıkılarak derlenen bu makalede Covid-19'dan en çok etkilenen nüfüs olan ileri yaştaki bireylerin içinde bulunduğumuz pandemi sürecindeki dezavantajları ve buna yönelik alınabilecek önlemler ele alınmıştır.

Anahtar Kelimeler: İleri Yaş, Covid-19, Pandemi.

Abstract

The Covid-19 virus epidemic, which emerged in Wuhan, China, towards the end of 2019 and spread all over the world in a short time, was declared as a pandemic by the World Health Organization (WHO). The Covid-19 virus epidemic, which affects all humanity, children, young, old, female and male, is a very new and open subject to research. Covid-19, which is highly contagious, causes relatively high mortality rates, especially in aging populations. It is also necessary to investigate how to make it possible for elderly individuals to recover without any pathology in the long term, together with the risks of getting Covid-19. The death rate of older Covid-19 patients is higher worldwide than younger patients. Of course, it is known that the high rate of chronic diseases in the elderly and the more vulnerable immune system have an effect on this. In the long run, we need to move from investing in disease-specific research first to simultaneously targeting adequate resources to decoding the human immune system, especially for the world's most vulnerable population. But such an effort could accelerate the development of new vaccines, diagnoses and treatments, and of course, this is necessary not only for Covid-19, but also for future pathogens and major global epidemics. In this article, which was compiled based on the literature information, the disadvantages of the elderly people, who are the population most affected by Covid-19, in the pandemic process we are in and the measures that can be taken for this are discussed.

Keywords: Advanced Age, Covid-19, Pandemic.

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Giriş

Çin'in Wuhan kentinde 2019 yılının sonlarına doğru ortaya çıkan ve kısa sürede tüm dünyaya yayılan Covid-19 virüs salgını Dünya Sağlık Örgütü (DSÖ) tarafından pandemi olarak ilan edilmiştir (World Health Organizations, 2020). Ülkemizde ise ilk Covid-19 vaka tanısı 10 Mart 2020 tarihinde konulmuştur (Daily Sabah, 2020). Koronavirüsler (CoV), soğuk algınlığından Orta Doğu Solunum Sendromu (MERS-CoV) ve Şiddetli Akut Solunum Sendromu (SARS-CoV) gibi çok daha ciddi hastalıklara kadar farklı hastalıklara neden olabilen büyük bir virüs ailesidir (Sağlık Bakanlığı, 2020). Virüs

Her geçen gün çok sayıda kişiye Covid-19 tanısı konulmaktadır. Covid-19 oldukça bulaşıcıdır özellikle yaşlanan nüfusta nispeten yüksek ölüm oranlarına neden olmaktadır. Covid-19'un pnömoniye sebep olan bir virüs olması sebebiyle vaka sayılarının artması ile beraber aynı zamanda yoğun bakıma ihtiyaç duyan hasta sayısında da artış olmuştur (She et al., 2020; Çevirme ve Kurt, 2020). Tüm bunlar yaşanırken Covid-19'dan orantısız bir şekilde etkilenen grup ileri yaştaki bireyler olmuştur. 2003 SARS salgınıyla ilgili geriye dönük yapılan araştırmalar SARS salgın sürecinde intihar oranlarının yaşlı yetişkinler arasında ani bir artış gösterdiğini belirlemiştir. Bu durum Covid-19'un fizyolojik sağlık üzerindeki etkisinin yanında zihinsel sağlık üzerindeki etkisinin de gerçek zamanlı olarak incelenmesinin aciliyetini ortaya koymaktadır. Böylelikle Covid-19'un yaşlı sağlığındaki olumsuz etkileri bütüncül olarak ele anılabilir ve erken dönemde olası zararlar öngörülerek en aza indirgenebilir (Applegate and Ouslander, 2020; Lloyd-Sherlock, 2020). İleri yaştaki bireylerin Covid-19' a yakalanma riskinin yanında uzun vadede herhangi bir patoloji olmaksızın iyileşmenin nasıl mümkün kılınacağının da araştırılması gerekmektedir. İleri yaştaki bireylerin biyolojik ve psikolojik dayanıklılığı, Covid-19'a karşı önleyici ve koruyucu önlemlerin neler olabileceği araştırılmalıdır (Vahia et al., 2020). İleri yaştaki bireylerin Covid-19'a karşı korunması amacıyla yatarak veya ayaktan tedavi uygulayan üçüncü basamak sağlık kurumları, bakım evleri ve huzur evleri gibi konut ortamlarında bir dizi önlemin alınmış olması gerekmektedir.

Lian ve arkadaşları (2020) yaptıkları araştırmada; Covid-19'lu yaşlı ve genç gruplar arasında öksürük, balgam üretimi, hemoptizi, boğaz ağrısı, burun tıkanıklığı, kas ağrısı, yorgunluk ve gastrointestinal sistem semptomlarında anlamlı farklılığın olmadığını ancak, nefes darlığı görülme oranının daha yaşlı grupta anlamlı olarak daha yüksek olduğunu ve yaşlı bireylerin akciğer BT bulgularında çoklu beneklenme ve buzlu cam opasitesinin daha şiddetli olduğunu, yaşlı bireylerde daha fazla ARDS'nin geliştiğini belirlemişlerdir. Ayrıca ileri yaştaki bireylerde Covid-19'a yakalanma sonrasında kardiyovasküler sistemde arızanın genç bireylere kıyasla daha fazla olduğu, hastalık süresince yetersiz beslenmenin, düşük albümin ve hemoglobin seviyelerinin ileri yaştaki bireylerde daha sık görüldüğü belirlenmiştir.

Özellikle hipertansiyon, diyabet ve böbrek yetmezliği gibi komorbitileri olan yaşlı hastalarda hem SARS hem de MERS salgın sürecinde ard arda yüksek bir ölüm oranı olduğu bildirilmiştir. Aynı tabloyu Covid-19 pandemi sürecinde de görmekteyiz (Ahmadzadeh et al. 2020). İleri yaştaki Covid-19 hastalarının ölüm oranı genç hastalara oranla tüm dünyada daha yüksektir. Elbette bunda ileri yaşta kronik hastalıkların fazla olmasının, immün sistemin de daha savunmasız olmasının etkisinin olduğu bilinmektedir. Bu sebepledir ki; dünyada küresel bir salgın olarak ortaya çıkan Covid-19'un tedavisinde hayat kurtaran aşıların ve terapötik tedavilerin hızlı bir şekilde geliştirilmesi için kısa vadeli çabalar son derece önemlidir. Ancak uzun vadede, öncelikle hastalığa özgü araştırmaya yatırım yapmaktan, eşzamanlı olarak yeterli kaynakları hedefleyerek, özellikle dünyanın en savunmasız nüfusu için, insan bağışıklık sistemini güçlendirme çalışmalarına geçmemiz gerekmektedir. Ancak böyle bir çaba yeni aşıların, teşhislerin ve tedavilerin geliştirilmesini hızlandırabilir ve elbette sadece Covid-19 için değil, aynı zamanda gelecekte ortaya çıkması mümkün patojenler ve başlıca küresel salgınlar için de bağışıklanma çok önemlidir. Tüm insanlığın daha uzun ve sağlıklı yaşam sürmesine yardımcı olmak için mümkün olan en kısa sürede cesur ve gerçekçi eylemlere ihtiyaç duyulmaktadır (Koff and Williams, 2020).

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ŞEHİR SAĞLIĞI DERGİSİ
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Yapılan araştırmalar için ve etik kurul kararı gerektiren klinik ve deneysel insan ve hayvanlar üzerindeki çalışmalar için ayrı ayrı etik kurul onayı alınmış olmalı, bu onay makalede belirtilmeli ve belgelendirilmelidir.

Türkçe makalelerde hem metin içinde hem de kaynakçada TDK Yazım Kılavuzu (Yazım Kılavuzu, 2009, Türk Dil Kurumu, Ankara) veya www.tdk.gov.tr adresindeki on-line hali) yazım kuralları dikkate alınmalıdır.

Kaynakça; hem metin içinde hem de kaynakçada Amerikan Psikologlar Birliği (APA) tarafından yayımlanan Publication Manual of American Psychological Association adlı kitapta belirtilen yazım kuralları uygulanmalıdır.

Dergi isimleri Index Medicus veya ULAKBİM/Türk Tıp Dizini'ne uygun olarak kısaltılmalıdır.

Gönderilen çalışmaların aşağıda koyu yazılan bölümleri içermesi gerekmektedir:

- Türkçe Başlık Sayfası (Makale başlığını, yazar/lar/ın tam adlarını ve unvanlarını, çalıştıkları kurumlarını, adres, telefon, faks ve elektronik posta bilgilerini içermelidir.)
- Türkçe Öz (150-200 kelime arası)
- Anahtar Kelimeler (5-8 kelime arası)
- Ana Metin (Nicel ve nitel çalışmalar giriş, yöntem, bulgular, tartışma bölümlerini içermelidir.)
- İngilizce Başlık Sayfası (Makale başlığını, yazar/lar/ın tam adlarını ve unvanlarını, çalıştıkları kurumlarını, adres, telefon, faks ve elektronik posta bilgileri ve uluslararası geçerliliği bulunan "ORCID" bilgisine yer verilmelidir.)
- Abstract (150-200 kelime arası)
- Key Words (5-8 kelime arası)
- İngilizce Ana Metin (Nicel ve nitel çalışmalar giriş, yöntem, bulgular, tartışma bölümlerini içermelidir.)

YAYIM SÜRECİ ÜZERİNE YAZARLARA NOTLAR

Şehir Sağlığı Dergisi, şehir ve sağlık alanında çalışan tarafları ortak bir platformda buluşturmayı amaçlamaktadır.

Bu kapsamda;

- Şehirlerdeki insanların sağlığını ve esenliğini geliştirmek için yapılan bilimsel çalışmaların, araştırma ve analizlerin yer aldığı akademik bir dergi niteliğinde olacaktır. Bu uluslararası dergi şehir sağlığı ve sağlıklı bir çevre konusundaki politikaların oluşturulması ve uygulanması süreçlerinde yer alan taraflar arasında yönetişimi güçlendirmeye katkı sunacaktır. Sağlıklı şehirlerin oluşması konusunda karar destek mekanizmaları için başvuru kaynağı niteliğinde olan bir dergi olacaktır.
- Derginin yayın dili Türkçe ve İngilizcedir.
- Birden çok yazarlı makalelerde editoryal yazışmanın kiminle yapılacağı belirlenmeli ve açık bir şekilde belirtilmelidir.
- Yayımlanan yazıların içeriğinde ya da alıntılarında olabilecek çarpıtma, yanlış, telif hakkı ihlali, intihal vb. hususlardan yazar/yazarlar sorumludur.
- Yayımlanan yazıların içeriğinden yazarları sorumludur. İlgili çalışmada, eğer etik onay alınması gereken durumlar söz konusu ise yazarların etik kurullardan ve kurumlardan onay aldığı varsayılmaktadır.
- Yayımlanmış yazıların yayım hakları yayımcı firmaya aittir.

CITY HEALTH JOURNAL
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Papers to be submitted to the journal may be in Turkish or English languages. Papers to be submitted to the journal must be not published previously in another platform.

Papers defined to be written in accordance to the rules of the Journal are assessed by the editors and sent to two or more peers for review. Papers may be rejected or the author may be requested to make revision. In the event the paper is approved after the completion of any revisions within indicated periods, it is published in the issues to be developed within the year.

PREPARATION OF PAPER

The paper should be typed on paper with A4 dimensions, leaving 2.5 cm space from the top, below, right and left edges, with double line space, without hyphenation at line end, by using font size 10 Times New Roman character font.

The tables, figures, graphs and similar that are included should not exceed an area of 10 x 17 cm for preventing exceeding of page borders and for using with convenience. Thus, smaller font sizes and single line space may be used for objects such as tables, figures, images, graphs etc. The tables, figures, images, graphs etc. should be inserted into the text.

Papers should not exceed 20 pages. Sending a copy of the paper produced through MS Word to the Journal's e-mail addresses or submitting the same online from the website is sufficient for the editorial process to commence. An electronic mail message confirming its receipt is sent at the latest in a week after the paper was sent.

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For Turkish papers, the grammar rules in TDK Spelling Book (Yazım Kılavuzu, 2009, Turkish Language Association) or on the address www.tdk.gov.tr (online version) should be complied with in respect to both the text and the references sections.

References (For both the text and the references sections, the grammatical rules defined in the book named Publication Manual of American Psychological Association and published by American Psychological Association should be implemented).

Journal names should be abbreviated in accordance with Index Medicus or Ulakbim/Turkish Medical Index.

The papers submitted should include the sections presented in bold characters below:

- Turkish Title Page (should include paper title, full names and titles of author(s), the institutions they are employed in, and their address, telephone, fax and electronic mail addresses)
- Turkish Abstract (between 150 and 200 words)
- Keywords (between 5 and 8 words)
- Main Text (quantitative and qualitative studies should include introduction, methodology, findings and discussion sections)
- English Title Page (should include the paper title, full names and titles of author(s), the institutions they are employed in, and their address, telephone, fax and electronic mail addresses, and their "ORCID" data with international validity)
- Abstract (between 150 and 200 words)
- Keywords (between 5 and 8 words)

English Main Text (quantitative and qualitative studies should include introduction, methodology, findings and discussion sections)

NOTES TO AUTHORS ON THE PROCESS OF PUBLISHING

City Health Journal aims to bring together the parties dealing in the fields of city and health on a joint platform.

In this regard, it shall be;

- The Journal shall be an academical journal including the scientific studies, researches and analyses conducted for developing the health and wellbeing of the people living in cities. This international journal shall provide contribution to strengthening the governance among the parties included in the making and implementation of policies in regards to the topic of city health and health environment. It shall be a journal as a reference source for the decision support mechanisms on the topics of formation of health cities.
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