Placement and Replacement of Restorations in General Dental Practice in Iraq

Lezan Fattah[1] & Bushra Noaman[2] & Rebuar Khalid[3]

[1]Department of Conservative, Faculty of Dentistry, Tishk International University, Erbil, Iraq
[2]Department of Paedodontics, Faculty of Dentistry, Tishk International University, Erbil, Iraq
[3]Department of Radiology, Faculty of Dentistry, Tishk International University, Erbil, Iraq
Correspondence: Bushra Rashid Noaman, Tishk International University, Erbil, Iraq.
Email: bushra.rashid@ishik.edu.iq

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Abstract: Research needed to study how restorative practice is performed in all countries of the world. Purpose: To causes of the placed and replaced restorations by northern Iraqi dentists. Method: A Practice-based study performed by seventy general practitioner dentists and one hundred of fourth and fifth grades of dental students from a dental faculty participated to perform this study. The study included filing forms about restorative dentistry practice during the normal working time of the dentists and during restorative dentistry course of the dental students. Results: Of the 10029 restorations included in this study, the placed restorations are more than the replaced ones with a statistically significant difference. The results show that the age group of 15-19 had the highest initial restoration placed (90%), in contrast, the highest restoration replacement was in >60 age group (23%). Conclusions: The study revealed different aspects of the restorative practice in Northern Iraq, for the first time in the region. The information is of significance that will make a relation between the experienced clinicians and academics in Iraq.

Keywords: Caries, Fracture, Operative dentistry, Repair, Replacement, Restoration

1. Introduction

Research carried out in the last quarter of the century in various countries –primarily in the United States and Europe, show that replacement of restorations and the treatment of primary caries constitute a large part of dental practice (Mjör, 2000; Nascimento, 2004; Palotie, 2003; Sunnegardh-Gronberg, 2008; Tyas, 2005). Studies that have been carried out from the eighties onwards have revealed that there has been no remarkable change in the reasons for placing and replacing direct restorations (Allander, 1990; Deligeorgi, 2001; Dionysopoulos, 2003; Forss & Widström, 2004; Mjor,1981; Wilson, 1997). The restorative strategies described in textbooks in the previous years are based on experimentation and everyday practice (Forss & Widström, 2004). Even though the recommendations for universal clinical practice, which incorporate the criteria of placement and replacement of restorations, are still inadequate. Studies on the practice of restorative treatments continue to be undertaken (Nascimento, 2004; Rindal, 2010; Schleyer, 2013; Vidnes-Kopperud, 2009). Iraq needs the same type of studies since no study in Iraq performed to assess the practice of restorative dentistry till now.

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This study aimed to reveal the general trend in restorative practice in our country by combining the data obtained from the clinicians working in routine practice and the data obtained from the academic environment. Other purposes of our study were to perform a detailed analysis of the reasons for placing and replacing restorations, to compare the findings with those of the international research community.

2. Materials and Method

This study started after gaining the agreement of the university and registering the research and of the dentists to participate to collect data for the study. All data were collected during the routine dental practice, and after the acceptance of the patients.

2.1 Study Design

In this practice-based study, both private centers' general dental practitioners (GPD) and university dentistry students (DS) participated to provide the data to this research. One hundred GDP participated in their private clinics which were in the center of Erbil city (the capital of Kurdistan region, north of Iraq) which usually visit for dental treatment from all parts of the north of Iraq. Therefore, it represents the entire northern region. Seventy-six of those dentists accepted to be volunteers for collecting data for this study, in addition to 100 DS.

Authors made a presentation for the participating dentists working in their private practice. In this presentation, information such as patient selection criteria, the number of restorations need to be collected, and the method for completing the data collection form was given. The presentations were held in groups of 2 or 3. In addition, clinical photographs and radiographs of some restorations that needed to be replaced for various reasons were discussed with each clinician. These photographs, used for the calibration of clinicians, were obtained from various books and some websites. The researchers clearly answered all questions asked by the participating dentists.

2.2 Data Collection

For collection of the data in the dentistry faculty, the fourth- and fifth-year's students were trained for three weeks in the teaching clinic. More than one form is filled in by patients for whom multiple restorations are placed. For forms, which were completed by the students, kappa test was utilized to evaluate intra-examiner reproducibility by the supervisor doctors. Almost perfect agreement was obtained between the intra-examiner and each of the examiners (100%). In this part of the study, it was planned to record 3000 direct restorations which are performed for patients who attended conservative department students' clinics.

Each clinician was requested to collect a variety of parameters for the first 100 restorations they placed from the beginning of the study. Clinicians were asked to collect the data within 2 months, but additional time was provided for clinicians who could not reach adequate restoration numbers within this period.

2.3 The Sample

The patient sample group consisted of 14-year-old or older patients who had completely permanent dentitions. Clinicians were asked to record details of the patient's gender, age, restored tooth number, cavity type (according to Black's classification), material used, restoration was initial placement or replacement for each restoration. Patients were grouped as: 15-19, 20-29, 30-39, 40-49, 50-59, & >60

years of age. Apart from these, the gender and professional experience of the clinicians participating in the study was also recorded. The data were collected in a period of 8 months. The data were collected in the Microsoft Excel and SPSS 20.00 software for Windows and was used to evaluate the findings. The Pearson Chi-Square test (with continuity correction and Fisher's exact test, if necessary) showed that p value was less than 0.05 which is considered as significant.

3. Results

3.1 Sample Distribution

The data were collected from a total of 4,771 patients. From those patients, 53% (2,528) were male and 47% (2,243) were female. The difference between male and female patients was non-significant. (Table 1). According to the age groups, group 20-29 consisted of the highest number among all the groups (n=1766) and followed by 30-39 age group (n=1466). The least number of patients were in the age group >60 (n=117).

Table 1: The number of patients according to age group

	Age groups						
	15-19	20-29	30-39	40-49	50-59	60 and older	Total
Male	239	974	751	375	120	69	2528
Female	263	742	715	354	121	48	2243
Total	502	1716	1466	729	241	117	4771

3.2 The Number of Restorations According to Gender of Patients

Of the restorations (n = 10,029), 87% (n = 8,691) were initial restorations and 13% (n = 1,338) were replacement restorations. The difference between restoration placement and replacement was found to be statistically significant (p = 0.000). Of the initial restorations, 52% were placed in male patients and 48% in female patients. Of the replacement restorations, 48% were placed in males and 52% in females and the difference was insignificant (p = 0.00) in terms of both initial placement and replacement of restorations (Table 2).

Table 2: The number of restorations according to gender of patients

	Male		Female		Total
	N	%	N	%	
Initial restorations	4580	52	4111	48	8691[a]
Replacement restorations	644	48	694	52	1338[a]
Total	5224	100	4805	100	10029

[a] statistical significance.

3.3 The Distribution of Initial and Replacement Restoration Rates According to Age Groups

Figure 1 shows the distribution of the number of all restorations according to age groups. It was found that in all age groups, restorations were placed more than they were replaced, and this difference was statistically significant in all age groups (p = 0.000 for all age groups). According to this, initial restorations are mostly placed in the 15-19 age group (92%) and tended to decrease in older ages (89% in 20-29 age group, 86% in 30-39 age group, 83% in 40-49 age group, 81% in 50-59 age group and 77% in >60 age group). The restoration replacement rate showed an increasing trend up to the age group of >60 and reached the highest with 23% in this age group. In other groups, it is decreasing gradually from (50-59) age group (19%) to 15-19 age group (8%).

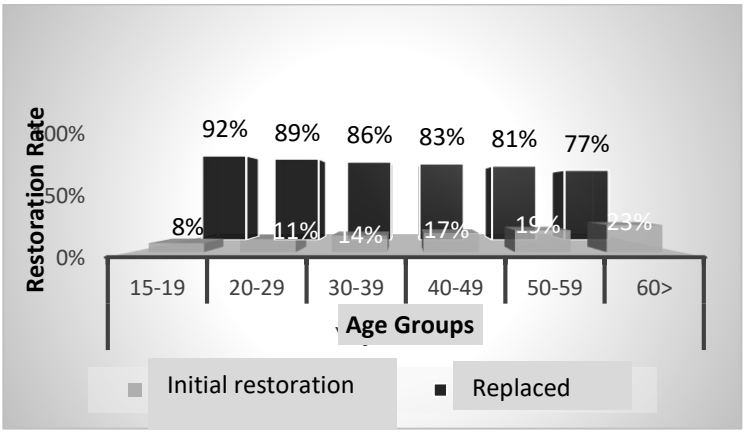

Figure 1: The distribution of initial and replacement restoration rates according to age groups

3.4 Rates of Initial Placement and Replacement of Restorative Materials

Replacement and initial placement rates of restorative materials are shown in Figure (2). It was observed that all restorative materials were placed with higher rates than they were replaced, and there was significant statistical difference (p= 0.000). The study revealed that the composite was the mostly used as initial restorative material (88%). In contrast, the composite was the least used as replacement restoration (12%). The amalgam restorative material was used in (72%) of the cases as initial

restoration. Whereas, the amalgam used in (28%) as replaced restoration. Glassionomer restorative material was used 84% as initial restoration and 16% as replaced restoration.

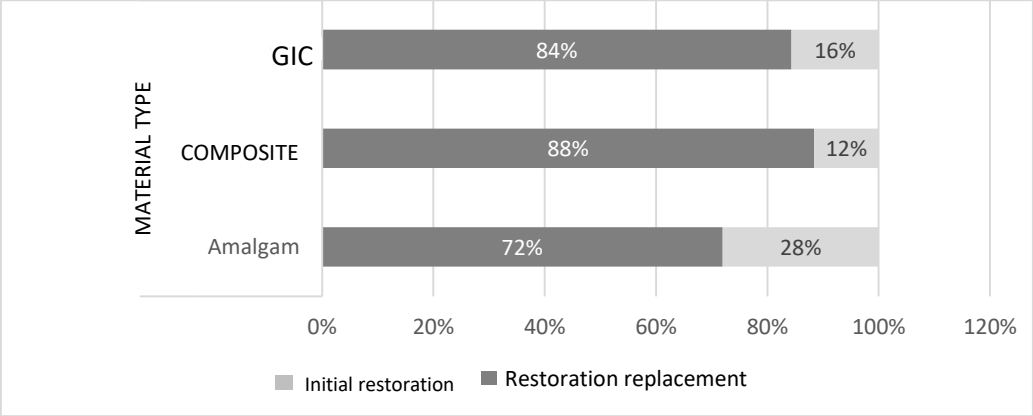

Figure 2: Rates of initial placement and replacement of restorative materials

3.5 The Distribution of Classes of Restorations According to Patient Gender

Operative procedures were predominantly performed in class II cavities in male and female patients (40.2% and 40.9% respectively). Class I cavities were the second most common types of cavities where operative procedures were performed found after class II in both males and females (Table 3). Class III is almost equal in both genders (female; 10.8%, male; 10.7%). Class IV experiences the least cavity type in the sample. And they were slightly more in female 7% than in males 6.5%. Class V cavity type was 9.5% in males and 9.1% in females.

Table 3: The distribution of classes of restorations according to patient gender

		Restoration Class					Total
		Class I	Class II	Class III	Class IV	Class V	
		N (%)	N (%)	N (%)	N (%)	N (%)	
Gender	Male	1726 (33)	2101 (40,2)	558 (10,7)	341 (6,5)	498 (9,5)	5224 (100)
	Female	1547 (32,2)	1964 (40,9)	517 (10,8)	338 (7)	439 (9,1)	4805 (100)
	Total	3273 (32,6)	4065 (40,5)	1075 (10,7)	679 (6,8)	937 (9,3)	10029 (100)

3.6 Number and Percentage of Restorations According to the Teeth

The distribution of restorations according to tooth types is shown in both males and females, more than 50% restorations were placed in molar teeth. This rate was 22.3% in anterior and 21.9% in premolar teeth (table 4). The restorations were more performed for males than females (n=5224 and

n=4805 respectively). The anterior teeth restored more in male patients (n=1158) than females (n=1080). The same for the premolars restorations (males; n=1132 and females; n=1060). Similarly, the molars restorations in males more than females (n=2934 and 2665 respectively).

Table 4: Number and percentage of restorations according to the teeth

		Tooth group			Total
		Anterior	Premolar	Molar	
Gender	Male	1158[a] (%22,2)	1132[b] (%21,7)	2934[b] (%56,2)	5224
	Female	1080[a] (%22,5)	1060[b] (%22,1)	2665[b] (%55,5)	4805
	Total	2238(%22,3)	2192(%21,9)	5599 (%55,8)	10029
P		0,778			

3.7 The Distribution Rates of Restorations (Initial and Replacement) According to Tooth Numbers

The distribution rates of restorations (initial restoration and replacement) according to tooth numbers are shown in Figure (3). The placed and replaced restorations were the highest in the lower molar teeth. Lower anterior teeth were recorded as the least restored teeth. The highest restored teeth in both upper and lower jaws were teeth # 16, 26, 36, and 46. Tooth #36 restorations were recorded 9.8% and 10.43% for tooth #46 with no significant difference between the two teeth. The second tooth in restoration record was tooth #37 (7.01%). The restorations recorded in teeth #26 and #16 were 5.4%. Upper central incisor recorded restored after the molars (#21) was 4.76%, more than premolars (#15, #25, #35, and #45) were 3.5% of the restored teeth. Teeth #24, #34, #44 were less restorations, although tooth #14 similar type had higher restorations record (5.4%).

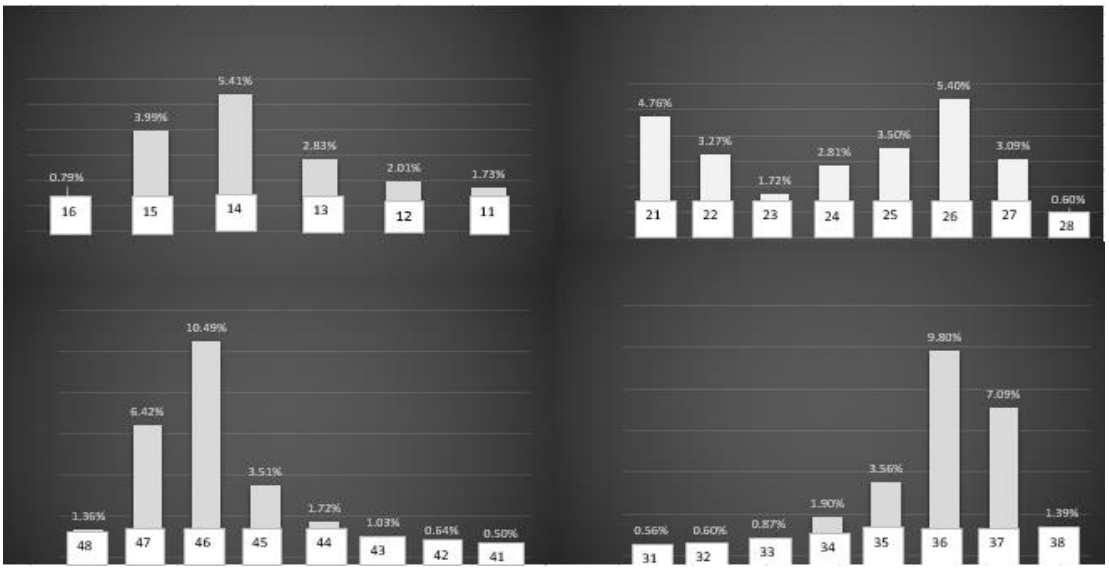

Figure 3: The distribution rates of restorations (initial and replacement) according to teeth numbers

4. Discussion

In this study, research design defined as practice-based in international medical literature was used. The type of studies depends on the analysis of data reported by clinicians regarding the routine procedures they perform (Mjör, 2007). The evaluation of new materials and techniques in the biomedical field, including medicine and dentistry, are often performed with long-term controlled clinical trials, ideally with a small number of patients and clinicians. In addition, such surveys are often carried out in carefully selected groups of patients by specially trained experts without time limits under controlled conditions which are very difficult to apply to a day-to-day practice. Thus, controlled clinical trials provide scientific accuracy just as experimental studies. In contrast, the practice-based methodology used in our work has some limitations. First, these studies are not as scientifically rigorous as controlled clinical trials (Mjör, 2007). Other disadvantages of practice-based research have been pointed out as follows (Mjör, 2007; Mjör, 2005); I. Differences in clinicians regarding treatment decisions II. Failure to standardize the criteria used to make treatment decisions III. Differences in assessment of quality, IV. Differences in the decisions to replace restorations. V. Misunderstanding of the descriptions and instructions in the research protocol. At this point, it can be said that the findings obtained in this study, which is practice-based, and in which the data analyzed are obtained under the conditions of heavy workload and routine clinical practice, can be useful in terms of applicability. The combination of clinical experience and scientific research has the potential to strengthen the evidence-based foundation of established practices (Oates, 2011). Hence, establishing links between experienced clinicians and academics can open the door to some improvements in increasing the effectiveness of dental services in everyday practice (Curro, 2011). Identification of the problems and recognizing the limits of the results obtained from detailed studies were carried out in under clinical conditions and transferring them to the researcher working in the laboratory can provide a good projection in terms of future studies that will ultimately affect the routine practice (Makansi, 2010).

In our study, the need for the initial restorations was more than the replacement restorations and the replacement were more in males than females, it was agreeing with Silvani (Silvani, 2014). This result agrees with studies performed in countries such as Italy, Greece and Korea, this proportion between the initial and replaced restorations remain lower (Deligeorgi, 2000; Chrysanthakopoulos, 2011), and disagree with Scandinavian and other countries such as the United Kingdom and the United States (Deligeorgi, 2001). In this study, 92% of the initial restorations performed in 15-19 age group, while replacing restorations was the highest among >60 years' age group which agree with the study of Forss and Widström (Forss & Widström, 2004). The main cause for placement of direct restorations was primary caries, while for the replacements, the secondary caries was the main reason which is like the results of Silvani in Brazil (Silvani, 2014).

In this study, operative procedures were predominantly performed in class II cavities in male and female patients. However, a study in Grease concluded that the majority of restorations placed in Class III cavities (Chrysanthakopoulos, 2011). The placed restorations was more in males than females, while the replaced restorations were more in females than males and that is in agreement with Chrysanthakopoulos (2011). In the present study, the composite restorative material was the favorable material for dentists as an initial restoration which is like a study in Brazil, and with other study in Greece (Chrysanthakopoulos, 2012). In contrast, the material that was mostly chosen for replacing the defective restoration was the amalgam (28%) which followed by GIC then composite. In clinical practice, the placement-replacement ratio for GIC, amalgam and composite were reported as 1:0.7 and 1:0.9, respectively (Mjör& Toffenetti, 1992). The study revealed that most of the cavity type was the

class II, followed by class I, this finding is in good agreement with a study of Nasciemento et al. (2004) in the USA. Our study revealed that, the lower molar teeth required restoration more than others, followed by anterior teeth then the premolars and the difference was of high statistically significant.

5. Conclusion

In the limit of this practice-based study, close inspection of the reasons for placement and replacement of restorations routinely undertaken by dentists in private practice could provide a very useful perspective. Henceforth, beginning links between experienced clinicians and academics can improve dental services in everyday practice.

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