

# Attitudes of Senior Dental Students of Al Quds University towards Placement of Restorative Materials in Posterior Teeth

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**Abstract** The aim of this article is to assess the attitude of senior dental students of college of dentistry, Al Quds University towards placement of direct restorative materials in posterior teeth. Amalgam is used conventionally in restoration of posterior teeth while the use of resin composites is on rise for the same purpose. The esthetic concern of the patients and safety concerns about use of amalgam are changing the conventional trends of posterior teeth restoration. Some dental schools have even declined the use of amalgam in their institutions. But the properties of amalgam such as its high strength and less wear over a period of time are still making it the best alternative for the posterior teeth restoration. This study was conducted to evaluate the attitude of the dental students towards the use of amalgam and resin composites in restoration of posterior teeth. A 20 items online questionnaire was sent to 82 fifth year dentistry students of Al Quds University. Out of them 69 students responded with a response rate of 84.1%. The questions involve influences of various factors on the choice of material for posterior teeth restoration. The size of the cavity is found to have almost equal influence in both the cases. Esthetic demand and patient's choice also affect the choice of material strongly. Age of the patient doesn't seem to affect much on the material choice. Moisture control was found critical in case of composite restoration. Patient's pregnancy seems to strongly influence in case of amalgam restoration due to the safety concerns regarding the same. As per this study, the students seem to choose both the materials equally depending upon the case scenario.

**Keywords:** Amalgam, composite, posterior teeth restoration, Esthetic restoration, amalgam safety

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## 1. Introduction

In 1890, Black gave the classification of cavity preparation as per the location of the carious lesion. This classification is majorly used for the restoration of amalgam. But after the introduction of minimal intervention technique, resin composites are becoming more and more popular with each passing day [1].

With the increasing awareness about the oral health people are adopting the more esthetic alternatives. Composites have an edge over amalgam in this domain.

But despite of the esthetic demand in present era, amalgam restoration is still being used widely. [2,3,4,5] The main reason for this can be credited to straight forward handling procedure [2] and high clinical success. [4,6] Recently the popularity of the amalgam is diminished because of the health hazard concerns and worldwide plan of eradicating mercury use.

According to American association council of scientific affairs, amalgam and composites have equal safety and

effectiveness on teeth restoration. [7] The national institute of health has illustrated that the amalgam filling does not pose any health risk and it is not needed to be replaced by non-amalgam restoration [8].

In case of large posterior teeth cavities, amalgam has been restorative material of choice as placement of resin composites can be a tedious process. Also a long period study of posterior teeth restoration shows that the composites have more worn upon aging as compared to amalgam. [9] This wear challenge has been improved by introduction of new generations of Resin based composite resins [10].

Certain dental schools have discontinued the restoration of teeth with amalgam [11] while others are still not in favor of using esthetic restorations. [12] The conflict in using the amalgam and resin composites in posterior teeth has led to a puzzling situation in dental schools [13].

This study is conducted to evaluate the influence of such factors on the placement of restorative materials in posterior teeth among the fifth year dental students of Al Quds University.

## 2. Materials and Methods

In this study, the restorative treatment taught to and performed by final year students of Al Quds University was evaluated. A questionnaire comprising of 20 questions was distributed to the 82 registered final year students of academic batch 2013-2014. This questionnaire was similar to the one conducted by Lynch C. *et al.* [14].

Personal information such as name of the dentist was not sought to maintain anonymity. The study received the needed ethical approval from Al Quds University Research and Ethics Committee under the number 9/REC/18.

The questionnaire was divided in two parts, one was regarding the use of composites and other was related to the use of amalgam.

The questions given were about the different factors that may influence the use of composites and amalgam in the posterior teeth. These factors included site of lesion, size of the cavity, age of the patient, dentition, esthetic demand, patient choice, amalgam safety, pregnancy, theoretical teaching, clinical experience, moisture control, opposing dentition, root filled tooth, rubber dam placement, confidence using materials, clinical problems experienced and information from journals.

The responses were given degree from 1 to 5 where 1 represents no answer, 2 represents don't know, 3 represents does not influence, 4 represent slight influence and 5 represents strong influence.

## 3. Results

Out of 82 students, 69 students responded with a response rate of 84.1%. The observed results are as follows:

When asked about the influence of site of lesion, 39 (56.5%) respondents believed that it has strong influence while 29 (42.0%) and 1.4% respondents believed that it has a slight or no influence respectively. These figures are 89.8%, 4.3% and 4.3% respectively in case of Amalgam. (Table 1).

In case of the size of the cavity, 41 (59.4%) participants suggested that it strongly influences the choice of composite, 19 (27.5%) suggested that this factor has slight influence while 9 (13.0%) responded that size of the cavity has no influence on the choice. In case of Amalgam, 59.4% students suggested strong influence, 37.6% said there is only slight influence while 2.9% favored no influence at all. (Table 1).

Age of the patient doesn't seem to influence for 26 (37.6%) participants while 24 (34.7%) students believed it has a slight influence on choice of composites. 12(17.3%) participants believed that age of the patient has a strong influence on the choice of composites in posterior teeth restoration. 5.80% students gave no answer about it while 4.3% participants said that they don't know about its influence. In case of amalgam, 43.4% opted that age has no influence on the selection of amalgam, 34.7% said that age has only slight influence while 17.3% suggests that it strongly influences the choice of amalgam as restorative material in posterior teeth. (Table 1).

About primary/secondary dentition 41 (59.4%) respondents stated that this factor has slight influence on

the choice of the restorative material while 15 (21.7%) participants believed that the dentition has no effect on the choice. 13 (18.8%) participants believed that this factor has a strong influence for choosing composite as a restorative material. 46.3% students that it has a strong influence on their choice of amalgam as restorative material, 30.4% students suggests that it has a mild influence while 17.3% said it has no effect in choosing amalgam as the restorative material. (Table 1).

Esthetic demand seems to influence a lot on the choice of composites as a material of choice as per 95.6% of the participants while only 4.3% respondent students believed that it has no influence. Whereas in case of amalgam, 86.9% students think esthetic demand has a strong influence while 8.7% think that esthetics may have a slight influence in accepting or rejecting amalgam. Rest 4.3% students think that it has no influence at all on amalgam choice. (Table 1).

Majority of the students believed that patient's choice must be considered while placing the composites as per 46.3% respondents whereas 36.2% participating students think that it has only a slight effect on the choice. According to 11.5% participants patient's choice doesn't influence the choice of the material at all. These figures seem to be almost same in case of amalgam too. Almost same number of 33 (47.8%) students said that patient's choice has an impact slight as well as strong in case of choosing amalgam for posterior teeth restoration. (Table 2).

The participants were also asked about the influence of patient's safety on their choice of restorative material. 44.9% gave a positive answer and agreed that patient's concern for amalgam safety has a slight influence on their choice whereas 28.9% said it has a strong influence on their choice. In case of amalgam, it seems to have more influence as per 49.2% participant students while 37.6% students suggests that it have only a mild influence on the choice of amalgam. 21.7% participant students said that it doesn't influence the choice of composites while rest 4.3% said that they don't know about it. (Table 2).

On asking about influence of dentist's concern about amalgam safety, 43.4% students said that it doesn't have influence on the choice while 39.1% and 13.0% said it has a slight and a strong influence on the choice of composite as restorative material respectively. Rest 4.3% said that they don't know. Dentist's concern about amalgam safety doesn't look like an issue as 43.4% students said that there is no influence of it at all on their choice of amalgam to be used as a restorative material. 40.5% participants think that this factor has a slight influence while 11.5% students think it has a strong impact on the choice of amalgam for the use. (Table 2).

When the students were asked about influence of factor such as patient's pregnancy on their choice of material, 47.8% suggested that it doesn't influence the choice of material as composite, 15.9% said that it has slight influence while 11.5% said that it has a strong influence on the choice. In case of amalgam, 43.4% participants said that pregnancy had a strong influence on their choice while 20.2% said that there is only a mild influence of patient's pregnancy on the choice of amalgam as restorative material. 21.7% respondents think that there is no influence at all. (Table 2).

Table 1. Attitude of final year students towards direct restoration in posterior teeth

FACTORS INFLUENCING DIRECT RESTORATION IN POSTERIOR TEETH	COMPOSITE			AMALGAM		
	GRADE	NUMBER OF PARTICIPANTS	%	GRADE	NUMBER OF PARTICIPANTS	%
Site in mouth	No answer	0	0.00%	1	0	0.00%
	Don't know	0	0.00%	2	1	1.4%
	Doesn't influence	1	1.4%	3	3	4.3%
	Slight influence	29	42.0%	4	3	4.3%
	Strong influence	39	56.5%	5	62	89.8%
		69			69	
Size of cavity	No answer	0	0.0%	1	0	0.0%
	Don't know	0	0.0%	2	0	0.0%
	Doesn't influence	9	13.0%	3	2	2.9%
	Slight influence	19	27.5%	4	26	37.7%
	Strong influence	41	59.4%	5	41	59.4%
	69			69		
Age of patient	No answer	4	5.8%	1	0	0.0%
	Don't know	3	4.3%	2	3	4.3%
	Doesn't influence	26	37.6%	3	30	43.4%
	Slight influence	24	34.7%	4	24	34.7%
	Strong influence	12	17.3%	5	12	17.3%
	69			69		
Primary/Secondary dentition	No answer	0	0.0%	1	0	0.0%
	Don't know	0	0.0%	2	4	5.8%
	Doesn't influence	15	21.7%	3	12	17.3%
	Slight influence	41	59.4%	4	21	30.4%
	Strong influence	13	18.8%	5	32	46.3%
	69			69		
Esthetic demand	No answer	0	0.0%	1	0	0.0%
	Don't know	0	0.0%	2	0	0.0%
	Doesn't influence	3	4.3%	3	3	4.3%
	Slight influence	0	0.0%	4	6	8.7%
	Strong influence	66	95.6%	5	60	86.9%
	69			69		

**Table 2. Attitude of senior dental students regarding Factors like patient's choice, safety concerns about amalgam, patient pregnancy and theoretical teachings influencing direct restoration in posterior teeth**

FACTORS INFLUENCING RESTORATION	COMPOSITE			AMALGAM		
	GRADE	NUMBER OF PARTICIPANTS	%	GRADE	NUMBER OF PARTICIPANTS	%
Patient's choice	No answer	1	1.4%	No answer	0	0.0%
	Don't know	3	4.3%	Don't know	0	0.0%
	Doesn't influence	8	11.5%	Doesn't influence	3	4.3%
	Slight influence	25	36.2%	Slight influence	33	47.8%
	Strong influence	32	46.3%	Strong influence	33	47.8%
		69			69	
Patient concern for amalgam safety	No answer	0	0.0%	No answer	0	0.0%
	Don't know	3	4.3%	Don't know	0	0.0%
	Doesn't influence	15	21.7%	Doesn't influence	9	13.0%
	Slight influence	31	44.9%	Slight influence	26	37.6%
	Strong influence	20	28.9%	Strong influence	34	49.2%
		69			69	
Your concern for amalgam safety	No answer	0	0.0%	No answer	0	0.0%
	Don't know	3	4.3%	Don't know	3	4.3%
	Doesn't influence	30	43.4%	Doesn't influence	30	43.4%
	Slight influence	27	39.1%	Slight influence	28	40.5%
	Strong influence	9	13.0%	Strong influence	8	11.5%
		69			69	
Patient pregnancy	No answer	3	4.3%	No answer	2	2.9%
	Don't know	14	20.2%	Don't know	8	11.5%
	Doesn't influence	33	47.8%	Doesn't influence	15	21.7%
	Slight influence	11	15.9%	Slight influence	14	20.2%
	Strong influence	8	11.5%	Strong influence	30	43.4%
		69			69	
Theoretical teaching received	No answer	0	0.0%	No answer	0	0.0%
	Don't know	6	8.7%	Don't know	3	4.3%
	Doesn't influence	5	7.2%	Doesn't influence	3	4.3%
	Slight influence	30	43.4%	Slight influence	33	47.8%
	Strong influence	28	40.5%	Strong influence	30	43.4%
	69			69		

On asking about the effect of theoretical teaching received and clinical experience received, 40.5% and 55.0% students respectively suggested that they have strong influence while 43.4% and 39.1% respectively suggested that they have slight influence on the choice of restorative material as composite for posterior teeth. These

figures are bit same in case of amalgam also. Theoretical teaching seems to influence strongly as per 43.4% students while 47.8% students say that it only influences slightly while choosing amalgam. In case of clinical experience, 50.7% students said it has a strong influence on their choice of using amalgam. (Table 3).

**Table 3. Attitude of senior dental students regarding Factors such as clinical teachings, material properties, moisture control, rubber dam placement, subgingival margins, opposing dentition influencing choice restorative materials in posterior teeth**

FACTORS INFLUENCING RESTORATION	COMPOSITE			AMALGAM		
	GRADE	NUMBER OF PARTICIPANTS	%	GR-ADE	NUMBER OF PARTICIPANTS	%
Clinical teaching/experience received	No answer	0	0.0%	No answer	0	0.0%
	Don't know	0	0.0%	Don't know	3	4.3%
	Doesn't influence	4	5.8%	Doesn't influence	6	8.7%
	Slight influence	27	39.1%	Slight influence	25	36.2%
	Strong influence	38	55.0%	Strong influence	35	50.7%
		69			69	
Knowledge of material's properties	No answer	0	0.0%	No answer	0	0.0%
	Don't know	2	2.9%	Don't know	3	4.3%
	Doesn't influence	0	0.0%	Doesn't influence	2	2.9%
	Slight influence	23	33.3%	Slight influence	27	39.1%
	Strong influence	44	63.7%	Strong influence	37	53.6%
		69			69	
Moisture control	No answer	0	0.0%	No answer	0	0.0%
	Don't know	0	0.0%	Don't know	0	0.0%
	Doesn't influence	3	4.3%	Doesn't influence	17	24.6%
	Slight influence	7	10.1%	Slight influence	30	43.4%
	Strong influence	59	85.5%	Strong influence	22	31.8%
		69			69	
Subgingival margins	No answer	0	0.0%	No answer	2	2.9%
	Don't know	0	0.0%	Don't know	4	5.8%
	Doesn't influence	1	1.4%	Doesn't influence	9	13.0%
	Slight influence	19	27.5%	Slight influence	27	39.1%
	Strong influence	49	71.0%	Strong influence	27	39.1%
		69			69	
Opposing dentition	No answer	0	0.0%	No answer	0	0.0%
	Don't know	2	2.9%	Don't know	0	0.0%
	Doesn't influence	9	13.0%	Doesn't influence	22	31.8%
	Slight influence	33	47.8%	Slight influence	28	40.5%
	Strong influence	25		Strong influence	19	27.5%
		69			69	
Root filled tooth	No answer	0	0.0%	No answer	0	0.0%
	Don't know	3	4.3%	Don't know	4	5.8%
	Doesn't influence	14	20.2%	Doesn't influence	22	31.8%
	Slight influence	44	63.7%	Slight influence	26	37.6%
	Strong influence	8	11.5%	Strong influence	17	24.6%
		69			69	
Rubber dam placement	No answer	0	0.0%	No answer	0	0.0%
	Don't know	0	0.0%	Don't know	0	0.0%
	Doesn't influence	7	10.1%	Doesn't influence	36	52.1%
	Slight influence	15	21.7%	Slight influence	20	28.9%
	Strong influence	47	68.1%	Strong influence	13	18.8%
		69			69	

When students were asked about moisture control and rubber dam placement, 85.5% and 68.1% respectively suggested that these factors have strong influence on the selection of restorative material while 10.1% and 27.5% respectively said that these factors have slight influence. Moisture control and rubber dam placement doesn't seem to be of much concern in placement of amalgam. 43.4% students think that moisture control poses mild effect on choice of amalgam while 52.1% students think that rubber dam placement has no effect on the choice of amalgam for restoration. (Table 3).

Opposing dentition seems to influence slightly as per 47.8% students while 36.2% students said that it has strong influence. In case of root filled tooth, 63.7% students said that it has slight influence, 11.5% students said that it has strong influence. Rest 20.2% said that it doesn't effect the selection of the restorative material. As

per 40.5% students, amalgam placement is less affected by opposing dentition while 31.8% participants think it has a mild influence. For root filled tooth, 37.6% respondents think that it has slight influence while 31.8% students think that it has no influence on choice of amalgam as restorative material (Table 3).

About confidence using material 37.6% students said that it has mild influence on the choice of composites while 30.4% suggested it has strong influence. 27.5% said that confidence of using material doesn't have much influence on choice of the restorative material. 52.1% students think that confidence while using material has a mild influence on choosing amalgam for posterior teeth restoration while 26.0% think confidence doesn't influence their choice of choosing amalgam at all. (Table 4).

**Table 4. Attitude of senior dental students regarding Factors such as confidence using material, previous problems experienced with the material and information from journals influencing choice of material for posterior teeth restoration**

FACTORS INFLUENCING RESTORATION	COMPOSITE			AMALGAM		
	GRADE	NUMBER OF PARTICIPANTS	%	GRADE	NUMBER OF PARTICIPANTS	%
Confidence using material	No answer	0	0.0%	No answer	1	1.4%
	Don't know	3	4.3%	Don't know	2	2.9%
	Doesn't influence	19	27.5%	Doesn't influence	18	26.0%
	Slight influence	26	37.6%	Slight influence	36	52.1%
	Strong influence	21	30.4%	Strong influence	12	17.3%
		69			69	
Previous clinical problems experienced with material	No answer	0	0.0%	No answer	1	1.4%
	Don't know	1	1.4%	Don't know	3	4.3%
	Doesn't influence	8	11.5%	Doesn't influence	12	17.3%
	Slight influence	33	47.8%	Slight influence	42	60.8%
	Strong influence	27	39.1%	Strong influence	11	15.9%
		69			69	
Information from journals	No answer	6	8.7%	No answer	4	5.8%
	Don't know	3	4.3%	Don't know	6	8.7%
	Doesn't influence	12	17.3%	Doesn't influence	7	10.1%
	Slight influence	36	52.1%	Slight influence	43	62.3%
	Strong influence	12	17.3%	Strong influence	9	13.0%

Previous clinical problems experience seems to influence mildly as per 47.8% respondent students. 39.1% students suggest that it affect their choice strongly while 11.5% students said it doesn't affect their choice. Recent information from journals seems to influence strongly as per 17.3% students while 52.1% students said it only has a slight influence on the choice of composite as restorative material. 60.8% students think that previous clinical problems with the material have a mild influence on choosing amalgam as restorative material. 62.3% of the respondents think that information from the journals may affect their decision of choosing amalgam slightly. (Table 4).

## 4. Discussion

Composites are the most common alternative to amalgam for posterior teeth restoration. [15] Though amalgam has always been the material of choice for restoration of posterior teeth because of its strength and more durability, composite use is on increase because of development of better resin-reinforced composites and its esthetic appeal [16].

This study was conducted to assess the attitude of final year dental students of Al Quds University towards the

direct restorative material placement in posterior teeth. The questionnaire contained all the necessary factors that may influence the choice of the material in posterior teeth restoration. The students were asked about composites and amalgam. Similar surveys were also conducted before in some European colleges [14].

Though students were free to respond or not, an enthusiastic response rate of 84.14% was achieved in this study which was higher from the other similar studies published [14].

In this study, it is seen that site of the cavity in the mouth is an essential factor in choosing amalgam for restoration of posterior teeth. This is favored by 89.86% of the participant students. This is far low for composites as only 56.52% students think that site influences the use of composites. Along with recent developments in resin composite technologies, there is evidence to support the use of resin composite as a direct restorative material for occlusal and occlusoproximal cavities [17,18].

In this study the main decisive factor seem to be esthetic demand. 95.65% students are choosing composites for only this factor. As per Adele Hervas Garcia [19] composites are used as a restorative material to solve esthetic problem rather than functional problem. It is mostly used in the anterior teeth restoration only because of this factor [20].

Patient pregnancy seems to have an effect on the placement of amalgam as restoration as per 43.48% participants. Non-ionized mercury is capable of crossing through lipid layers at membrane barriers placenta. This fact has become the basis for claims of neuromuscular problems in patients with amalgam restorations. [21] The developing neurological systems in fetuses and young children may be more sensitive to the neurotoxic effects of mercury vapor. [22] There is yet no evidence that exposure to mercury has been associated with any adverse pregnancy outcomes or health effects in the newborn and infants. [23] As recently as May 2005, the ADA endorsed amalgam as being safe for pregnant women.

The safety of dental amalgam has been questioned, and it has been discussed to what extent mercury released from amalgam fillings may lead to adverse health effects.[24] In this study, patient concern for amalgam safety has been an important factor while choosing amalgam as per 49.28% participant students. There is no strong evidence regarding toxic effect of amalgam on patient. Marshall, in his review on dental amalgam, summed it up appropriately: "if some reported values of Hg release are extrapolated to clinical life times, the entire restoration could lose its Hg in short time. For example, a 500 mg amalgam restoration contains approximately 200–250 mg of Hg, and the entire quantity of Hg would be lost in 10,000 days if the Hg was released at the rate of 25 µg/day. This estimate of release is of the order of magnitude reported in some studies of vapor release" [23].

Moisture control is also an important factor for the placement of composites in the posterior teeth. 85.51% students also say so. Some other authors also support this fact. [25] As per Stephen J. Bonsor, composite is a hydrophobic material, thus moisture control is vital for placement of composites in the teeth. [26] Placement of sub-gingival margins of restoration also plays a vital role in composite restoration as per 71.01% students. Subgingival margins are associated with biological and

technical problems such as difficulty in isolating the working field with a dental dam, adhesion procedures, impression taking, and final positioning of the restoration itself. [27].

## 5. Conclusion

From this study it has been concluded that amalgam and composite both are equally popular among the students though both materials have their merits and demerits. As per the patient's demands, condition of the tooth to be restored and the experience and the knowledge related to the material, restorative materials are used. More of such studies must be conducted to evaluate the degree of awareness in the dental students.

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