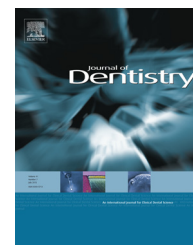




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Factors relating to usage patterns of amalgam and resin composite for posterior restorations – a prospective analysis

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ABSTRACT

Objectives: This study prospectively analyzed the use of amalgam and resin composite posterior restorations placed by general dentists in relation to dentist, patient and cavity factors.

Methods: One thousand posterior restorations placed by a representative sample of general dentists working in the Ministry of Health (MOH), Kuwait, during routine clinical practice were included. Information about the restorations was recorded using a survey questionnaire. Descriptive statistics and multivariate logistic regression analysis were used to determine the factors associated with the use of amalgam versus tooth coloured restoratives.

Results: Dentists chose amalgam for 30.8% of the 1000 restorations. Dentists with longer work experience (>15 years) were more likely to choose amalgam (OR = 2.61, 95% CI = 1.06, 6.40). Younger dentists (≤30 years) were less likely to choose amalgam (OR = 0.45, 95% CI = 0.26, 0.77). Amalgam was more likely to be chosen for patients with poor oral hygiene (OR = 1.58, 95% CI = 1.08, 2.32) and a higher number (≥4) of restorations (OR = 1.44, 95% CI = 1.07, 1.94) with large cavity sizes (OR = 6.33, 95% CI = 3.88, 10.32). Tooth-coloured restorations were more likely to be chosen for cavities of smaller sizes.

Conclusions: The use of resin composite materials as the dominant choice among dentists in Kuwait reflects the trend worldwide. Nevertheless, clinicians still find a use for amalgam in posterior load-bearing teeth and in the high-caries risk population.

Clinical significance: The findings give insight into factors influencing material usage under different clinical conditions and provides information about the perceived deficiencies or shortcomings of resin composite materials in a general dental practice setting. This information can be useful for identifying perceived barriers to the usage of newer restorative materials and finding ways to overcome them.

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1. Introduction

Demands for aesthetic dentistry are increasing worldwide. Resin composite materials are also rapidly evolving and patients are more aware of, and demanding of, aesthetic tooth-coloured restorations.¹ In the early part of the new

millennium, amalgam, despite being one of the oldest restorative materials, still remains widely used by dentists.² In the United States, amalgam was not long ago considered to be the most commonly used posterior tooth restorative material.³ Amalgam remains a less costly restorative option, and one that is also increasingly used in patients over 35 years of age.⁴ Controversy regarding the longevity of restorations,

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combined with availability and cost, continues to limit the choices of dental restorative materials and favours the continued use of amalgam in developing countries.⁵

Global concerns regarding the environment have been primary drivers for the discontinuation of dental amalgam usage.⁶ Identified as one of the top five mercury-added products, dental amalgam is ranked fifth behind batteries, measuring devices, electrical switches and relays, and mercury-containing light bulbs.⁷ At the 2013 Minamata Convention, the need for a world-wide reduction and ultimate cessation in the production and use of mercury-containing products was heralded. Delegates agreed a 'phase-down in the use of fillings using mercury amalgam'. These concerns and policy implementations will irrevocably change the practice of dentistry in the coming years.⁸

The dental profession is also currently being guided by newer concepts regarding repair and restoration of demineralized tooth structure.⁹ Minimally invasive dentistry concepts are increasingly applied worldwide. The goal of these concepts is to preserve the greatest amount possible of tooth structure.¹⁰ In contrast to the use of dental amalgam, the use of adhesively bonded resin composite materials, which are increasingly found to perform as well as dental amalgam in clinical service, favours the adoption of minimal intervention approaches to the restoration of posterior teeth.¹¹ Not surprisingly, clinicians are choosing adhesive resin composites since they allow for more conservative preparations and also offer the possibility of a reduced risk of tooth fracture.¹² In addition, composite resin restorations have a capacity for repair in ways which are rarely possible with dental amalgams, thus helping to conserve and preserve tooth tissues.¹¹ Composite restorations placed in large cavities have also shown higher survival rates than amalgam in low risk patient populations.¹³ These factors have contributed to the shift towards the use of resin composites as an alternative to amalgam.¹⁴ Whereas amalgam was reportedly used in 29% of restorative cases in 1992 in Finland, by 1997 this figure had decreased to 5%.¹⁵ This was partly due to patients' concerns regarding the mercury content of amalgam restorations, but mainly due to the increase in demand for more aesthetic and natural-looking restorations.¹⁶

Practitioner educational background and experience can influence material usage patterns. It has been noted that although material selection was usually independent of the clinician's gender, resin composite is favoured by female dentists compared to their male counterparts.¹⁷

Kuwait has a population of just over 2.5 million people.¹⁸ The government provides free of charge services at polyclinics located in each residential district in the country. These clinics contain general medical and dental clinics, and provide primary medical and dental care to the majority of society. At the time of this investigation, little has been reported about the usage pattern of restorative materials within the Kuwaiti dental healthcare services.

Using a specifically designed questionnaire, this study prospectively gathered information on the use of dental amalgam and resin composite restorations placed in posterior teeth in government dental clinics in Kuwait and analyzed usage patterns in relation to dentist, patient and cavity factors. The null hypothesis was that there is no difference in the

factors affecting the usage of amalgam and resin composite among dentists working in the government sector in Kuwait.

2. Materials and methods

2.1. Procedure

The study was approved by the Joint Committee for the Protection of Human Subjects in Research of the Health Science Centre, Kuwait University and Kuwait Institute for Medical Specialization. Subjects were approached in person by the researcher (MK), and upon agreeing to participate, were requested to sign a consent form prior to completing the survey questionnaire.

2.2. Participants

The study population was drawn from the 533 general dental practitioners working exclusively in Ministry of Health (MOH), Kuwait, general dental clinics. In order to obtain a representative distribution of participating dentists working at MOH general dental clinics, a clustered sample design was first used to obtain a random selection of 50% of MOH general dental clinics situated in each of the six health service regions in the country from a total of 82 clinics. The clinics thus selected were visited during one of the working shifts (morning or evening) and dentists working at the time were asked to participate in the study. Dentists were requested to provide information on the next ten restorations (one per each of their next ten patients) of previously unrestored teeth they were scheduled to treat in accordance with existing treatment plans. In this way, no replacement restorations were included; neither was any patient included in a dentist's series of ten patients more than once. The rationale for using 10 restorations per dentist was: (a) to achieve the minimum sample size of 10 events per variable recommended for logistic regression; and (b) to achieve sufficient statistical power for logistic regression, taking into account the possibility of missing values. A power analysis (assuming the probability of restoration with amalgam = 0.3, and the significance level $\alpha = 0.05$) had indicated that a minimum sample size of 743 restorations was required to achieve a power of 0.9 with an Odds Ratio of 1.3. Taking into account a drop-out rate of up to 25%, it was decided to include 1000 restorations, viz. 10 per each of 100 dentists. Consequently, descriptive data for a total of 1000 restorations were collected.

2.3. Survey instrument

The questionnaire consisted of questions relating to the respondent's gender, age, experience and university where they had obtained their dental education. Forms were left with each dentist with the request to provide information for a minimum of ten consecutive posterior restorations to be placed on a prospective basis for previously unrestored teeth. The dentist was requested to include only one restoration per patient. Patients' gender, age, oral hygiene status, number of restorations they had and the last time they had been to a dentist were also recorded. Information on patient socioeconomic

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