

# SELECTION OF DIRECT RESTORATIVE MATERIALS IN GENERAL DENTAL PRACTICES IN LAHORE

<sup>1</sup>MOEEN UD DIN AHMAD, BDS, MCPS

<sup>2</sup>SAIMA RAZZAQ KHAN, BDS, FCPS

<sup>3</sup>SHAHID MEHMOOD, BDS, MDS

## ABSTRACT

*The objective of the present study was to determine the choice of direct restorative material for restorations of teeth among dentists in the city of Lahore. It was a descriptive case series study. It was non-probability convenience sampling.*

*Thirty registered dental surgeons with more than three years of clinical experience were selected randomly. The selection was carried out from a list of dentists in Lahore who were interested to participate in the survey. They were asked to take the informed consent from the patients to register 100 consecutive direct restorations on a Proforma.*

*The results of the present study revealed that the sample group comprised of 1313 males and 1687 females, and male to female ratio was 0.8:1. Percentage of new restorations was 90.1% while replacement restorations were 9.9%. It was concluded that the Amalgam (58.9%) was the most frequently used restorative material. This was followed by resin composite (25.6%), Glassionomers/ cermet (13.4%) and compomer [2.1%] in the city of Lahore. Therefore it is recommended to develop rules to prevent mercury contamination in environment by good waste management practices.*

**Key Words:** Restorative materials, direct restorations.

## INTRODUCTION

Restorative dentistry constitutes the majority of the work load in daily clinical practice.<sup>1</sup> Restorations are placed and replaced to restore the anatomical form of teeth. With the increasing availability of new dental materials, choice of material for restoration is an important part of a dentist's decision making process. Many factors are associated with selection of a direct restorative material which includes dentist factor, patient choice and carious lesion characteristics.<sup>2</sup>

There are many direct restorative materials available but amalgam and resin composite are the most commonly used materials.<sup>3</sup> Amalgams have less post-operative sensitivity, higher survival time for complex restorations compared to resin composites and are not technique sensitive<sup>4</sup> but it is the main source of human

total mercury body burden. In the United States, dental amalgam is the 3rd most significant source of environmental mercury.<sup>5</sup> There has been an alarming increase of mercury levels in our environment<sup>6</sup> and our bodies.<sup>7</sup> It was found that individuals with more than 12 amalgam fillings have more than 10-times higher mercury levels in several tissues including the brain, compared to individuals with only 0-3 amalgam fillings.<sup>8</sup>

In resin composite restorations, greater retention may be achieved with a smaller cavity preparation which leads to conservation of tooth structure.<sup>9</sup> Resin composites also have biological risks like estrogenicity and cytotoxicity.<sup>10</sup> Bisphenol A is detectable in saliva and urine after composite resin restorations or fissure sealant placement.<sup>11</sup>

<sup>1</sup> Associate Professor Operative Dentistry, Lahore Medical & Dental College, Lahore. Postal address: 176 G-3, Johar Town, Lahore, Pakistan. E-mail: [drmoeen@hotmail.com](mailto:drmoeen@hotmail.com). Phone No.: 042-35311717, 03004341747

<sup>2</sup> Assistant Professor Operative Dentistry, LMDC E-mail: [saimarazaqkhan@hotmail.com](mailto:saimarazaqkhan@hotmail.com). Phone No.: 03324791720

<sup>3</sup> Former Professor Operative Dentistry, LMDC E-mail: [arslan9@hotmail.com](mailto:arslan9@hotmail.com)

The selection of a direct restorative material becomes an important issue because of a reported higher prevalence of dental diseases in recent years in Pakistan<sup>12</sup> which should lead to more dental restorations. Such studies could also be helpful in developing environmental controls for spread of mercury from a dental clinic. The purpose of the present study was to know the choice of material for direct restorations of teeth among dentists in the city of Lahore.

## METHODOLOGY

Thirty registered dental surgeons with more than

TABLE 1: FREQUENCY DISTRIBUTION BY GENDER (n = 3000)

Gender	Frequency	Percentage
Males	1313	43.8
Females	1687	56.2
Male to female ratio 0.8:1		

TABLE 2: DISTRIBUTION BY AGE (n = 3000)

Age (years)	Frequency	Percentage
< 30	1562	52.1
31–60	1357	45.2
> 60	81	2.7
Mean $\pm$ SD	32.11 $\pm$ 12.74	

TABLE 3: DISTRIBUTION OF NEW AND REPLACEMENT RESTORATIONS (n = 3000)

Age (years)	New restoration	Replacement restoration	Total restoration
< 30	1431	131	1562
31-60	1196	161	1357
>60	77	4	81
Total	2704	296	3000

TABLE 4: DISTRIBUTION OF RESTORATIVE MATERIALS PLACED IN DIFFERENT CAVITY DESIGNS (n = 3000)

Class	Amalgam	Resin composite	Compomer	GIC/cermet	Total
I	697 (23.2%)	309 (10.3%)	36 (1.2%)	110 (3.7%)	1152 (38.4%)
II	1022 (34.1%)	127 (4.2%)	19 (0.7%)	58 (1.9%)	1226 (40.9%)
III	—	162 (5.4%)	2 (0.1%)	25 (0.8%)	189 (6.3%)
IV	—	103 (3.4%)	—	16 (0.5%)	119 (4%)
V	—	55 (1.8%)	6 (0.1%)	53 (1.8%)	114 (3.8%)
Root caries	—	—	—	38 (1.3%)	38 (1.3%)
Compound restorations	48 (1.6%)	12 (0.4%)	—	102 (3.4%)	162 (5.4%)
Total	1767(58.9%)	768(25.6%)	63(2.1%)	402(13.4%)	3000(100%)

**Key:** GIC Glass ionomer cement

three years of clinical experience were selected randomly. The selection was carried out from a list of dentists who were interested to participate in the survey. They were asked to take the informed consent from the patients to register 100 consecutive direct restorations. The dental restorations placed with the direct restorative materials in permanent teeth were included. All those patients having temporary fillings were excluded from the study. The demographic information like age and sex were recorded. Restoration class (according to GV Black classification), new restoration placement or replacement and choice of material were recorded on a Proforma.

The data were entered and analyzed in statistical software (SPSS version 10) a computer based software program. The quantitative variable like age was presented as mean and  $\pm$  standard deviation. The qualitative variable like sex, type of restorative material, new or replacement restorations and restoration classes were presented as frequency and percentages.

## RESULTS

The sample population comprised of 1313 males and 1687 females, with male to female ratio was 0.8:1 (Table 1). The percentage of the restorations received by the females was 56.2% and by the males 43.8%. The mean age of the total sample was 32.11 $\pm$ 12.74 falling in range 7-75 years. The majority of the sample population fell in the age groups <30 years and 31-60 years (Table 2). Frequency distribution of new and replacement restorations in different age groups can be seen in (Table 3). New restorations were 90.1% while replacement restorations were 9.9%.

Amalgam (58.9%) was the most frequently used restorative material. This was followed by resin com-

posite (25.6%), GIC/cermet (13.4%) and compomer [2.1%] (Table 4). Class I cavity preparations were mainly restored with amalgam followed by resin composite, Glassionomers/cermet and compomer. Class II cavity preparations were also mainly restored with amalgam followed by resin composite and compomer. Class III and IV cavity preparations were restored mainly with composite resin. The class V cavity preparations were restored equally by resin and GIC/cermet. Root caries were totally restored with GIC/cermet. (Table 4).

## DISCUSSION

In this study, new restorations (90.1%) dominated over replacement restorations (9.9%). The higher percentage of new restorations may indicate either the success of the existing restorations or a large number of untreated lesions. In an oral health survey in Pakistan, it was noted that between ages of 12-15 years, 97% of all carious lesions were untreated.<sup>12</sup> Therefore higher percentage of new restorations could be due to untreated lesions. This trend was also shown in several epidemiological studies in Saudi Arabia.<sup>13,14</sup> The major cause for replacement of restoration was secondary caries which may reflect a short life span of the restoration.<sup>15</sup> Restoration failure have been attributed to the material used, the technical quality of the restoration, and the degree of patient's compliance.<sup>16</sup>

The most commonly used restorative material was amalgam (58.9%) followed by resin composite (25.6%), GIC/cermet (13.4%) and compomer (2.1%). Restorations provided by vocational dental practitioners and their trainers in the United Kingdom reported the use of amalgam 53.9%, resin composite as 29.8% and glass ionomer cement as 16.3% which shows almost the same trend.<sup>17</sup> The relatively high use of amalgam in the previous studies may show dentist confidence in amalgam restorations.<sup>14,18</sup> It is considered to be the most cost effective restorative material for situation in which aesthetics is of secondary importance.<sup>19</sup>

In class I restorations, the most commonly used material was amalgam which is almost double the amount of restorations placed in resin composite. In class II restorations still amalgam was predominated and five times more than resin, compomer and GIC / cermet collectively. This trend is the same as in United

Kingdom.<sup>16,17</sup> High-copper amalgams can provide satisfactory performance for more than 12 years.<sup>20</sup> This appears to be true even for large restorations that replace cusps.<sup>21</sup> It is interesting to note, although there is an increasing trend to use esthetic materials<sup>1</sup>, amalgam still constitute 75% of all the restorative materials used by the dentists.<sup>22</sup>

A composite resin is the material of choice as tooth-colored restorative materials and for conservative aesthetic restorations of posterior teeth.<sup>1</sup> One third of the class I restorations and almost all the anterior restoration were in composite in this study. The advancement in development of resin materials were made during the past decade, leading to better materials and dentine bonding system. Improvements in filler technology and fiber reinforcement have resulted in the increasing trend to use it in stress-bearing areas of posterior teeth.<sup>23</sup>

The use of glassionomer cements including cermet was much greater than reported earlier in Pakistan.<sup>24</sup> It is comparable to the study in United Kingdom.<sup>16</sup> The use of compomer is the same as in Australia<sup>25</sup> but much less than in UK.<sup>16</sup> It is a comparatively expensive material which may be the reason for less use in Pakistan.

This study was conducted in private clinics of more developed urban areas of Lahore. The results found in this study may not be representative of whole of Pakistan. However, the finding of this survey may be considered an important insight in the use of direct restorative materials in clinical practice. Therefore it is recommended to develop rules to prevent mercury contamination in environment by good waste management practices.

## CONCLUSION

It was concluded that amalgam was the most chosen restorative material followed by resin composite. New restorations were more frequent than replacement restorations and majority of restorations were placed in class I and II preparations.

## REFERENCES

- 1 Braga SR, Vasconcelos BT, Macedo MR, et al. Reasons for placement and replacement of direct restorative materials in Brazil. *Quintessence Int.* 2007;38(4):89-94.

- 2 Vidnes-Kopperud S, Tviet AB, Gaarden T, et al. Factors influencing dentists' choice of amalgam and tooth-colored restorative materials for class II preparations in younger patients. *Acta Odontol Scand*. 2009;67(2):74–79.
- 3 Burke FJT, McHugh S, Hall AC, et al. Amalgam and composite use in UK general dental practice in 2001. *Br Dent J*. 2003;194(11):613–18.
- 4 Shenoy A. Is it the end of the road for dental amalgam? A critical review. *J Conserv Dent*. 2008;11(3):99–107.
- 5 Bender M: Taking a bite out of dental mercury pollution. New England zero Mercury Campaign. [[http://mpp.cclearn.org/wp\\_content/uploads/2008/08/nezmc\\_report\\_card\\_on\\_dental\\_mercuryfinal.pdf](http://mpp.cclearn.org/wp_content/uploads/2008/08/nezmc_report_card_on_dental_mercuryfinal.pdf)].
- 6 UNEP (United Nations Environment Program Chemicals): Global Mercury Assessment 2002. [<http://www.chem.unep.ch/mercury/Report/GMA-report-TOC.htm>].
- 7 Laks DR: Assessment of chronic mercury exposure within the U.S. population, National Health and Nutrition Examination Survey, 1999-2006. *Biomaterials* 2009.
- 8 Guzzi G, Grandi M, Cattaneo C, Calza S, Minoia C, Ronchi A, Gatti A, Severi G: Dental amalgam and mercury levels in autopsy tissues: food for thought. *Am J Forensic Med Pathol* 2006; 27:42-45.
- 9 Sunnefärdh-Grönberg K, van Dijken JVM, Funegård U, et al. Selection of dental materials and longevity of replaced restorations in public dental health clinics in northern Sweden. *J Dent*. 2009;37(9):673–78.
- 10 Wada H, Tarumi H, Imazato S, Narimatsu M, Ebisu S. In vitro estro- genicity of resin composites. *J Dent Res* 2004; 83:222-26.
- 11 Chung SY, Kwon H, Choi YH, Karmaus W, Merchant AT, Song KB, et al. Dental composite fillings and bisphenol A among children: a survey in South Korea. *Int Dent J*. 2012 Apr; 62(2):65-69.
- 12 Ministry of Health, World Health Organization. Oral health in Pakistan: a situation analysis. 2004.
- 13 Al-Kateeb TL, Al-Marsafi A, O'Mullane DM. Caries prevalence and treatment need among children in an Arabian community. *Community Dent Oral Epidemiol* 1991; 19: 277-80.
- 14 Wyne A, Darwish S, Adenubi J, Battata S, Khan N. The prevalence and pattern of nursing caries in Saudi preschool children. *Int J Paediatr Dent* 2001; 11: 361-64.
- 15 Mjör IA, Toffenetti F. Secondary caries: a literature review with case reports. *Quintessence Int* 2000; 31: 165-79.
- 16 Burke FJ, Wilson NH, Cheung SW, Mjör IA. Influence of patient factors on age of restorations at failure and reasons for their placement and replacement. *J Dent* 2001; 29: 317-24.
- 17 Burke FJ, Cheung SW, Mjör IA, Wilson NH. Restoration longevity and analysis of reasons for the placement and replacement of restorations provided by vocational dental practitioners and their trainers in the United Kingdom. *Quintessence Int* 1999;30:234–42.
- 18 Effect and side effects of dental restorative materials. NIH Technology Assessment Conference 1991; *Acta Dent Res* 1992; 6: 1-144.
- 19 NHS Centre for Reviews and Dissemination. Dental restorations: what type of filling? Effective health care. London: Royal Society Medicine Press, 1999.
- 20 Mahler DB. The high-copper dental amalgam alloys. *J Dent Res*. 1997;76:537–41.
- 21 Smales RJ. Longevity of cusp-covered amalgams: Survivals after 15 years. *Oper Dent*. 1991;16:17–20.
- 22 Bharti R, Wadhvani KK, Tikku AP, Chandra A. Dental amalgam: An update. *J Conserv Dent*. 2010 Oct;13(4):204-08.
- 23 Garoushi S, Tanner J, Vallittu P, Lassila L. Preliminary clinical evaluation of short fiber-reinforced composite resin in posterior teeth: 12-months report. *Open Dent J*. 2012;6:41-45.
- 24 Mahmood S, Smales RJ. Placement of restorations in selected patients from different practice environments. *J Pak Dent Assoc* 2002; 3: 131-35.
- 25 Tyas MJ. Placement and replacement of restoration by selected practitioners. *Aust Dent J* 2005; 50: 81-89.