

# The approaches of Turkish dentists to the invasive treatment

Ömer Hatipoğlu<sup>1</sup>, Katibe Tuğçe Temur<sup>2</sup>

<sup>1</sup>Kahramanmaraş Sütçü İmam University, Faculty of Dentistry, Department of Restorative Dentistry, Kahramanmaraş, Turkey  
<sup>2</sup>Kahramanmaraş Sütçü İmam University, Faculty of Dentistry, Department of Oral and Maxillofacial Radiology, Kahramanmaraş, Turkey

## Correspondence:

Dr. Ömer HATİPOĞLU  
Kahramanmaraş Sütçü İmam University,  
Faculty of Dentistry, Department of  
Restorative Dentistry, Kahramanmaraş,  
Turkey.  
E-mail: ohatipoglu@ksu.edu.tr

Received: 23 May 2018  
Accepted: 24 June 2018

Access Online  
Quick Response Code



DOI:  
10.5577/intdentres.2018.vol8.no2.2

## Abstract

**Aim:** To research the effect of gender, workplace, and experience on the invasive treatment approaches of dentists in Turkey.

**Methodology:** In May 2018, 323 dentists working in Turkey participated in a survey. In the questionnaire, dentists were asked about their demographic characteristics such as gender, experience, and workplace. In addition, the invasive treatment initiation stages and the dental materials and techniques that they preferred for patients with low and high risk of caries were queried. The data obtained were analyzed using Pearson's  $\chi^2$  test.

**Results:** Gender was significantly related to the choice of invasive treatment approach for patients who have high ( $p=0.024$ ) or low risk of caries ( $p=0.032$ ). The experience factor was not significantly related to the choice of invasive treatment approach ( $p>0.05$ ), but the workplace factor was significantly related for those with a low risk of caries ( $p=0.037$ ). The selection of dental material was significantly related to the workplace factor ( $p<0.001$ ), but not related to gender ( $p=0.359$ ) or experience ( $p=0.067$ ). The selection of the restorative technique was significantly related to experience ( $p=0.033$ ), but not related to the factors of gender ( $p=0.132$ ) or workplace ( $p=0.082$ ).

**Conclusions:** To further increase minimally invasive approaches to dental treatment, authorities need to improve their health policies to reduce dentists' workload.

**Keywords:** Dental caries, dental health survey, minimally invasive

**How to cite this article:** Hatipoğlu O, Temur KT. The approaches of Turkish dentists to the invasive treatment. Int Dent Res 2018;8(2):56-62.

## Introduction

The process of tooth decay begins with the settlement of bacteria into the biofilm complex. The course of this process varies depending on the flow and composition of saliva, the use of fluoride-containing agents, the consumption of sugary foods, and the

subject's habits for cleaning their teeth (1). In the initial phase, decay is reversible, although dentin and enamel are damaged (2). Beyond this initial situation, the diagnosis and treatment planning of each dentist varies (3). Thus, clinicians make a critical decision whether or not to begin invasive treatment, depending on the depth of decay and cavitation (4).

The prohibition against using amalgam in many countries has led dentists to prefer alternative filling materials (5, 6). Besides prohibition, in recent years, increased aesthetic expectation, improved bonding systems, and the toxicities of amalgam have forced changes in the choice filling material used (7). The release of new dental materials on the market and alterations in dental treatment education have led to differences in the treatment methods used by older and younger dentists. Younger dentists are educated according to minimally invasive treatment protocols, while older dentists were trained according to Black’s principles, especially those of restraint and stabilization in treatment (8).

There is a consensus that non-cavitated enamel lesions should be treated with non-invasive methods (9). Criteria for determining when restorative intervention is needed has been discussed by many researchers. However, the stage at which invasive treatment should be preferred varies according to different regions, gender, and experience (5, 10, 11). For example, the number of dentists recommending invasive treatment of caries involving the dentin-enamel junction (DEJ) is minimal in Norway (7%), Sweden (7%), Kuwait (17%), Scotland (20%), whereas it is much more common in Brazil (79%), Croatia (81%) and France (88%) (5, 6, 8, 12–15). However, there is no study which measures the stage at which invasive treatment is preferred by dentists in Turkey. The goal of this study is to investigate the effect of gender, workplace, and experience on Turkish dentists’ choice of treatment approach.

The null-hypotheses of our study were (1) invasive treatment decisions of Turkish dentists do not vary according to workplace, experience, or gender; (2) Turkish dentists selection of filling materials and

application techniques is not influenced by their workplace, experience or gender.

## Materials and Methods

Ethical approval was given by the ethical committee of Kahramanmaraş Sütçü İmam University in Turkey. The questionnaire was delivered electronically to 1254 dentists in Turkey in May 2018, but only 323 (25,75%) dentists replied. The distribution of Turkish dentists (n=323) according to gender (male OR female), experience ( $\leq 10$  years OR  $> 10$  years) and workplace (the public dental health system [PDHS] OR private clinics OR universities) is illustrated in Table 1.

The questionnaire was composed of two sections. In the first part, demographic characteristics, such as experience, gender and workplace were requested. In the second part, the following questions were asked: (1) Figure 1 demonstrates different radiographic images of approximal caries. In a patient with a low caries risk (LCR) or high caries risk (HCR), at which stage of approximal caries do you prefer to begin invasive treatment (Stage 1-7)? Which preparation technique (Traditional OR Tunnel OR Saucer-Shaped Preparation) and filling material (Amalgam OR Composite OR Glass ionomer cement OR Combination) do you prefer in the invasive treatment of approximal caries?

The Sample size was calculated using Raosoft web survey software ([www.raosoft.com/samplesize.html](http://www.raosoft.com/samplesize.html)). With an 80% confidence interval, 5% alpha error, 26674 population size (according to TUIK statistical data in Turkey), 268 participants were required (16).

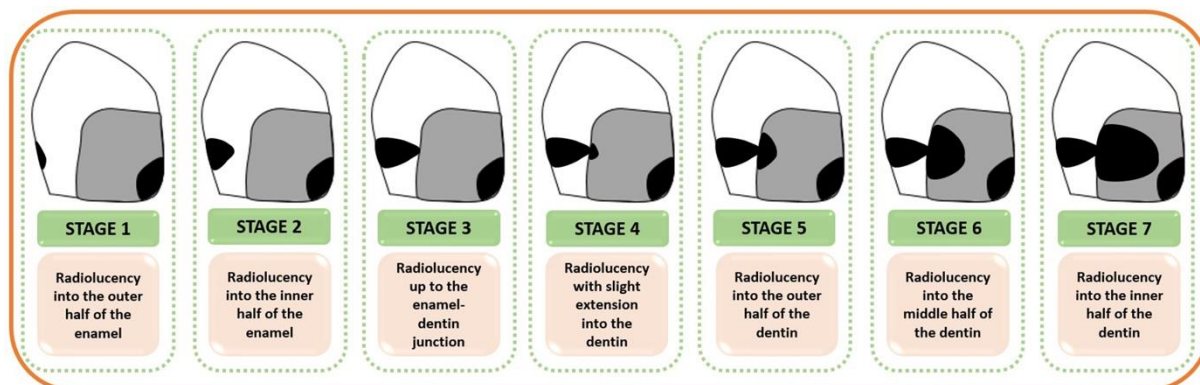


Figure 1. Different radiographic images of approximal caries.

### Statistical Analysis

Data analysis was completed using the Statistical Package for the Social Sciences version 23.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics with Pearson’s  $\chi^2$  test were conducted for associations between the demographic characteristics of the dentists and their restorative decisions for approximal caries. The probability level for statistical significance was set at  $P=0.05$ .

### Results

A total of 323 dentists participated in the study; 56% of participants were female. The ratio of participants who have  $\leq 10$  years of experience was 70.5%. The ratio of private clinic dentists who participated in the study was the highest (48.3%), and the ratio of the dentists working at universities was the lowest (22%) (Table 1).

In the LCR group, the rate of invasive treatment selection was highest in stage 3 and stage 4 for both male and female dentists (M:27.7%, F:32.4%). In the HCR group, the rate of invasive treatment selection was highest in stage 2 for both genders (M:41.1%, F:28%).

For both the LCR and HCR groups, the  $\chi^2$  tests indicated that the selection of invasive treatment was significantly associated with gender (LCR:  $p=0.032$ , HCR:  $p=0.024$ ) (Table 2).

For the experience groups, the rate of invasive treatment selection for all participants was highest in stage 4 in the LCR group ( $\leq 10$  years: 31.1%,  $>10$  years:26.3%). In the HCR group, the rate of invasive treatment selection for all the participants was highest in stage 2 ( $\leq 10$  years:33.8%,  $>10$  years:33.7%) (Fig. 2). For both in LCR and HCR groups, the  $\chi^2$  tests indicated that the selection of invasive treatment was not significantly associated with experience (LCR:  $p=0.525$ , HCR:  $p=0.326$ ) (Table 2).

In all of the workplace groups, the rate of invasive treatment selection was highest in stage 4 with the LCR group (PDHS: 29.2%, Private Clinics: 28.8%, Universities: 32.4%) and highest in stage 2 with HCR group (PDHS: 32.3%, Private Clinics: 31.4%, Universities: 40.8%) (Fig. 2). The  $\chi^2$  tests indicated that the selection of invasive treatment was significantly associated with workplace with the LCR group (LCR:  $p=0.037$ ), but not with the HCR group (HCR:  $p=0.236$ ) (Table 2).

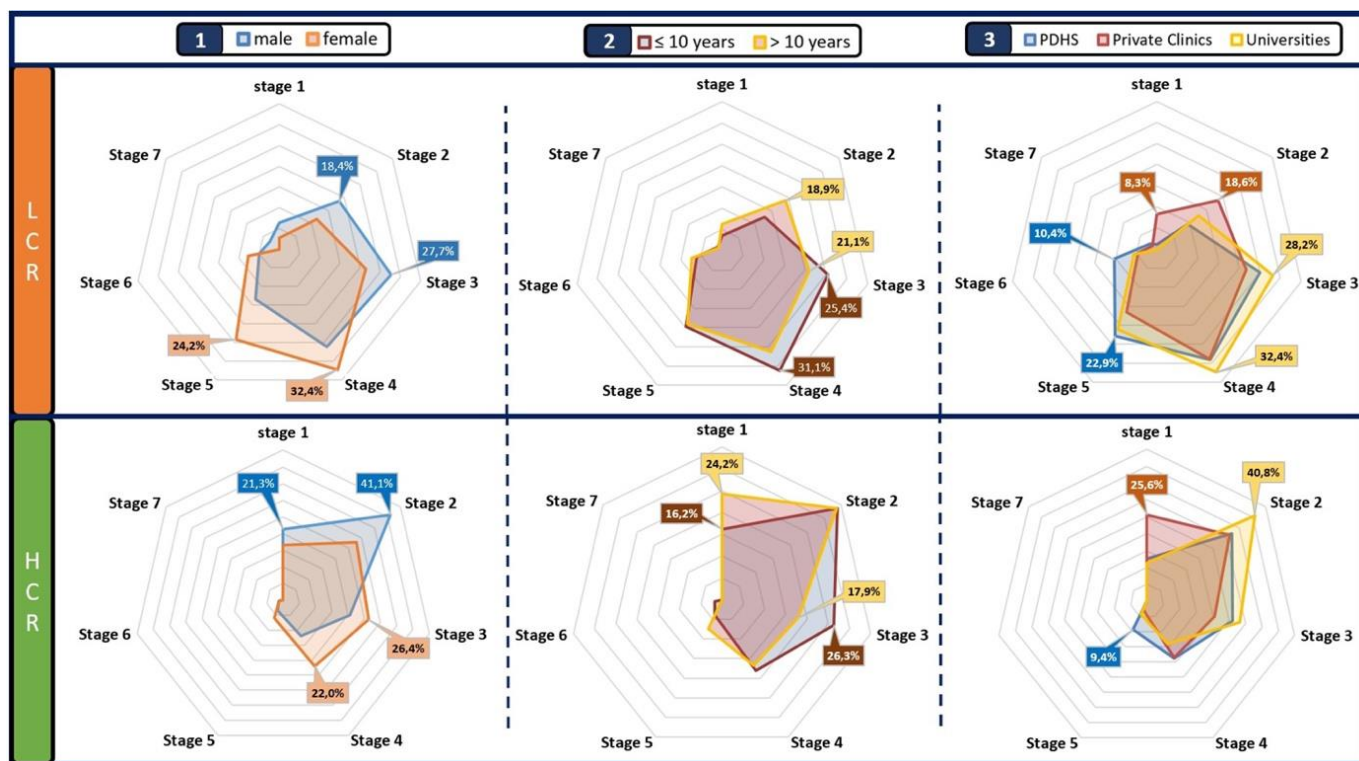


Figure 2. Invasive treatment approach to LCR and HCR groups of patients according to (1) gender, (2) experience, and (3) workplace.

For both genders, composite resin was the most selected dental material (F:85%, M:80.1%), and the lowest was glass ionomer cement (F:2.8%, M:3.6%).

Saucer-shaped preparation was the most-selected restorative technique (F:70.3%, M:63.1%), and the lowest was tunnel preparation (F:6.6%, M:4.3%) (Fig.

3). The  $\chi^2$  tests indicated that decisions on what dental material or restorative technique to use were not significantly associated with gender (Dental material:  $p=0.359$ , Restorative technique:  $p=0.132$ ) (Table 2).

For the experience groups, composite resin was the most selected dental material ( $\leq 10$  Years: 82.9%,  $>10$  Years: 78.9%). The rate of restorative technique selection was highest for saucer-shaped preparation ( $\leq 10$  Years: 71.1%,  $>10$  Years: 57.9%) (Fig. 3). The  $\chi^2$  tests indicated that decisions on dental material were not significantly associated with experience ( $p=0.067$ ), but significantly associated with restorative technique ( $p=0.033$ ) (Table 2).

For the workplace groups, composite resin was the most-selected dental material (PDHS: 70.8%, private clinics: 89.1%, universities: 80.3%), and highest for saucer-shaped preparation was the most selected restorative technique (PDHS: 62.5%, private clinics: 64.1%, universities: 80.3%) (Fig. 3). The  $\chi^2$  tests indicated that choices of dental material were significantly associated with workplace ( $p=0.033$ ), but not significantly related with restorative technique ( $p=0.082$ ) (Table 2).

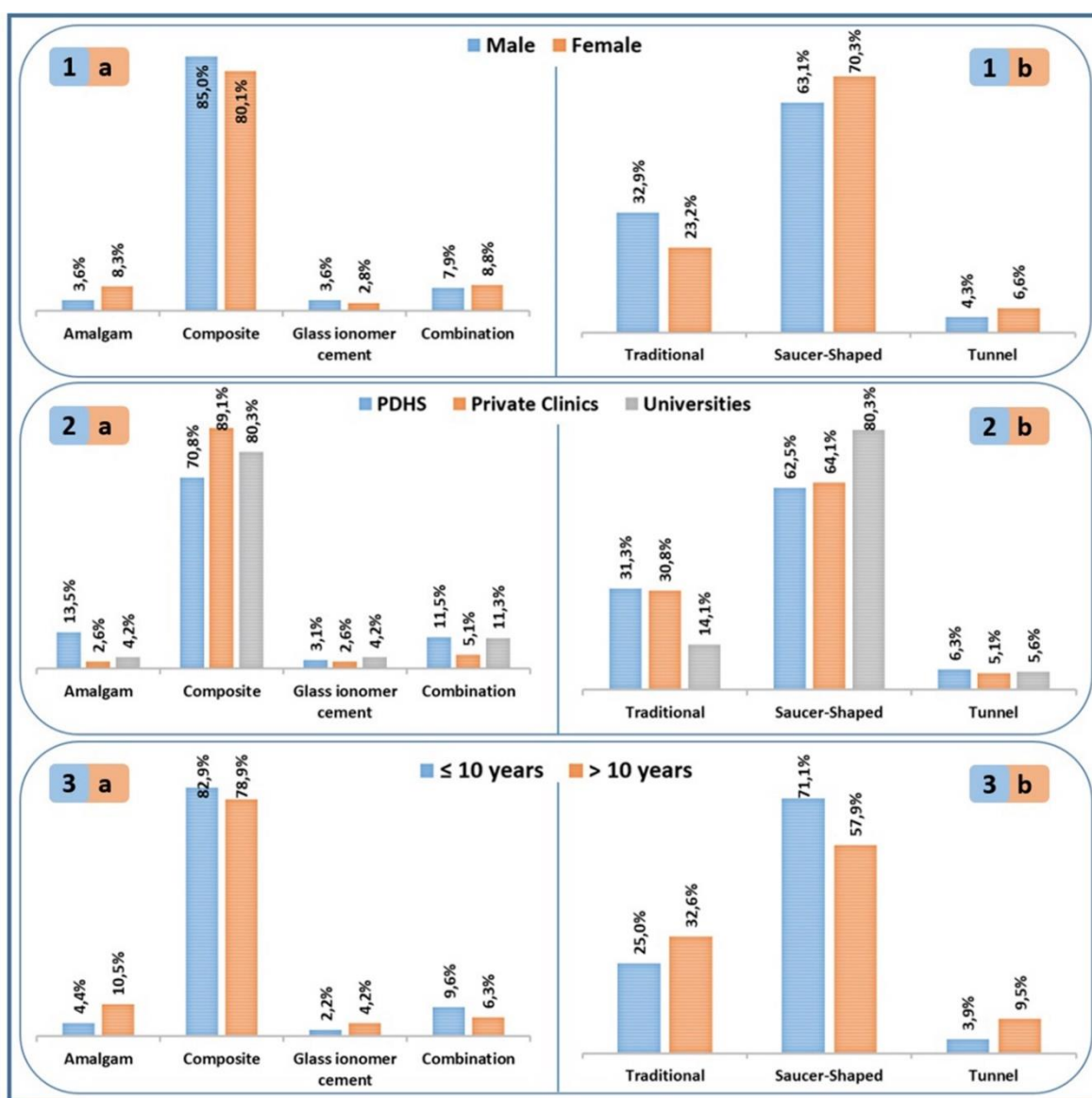


Figure 3. Effects of (1) gender, (2) workplace and (3) experience on (a) dental material and (b) restorative technique selection.

**Table 1.** Distribution of Turkish dentists (n=323) according to gender, experience, workplace.

Demographic features	Factors	n	%
Gender	Male	141	43.7
	Female	182	56.3
Experience	≤ 10 Years	228	70.6
	> 10 Years	95	29.4
Workplace	Private Clinics	156	48.3
	PDHS	96	29.7
	Universities	71	22

**Table 2.** Statistical data between the participants' demographic characteristics and their restorative approaches for approximal caries (Pearson's  $\chi^2$  tests).

Restorative Approaches	Demographic characteristics	$\chi^2$	p-value
Invasive treatment decision for LCR group	Gender	16.82	0.032*
	Experience	4.16	0.525
	Workplace	22.07	0.037*
Invasive treatment decision for HCR group	Gender	11.19	0.024*
	Experience	4.64	0.326
	Workplace	8.03	0.236
Dental material selection for approximal caries	Gender	3.22	0.359
	Experience	7.14	0.067
	Workplace	17.99	<0.001*
Restorative technique selection for approximal caries	Gender	4.05	0.132
	Experience	6.83	0.033*
	Workplace	8.27	0.082

\* Significant  $p < 0.05$

## Discussion

Minimal intervention dentistry aims to ensure that healthy tooth structure is preserved as much as possible by limiting the unnecessary removal of dental tissue. In the past, caries were considered a potential risk, but now, it is common to attempt to postpone the operation as much as possible (17). In traditional restorative approaches, while restoration is recommended when approximal caries reach the DEJ; currently, in preservative dentistry, restorations are not indicated until caries reach the middle half of the dentin, provided that there is no evidence of cavitation (9, 18). The reasoning behind this is that if the amount of sound tooth structure remains sustained, the likelihood that the dental vitality and function will be maintained longer is greater (2).

Treatment plans of dentists vary according to patient attributes such as age, caries risk and socio-economic conditions. For example, Brennan, et al. (19) stated that living at a lower socioeconomic level in Australia is associated with lower incidence of preventive treatment. In patients with LCR, clinicians may be more responsible in considering the operational approach than in patients with HCR (20). Information about the possibility of caries progressing is crucial when determining the correct time for invasive intervention.

Regarding LCR groups, however, in some countries, such as Norway (7%) and Sweden (7%), the number of dentists who prefer surgical treatment before caries reach the DEJ is few; in Croatia (81%) and France (88%), many dentists adopt the traditional approach (5, 6, 8, 15). Our study indicates that 49% of Turkish dentists do not prefer minimal invasive treatment. The reasons for the dissimilarity between

countries may be differences in the education systems, variation in the number of patients per dentist, or cultural factors (3). The fact that the studies were carried out in different years probably caused some of the variation in the results.

In our study, male dentists prefer invasive treatment more than female dentists. These results are in line with the results of previous studies in Japan, the USA, and Australia (4, 10, 21, 22). However, Traebert et al. (23) and Geibel et al. (24) found that, in Brazil and Germany, gender is not significant in dentists' decision to provide surgical treatment. One reason why gender is associated with invasive treatment is that patients whose preference is preventive treatment might tend to opt female dentists (25).

Vidnes-Kopperud et al. (5) stated that the tendency of dentists to restore caries involving DEJ decreased from 66% to 7% from 1983 to 2009 in Norway. Over the years, changing treatment criteria can lead to different preferences in treatment procedures between elderly and younger dentists. Since elderly dentists were educated according to Black's principles, they may prefer invasive treatment much more often (26). In studies conducted in Croatia and Brazil, it was found that experience is significant in dentists' decision to operate (14, 15). A study carried out in Australia found that, in parallel with our study, experience has no significant effect on clinicians' decision to operate (21). However, in our study, dentists who graduated in the last 10 years seem to prefer a minimally invasive approach relative to older dentists. A possible reason for this may be that more emphasis has been placed on minimally invasive treatment in Turkish education system in recent years.

In studies conducted in Sweden, the USA and Norway, it has been shown that the workplace influences the dentists' treatment plan significantly, as found in our study (4–6). In our study, those who worked in the PDHS generally choose less invasive means for patients with LCR. Dentists working in private clinics may prefer surgical treatment much more than dentists working in the PDHS because of the higher revenue generated by operative treatment.

In this study, the use of composite as the dental material was found to be most common. Dental schools in the UK, Ireland and Japan are known to prioritize the use of composite instead of amalgam for the restoration of posterior teeth (27). In a study conducted in 2001, it was concluded that most Swedish dentists prefer to use composites, but Danish dentists favor amalgam restoration (11). The use of composite instead of amalgam will imply the removal less sound tissue from teeth. Therefore, composite restoration applications do not require retentive areas such as undercuts, locks, or grooves as required by the

application of amalgam. However, the application of posterior composite restorations requires more time, owing to the adhesive bonding steps, shaping, polishing procedures and need to provide saliva control (28). The reason that dentists in the PDHS prefer amalgam as dental material compared to other dentists may be because of the heavy workload and limited time allocated to each patient.

In studies performed in Kuwait and Croatia, dentists prefer traditional and tunnel preparation for restorative treatment, respectively (12, 15). But, in the present study, Turkish dentists preferred saucer-shaped preparation, similar to Norwegian and French dentists (5, 8). It is also a fact that saucer-shaped preparations support dental tissue by removing less material from the dental tissue (29). In addition, the analysis indicates that young dentists favor saucer-shaped preparations more than older ones. This may indicate that the Turkish education system currently focuses much more on minimally invasive treatment than in the past.

## Conclusions

The null-hypotheses were rejected; the demographic attributes of dentists, such as gender, experience, and the workplace do influence the treatment approaches of dentists in Turkey. The fact that studies were carried out in different years restricts the accurate comparison of country-specific studies. It is a fact that in the education systems of most countries, minimally invasive treatment is more prominent than in the past. However, in order to improve its applicability, each country need to improve its health policies in a way that reduces the workload of dentists.

---

**Ethical Approval:** Ethics committee approval was received for this study from Kahramanmaraş Sütçü İmam University. (Decision No: 2018/188).

**Informed Consent:** Written informed consent was obtained from all the participants.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Conception - Ö.H.; Design - Ö.H.; Supervision - K.T.T.; Materials - K.T.T.; Data Collection and/or Processing - K.T.T.; Analysis and/or Interpretation - Ö.H.; Literature Review - Ö.H.; Writer - Ö.H.; Critical Review - Ö.H.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

---

## References

1. Selwitz RH, Ismail AI, Pitts NB. Dental caries. *The Lancet* 2007; 369:51-9. [\(Crossref\)](#)
2. Frencken JE, Peters MC, Manton DJ, Leal SC, Gordan VV, Eden E. Minimal intervention dentistry for managing dental caries—a review. *International dental journal* 2012; 62: 223-43. [\(Crossref\)](#)
3. Kay E, Locker D. Variations in restorative treatment decisions: an international comparison. *Community dentistry and oral epidemiology* 1996; 24: 376-9. [\(Crossref\)](#)
4. Gordan VV, Garvan CW, Heft MW, Fellows JL, Qvist V, Rindal DB, et al. Restorative treatment thresholds for interproximal primary caries based on radiographic images: findings from The Dental PBRN. *Gen Dent* 2009;57:654-63.
5. Vidnes-Kopperud S, Tveit A, Espelid I. Changes in the treatment concept for approximal caries from 1983 to 2009 in Norway. *Caries research* 2011; 45: 113-20. [\(Crossref\)](#)
6. Mejåre I, Sundberg H, Espelid I, Tveit AB. Caries assessment and restorative treatment thresholds reported by Swedish dentists. *Acta Odontologica Scandinavica* 1999; 57: 149-54. [\(Crossref\)](#)
7. Clarkson TW, Magos L, Myers GJ. The toxicology of mercury—current exposures and clinical manifestations. *New England Journal of Medicine* 2003; 349: 1731-7. [\(Crossref\)](#)
8. Doméjean-Orliaguet S, Tubert-Jeannin S, Riordan PJ, Espelid I, Tveit AB. French dentists' restorative treatment decisions. *Oral Health Prev Dent.* 2004;2(2):125-31. [\(Crossref\)](#)
9. Tyas MJ, Anusavice KJ, Frencken JE, Mount GJ. Minimal intervention dentistry—a review. *International Dental Journal* 2000; 50: 1-12. [\(Crossref\)](#)
10. Kakudate N, Sumida F, Matsumoto Y, Manabe K, Yokoyama Y, Gilbert G, et al. Restorative treatment thresholds for proximal caries in dental PBRN. *Journal of dental research* 2012; 91: 1202-8. [\(Crossref\)](#)
11. Espelid I, Tveit AB, Mejåre I, Sundberg H, Hallonsten A-L. Restorative treatment decisions on occlusal caries in Scandinavia. *Acta Odontologica Scandinavica* 2001; 59: 21-7. [\(Crossref\)](#)
12. Khalaf ME, Alomari QD, Ngo H, Doméjean S. Restorative treatment thresholds: factors influencing the treatment thresholds and modalities of general dentists in Kuwait. *Medical Principles and Practice* 2014; 23: 357-62. [\(Crossref\)](#)
13. Nuttall N, Pitts N. Restorative treatment thresholds reported to be used by dentists in Scotland. *British dental journal* 1990; 169: 119. [\(Crossref\)](#)
14. Traebert J, Marcenes W, Kreutz JV, Oliveira R, Piazza CH, Peres MA. Brazilian dentists' restorative treatment decisions. *Oral Health Prev Dent.* 2005;3(1):53-60. [\(Crossref\)](#)
15. Baraba A, Anić I, Doméjean-Orliaguet S, Espelid I, B Tveit A. Survey of Croatian dentists' restorative treatment decisions on approximal caries lesions. *Croatian medical journal* 2010; 51: 509-14. [\(Crossref\)](#)
16. TUIK Statistical Data in Turkey. <http://www.tuik.gov.tr>. Accessed March 13, 2018.
17. Anusavice KJ. Preservative dentistry: the standard of care for the 21st century. *Journal of public health dentistry* 1995; 55: 67-8. [\(Crossref\)](#)
18. Pitts N, Rimmer P. An in vivo comparison of radiographic and directly assessed clinical caries status of posterior approximal surfaces in primary and permanent teeth. *Caries research* 1992; 26: 146-52. [\(Crossref\)](#)
19. Brennan D, Spencer A. The role of dentist, practice and patient factors in the provision of dental services. *Community dentistry and oral epidemiology* 2005; 33: 181-95. [\(Crossref\)](#)
20. Bader JD, Shugars DA. Descriptive models of restorative treatment decisions. *Journal of public health dentistry* 1998; 58: 210-9. [\(Crossref\)](#)
21. Tan P, Evans R, Morgan M. Caries, bitewings, and treatment decisions. *Australian dental journal* 2002; 47: 138-41. [\(Crossref\)](#)
22. Riley III J, Gordan V, Rouisse K, McClelland J, Gilbert G. Differences in male and female dentists' practice patterns regarding diagnosis and treatment of dental caries: findings from The Dental Practice-Based Research Network. *J Am Dent Assoc* 2011;142:429-40. [\(Crossref\)](#)
23. Traebert J, Wesoloski CI, de Lacerda JT, Marcenes W. Thresholds of restorative decision in dental caries treatment among dentists from small Brazilian cities. *Oral Health Prev Dent* 2007;5(2):131-5. [\(Crossref\)](#)
24. Geibel M-A, Carstens S, Braisch U, Rahman A, Herz M, Jablonski-Momeni A. Radiographic diagnosis of proximal caries—influence of experience and gender of the dental staff. *Clinical oral investigations* 2017; 21: 2761-70. [\(Crossref\)](#)
25. Fontana M, Zero DT. Assessing patients' caries risk. *The Journal of the American Dental Association* 2006; 137: 1231-9. [\(Crossref\)](#)
26. Black GV, Black AD. *A Work on Operative Dentistry in Two Volumes. Vol 1.* Chicago:Medico-dental publishing Company; 1920.
27. Wilson NH, Lynch CD. The teaching of posterior resin composites: planning for the future based on 25 years of research. *Journal of dentistry* 2014; 42: 503-16. [\(Crossref\)](#)
28. Sarrett DC. Clinical challenges and the relevance of materials testing for posterior composite restorations. *Dental Materials* 2005; 21: 9-20. [\(Crossref\)](#)
29. Nordbø H, Leirskar J, von der Fehr FR. Saucer-shaped cavity preparations for posterior approximal resin composite restorations: observations up to 10 years. *Quintessence international* 1998;29(1):5-11.