

Attitudes and Knowledge of dentists in Pakistan regarding the use of Dental Amalgam as a restorative material

TALHA NAYAB¹, MUHAMMAD ATIF², UZAIR AYUB³, SIKANDAR JAVED BAJWA⁴, MALIK ARSHMAN KHAN⁵, BILAL ZAMAN BABAR⁶, MARYAM KHURSHID⁷, MAMMAN FAYYAZ⁸

¹Assistant professor, Department of Dental Materials, Jinnah Sindh Medical University

²Assistant Professor of Oral Pathology SIOHS, Jinnah Sindh Medical University

³Senior Registrar & Head, Department of Periodontology, Women Medical & Dental College Abbottabad

⁴Associate Professor, Oral Biology Department, Lahore Medical & Dental College

⁵Associate Professor & Head, Department of Oral Biology, Abbottabad international Medical & Dental College Abbottabad

⁶Associate Professor & Head, Department of Dental Material, Women Medical & Dental College Abbottabad

⁷Senior Registrar, Women Medical & Dental College Abbottabad

⁸Department Of Anatomy

Correspondence to Dr Sikandar Javed Bajwa sikandar.bajwa15@gmail.com, 0333 4761848

ABSTRACT

Aim: To assess the attitudes of Pakistani dentists regarding the safe use of amalgam as a restorative material.

Study design and setting: This cross-sectional, was conducted at Women medical and dental College, Pakistan.

Methods: This cross-sectional study was conducted amongst the dentist of Pakistan. Survey utilized for this study was adopted and modified from the study conducted by Alkhudhairy F. Descriptive statistics were checked by means of percentages and frequency for all variables. In order to check significant difference among the responses given Chi-square test was applied.

Results: From a total of 212 participants, there were 97 (45.8%) males and 115 (54.2%) females. There were 167 participants working in private sector while 45 worked in public sector. Amalgam was most commonly preferred for preparation of small cavities, agreed mutually by both males (45.4%) and females (27%). Majority of the male participants (51.5%) stated being unsure regarding the safety of amalgam, while majority of females (49.5%) reported amalgam unsafe for both dentist and the patients. Composite was the frequently used alternative restorative material by both males (39.2%) and females (51.3%).

Conclusions: Though amalgam was the utmost frequently used material used for restoration of posterior teeth. Many study participants had awareness regarding the mercury toxicity but still it was used. However additional sessions can be conducted for reinforcing the safety element regarding the use of amalgam.

Keywords: Dentists' opinion, material, mercury, restorative materials, esthetics

INTRODUCTION

Due to its excellent long-term clinical performance and low cost, dental amalgam has been the preferred material for over 150 years.¹ The American National Standards Institute and the American Dental Association defined dental amalgam as an alloy composed of silver, tin, copper, zinc, indium, mercury, and noble metals (gold, platinum, and palladium).² The ADA and ANSI standards only allow capsulated alloys and mercury. Capsulated amalgam comes in assorted sizes that reduce mercury vapour leakage and waste during management.

Composites have increased in popularity recently due to variety of settings, regardless of the risk management decision made by the patient. Amalgam is still used for posterior teeth in some countries. In 2003, in the UK, 49% of dentists used amalgam instead of resin composites for restorative work. Most patients preferred amalgam because of the reduced sensitivity during procedures, increased resistance to tooth wear, lower patient costs, and improved clinical longevity. Similarly, research from Brazil in 2004 revealed that, apart from the South region, where aesthetic demands were high, amalgam was the most frequently used material for posterior teeth, followed by resin composites and glass ionomer cement³.

Canada's health regulators released a study on dental amalgam's efficacy and safety in 2018 in an effort to help policymakers to decide whether or not the dental material should continue to be used in Canada. Amalgam and composite resin were compared for their ability to restore permanent posterior teeth, as well as how safe they were to use for patients of all age groups.² Both materials were found to be clinically effective and safe, but the low-cost of dental amalgam was highlighted in that comprehensive systematic evaluation. Amalgam restorations are more likely to survive and last longer than the principal alternative material, composite resin restorations⁴.

Amalgam is relatively known to be resistant to moisture during placement. In comparison placing composite resin requires "extraordinary care" and a "considerably bigger number of stages." Mercury is bacteriostatic, but TEGMA (found in certain earlier resin-based composites) "encourages microbe growth."⁵ Apart from allergic responses in a few people, the present usage of amalgam poses no health hazard. Except in individuals allergic to amalgam ingredients, there has been no therapeutic rationale for removing clinically adequate amalgam restorations. According to a recent study by the American Dental Association's Council on Scientific Affairs, "studies continue to support the stance that dental amalgam is a safe restorative choice for both children and adults." It is critical to distinguish between known and hypothetical threats when reacting to safety issues⁶.

Several countries have seen a decline in the use of amalgam due to its aesthetically displeasing look. Moreover; the Minamata Convention has questioned its potential health risks due to mercury content and possible environmental damage caused by improperly manipulated residues.^{7,8} Research by Aggarwal in UK found significant reduction in use of amalgam, following Minamata convention, in spite of this 42% of restoration during 2015 to 2016 comprised of amalgam⁹. Another research by Khan evaluated the knowledge of dentist in Lahore regarding amalgam, this study focused on assessing the knowledge regarding use and waste management of amalgam¹⁰. To the best of authors knowledge there is lack of studies in Pakistan following the Minamata Convention that has assessed the knowledge of Pakistani dentist regarding the safe use of amalgam in dental practices.

MATERIAL AND METHODS

This cross-sectional study was conducted during the time period of six months amongst the dentist of Pakistan. The questionnaires were distributed to 270 dental surgeons after their lectures and lab/OPD sessions. 212 filled questionnaires were received back providing a response rate of 78%. Formal Approval of the study was obtained from the Ethical Review Committee of Women Medical and Dental College (ERC 12D/2021) before starting the

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study, which was carried out in accordance with the Declaration of Helsinki.

The main research idea was explained to the participants before requesting them to fill the questionnaires. Verbal consent was taken from the participants before distributing the questionnaires. The participants were assured that their anonymity will be retained. It required five minutes to completely fill the questionnaires. Survey utilized for this study was adopted and modified from the study conducted by Alkhudhairy F.¹¹ Dental house officers, general practitioners and dental specialists were included in this study, while participants who did not gave consent for study and the dental students were excluded from the study.

The initial part of survey comprised of the demographic details of the participants which included the age, gender. The next part focused upon the questions related to frequency using amalgam as a restorative material, reasons for restricting usage of dental amalgam, opinion regarding the safety of amalgam, health risks do associated with amalgam, which material can be used as an alternative to amalgam.

Statistical Analysis: Sample size calculation was done using Open EpiTM (v-3). All the responses were coded and statistical analyzed using SPSS (v-23). Descriptive statistics were checked by means of percentages and frequency for all variables. In order to check significant difference among the responses given were analyzed using Chi-square test. P-value less than 0.05 were considered significant.

RESULTS

From a total of 212 participants, there were 97 (45.8%) males and 115 (54.2%) females. There were 167 participants that worked in private sector while 45 worked in public sector. Majority of participants (173) were 22-25 years old. There were 121 interns followed by 61 general practitioners and 30 specialists (Table 1).

Regarding the frequency of using amalgam as a restorative material, 73(75.3%) males and 84(73%) females agreed using it. Amalgam was most commonly used for preparation of small cavities, agreed mutually by both males (45.4%) and females (27%), followed by the response of not using amalgam as a restorative material in their practice. The most common reason of restricting usage of amalgam was due to esthetics followed by the mercury toxicity (p= 0.000). Majority of the male participants (51.5%) stated being unsure regarding the safety of amalgam, while majority of females (49.5%) reported amalgam unsafe for both dentist and the patients. Composite was stated to be the commonly used alternative restorative material by both males (39.2%) and females (51.3%) (Table 2).

Table 1: Demographic details of the participants

Variable	n	%
Gender		
Males	97	45.8
Females	115	54.2
Service Sector		
Private	167	78.8
Public	45	21.2
Age groups		
22-25	173	81.6
26-30	9	4.2
31-35	9	4.2
36-40	21	9.9
General practitioner	61	28.8
intern	121	57.1
Specialist	30	14.2

Table 2: Association of variables with gender

	Males	Females	P value
Do you frequently use amalgam as a restorative material?			
Yes	73 (75.3%)	84(73%)	0.75
No	24 (24.7%)	31 (27%)	
What is amalgam commonly used for in your practice?			

Build up material	6 (6.2%)	15 (13.0%)	0.012
Core material	1 (1.0%)	6 (5.2%)	
Large restoration	9 (9.3%)	24 (20.9%)	
Small filling	44 (45.4%)	31 (27.0%)	
Simple restorations, Build up material	4 (4.1%)	10 (8.7%)	
Simple restorations, Large restorations	10 10.3%	10 (8.7%)	
Simple restorations, Large restorations, Core material	1 (1.0%)	1 (0.9%)	
Not used	22 (22.7%)	18 (15.7%)	
What are the reasons that restrict you from using dental amalgam?			
Esthetics	39 (40.2%)	14(12.2%)	0.000
Esthetics, Mercury toxicity	2 (2.1%)	9 (7.8%)	
Esthetics, Mercury toxicity, Patient's desire	2 (2.1%)	12(10.4%)	
Esthetics, Patient's desire	7 (7.2%)	5 (4.3%)	
Esthetics, Patient's desire	18 (18.6%)	44(38.3%)	
Mercury toxicity	20 (20.6%)	10 (8.7%)	
Other reasons	9 (9.3%)	21(18.3%)	
Patient's desire			
What is your opinion regarding the safety of amalgam			
Not sure	50 (51.5%)	4 (3.5%)	.000
Safe for patient & dentist	35 (36.1%)	54 (47.0%)	
Unsafe for both patient & dentist	12 (12.3%)	57 (49.5%)	
Which health risks do you feel are commonly associated with amalgam?			
Autoimmune reactions	2 (2.1%)	4 (3.5%)	0.007
Environmental hazard	20 (20.6%)	28 (24.3%)	
Mercury toxicity	52 (53.6%)	74 (64.3%)	
Others	20 (20.6%)	5 (4.3%)	
Psychological	3 (3.1%)	4 (3.5%)	
Which material can be used as an alternative to amalgam			
Ceramic	15 (15.5%)	22(19.2%)	0.016
Composite	38 (39.2%)	59(51.3%)	
GIC	22 (22.7%)	26 (22.6%)	
Other	22 (22.7%)	8 (7.0%)	

DISCUSSION

The findings from the current study are helpful in detecting prevalence of using dental amalgam and identifying positive tendencies regarding its usage in Pakistan followed the phase down approach. Similarly universally the use of dental amalgam has decreased considerably since the last two decades. Countries like Norway, Netherlands, Finland, Japan and Denmark have effectively reduced the use of dental amalgam despite the challenges¹².

Amalgam has been a material of choice till 1980s for posterior teeth until the advent of tooth coloured restorative material composites. However, amalgam is still being used in Pakistan, as it is cost effective, easy to handle and durable. The findings from the current study reveal that amalgam was commonly preferred as a restorative material by both females and male dentists in Pakistan.¹³ These findings are in contrast from the previously conducted researches where composite was more frequently used as compared to amalgam. Furthermore, Interns more commonly preferred using amalgam similar to previously conducted research where amalgam fillings were frequently used in private setups. These findings are in contrast with the research conducted by Alkhudhairy F where amalgam was used by majority of the experienced dentist as compared to the recently graduated dentist¹¹.

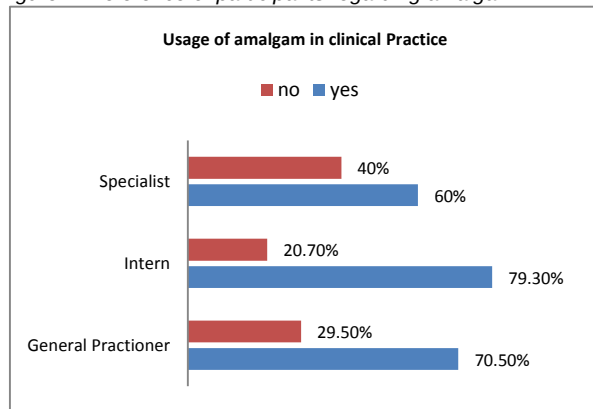
Amalgam was frequently used for restoration of small-sized and large restoration by majority of the study participants while about 23% males did not prefer using amalgam for restorations (p 0.012). Similarly, general dentists (46.3%) also selected amalgam for restoring small fillings, specialists (36.7%) did not prefer amalgam while interns generally used it for restoration of large fillings (29.5%). These findings are in contrast from a previously conducted survey by Alkhudhairy F where amalgam was employed for large restorations and crown buildup¹¹.

Esthetics according to 40% males and mercury toxicity for 38% females were the reason for restricting use of dental amalgam. These findings are in line with the research by Vidnes-Kopperud et al, where the study participants favored using tooth-colored restorative materials in areas of the mouth that were visible to enhance the esthetic component.¹⁴ Similarly another research by Espelid et al identified esthetics as a major reason for patients favoring tooth colored filling over longevity of the restorations regardless of gender.¹⁵ Regarding the mercury toxicity, 27% of the study participants in research by Alkhudhairy F agreed mercury

toxicity as a causative factor for restricting the use of dental amalgam¹¹.

Concerning the safety of dental amalgam as a restorative material for patient and dentist, majority of males (51.5%) reported being unsure while 49.5% females felt amalgam was unsafe. These findings are in contrast with the study led by Pooja and Antony in India where majority of the dentists assumed amalgam to be safe for patients.¹⁶

Figure1: Preference of participants regarding amalgam



Most common health risk associated with usage of dental amalgam was mercury toxicity followed by environmental hazard according to the males and females participants. These findings are in contrast with the previously conducted researches where nearly 68 % of the participants lacked knowledge regarding the mercury content within the amalgam restorations, similar findings were seen studies conducted in Iraq and Turkey^{17,18,19}.

According to Christensen, dentists experienced an increase in demand for the various dental treatment, based on the strength of patients' desires for a tooth colored restorations, at the same time many dentists placed whichever type of restoration according to the financial state of patients as composite fillings are generally mostly costly²⁰. Similarly tooth coloured restorative material composite were preferred as an alternative to amalgam followed by glass ionomer cement in the current study. Likewise, in a previously conducted research patients were enquired regarding the type of restorations they favored 70% preferred tooth-colored restorations.^{19,21} This can be attributed to the fact that nowadays esthetically sound appearance plays a crucial role in the self-esteem and success of an individual's hence people generally aims for cosmetic interventions.

Few limitations that can be identified from the current are that it was a single centric study with a limited number of participants. Knowledge and attitude of dental students must also be assessed.

CONCLUSION

Though amalgam was the utmost frequently used material used for restoration of posterior teeth. Many study participants had awareness regarding the mercury toxicity but still it was used. However additional sessions can be conducted for reinforcing the safety element regarding the use of amalgam.

Conflict of Interest: none

Funding sources: none

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