

# The Changes in Dentists' Perception and Patient's Acceptance on Amalgam Restoration in Kurdistan-Iraq: A Questionnaire-based Cross-Sectional Study

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## ABSTRACT

**Background:** There has been considerable controversy concerning the health risks and benefits of utilizing mercury-containing amalgam. Across the developing countries, a reduction in the use of dental amalgam in oral health care provision is expected.

**Purpose:** Assessment of dentists' and patient's attitude of dental amalgam regarding attractiveness, perceived health, and treatment preferences in Kurdistan, Iraq.

**Materials and Methods:** A 4-page questionnaire comprised two parts, specific for dentist and patient were structured and delivered to each dentist oneself. Both open-ended and close-ended questions about the treatment needs of patients, uses of amalgam and its alternative, the properties and usefulness of different materials. Patient's acceptance was assessed by means of structured questionnaire prepared based on commonly asked questions from routinely daily practice. Questions on the type of filling material in their mouth, previous knowledge of mercury in dental amalgam and disappointment due to mercury hazard and toxicity. They were to indicate their acceptance with filling their cavities by dental amalgam with or without prior information about its mercury content. This part was also accomplished by the dentists participated in this survey.

**Results:** Out of 185 dentists shared, only 39 (21.1%) indicated that amalgam presents no harm for the dentists and patients. While majority of dentists 85 (45.9%) were uncertain about this issue. Amalgam was selected most often 107 (57.8%) as the material of choice for restoring posterior teeth. About 94(50.8%) and 85(45.9%) of the practitioners primarily used glass ionomer/resin-reinforced glass ionomer and composite, respectively. Among 1850 patients received treatment, only 450 (24.32%) claimed to have heard about adverse reactions to dental amalgams. Those who believed it to be safe were 200 (10.82%). Acceptance towards amalgam was 62%.

**Conclusion:** While amalgam was the most common material used for posterior restorations, direct tooth-coloured restorative materials were also popular among dentists participated in this study. Awareness of toxicity of mercury in dental amalgam was slightly low among the respondents studied. This may be suggested to be a reflection of devoid of planetary amalgam controversy in Kurdistan. The level of acceptance toward amalgam appears to be related to economics, dental education, and aesthetic orientation of the residents.

**Keywords:** Dental amalgam, Dental treatment

## INTRODUCTION

The dental public health strategies have been open to emerging diagnostic and treatment approaches all the time. In long term evaluation, the oral health of the public, the health of the dental practitioner and the practice of dentistry has been improved. In accordance with chronology, dentistry has developed gradually as a strong and respected profession based on sound science, a moral commitment of service to the public, and an ethical obligation to protect the health of the patient seeking dental treatment [1].

Dental amalgam has been widely used over 150 years ago as a dental restorative material, and has provided a valuable and relatively inexpensive service for patients ever since. It is made of two nearly equal parts; mercury and a powder composed of silver, copper, tin and zinc. The evidence obtainable suggests that dental amalgams are considered to be effective and safe; however, some concerns have been conveyed regarding the possible health effects of mercury in amalgam, contamination of the environment from mercury and treatment of its waste products [2,3].

The general acceptance of silver amalgam as a restorative material resulted from investigations of GV Black in 1895 on operative dentistry, which included detailed research into amalgam. His findings changed attitudes towards amalgam [4].

The amalgam controversy prompted authorities in some countries to formulate strategies and proposals on its phase out and future restrictions on its utilization [5].

In spite of the development of the internet, television is still one of the most important sources of information where health issues are concerned. It can play a significant role in shaping public images about these issues. The Internet is now the main national and international source for noteworthy information especially about recent events, and many of the anti-amalgam websites contain considerable references to scientific data regarding mercury in amalgam and its effect on health. For patients not having a good or outstanding judgment and understanding, this makes the information all the more believable [6,7].

Restoration replacement may lead to removing of unnecessary amount of sound tooth structure, cavities enlarge and both the adjacent tooth structure and restorations become more liable to fracture during mastication. In most instances, teeth with previous complex restoration, will not withstand successive restoration replacements without requiring endodontic treatment and/or an extra coronal prosthesis [8].

In fact, the placement of effective long-lasting restorations reduces the long-term cost of dental treatment [9].

Mercury vapor release from amalgam fillings into human mouth air after chewing becomes a source of mercury exposure, as displayed by whole-body image scan and tissue analysis. In an *in vivo* study done by Hahn et al., demonstrated that when radioactive Hg was mixed with dental amalgam and placed in teeth of mature sheep, this isotope appeared in various organs and tissue spaces within 29 days [10].

The last decade, however, there has been evidence of a shift away from the use of silver amalgam to more aesthetic tooth-colored restoration, mainly because of patient worry about the use of a mercury-containing filling material and partly because patients' perception of dental aesthetics appears to indicate that a proportion of the population are dispirited with the metallic colour of the restorations in their teeth [11].

Based on current evidence, provision of tooth-coloured restorations will be increasingly demanded, but a phase-out of virtually all usage of amalgam must be planned. Nevertheless, amalgam restorations may provide good longevity and involve less technique sensitivity in their placement than the alternatives [11,12].

Amalgam is still predominantly used by public and private dentists in Kurdistan region of Iraq and most of them agreed that amalgam is safe. Increased public familiarity of these controversies surrounding amalgam is expected to induce their health responsibility over the potential risk in its use and also the tendency to look for amalgam. The aims of this study were to determine dentists' perception on amalgam restoration and its alternatives. Estimate patient's knowledge and attitudes towards amalgam restorations and to correlate the findings with the age, sex and occupation of the participants, in Kurdistan Region of Iraq.

## MATERIALS AND METHODS

The research protocol designed for this study, were approved by the University of Sulaimani Research Ethics Board.

This cross-sectional study was performed between March and June 2011 in the Kurdistan Region of Iraq. A total sample of 200 general dentists and specialists registered at the Kurdistan Syndicate of Dentists, working in government and private dental clinics from different governorates of Sulaimani, Duhok, and Hawler were invited randomly to participate in this study. Data were collected through a 4-page structured questionnaire with close-ended and open-ended questions. The questionnaire did not accumulate any information that could approve identification of any participant.

The prepared questionnaires were personally delivered to each dentist. A simplification was given to dentists about the importance of their participation and the study purposes. The questionnaires were collected four weeks later. Loss of participants was considered when professionals did not return the questionnaire after this period.

The questionnaire comprised two parts. First part, specific for Dentist and included the following questions as follow:

- **Demographic data and professional capability:**
  1. Sex. a) Male. b) Female.
  2. Age.....
  3. Qualification:
    - a) General Dental Practitioner. b) Specialist.
  4. Years of professional activity?
    - a) Less than five years.
    - b) More than five years.
- **Source of awareness from amalgam controversy:**
  - a) Patients inquiries.
  - b) Undergraduate education.
  - c) Workshop and Conferences.

- d) IT [TV, internet].
- e) Colleagues.
- f) Continuing dental education.

- **Opinion about amalgam safety:**
  - a) Safe for the practitioner and patient.
  - b) Unsafe for the practitioner and patient.
  - c) Uncertain.
- **Placement and removal of amalgam and use of its alternatives:**
  1. According to which criteria you will select amalgam as a material of choice?
    - a) Sex.
    - b) Degree of education.
    - c) Patient attitude.
    - d) Affordability.
  2. What is your opinion about dental amalgam as a restorative material?
    - a) Longevity and superior mechanical properties
    - b) Applicable and less technique sensitive; and
    - c) Required less patient cooperation.
  3. According to which criteria you will replace amalgam restoration?
    - a) Criteria of defective restoration
    - b) Patient wishes; and
    - c) Aesthetic.
  4. Which of the following amalgam alternatives do you usually select?
    - a) Resin composite
    - b) Glass ionomer and resin modified glass ionomer; and
    - c) Others.

Second part of the questionnaire specific for patients dictated also by the dentists and comprised of the following questions:

- **Demographic data:** a) Age, b) Sex & c) Occupation.
- **Awareness of patients with dental fillings about the harmful effect of mercury in dental amalgam:**
  1. Knowledge about dental fillings?
  2. Have you heard about the adverse reaction of dental amalgam?
  3. Harmful effect of mercury in dental amalgam?
- **Acceptance on amalgam filling with or without prior information about its mercury content:**
  1. Filling their cavities with dental amalgam?
  2. Filling their cavities with amalgam alternatives?

The data contained in the returned questionnaires were entered into a Microsoft Access database and subsequently analyzed using Minitab (version 15), since its reliable, easy to use and comprehensive. Data analysis involved descriptive statistics and cross-tabulations.

## RESULTS

From the total of 200 dentists who were visited and received the questionnaire, 185 participated in the study (92.5% response rate). Among the dentists participated 118 (63.8%) were males, while 67 (36.2%) were females. Eighty one (43.8%) of them were general dentists, 104 (56.2%) were dental specialists. Of the whole, 115 (62.2%) of them were aged more than 30 years, 150 (81.1%) have experience more than 5 years.

The number of patients treated by the dentists in the study period was 1850. Of the whole, 60.1% were female, 59.9% were male.

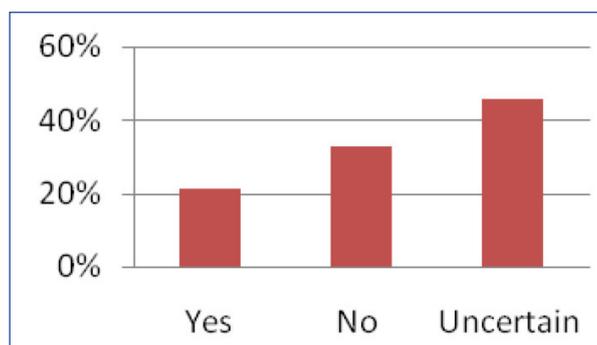
The distribution of patients according to their age were as follow; less than 20 year were 15.2%, from 20-35 years were 51%, from 40 year and above were 33.8%.

The sources of knowledge about amalgam controversy, as cited by dentists, are illustrated in [Table/Fig-1].

Source of awareness	Frequency	Percent
Patients inquiries	35	18.9
Undergraduate education	55	29.7
Workshop and Conferences	12	6.5
IT(TV,internet)	23	12.4
Colleagues	12	6.5
Continuing dental education	48	25.9
Total	185	100.0

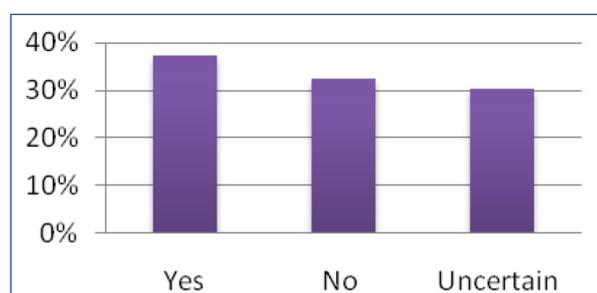
[Table/Fig-1]: Percentage of dentist knowledge about amalgam safety issue per source of information

**Dentists' opinions on the safety of amalgam for patients and users:** While majority of dentists 85(45.9%) were uncertain about this issue, 61 (33.0%) believed that amalgam is unsafe for patients and users. Only 39 (21.1%) of the respondents indicated that amalgam presents no harm for the dentists and patients. Opinions of the respondents regarding safety of the amalgam are illustrated in [Table/Fig-2].



[Table/Fig-2]: Dentists opinion on amalgam safety

**Dentists' awareness of the controversy concerning amalgam safety:** Nearly, only 69(37.3) of the respondents were aware of the controversy concerning amalgam safety, of which 60(32.4%) not aware of it, about 56(30.3) were uncertain of it. Distribution of the respondents is illustrated in [Table/Fig-3].



[Table/Fig-3]: Awareness of dentists of the controversy concerning amalgam safety

**Awareness of patients with dental fillings about the harmful effect of mercury in dental amalgam:** From the total of 1850 patients were treated by the dentists participated in this study during the study period, 1200 (64.86%) of them expressed their uncertainty regarding the adequate knowledge about dental fillings and harmful effect of mercury in dental amalgam. About 450 (24.32%) of the participants claimed to have heard about adverse reactions to dental amalgams. Those who believed it to be safe were 200 (10.82%).

**Patients' acceptance on amalgam filling:** The data regarding the responses to a survey assessing the patient's acceptance with amalgam that accomplished previously by dentists participated in this study were also collected. The number of patients had amalgam filling in one or more teeth were 1530 (82.70%). The overall percentage of agreement with filling their cavities with amalgam was (62%) 1147.

**Placement and removal of amalgam and use of its alternatives:** Dentist's selections of alternative restorative materials were found to be influenced by sex, degree of education and patient demand. Amalgam was selected most often 107 (57.8%) as the material of choice for restoring posterior teeth. The majority of the practitioners felt that amalgam possessed greater longevity and superior mechanical properties, required less time to place and less patient cooperation, and was more affordable for the patient than tooth colored restorations.

About 94(50.8%) and 85(45.9%) of the practitioners primarily used glass ionomer/resin-reinforced glass ionomer and composite, respectively. The main reason practitioners gave for using glass ionomers/RMGI's was the benefit of fluoride release and lack of postoperative sensitivity. The dental practitioners choose composites for posterior restorations on the basis of patient's preference and aesthetic. Amalgam is still well accepted by the larger part of the dentists and patients in the studied population.

## DISCUSSION

The findings from the present study can be used as a baseline data to figure out how prevalent any problems and positive tendencies are in our community. Baseline measures can be very effective in helping any proposed plan for improving official oral health program. If the baseline is not conducted until the official program launch, many of these important changes may not be captured.

A practical assessment of the uses of amalgam in the past and an amalgam ban in the future requires certain presumptions. These presumptions are stated given current findings but they may lack predictive legality, especially due to lack of a formal policy on the use of dental restorative materials in Kurdistan governorate, on the other hand the treatment recommendations vary considerably among dentists depending upon their location, experience, training, and technical approach.

World Health Organization (WHO) recommends that the phase-down approach of dental amalgam should involve elevating of public awareness and careful planning. Dental practitioner will need to be made aware of the environmental impact of dental materials. Likewise, consultation with important stakeholders, governments, insurance companies and dental manufacturers is needed [13]. Dentists should consider patients attitudes, beliefs, and values regarding aesthetics and function when presenting treatment options. In the present study, although patients are more concerned with in clinical decision- making, they still rely on the dentist's expertise and advice.

As the results show, 61(33.0%) of the dentists in our sample believed that amalgam is unsafe for patients and users, however amalgam was selected most often 107 (57.8%) as the material of choice for restoring posterior teeth. The majority of the practitioners felt that amalgam possessed greater longevity and superior mechanical properties, required less time to place and less patient cooperation, and was more economical for the patient than tooth coloured restorations. Given the high prevalence of severe and large carious lesions, the use of dental amalgam is highly indicated. For smaller lesions, composites may be more suitable but their use depends on availability and cost. The types of restorative materials used in dental schools vary between countries. In our country, while dental amalgam restorations are still taught in the dental curriculum and considered to be the first choice for posterior restoration, little emphasis is placed on tooth-coloured restorative materials, leading

to an increasing trend in using more amalgam than composite resins and glass ionomers in the future exclusively for moderate and large class II restorations.

Successful training of dental students and practitioners is based on research on the available and alternative dental materials. The directed programs on undergraduate training must better consider the safety of the environment, characteristics of dental amalgam and existing alternatives to amalgam for restorative dental care, development of skills in application of new quality materials for restoration, and the safety of dental restorative materials to the health care providers [14].

About 94 (50.8%) and 85 (45.9%) of the practitioners primarily used glass ionomer/resin- reinforced glass ionomer and composite respectively. These materials are more popular with patients. Patients' preferences based mostly on aesthetic reasons. Among the dentists in this survey, the use of indirect tooth coloured restorations was limited, possibly because of the higher cost and technique difficulties of these prosthesis.

Costs of materials vary between countries. Composites may be twice as expensive as amalgam and, as a result, the use of dental amalgam is still common. Some higher-income 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-coloured dental materials and different extra coronal prosthesis. Others have required or recommended dental practices to manage amalgam waste products so that they are not released to the environment. A large number of high income countries having introduced comprehensive preventive dental care. The application of silver amalgam has declined partly due to the fact that dental caries is less prevalent, caries lesions are less progressive and tooth structure loss is only minimum [15].

The use of questionnaire responses to determine dentists' attitudes and behaviour is common, although not without difficulties such as non-response bias [16,17].

Two objections in conducting a survey are to develop a questionnaire that is comprehensive enough to provide useful information yet short enough to encourage a favorable response rate. The response rate obtained in the present study was 92.5%. Losses and refusals were reduced. This response rate is acceptable, since rates around 50% and (64%) have been reported in similar surveys [18,19].

Following a review of existing evidence and much speculation, it was agreed that dental amalgam remains a dental restorative material of choice, in the absence of an ideal alternative. Dental amalgam is becoming more refined as the technology is improving.

## CONCLUSION

While amalgam was the most common material used for posterior restorations, direct tooth- coloured restorative materials were also popular among dentists participated in this study. More than

half of the dentists were aware of the controversy in regards to amalgam safety, only a minority of them believes that amalgam is not hazardous to dental personnel and patient's health, but pays more attention to patients' demand and satisfaction.

Awareness of toxicity of mercury in dental amalgam was slightly low among the patients seeking dental treatment studied. This may be suggested to be a reflection of devoid of planetary amalgam controversy. The majority of patients continue to accept amalgam, however among these maximum number are satisfied with the tooth color filling for more natural look. Overall acceptance toward amalgam appears to be related to economics, dental education, and aesthetic orientation of the residents.

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