BJMHR
British Journal of Medical and Health Research
Journal home page: www.bjmhr.com

Dentists Perspective on Silver Amalgam Restorations and Associated Hazards- a Cross Sectional Study

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ABSTRACT

The controversies regarding amalgam use in dentistry has been an issue for decades. The perspectives on practice of silver amalgam restorations and its associated hazards still vary among dentists. Thus, the aim of the present study was to assess the knowledge of dentists regarding potential risks of silver amalgam and the use of alternative dental restorative materials in southern Saudi Arabia. A cross-sectional study was carried out, among 231 dentists working in the southern Saudi Arabia. A close-ended questionnaire was mailed to all dentists in Southern Saudi Arabia who consented to the study. The response rate was 96%. About 84% of the participants were aware of the mercury toxicity. More than 50%of the practitioners felt the use of silver amalgam should either be reduced or stopped. Most of the dentists preferred resin composite followed by silver reinforced glass as alternatives to Amalgam. The present study showed that despite the controversies and regular media debates and discussions regarding the safety of silver amalgam restorations, the restorative material has been rated as 'safe' by about fifty percent of the practitioners when asked about mercury toxicity.Majority of the dentists in the region were aware of mercury toxicity and preferred alternative restorative materials.

Keywords: Silver Amalgam, mercury toxicity, dentist perspective.

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Received 24 May 2015, Accepted 31 May 2015

Please cite this article as: Yaseen SM *et al*., Dentists Perspective on Silver Amalgam Restorations and Associated Hazards- a Cross Sectional Study. British Journal of Medical and Health Research 2014.

INTRODUCTION

Dental amalgam introduced into clinical dentistry over 150 years ago and has been a valuable and relatively inexpensive restorative material ever since[1]. Although other esthetic restorative materials are developed over the years, it is still in use, because of its excellent compressive strength, ease of handling, and its bacterio static effect[2]. Many dentists, authors and public health campaigners have criticized the continuous use of dental amalgam in dental practice because of the suspicion that it could cause mercury poisoning. Also, studies evaluating levels of mercury in dietary fish, air emissions and hazards to mercury exposure on health have increased public awareness. However, the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) in a report to the EU-Commission claimed that "No risks of adverse systemic effects exist and the current use of dental silver amalgam does not pose a risk of systemic disease"[3]. Mercury is unique in its ability to form silver amalgams with other metals. Dental silver amalgam consisting of silver, copper, tin, and mercury is ascertain as a safe, stable, and cost-effective restorative material. Although there has been considerableimprovement in mixing and handling dental amalgam (capsulation) in contrast to the old method of mortar and pestle so as to reduce exposure to mercury and proper disposal of amalgam waste in the clinic yet mercury vapor in high concentration can have deleterious effects on several organ systems. However. there is no evidence of risk at the levels generated by chewing with silver amalgam restorations chewing with silver amalgam restorations[3-5]. Hence dental professionals are not only expected to be well versed with the potential hazards of silver amalgam but also to be aware of the proper techniques of handling silver amalgam and disposal of the silver amalgam waste produced during restoration. Hence, this study aims to assess the knowledge regarding potential hazards of silver amalgam among dentists in southern Saudi Arabia and the use of alternative dental restorative materials among dentists inthe south Saudi Arabia.

MATERIALS AND METHODS

This cross-sectional questionnaire study was carried out, among dentists working in southern Saudi Arabia. The ethical approval for conducting this study was obtained from institutional ethics committee. All dentists, who consented to the study and registered in the Saudi Dental Society in southern Saudi Arabia,were included in the study. Close-ended questionnaire were distributed to 239 dentists, out of which 8 did not to give their informed consent and hence not included in the study. A structured close ended 10 item questionnaire wasgiven to the respondents**.** The survey also included demographic information like the dentist's gender, field of practice and service sector. The questionnaire was pretested earlier on 20 interns posted to the Interns clinic, College of Dentistry, King Khalid University. Reliability of the

questionnaire using Cronbach's Alpha was 0.82. The data entry and analysis were performed using statistical package for social sciences software package (SPSS Inc., Chicago, IL, USA) version 17. The data was analyzed using Fischer exact test. P value <0.01 was considered highly significant.

Questionnaire used in the study

1. Are you aware of controversy regarding Mercury toxicity due to silver amalgam use in dental Practice?
2. What is your source of Awareness?
3. Do your patients enquire about silver amalgam safety?
4. Patients request for replacement of silver amalgam restoration is mainly because of?
5. Are you aware of Signs and Symptoms of Mercury Poisoning?
6. What is your opinion about the use of silver amalgam in Dental Clinics?
7. Which of the following silver amalgam alternatives you prefer?
8. Are you concerned about the environmental issues of mercury disposal in the Dental office?
9. What is your opinion about silver amalgam safety due to Mercury toxicity?
10. Teaching Silver amalgam restoration and its cavity preparation principles to Dental students should be:

RESULTS AND DISCUSSIONS

A total of 239 questionnaires distributed, 231 were returned (96% response rate). Among the 231 dentists surveyed, 57 were from Abha, 105 from Khamis Mushayt, 42 from Jizan and 27 from Najran 159 were general practitioners while 72 were specialists. One hundred and twenty-four were working in the governmentsector while 107 were in the private sector (Table 1). One hundred and ninety believed that silver amalgam could cause mercury toxicity whereas 29dentists do not believe, and eight dentists were not certain. The various sources of regarding mercury toxicity were patient inquiries6.49%; Undergraduateeducation35.49%, Conferences13.5%, TV/Internet13.85%, Colleagues 12.97%, Continuing Dental Education17.7%. About 87.5 %of the dentists reported that esthetics was the primary reason for the replacement of silver amalgam in their practice. While, 8.2% of the dentists reported that it was due to concerns about mercury toxicity and 4.3%of dentists reported that it was due to other reasons. There was statistically significant difference in awareness between General Dentists and Specialists with p-value of <0.001 regarding the concern about the environmental issues of mercury disposal in the dental office with the specialists showing more concern regarding environmental issues. When asked about the alternatives to silver amalgam, there was statistically significant difference between General Dentists and

Specialists with a P value of 0.01 with the specialist doing more composite fillings than general practitioners. In this study, 84%of the dentists were aware of the controversy regarding mercury toxicity due to silver amalgam use in dental practice. This finding is in close accordance with the conclusions of the study conducted by Walid Sadig, who reported that 75.5% dentists within his study group were aware of mercury toxicity[14]. The pattern of acquisition of information on the silver amalgam controversy among dentists in the present study is similar to that reported by Sadig and Khairuldeen[15]. These patterns may be influenced by the literacy level of the population and the regular debates and discussions conducted by media. Furthermore, in the present study the specialists reported to be more concerned than general practitioners about the environmental issues of mercury disposal in dental office which could be because of greater sources of information from conferences and continuing dental education are noted among specialists compared to general dentists and are in agreement with their calling and training,as they are more exposed to meetings and updates in the course of their specializations. The updates are usually highly interactive in nature, and participants are exposed to the latest development in their specialty. In the current study, the number of dentists who agree on the safety of silver amalgam is lowerthan that reported by Khairuldeen and others but higher than the one reported by Udoye and Aguwa[16] in their study in Nigeria. However, in the current study, greater numbers of dentists agree over the safety of silver amalgam. The reason for the discrepancy can be attributed to the differences in the study population and the level of awareness of the dentists. In the same vein, and for the same reason mentioned earlier, fewer dentists are aware of the silver amalgam controversy in the dental literature. A greater percentage of specialists than general dentists knew all the signs and symptoms of mercury toxicity in the current study. This may be explained by their level of access to conferences, collaboration among professionals and updates through courses. The results of this study revealed that, the most commonly suggested silver amalgam alternative restorative material was composite resin. This is in agreement with previous studies[17,18]. A slightly greater proportion of private dentists as compared to public dentists selected composites and glass ionomer. Whereas, more dentists in public service than private practice selected porcelain and cast gold. The possible reason for the lower frequency of nominating porcelain and cast gold restoration by the private practitioner's might be the higher cost and longer time needed to fabricate. Further, choosing cast gold restorations might have been influenced by years of experience. This preference was attributed to the fact that respondents with more years of experience mayhave had more exposure and training in fabricating cast gold inlays and onlays during their undergraduate education than those dentists who have graduated recently. The results indicated that 32.4 % of the dentists

encountered patients who expressed worry regarding the silver amalgam safety. This percentage is lesser than the one reported by Khairuldean in their study in Riyadh in 1994[15]. However this is much lower than what reported in other countries. [6, 17]Patient concerns, although probably initiated by media reports, may be maintained by hard to change psychological processes. Since most dentists believed that silver amalgam is safe for the patient's health, discrepancies may exist between the beliefs of dentists and patients posing a challenge to the practicing dentist who must communicate with patients beliefs about the risk. Numerous studies have been conducted to assess the toxicity and biohazards associated with mercury within the dental silver amalgam. One such study conducted by Guzzi G et al showed that there was no evidence of the presence of circulating anti-GBM antibodies in subjects suffering from adverse events due to long-term exposure to mercury from dental silver amalgams, even in individuals who presented allergy to mercury[19]. Similar conclusions were drawn by Nicolae A et al who found that the mean urinary mercury concentrations in the general Canadian population are significantly lower than the values considered posing any risks for health[20]. Moreover the patients concern can be media dependent and the patients are usually positively or negatively influenced, depending on whether it is pro silver amalgam or anti-silver amalgam agenda. In the current study, more than half of the dentists admitted to reducing the use of silver amalgam. The probable reason could be more awareness among dentists regarding the occupational exposure of dentists to mercury. This phenomenon may have been due to the fact that approximately 65% of the dentists in our study were concerned about the disposal of mercury in the clinics and approximately 85% were concerned about the toxicity associated with mercury. The high percentages of dentists demonstrate the acceptability and reliability of silver amalgam over other alternatives as a tested restorative material. More than half of the dentists agree over the safety of silver amalgam and also advocate its use with dental undergraduate students. The greater opposition from general dentists compared to specialists may be due to the type of sampled population (perhaps conservative dentists did not receive the survey). The distribution of patients and the location of a practice may also be factors. In this study, the majority of dentists were general dentists. In addition to this, it is noteworthy that all specialists, who participated in the study, were from different dental specialties,a shortcoming that does not give an accurate picture of the opinion of specialists who deal with conservative and endodontic procedures.The challenges of using inorganic mercury in silver amalgam include both, the occupational exposure and the possible health problems for the dental patients[20,21]. One must look to the vast literature on exposure, toxicology, and risk assessment of mercury, to assess whether anything is or is not scientifically wrong with silver amalgam[22].

Table 1: Responses of Dentist's on use of silver amalgam, its associated hazards and preferred alternatives.

	Responses	General Practitioner N (%)	Specialist N (%)	P value*
Patients enquiring about silver amalgam safety	Yes	55 (34.6)	20 (27.77)	0.3
	No	104 (65.40)	52 (72.23)	
	Total	159(100%)	72(100%)	
Reason for request for replacement of silver amalgam restoration	Color	140(88.1%)	62(86.1%)	0.43
	Mercury toxicity	11(6.9%)	8(11.1%)	
	Other reasons	8(5%)	2(2.8%)	
	Total	159(100%)	72(100%)	
Awareness regarding signs and symptoms of mercury Poisoning	Yes	95 (59.74)	47 (65.27)	0.42
	No	64 (40.26)	25 (34.72)	
	Total	159(100%)	72(100%)	
Dentist's opinion about the use of silver amalgam in Dental Clinics	Reduce the usage	83 (52.20)	29 (40.28)	0.24
	Stopped completely	16 (10.06)	11 (15.28)	
	To be continued as usual	57 (35.84)	29(40.28)	
	Uncertain	3 (1.9)	3 (4.16)	
	Total	159(100%)	72(100%)	
Alternative restorative materials and percentage wise distribution according to preference given by dentists	Resin Composite	121(76.1%)	40(55.6%)	0.01
	Ceramic	11(6.9%)	9(12.5%)	
	Cast metal restoration	8(5%)	4(5.6%)	
	Silver reinforced GIC	19(11.9%)	19(26.4%)	
	Total	159(100%)	72(100%)	
Concern about the environmental issues of mercury *disposal in the dental* office	Yes	104 (65.4)	64(88.88)	<0.001**
	No	55(34.6)	8 (11.11)	
	Total	159(100%)	72(100%)	
Opinion about silver amalgam safety due to mercury toxicity	Safe	85 (53.45)	35 (48.61)	0.72
	Unsafe	47 (29.55)	22 (30.55)	
	Uncertain	27 (17)	15 (20.84)	
	Total	159(100%)	72(100%)	
Opinion regarding teaching silver amalgam restoration and its cavity preparation principles to dental students	Encourage	77 (48.42)	42 (58.33)	0.14
	Reduce	64 (40.25)	27(37.5)	
	Stop	18(11.33)	3 (4.17)	
	Total	159(100%)	72(100%)	

*Fisher Exact test was performed,

Significant figures + Suggestive significance (P value: $0.05<P<0.10$)

* Moderately significant (P value: $0.01<P \leq 0.05$)

** Strongly significant (P value: $P \leq 0.01$)

CONCLUSION

The present study highlights on knowledge, awareness, and approach of practicing dentists towards silver amalgam restorations and the mercury toxicity associated with it. More than 50% of the practitioners felt use silver amalgam should either be reduced or stopped. Potential silver amalgam occupational hazard and risk to dentists, and dental personnel should neither be exaggerated nor neglected. However, reasonable precautionary measures should be implemented by the dental profession to assure safety of patients, dentists, and dental team members.

REFERENCES

1. Taut C. Dental amalgam: Is this the end? A review. J Ir Dent Assoc 2013; 59(6):311-7.
2. Rathore M, Singh A, Pant VA. The dental silver amalgam toxicity fear: a myth or actuality. Toxicol Int 2012;19(2):81-8.
3. Mutter J. Is dental silver amalgam safe for humans? The opinion of the scientific committee of the European commission. J Occup Med Toxicol 2011;6(1):2.
4. Kao RT, Dault S, Pichey T. Understanding the mercury reduction issue: the impact of mercury on the environment and human health. J Calif Dent Assoc2004;32(7):574-9.
5. Bates MN. Mercury amalgam dental fillings: an epidemiological assessment. Int J Hyg Environ Health 2006; 209 (4): 309-316.
6. Thygesen, LC, Flachs EM, Hanehoj K, KjuusH, Juel K. Hospital admissions for neurological and renal disease among dentists and dental assistants occupationally exposed to mercury. Occup Environ Med 2011;68 (12): 895-901.
7. Sawair FA, Hassoneh Y, Jamleh AO, Al-Rabab'ah M. Observance of proper mercury hygiene practices by Jordanian general dental practitioners. Int J Occup Med Environ Health. 2010; 23(1):47-54.
8. Hashim R, Mahrouq R, Hadi N. Evaluation of Dental waste Management in emirate of Ajman, United Arab Emirates. J Int Dent Med Res 2011; 4(2):64-9.
9. Council of European Dentists (CED). CED Resolution. Dental amalgam. November 2010.
10. Council of European Dentists (CED). CED Resolution. Responsible practice. November 2011.
11. Climate and Pollution Agency. Review of the Norwegian Experiences with the Phase-out of Dental Amalgam. Oslo, 2010.
12. Kay EJ, Lowe JC. A survey of stress levels, self-perceived health and health-related behaviours of UK dental practitioners in 2005. Br Dent J. 2008;204:E19.

13. Gijbels F, Jacobs R, Princen K, Nackaerts O, Debruyne F. Potential occupational health problems for dentists in Flanders, Belgium. Clin Oral Investig. 2006;10:8–16.
14. Sadig W. Preliminary study on dentists' perception and safety measures toward the use of dental silver amalgam in Riyadh private clinics. Saudi Dent J 2007;19(3):164-70.
15. Sadig W, Khairuldean N. Silver amalgam safety and alternative restorative material: a cross-sectional survey among dentists. Saudi Dent J 1996;8(1):27-30.
16. Udoye C, Aguwa E. Amalgam safety and dentists' attitude: a survey among a Subpopulation of Nigerian dentists. Oper Dent 2008; 33(4):467-71.
17. Vidnes-KopperudS, Tveit AB, Gaarden T, Sandvik L, Espelid I. Factors influencing dentists' choice of amalgam and tooth-colored restorative materials for Class II preparations in younger patients.Acta Odontol Scand 2009;67(2):74-9.
18. Nascimento GG, Correa MB, Opdam N, Demarco FF. Do clinical experience time and postgraduate training influence the choice of materials for posterior restorations? Results of a survey with Brazilian general dentists. Braz Dent J 2013;24(6):642-6.
19. .Guzzi G, Fogazzi GB, Cantù M, Minoia C, Ronchi A, Pigatto PD, Severi G. Dental silver amalgam,mercury toxicity and renal autoimmunity. J Environ Pathol Toxicol Oncol 2008;27(2);147-55.
20. Nicolae A, Ames H, Quinonez C. Dental silver amalgam and urinary mercury concentrations. A descriptive study. BMC Oral health 2013;13:44.
21. Swersen T, Kaur P. Toxicology of mercury and its compounds. J Trace Elem Biol 2012;26 (4); 215-26.
22. Koral SM. Mercury from dental silver amalgam: exposure and risk assessment. CompendContinEduc Dent.2013; 34 (2);138-4