

# Dentists' and Dental Students' Perspectives on Amalgam Restoration in Saudi Arabia

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## ABSTRACT

**Objective:** The study aims to assess dentists and dental students prospectively regarding amalgam and their opinions when dealing with it in the dental practice in Saudi Arabia.

**Study Design:** A cross-sectional study.

**Place and Duration of Study:** This study was conducted at the Qassim University's College of Dentistry from April 2021 to May 2023.

**Methods:** A cross-sectional study among dentists and dental students in the Kingdom of Saudi Arabia was conducted. The study included dentists from both public and private health care facilities. Data was collected using online google form, which consisted of demographic information and knowledge, attitude and practices of participants toward the use of amalgam material. Data was analyzed using chi-square test.

**Results:** Out of 122 participants, the majority were students (n=62), followed by specialists (n=25) and general practitioners (GP) dentists (n=22). A significantly higher percentage of participants revealed that the amalgam is not dangerous in the workplace (n=60, 49.2%). Moreover, a number of 81 participants (66.4%) said that amalgam restorations cannot be replaced by resin restoration. The specialist reported that most of their patients (n=22, 88.0%) do not prefer amalgam restorations due to the dark colour of the amalgam.

**Conclusion:** According to the results of this study, dental professionals in Saudi Arabia believe that amalgam is a risk-free material. Alternatives to dental amalgam are generally preferred by dental professionals mainly for esthetic concerns.

**Key Words:** Amalgam, Dentist, Dental Amalgam, Dental restoration, filling, KAP, Mercury

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## INTRODUCTION

Dental amalgam has been commonly used as a dental restorative material for over 150 years and has provided patients with a valuable and comparatively affordable treatment ever since. The data that is currently available demonstrates that dental amalgams are beneficial and risk-free; however, some of these concerns have been brought to light.<sup>1</sup>

Even though there is ongoing debate regarding the impact that waste containing mercury its physical properties, longevity, and less manual dexterity, this substance holds high importance in public health services.<sup>2,3</sup> Likewise national health authorities advised in previous years that amalgam should not be the first choice when placing restorations.<sup>4</sup> In addition, there is a discernible effort in the direction of dental educational institutions placing a greater emphasis on teaching dental students how to use mercury-free substitutes, in accordance with the guidelines outlined in the Minamata Convention on Mercury.

According to reports, public and media discourse influences dentists' views on amalgam.<sup>5</sup> In their survey, Khairuldean and Sadig reported that 75% of Saudi Arabian dentists were aware of the controversy surrounding the safety of amalgam.<sup>5</sup> Approximately, 85% of these dentists believed amalgam to be safe, while only 41% have been cognizant of all of the clinical symptoms of amalgam toxicity. Patients' perspective of dental aesthetics indicates that part of the population is unsatisfied with the metallic colour of the restorations in their teeth. Even so, there was an indication of a transition away from using silver

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amalgam to much more aesthetic tooth-coloured restorations over the last decade.<sup>6</sup> This could explain why dentists' and patients' preferences have changed in recent years. We tried to find out the answers to these issues in this report. This research looks at how a subset of dentists and students thought about amalgam and how they felt about dealing with it in Saudi Arabia.

**METHODS**

A cross-sectional study among dentists in the Kingdom of Saudi Arabia was conducted. This study was carried out at Qassim University's College of Dentistry from April 2021 to May 2023, with approval from the College of Dentistry Research Center (Reg. EA/6110/2021). A sample of 10 dentists and dental students just beginning clinical practice in Saudi Arabia was used for the pilot test of the questionnaire to evaluate its clarity in terms of both its structure and its content. The inclusion criteria were dental students beginning clinical practice and dentists. The study included dentists from both public and private healthcare facilities. Junior students who had not begun their clinical practice were among the exclusion criteria. Reminder emails were sent in two stages to enhance the response rates: one in February 2022 and another in November 2022. The questionnaire has 18 closed-ended questions and it was divided into two sections. The first section was regarding the demographic data and the characteristics of the practice (private practice, government hospitals). The second part focused on

measuring the perspective and knowledge of dentists regarding amalgam use and hazards, case selection, and safety concerns. The last question that was posed to the participants inquired as to whether or not they routinely employed amalgam restorations in their professional work. The collected data were analyzed using Statistical Package for Social Science (SPSS Inc). Descriptive statistics and frequency tables were compiled in order to provide an overview of the responses. For the statistical data analysis, the Chi-square test was utilized for categorical variables, and Fisher's exact test was used to assess the variations among groups.

**RESULTS**

A cross-sectional study was conducted among dental professionals between April 2021 to May 2023. Before the start of the study, Institutional ethical clearance was obtained from the College of Dentistry, Qassim University. The present study questionnaire was sent to 150 participants. Only 122 participants completed the questionnaire (response rate = 81.3%). Out of 122 participants, a number of 80 participants (65.6%) were males and 42 participants (34.4%) were female. It was observed that, out of the 122 participants, the majority of them were students (n=62), followed by specialists (n=25) and GP dentists (n=22). Most of the specialists and GP dentists were working in the government sector (n=108, 88.5%), while 14 participants (11.5%) were working in the private sector (Table 1).

**Table No.1: Demographic Profile**

Variables	Student	Intern	GP dentist	Specialist	Consultant	Total	p-Value
<b>Gender</b>							
Male	37 (59.7%)	3 (27.3%)	17 (77.3%)	21 (84.0%)	2 (100.0%)	80 (65.6%)	0.007
Female	25 (40.3%)	8 (72.7%)	5 (22.7%)	4 (16.0%)	0 (0.0%)	42 (34.4%)	
<b>Age</b>							
20-30	62 (100.0%)	11(100.0%)	22(100.0%)	25(100.0%)	2 (100.0%)	122(100.0%)	
<b>Service sector</b>							
Private	1 (1.6%)	0 (0.0%)	8 (36.4%)	5 (20.0%)	0 (0.0%)	14 (11.5%)	0.000
Government	61 (98.4%)	11(100.0%)	14(63.6%)	20 (80.0%)	2 (100.0%)	108(88.5%)	

**Table No. 2: Knowledge about Amalgam**

Variables	Student	Intern	GP dentist	Specialist	Consultant	Total	p-Value
<b>5. Patients perception in the amalgam toxicity comes from?</b>							
Social media	49 (79.0%)	10 (90.9%)	16 (72.7%)	19 (76.0%)	1 (50.0%)	95 (77.9%)	0.358
Research	6 (9.7%)	1 (9.1%)	3 (13.6%)	1 (4.0%)	0 (0.0%)	11 (9.0%)	
Banned	5 (8.1%)	0 (0.0%)	2 (9.1%)	3 (12.0%)	0 (0.0%)	10 (8.2%)	
The long contravery	2 (3.2%)	0 (0.0%)	1 (4.5%)	2 (8.0%)	1 (50.0%)	6 (4.9%)	
<b>6.What is your patient's view on the amalgam fillings?</b>							
Safe	13 (21.0%)	3 (27.3%)	1 (4.5%)	11 (44.0%)	1 (50.0%)	29 (23.8%)	0.026
Unsafe	5 (8.1%)	2 (18.2%)	6 (27.3%)	5 (20.0%)	0 (0.0%)	18 (14.8%)	
Uncertain	44	6 (54.5%)	15	9 (36.0%)	1 (50.0%)	75 (61.5%)	

	(71.0%)		(68.2%)				
9- What is your perception in using dental amalgam							
Higher strength and longevity	39 (62.9%)	4 (36.4%)	8 (36.4%)	13 (52.0%)	1 (50.0%)	65 (53.3%)	0.128
Less technique sensitive	9 (14.5%)	2 (18.2%)	2 (9.1%)	2 (8.0%)	1 (50.0%)	16 (13.1%)	
Unconservative restorations	14 (22.6%)	5 (45.5%)	12 (54.5%)	10 (40.0%)	0 (0.0%)	41 (33.6%)	
15- Is dental amalgam an occupation hazard at your place of work?							
Yes	28 (45.2%)	10 (90.9%)	13 (59.1%)	10 (40.0%)	1 (50.0%)	62 (50.8%)	0.047
No	34 (54.8%)	1 (9.1%)	9 (40.9%)	15 (60.0%)	1 (50.0%)	60 (49.2%)	
Total	62 (100.0%)	11 (100.0%)	22 (100.0%)	25 (100.0%)	2 (100.0%)	122 (100.0%)	

**Table 3: Attitude about Amalgam use**

Variables	Student	Intern	GP dentist	Specialist	Consultant	Total	P-Value
12- How often do you use amalgam for restorations in your daily clinical practice?							
Always	1 (1.6%)	1 (9.1%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	4 (3.3%)	0.003
Sometime	4 (6.5%)	2 (18.2%)	2 (9.1%)	10 (40.0%)	1 (50.0%)	19 (15.6%)	
Rarely	19 (30.6%)	4 (36.4%)	3 (13.6%)	7 (28.0%)	0 (0.0%)	33 (27.0%)	
Never	38 (61.3%)	4 (36.4%)	17 (77.3%)	6 (24.0%)	1 (50.0%)	66 (54.1%)	
14- What is your reasons not to use amalgam filling?A							
Mercury toxicity	27 (43.5%)	3 (27.3%)	5 (22.7%)	3 (12.0%)	0 (0.0%)	38 (31.1%)	0.001
Unesthetics	7 (11.3%)	3 (27.3%)	7 (31.8%)	12 (48.0%)	1 (50.0%)	30 (24.6%)	
Patient's desire	25 (40.3%)	2 (18.2%)	6 (27.3%)	3 (12.0%)	0 (0.0%)	36 (29.5%)	
Unconservative	3 (4.8%)	3 (27.3%)	4 (18.2%)	7 (28.0%)	1 (50.0%)	18 (14.8%)	
16- Do you agree or disagree that successful amalgam restorations can be replaced with composite resin?							
Agree	25 (40.3%)	2 (18.2%)	8 (36.4%)	5 (20.0%)	1 (50.0%)	41 (33.6%)	0.307
Disagree	37 (59.7%)	9 (81.8%)	14 (63.6%)	20 (80.0%)	1 (50.0%)	81 (66.4%)	
18- Do you agree or disagree with the established ban on amalgam use in some countries?							
Agree	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
Disagree	62(100.0%)	11 (100.0%)	22(100.0%)	25(100.0%)	2 (100.0%)	122(100.0%)	
Total	62(100.0%)	11 (100.0%)	22 (100.0%)	25(100.0%)	2 (100.0%)	122(100.0%)	

**Table No.4: Practice of amalgam restoration**

Variables	Student	Intern	GP dentist	Specialist	Consultant	Total	p-Value
7- What is your patient concerned regarding amalgam filling?							
Color	53 (85.5%)	8 (72.7%)	16 (72.7%)	22 (88.0%)*	1 (50.0%)	100 (82.0%)	0.000
Toxicity	8 (12.9%)	3 (27.3%)	4 (18.2%)	2 (8.0%)	0 (0.0%)	17 (13.9%)	
Health problem	0 (0.0%)	0 (0.0%)	2 (9.1%)	1 (4.0%)	0 (0.0%)	3 (2.5%)	
Environment effects	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	2 (1.6%)	
8- Would you recommend an alternative to amalgam?							
Yes	47 (75.8%)	8 (72.7%)	18 (81.8%)	19 (76.0%)	1 (50.0%)	93 (76.2%)	0.761
No	8 (12.9%)	2 (18.2%)	3 (13.6%)	4 (16.0%)	0 (0.0%)	17 (13.9%)	

Uncertain	7 (11.3%)	1 (9.1%)	1 (4.5%)	2 (8.0%)	1 (50.0%)	12 (9.8%)	
10- What criterion will you use to decide whether or not to replace amalgam restoration? p							
Patient wishes	22 (35.5%)	4 (36.4%)	4 (18.2%)	4 (16.0%)	0 (0.0%)	34 (27.9%)	0.100
Aesthetic	15 (24.2%)	2 (18.2%)	1 (4.5%)	5 (20.0%)	1 (50.0%)	24 (19.7%)	
Criteria of defective restoration	25 (40.3%)	5 (45.5%)	17 (77.3%)	16 (64.0%)	1 (50.0%)	64 (52.5%)	
11- Which of the following amalgam substitutes do you prefer? P							
Glass ionomer and resin modified glass ionomer	11 (17.7%)	1 (9.1%)	3 (13.6%)	1 (4.0%)	0 (0.0%)	16 (13.1%)	0.218
Indirect restoration inlay and onlay	23 (37.1%)	7 (63.6%)	5 (22.7%)	7 (28.0%)	1 (50.0%)	43 (35.2%)	
Resin composite	28 (45.2%)	3 (27.3%)	14 (63.6%)	17 (68.0%)	1 (50.0%)	63 (51.6%)	
13- In which of the following do you use dental amalgam?P							
Simple cavity	7 (11.3%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	8 (6.6%)	0.141
Complex cavity	18 (29.0%)	5 (45.5%)	6 (27.3%)	14 (56.0%)	0 (0.0%)	43 (35.2%)	
Core material	8 (12.9%)	1 (9.1%)	1 (4.5%)	2 (8.0%)	1 (50.0%)	13 (10.7%)	
Not used	29 (46.8%)	5 (45.5%)	15 (68.2%)	8 (32.0%)	1 (50.0%)	58 (47.5%)	
17- If your patient had faulty amalgam restoration, what is your retreatment plan?							
Amalgam	3 (4.8%)	0 (0.0%)	2 (9.1%)	2 (8.0%)	0 (0.0%)	7 (5.7%)	0.888
Composite	26 (41.9%)	4 (36.4%)	12 (54.5%)	11 (44.0%)	1 (50.0%)	54 (44.3%)	
Indirect restoration inlay and onlay	33 (53.2%)	7 (63.6%)	8 (36.4%)	12 (48.0%)	1 (50.0%)	61 (50.0%)	
Total	62 (100.0%)	11 (100.0%)	22 (100.0%)	25 (100.0%)	2 (100.0%)	122 (100.0%)	

Comparative analysis of different dental care professionals and their knowledge, attitude and practices are shown in Tables 2,3 and 4. It was observed that the majority of the participants reported that Social media 95 (77.9%) was responsible for spreading myths about amalgam toxicity. However, a number of 75 participants (61.5%) were uncertain about their view on amalgam safety. On the other hand, most of the participants reported that amalgam is not hazardous at the workplace (n=60, 49.2%) (Table 2). Table 3 illustrates the attitude of study participants toward amalgam use. It was surprising to know that even though they said it was not hazardous. Most of the participants (n=66 (54.1%)) do not use amalgam restoration in their daily routine. Moreover, a number of 81 participants (66.4%) disagree that amalgam restorations can be replaced by resin restoration. A significant number of respondents (31.1%) chose "Mercury toxicity" as their reason for not using

amalgam fillings, followed by "Patient's desire" (29.5%) and then "Unesthetics" (24.6%). Lastly, participants' perception of their amalgam practice was recorded. Specialists reported that most of the time, their patients do not prefer amalgam restorations due to colour (n=22 (88.0%)) with a p-value of <0.05. The majority of GPs (n=18 (81.8%)) and consultants (n=19 (76.0%)) recommend an alternative to amalgam. The resin composite was found to be the most recommended material by GPs (n=14 (63.6%)) and consultants (n=17 (68.0%)). Most of the consultants (n=14 (56.0%)) would use amalgam only for complex cavities. However, in the case of faulty amalgam restoration, a number of 61 respondents (50.0%) plan to use indirect (inlay or onlay) restorations (Table 4).

### DISCUSSION

The utilization of dental amalgam on a global scale has experienced a sizeable decrease over the past two

decades.<sup>7,8</sup> A practical assessment of the uses of amalgam in the past and an amalgam ban in the future requires certain presumptions.<sup>9</sup>

In view of this, we asked the patients about their source of information related to amalgam and it was found that Social media (n=95 (77.9%)) was responsible for spreading myths about amalgam toxicity. These results found similar published by other studies.<sup>9-11</sup> When compared with GPs, the current study found that 11% of specialists thought amalgam was safe to use. Nevertheless, a study carried out by Al-Nahedh HN et al. reported that 60.2% of GPs and specialists proclaimed it to be safe for both the dentist and the patient, whereas only 14.9% proclaimed it to be unsafe for both. Al-Nahedh HN et al. and Yaseen et al. reported contradictory results in terms of the percentage of GDPs (53%) and specialists (48%) who consider amalgam to be safe.<sup>7, 12, 13</sup>

In the current study, the vast majority of intern 10 dentists (90.9 %) and approximately 50% of general practitioner dentists (GP) found amalgam to be an occupationally safe material. The research conducted by Bamise et al<sup>14</sup> revealed that 26% of participants held the belief that mercury could be harmful to the health of humans.<sup>13</sup>

Longevity was cited as the primary reason for considering dental amalgam by the vast majority of respondents findings that were reported by Faraj et al. were consistent with the findings of the current study.<sup>7,9</sup> It was surprising to know that even though they said it was not hazardous but a number of 66 participants (54.1%) did not use amalgam restoration in their daily routine, which was found to be similar to a study done by another author, who reported that 80% of the participants do not frequently use amalgam restorations in their clinical practice. This could indicate an optimistic influence of the Minamata Convention attributes on Mercury on the dental curriculum.

Moreover, a number of 81 participants (66.4%) in the present study disagreed that amalgam restorations can be replaced by resin restoration. Similarly, Alkhudhairy F discovered that 72% of the people who participated in this study had different opinions. On the other hand, the results of another survey revealed that 21% of dentists removed amalgam restoration at the request of their patients. In the present study, specialists reported that due to colour (n=22 (88.0%)) most of the patients do not prefer amalgam restorations with  $p < 0.05$  and the majority of GPs (81.8%) and consultants (76.0%) recommend an alternative to amalgam. This is consistent with the findings of Yaseen.<sup>12</sup> Glass ionomer was the most preferred option as a restorative material in the study conducted by Faraj and coworkers.<sup>7,9</sup> In terms of colour preferences, similar results were reported by an author and Vidnes- Kopperud et al.<sup>15</sup> favoured esthetics (77.1%) as the main reason to limit the use of amalgam, followed by patients' desire

(58.6%). In addition, Espelid et al. found that regardless of gender, patients were more concerned about the aesthetics of their restorations than the longevity of the restorations.<sup>16</sup>

In the current study, to replace faulty amalgam restoration, a number of 61 participants (50.0%) planned to use indirect (inlay or onlay) restorations. While another reported Large restorations (49.4%) and crown build-up (31.5%) were the most common restorative. One of the limitations of the current study is that only a small percentage of dentists participated in the survey, which makes it hard to generalize the results.

## CONCLUSION

The results of this study suggested that dentists in Saudi Arabia believe it is safe to use amalgam. Based on these findings, we can draw the conclusion that dental amalgam is well approved by both dentists and patients in Saudi Arabia. Furthermore, the majority of dentists believe that amalgam is safe for both dentists and patients. In general, dentist favor alternatives to dental amalgam for esthetic reasons, and for the most part, dentists do not use dental amalgam routinely as per the requests of their patients.

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