

Choice Between Composite and Amalgam Restorations According to Dentists and Patients Perception

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الخلاصة

الاهداف: تهدف الدراسة الى تقييم اختيارات اطباء الاسنان والمرضى في اختيارهم لأنواع المواد المستعملة للحشوات واختيار معلوماتهم عن وجود مادة الزئبق في حشوات الاملغم . **المواد وطرائق العمل:** دراسة مقطعية مستعرضة اعتمدت على نوعين من اوراق الاستبيان التي تم توزيعها , واحدة خاصة لأطباء الاسنان (119) والآخرى خاصة للمرضى(500) لاختبار معلوماتهم ومدى وعيهم بالإضافة الى تفضيلهم لحشوات الاملغم او الحشوات الراتنجية. **النتائج:** عدة مصادر ساهمت في توعية اطباء الاسنان للجدل حول حشوة الاملغم وان اكثر من 50% من عينة الأطباء كان جوابهم بان حشوة الاملغم هي امنة، بينما 21% كان جوابهم العكس بانها غير امنة وان عدة عوامل تحكمت في وضع نوعي الحشوات للمرضى ، الحشوات الراتنجية كانت السبب لإعادة الزيارة للمرضى بعدة انواع من الشكاوي. بالنسبة للمرضى 67.6% لم يكن لديهم اية معلومات عن التأثيرات السيئة لأطلاق مادة الزئبق من الحشوة وان الحشوة الراتنجية البيضاء كانت المفضلة لديهم. **الاستنتاجات:** ضمن حدود البحث كان الوعي لسلامة حشوة الاملغم بالنسبة لأطباء الاسنان واطيء ،مع اجماع كبير بانه المراجعة اللاحقة للعمل بعد الحشوات كانت بسبب الحشوات الراتنجية البيضاء . بالنسبة للمرضى اغلبيتهم لم يعلموا بمسألة احتواء الحشوات الاملغمية لمادة الزئبق وان اغلبية المرضى فضلوا وضع الحشوات الراتنجية البيضاء المماثلة للون اسنانهم.

ABSTRACT

Aims : The aim of the current study was to evaluate dentists and patients choices of type of restorative materials applied in fillings and their knowledge about the mercury content in amalgam restorations. **Materials and Methods:** a cross sectional descriptive study based on two types of questionnaire, one for the dentists(119) and the other specific for the patients (500) were distributed to determine the knowledge and awareness, preference of amalgam and composite restorations. **Results:** showed that the awareness of the dentists about the amalgam controversy came from different sources, half of the dentists sample stated amalgam restorations were safe, were as 21% of the sample stated it unsafe. Placement of the selected restoration(either type) was influenced by different factors, recall appointments of patients complaining from several complaint was mostly from composite, 67.6 % of patients didn't have any knowledge about harmful effect of mercury release from amalgam with the majority of the patients stating that they preferred composite or a tooth colored restoration. **Conclusion:** within the limitations of this study awareness of safety of dental amalgam among the dentists was low, with a large agreement that postoperative complications were mainly due to composite restorations. For the patients, the majority of them did not know anything about issues related to the mercury content of the amalgam and the majority of them favored the placement of composite restoration similar to the color of their teeth.

Key words: Amalgam, Composite, Choice, Dentist, Patients, Mercury

Nahel H., Mohammed A., Al-Naimi R. Choice Between Composite and Amalgam Restorations According to Dentists and Patients Perception. Al-Rafidain Dent J. 2020 ;20 (1): 1-17.

DOI: [10.33899/rden.2020.126468.1015](https://doi.org/10.33899/rden.2020.126468.1015)

Received: 31/12/2019

Sent to Referees: 2/1/2020

Accepted for Publication: 23/2/2020

INTRODUCTION

Worldwide and for more than 150 years, amalgam has been known for more than being a dental restorative material, it has proved to be a valuable and dependable filling materials which is relatively cheap and tolerant to the oral environment with minimum problems for millions of patients around the world ^(1,2). The war on amalgam is not new, it began in 1843 as the American Society of Dental Surgeons (ASDS) declared use of amalgam to be malpractice because of the fear of harmful effect of mercury to the dentist and patient in addition to its disposal in the environment ^(3,4). so that some countries banned the use of amalgam for all the populations (Norway, Sweden and Germany) ^(5,6). while other countries including Finland, Denmark and the Netherlands have phased down dental amalgam usage to 1-5% of restorations banning it in the vulnerable population like small children and pregnant ladies ⁽⁷⁾. In 2013 the Minamata Convention on Mercury, had the objective of protecting human health and environment from anthropogenic emissions and releases of mercury, the convention stressed parties and countries to phase down amalgam by reducing the mining, use and trade in mercury worldwide and ultimate elimination in the production and use of mercury containing products ⁽⁸⁾.

Alternatives to amalgam are composite restorations that have been improved in their formulations in order to withstand and tolerate

excessive stress and wear in addition to glass ionomer restorations and compomer ^(9,10,11).

The aim of the current study was to assess the source of awareness of dental personnel's working in Mosul city to the use of dental amalgam, opinion and safety of amalgam restorations, use of composite, and other related factors for replacement of amalgam with composite and causes of recall appointments, questionnaires for patients aimed also to determine the level of awareness about the possible harmful effect of mercury in amalgam fillings on their health, their acceptance of amalgam fillings, their preference in type of restoration (amalgam or composite), and knowledge about the stronger restoration.

MATERIALS AND METHODS

The protocol designed for this study, was approved by the College of Dentistry, University of Mosul, and Nineveh Health Directorate training center and human development. Two types of questionnaires, one for the dental personnel and the other specific for the patients were structured by the authors from relevant publications ^(12,13) that was modified and then distributed at the College of Dentistry, University of Mosul and at Al Noor Specialized dental health center, containing mostly close ended questions. The first specific for the dentist that consisted of socio-demographic and practice characteristics such

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as gender, years of service, specialty ,sources of awareness about amalgam controversy, opinion about amalgam restorations, the treatment needs of patients, uses of amalgam and its alternative, the properties and usefulness of both types of restoration materials both questionnaires can be seen in Figures (1) and (2).

1. Demographic data and professional capability:

a. Sex Male Female

b. Age

c. Qualification
 General Dental Practitioner Specialist

d. Years of professional activity?
 Less than five years More than five years

2. Source of awareness from amalgam controversy(not favoured):

a. Patients inquiries b. Undergraduate education

c. Workshop and conferences d. IT (TV, Internet)

e. Colleagues f. Continuing dental education

g. All of above

3. Opinion about amalgam safety:

a. Safe for the practitioner and patient

b. Unsafe for the practitioner and patient

c. Uncertain

4.Placement and removal of amalgam and use of its alternatives:

a. According to which criteria you will select amalgam as a material of choice?

1. Sex 2. Degree of education

3. Patient attitude 4. Affordability

b. What is your opinion about dental amalgam as a restorative material?

1. Longevity and superior mechanical properties

2. Applicable and less technique sensitive

3. Require less patient cooperation

c. According to which criteria you will replace amalgam restoration?

1. Criteria of defective restoration

2. Patient wishes

3. Esthetic.

d. Which of the following amalgam alternatives do you usually select?

1. Resin composite

2. Glass ionomer and resin modified glass ionomer

3. Others

e. Changing dental fillings at the patient's request without odontological indications?
 Yes No

5. Number of fillings present in dentists mouth:
 How many amalgam? How many composite?

6. Recall appointments of patient complaining of:

a. Most post operative sensitivity from patients related to
 Amalgam restorations Composite restorations

b. Most periapical lesions related to:
 Amalgam restorations Composite restorations

c. Most secondary caries related to:
 Amalgam restorations Composite restorations

d. Most change in color of restoration related to:
 Amalgam restorations Composite restorations

Figure (1): Questionnaire for Dentists

Questions for patients

1-Demographic data:

a. Age

b. Sex male female

c. Educational level of the patient

2-Awareness of patients with dental fillings about the harmful effect of mercury in dental amalgam :

a. Knowledge about dental fillings?

b. Have you heard about the adverse reaction of dental amalgam?

c. Harmful effect of mercury in dental amalgam?

3-Acceptance of amalgam filling with or without prior information about its mercury content:

a. Filling their cavities with dental amalgam?

b. Filling their cavities with amalgam alternatives?

4-Do you prefer amalgam?

Yes No

5-Do you prefer composite (white colored restoration)?

Yes No

6-Why do you prefer?

a. Esthetic

b. Stronger and longetivity

c. Cost

7-Knowledge about stronger filling (what ever type) obtained from:

a. Media (TV, Internet, Radio)

b. Heard from other person

c. Price of restoration (composite more expensive)

d. None of all above.

Figure (2): Questionnaire for patients

Patient's awareness and acceptance was assessed by means of structured questionnaire prepared based on commonly asked questions from routine daily practice. Knowledge of mercury content in amalgam restorations, also their acceptance with filling their cavities by

dental amalgam with or without prior information about its mercury content or use of other alternatives, causes of their preference and knowledge about the strength and durability of the type of restoration they preferred. This part was completed via dentists asking the questions to the patients that participated in this survey.

Statistical Analysis:

Statistical analysis was performed using SPSS programme version 16, and frequencies and percentages were calculated.

RESULTS

Table (1) demonstrates the demographic variables of the 119 dental personnel participating in the study, 51.26% were males while 48.74% were females, majority of the sample 63.87% had more than 5 years of service, with 57.14% being general dental practitioners while the rest were specialists in different fields of Dentistry.

Table (1): Demographic Variables of the Dental Personnel

Gender	No.	%
Male	61	51.26
Female	58	48.74
Years of Service		
Less than or equal to 5 years	43	36.13
More than 5 years	76	63.87
Specialty		
General Dental Practitioners	68	57.14
Specialist	51	42.86

Table (2) shows the source of awareness of the dentists about the amalgam controversy,

and that 52.9% of the dentists knew about the amalgam controversy from several sources.

Table (2): Source of Awareness of the Dentists About the Amalgam Controversy

Awareness Source	Frequency	Percentage (%)
Patients Inquiries	10	8.4
Undergraduate Education	8	6.7
Workshops	2	1.7
T.V & Internet	25	21
Colleagues	3	2.5
Continuing Education	8	6.7
All of the Above	63	52.9

Table (3) illustrates opinion of the dentists about the safety of dental restorations, 50.4% of the dentists stated amalgam restorations were safe, 21% stated amalgam as unsafe, while 28.6% were uncertain about its safety.

Table (3): Dentists Opinion About the Safety of Amalgam Restorations

Opinion About Amalgam	Frequency	Percentage (%)
Safe	60	50.4
Unsafe	25	21
Uncertain	34	28.6

It can be shown in Table (4) that dentists placed amalgam, composite and other tooth colored restorations according to patients attitude with a percentage of 48.7, while 42% of the dentist placed the restorations that the patient could afford, while 7.6 % of the dentists placed restorations according to educational level of their patients (i.e. placed tooth colored restorations to higher educational level).

Table (4): Factors Influencing Placement of Amalgam Restorations or Alternatives

Placement of Amalgam & Alternatives	Frequency	Percentage (%)
Gender	2	1.7
Degree of education	9	7.6
Patients Attitude	58	48.7
Affordability	50	42

Table (5) demonstrates dentists opinion about amalgam as a restorative material, 49.6% of dentists stated that amalgam restorations had a more longevity in the mouth, 22.7% stated that its application was less technique sensitive, while 4.2% of dentists used amalgam because it required less patient cooperation, 23.5% opinion was a combination of all the previous factors.

Table (5): Opinion About Amalgam as a Restorative

Opinion About Amalgam Restorations	Frequency	Percentage(%)
Longevity	59	49.6
Less Technique Sensitive	27	22.7
Require less Patient Cooperation	5	4.2
All of the above	28	23.5

The dentists opinion on when to replace amalgam restorations can be seen in Table (6),42.9% stated that they replaced amalgam when it had a defect, 38.6 % stated that they replaced amalgam to improve the esthetics while 18.5% of dentists replaced amalgam depending on the patient's wishes.

Table (6): When to Replace Amalgam with Composite or Tooth Colored Restorations

Placement of Amalgam & According to	Frequency	Percentage (%)
Defective Restoration	51	42.9
Patient Wishes	22	18.5
Esthetic	46	38.6

Figure (3) displays types of amalgam alternatives the dentists select, majority choice was composite resins 86.6%, only 10.9% stated they preferred glass ionomers and resin modified glass ionomers, while 2.5% used other means like ceramics as indirect restoration in addition to compomers and giomer

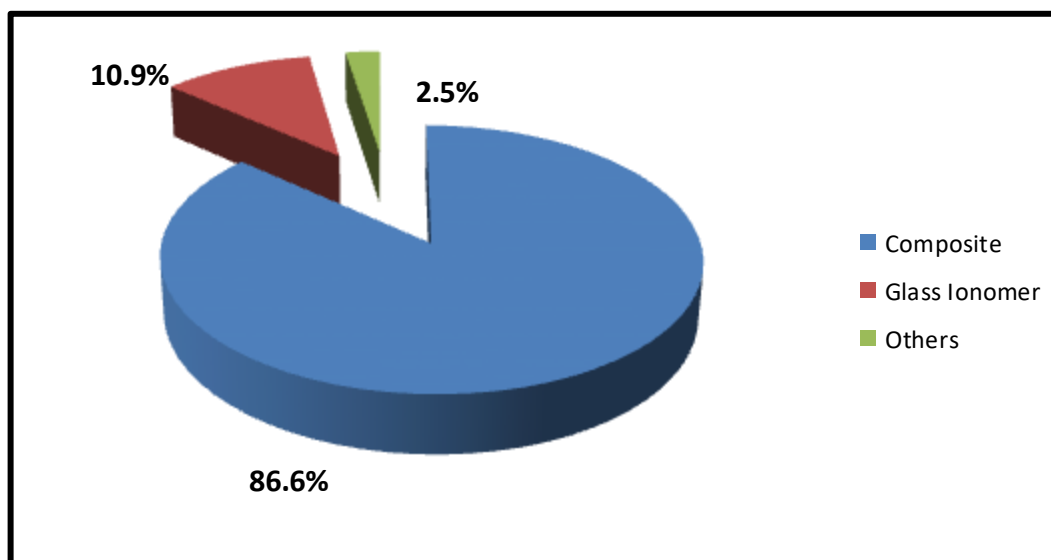


Figure (3): Types of Amalgam Alternatives the Dentists Select

When the dentists were asked if they would change amalgam restorations to composite without an odontological indication, 31.1% agreed to change while 68.9% stated that they couldn't change amalgam restoration if the restoration was faultless. Figure (4) demonstrate types of restorations present in the dentists mouth which was mostly both types of restorations (i.e. amalgam and composite) with a percentage of 68.1%.

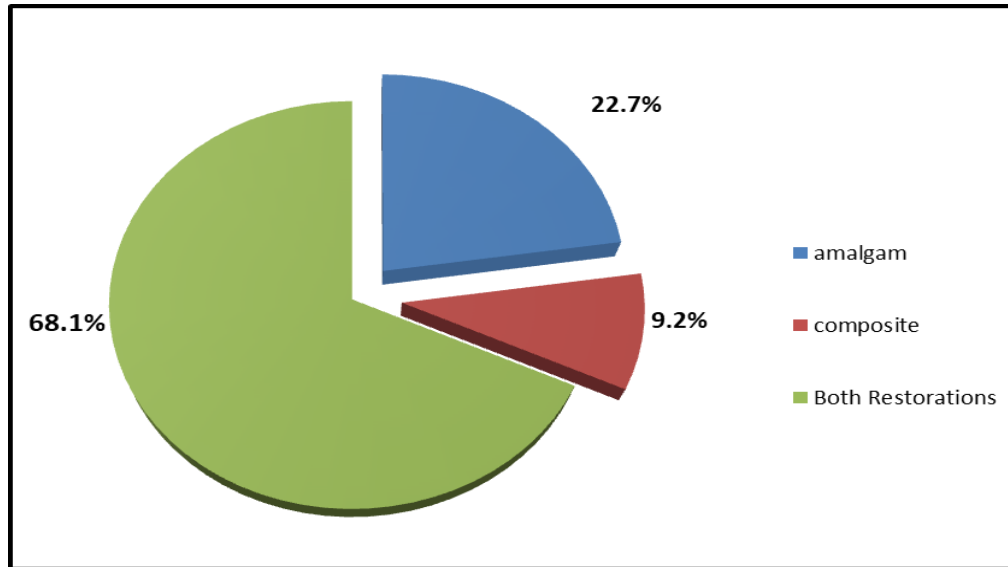


Figure (4): Types of Restorations Present in the Dentists Mouth

Table (7) depicts the recall appointments of patients complaining from post-operative complications including sensitivity, periapical lesions, secondary caries and changes of color of restorations were mostly from the composite restorations with a range (76.5-90.8)% while amalgam restorations exhibited complications with a range between (9.2 - 23.5)%.

Table (7): Recall Appointments of Patients Complaining From

Complaint	Amalgam		Composite	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Post-Operative Sensitivity	22	18.5	97	81.5
Periapical Lesions	11	9.2	108	90.8
Secondary Caries	28	23.5	91	76.5
Change in Color of Restorations	19	16	100	84

Distribution of the sample of patients by age is shown in Table (8), the sample was composed of 500 individuals, distributed in to 4 age groups, majority of the sample was in the age group equal or less than 30 years old with a percentage of 51.4%. Females contributed 51.8% of the sample (total 259), while males contributed 48.2% with a total of (241) as shown in Table (9). Table (10) displays educational level of the patients, 30.2% of the sample were Illiterate or had finished primary school, 30 % had completed secondary school ,while higher levels of education were seen in 36.8% of the sample.

Table (8): Distribution of the Patients by Age

Age Groups	Frequency	Percentage (%)
≤ 20	73	14.6
≤30	257	51.4
≤40	107	21.4
≤50	63	12.6

Table (9): Distribution of the Sample by Gender

Gender	Frequency	Percentage (%)
Male	241	48.2
Female	259	51.8

Table (10): Educational Level of Patients

Educational Level of Patients	Frequency	Percentage (%)
Illiterate or Primary School	166	33.2
Secondary School	150	30
Bachelor's Degree or Higher	184	36.8

Table (11) displays the awareness of the patients about dental amalgam, 32.4% had heard about the harmful effect of the mercury or amalgam adverse effects, while 67.6% hadn't heard about the adverse effect of mercury in the restoration.

Table (11): Awareness of Patients About Harmful Effect of Mercury in Amalgam Restorations

Awareness	Frequency	Percentage(%)
Heard about harmful effect of mercury in the filling or adverse reaction of amalgam	162	32.4
Did not know anything about harmful effect of mercury release from amalgam	338	67.6

For the acceptance of the amalgam restoration, when the patients were asked about the type of restoration they preferred regardless of the dentists opinion that is seen in Table (12), only 30% (150) stated they preferred amalgam restorations, while 70% favored composite restorations. Table (13) shows the reasons of the patients choice of either type of restoration, 70% (350) stated that they were concerned with the esthetic, 27% (135) were concerned about the strength and longevity of life time of restoration, while only 3% (15) stated that the lower cost of amalgam restorations influenced their choice.

Table (12): Type of Restorations Preference by Patients

Restoration Preference	Frequency	Percentage(%)
Amalgam Restorations	150	30
Composite restorations	350	70

Table (13): Cause of the Patients Choice of the Type of Restoration Whether Amalgam or Composite

Causes of Preference	Frequency	Percentage (%)
Esthetic	350	70
Stronger& longevity of life time of restoration	135	27
Cost of Restoration	15	3

Figure (5) displays the patients source of knowledge of the stronger restoration that they preferred, 3% (15) stated that cost influenced their choice of the type of restoration , 27.6 % (138) had heard from the media, 18.2% (91)

had heard from other persons, while 51.2% stated that the reason was non of the above like the available type of restoration in the health center or the dentist choice of the type of restoration.

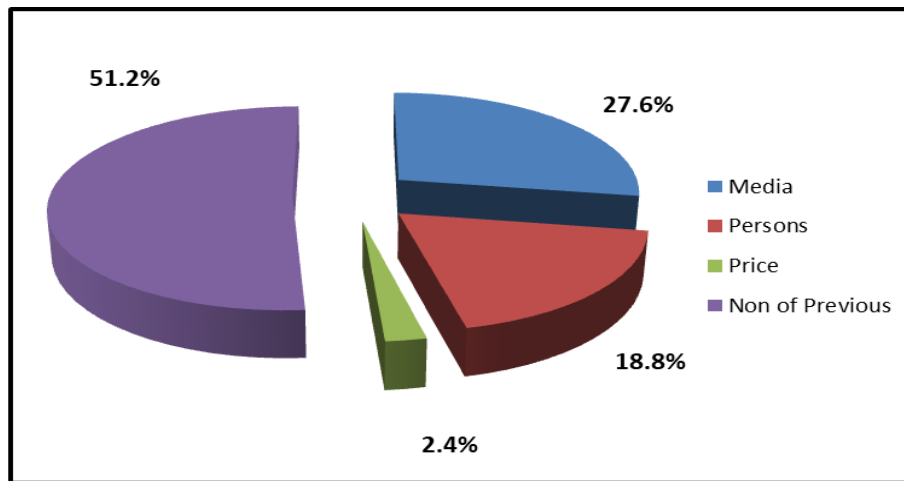


Figure (5): Patients Source of Knowledge of the Better Restoration

DISCUSSION

One of the strategies to combat and treat dental caries is by applying restorations. If decay is left untreated, dental caries leads to discomfort and sometimes to sever pain, eventually requiring the removal of affected teeth. Dental restorations failure is a major problem in dental practice and the replacement of restorations constitutes the majority of the operative work. Dental amalgam is a widely employed restorative material that contains approximately 50% mercury ⁽¹⁴⁾. The current cross sectional study aimed at evaluating

dentists and patients perception and preferences to the major types of restorations known in dentistry and that are mostly used.

Looking at the demographic variables of the cluster sample of dentists that participated in this survey showed that male dentists were slightly larger than female dentists, with the majority having served for more than 5 years and were mostly general dental practitioners. When dentist were asked source of awareness of the dentists about the amalgam controversy, Majority (52.9%)stated that a combination of patients inquiries, undergraduate education,

workshops, T.V and Internet, colleagues and courses of continuing education contributed to their knowledge of the amalgam controversy. T.V. in addition to the internet contributed to a large proportion of their knowledge (i.e. 21%), advances in information technology have changed our life-style and the use of the internet can be considered as a part of the dentists daily activity and this technology has become as ordinary as the telephone or television⁽¹⁵⁾ it is also cost-effective as it can be accessed from anywhere and at any time. The information on the internet is usually updated, which helps in updating the recent knowledge and motivate dentists to undertake research activity on any particular field⁽¹⁶⁾. When the dentists were asked about the safety of the amalgam restorations 50.4% of the sample replied that it is safe, this is much more than that reported in a previous study that reported a 10.82% of the dentists opinion that amalgam is safe⁽¹³⁾, according to the ADA opinion about amalgam is that it is the safest and most affordable and durable dental materials for specific treatment needs⁽¹⁷⁾, this includes the option to use dental amalgam, which the scientific community has extensively reviewed and affirmed to be a safe and effective restorative material, the results of two independent clinical trials designed to examine the effects of mercury release from amalgam on the central and peripheral nervous systems and kidney function noted that “there were no statistically significant differences in adverse

neuropsychological or renal effects observed over the 5-year period in children whose caries was restored using dental amalgam or composite materials”^(18,19) and although some people express concern about mercury vapor released from dental amalgam the quantity released is well below the limits set by the US Environmental Protection Agency and the World Health Organization⁽²⁰⁾. Yet a large proportion of dentists 28.6 % were uncertain about the safety of amalgam restorations, this figure is more than that reported in another study⁽¹²⁾.

When the dentists were asked about reason for filling with the type of restoration placed whether amalgam or composite , 48.7 % replied that the attitude and desire of the patients played a very important role in the dentists choice of the type of restoration, according to Christensen (2002)⁽²¹⁾ dentists will continue to experience an increased demand for their services, largely on the strength of patients' desires for having a better-looking smile so patients chose tooth colored restorations , while large proportion 42% of dentists placed either type of restoration according to the financial state of patients as composite restorations are more expensive. Half of the dentists opinion about the amalgam restorations that it is more durable and last longer in patients mouth compared to tooth colored restorations, this is in agreement with other studies^(19,22,23). 22.7% of the sample

said that the amalgam restorations were less technique sensitive as the isolation of the operating area for an amalgam restoration is less critical than for composite, this is in agreement with other studies ^(23,24,25).

When the dentist were asked when to replace amalgam restorations, the majority 42.9 % stated when there is a defective restoration, while 38.6% stated that they would replace amalgam according to their judgment for esthetic purposes, and only 18.5% agreed to replace amalgam according to patients wishes. The current study showed that that the majority of dentists agreed that the recall appointments of patients complaining from post-operative sensitivity, periapical lesions, secondary caries and changes in color of restorations were mostly attributed to the tooth colored restorations (mostly composite) with a range of (76.5-90.8) % for all types of complications, while amalgam exhibited the least percentage of these complications with a range between (9.2- 23.5) %, this is in agreement with Port (2012) ⁽²⁶⁾, Post-operative sensitivity in resin composite restorations is a common complication that causes discomfort to the patient and inconvenience to the professional, because it has many different causes.

For the patient sample, the largest proportion of the sample was in the age group equal to or less than 30 years and the primary aim of applying restorations was primary caries, with females attending for treatment

more than males which is attributed to the reason the youth and females utilize dental services more than males ⁽²⁷⁾ and are more considerable about their appearance.

An interesting finding was that the majority of the sample of patients 67.6 % did not know anything about issues related to the mercury content of the amalgam restorations and the harmful effect of mercury in general, this figure is in agreement with another study in North of Iraq ⁽¹³⁾, and a study in Turkey⁽²⁸⁾. But when the patients were asked about the type of restorations they preferred 70% stated that they wanted tooth colored restorations or as they said white fillings in comparison with black ones, In today's society, people want to look their best, since physical appearance and esthetics matters the most and this plays an important role in the individuals self-esteem and success so the quest for an improved appearance even intra orally has become synonymous with cosmetic intervention and trying to feel beautiful through various health professionals in the dental field, of the 30 % that chose amalgam 27% of the sample stated that the cause of their choice of restoration was that they were looking for the stronger& longevity of life time of restoration, there is no doubt that amalgam shows superiority when compared to that of composites, this is in agreement with other studies ^(25, 29,30,31) and in no doubt can it be replaced for the time being.

A small proportion stated that cost was a factor to be considered when putting a dental restoration, Iraq is a developing country that has undergone many economical and political issues after the year 2003 that has thrown its shadows on the Iraqis particularly the Mosuli community that has been affected in terms of availability and the cost of materials which varies between countries. Composites restorations are more expensive than amalgam and, as a result, the use of dental amalgam is still common, other higher-income developed countries have introduced a ban on use of dental amalgam as a restorative material, taking into considerations the higher availability and accessibility of alternative tooth-colored dental materials especially composite, in addition to introducing a comprehensive preventive dental care programme for every individual. The use of amalgam has been decreasing not because of public perception on mercury toxicity or environmental issues but due to the increased demand for esthetic restoratives. Amalgam is superior over composite as it fulfills almost all criterions except esthetics. Amalgam is more durable than composite resins, the application of silver amalgam shall not decline with in the coming years in Iraq particularly in Mosul city.

CONCLUSIONS

Within the limitation of this study (limited number of dentists and patients) awareness about the safety of amalgam restorations among the dentists was low, with most of the

dentist agreed that amalgam is easy to use, has lower cost as compared to composite and produces less postoperative problems. Patients knowledge about the mercury content in amalgam was very low, with the majority of the sample requesting a composite or tooth like restoration. Amalgam is still popular among patients and dentists in Mosul.

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