

An evaluation of mercury hygiene level for dentists in Mosul City

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ABSTRACT

The present study was carried out to observe the level of mercury hygiene for the dentists in Mosul city via a questionnaire given to the 98 dentists selected randomly. The data was collected and percentages were calculated. The results revealed that the dentists had some of good hygienic methods, for example, (80% of dentists were ventilate their clinic, 100% of dentists were use water cooling system during removal of old amalgam restorations), and some of unhygienic methods, for example, (33% of dentists only were uses amalgam capsules, 93% of dentists work without rubber gloves) which increase the possibility of dentists exposure to mercury toxicity. According to this results the dentists should change they manner form unhygienic type to minimize as much as possible the mercury toxicity. Seminars & lectures of continuos education are very important in this field.

Key words: Mercury hygiene, toxicity, amalgam.

الخلاصة

الدراسة المقدمة قد أجريت لملاحظة المستوى الصحي للزئبق لأطباء الأسنان في مدينة الموصل من خلال استبيانات أعطيت لـ 98 طبيب أسنان اختبروا عشوائيا. المعلومات قد جمعت ثم حسبت النسب المؤوية . النتائج أظهرت أن أطباء الأسنان لديهم بعض الطرق الصحية الجيدة مثال (80% لديهم تهوية لعياداتهم و100% من أطباء الأسنان يستعملون نظام التبريد المائي أثناء رفع الحشوة الملغمية القديمة) وبعض الطرق الغير الصحية مثال (33% فقط من أطباء الأسنان يستعملون الكبسولات الملغمية و93% من أطباء الأسنان يعملون بدون قفازات مطاطية) والتي تزيد من احتمالية تعرض أطباء الأسنان للتسمم بالزئبق وفقا لهذه النتائج يجب على أطباء الأسنان تغيير سلوكهم من الغير صحي إلى النوع الصحي للتقليل اكبر ما يمكن من التسمم بالزئبق , محاضرات ودورات التعليم المستمر مهمة جداً في هذا المجال.

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INTRODUCTION

Early claims of mercury problems appeared as soon as dental amalgams were first introduced in the United States. The original amalgamation process was demonstrated by chemist in France. In 1833 two English entrepreneurs the Crawcour brothers, realized the practical importance for dentistry, carried the idea to New York, and promoted the material as an inexpensive and convenient restoration⁽¹⁾. The safety of dental amalgam as a material for dental restoration has been debated since its introduction in 19th century^(2,3). The possible problems that have been cited involve three areas; (1) exposures of patient, (2) toxic effect to dental personnel from mercury contact or vapor inhalation and (3) the environment⁽⁴⁾.

The health risk from dental amalgam use is clearly greater for members of the dental office team than for a patient⁽¹⁾. Mercury can present a hazard mainly if handled without due precaution⁽⁵⁾. One concern is that mercury, a heavy metal that is toxic in sufficient quantities⁽⁶⁾. From most of the 1970s and 1980s the major concern with amalgam was hazard to dentists and office staff resulting from the inhalation of mercury vapor associated with use of two to three pounds of mercury a year in the preparation and insertion of amalgam restoration. In office placing great numbers of restorations and practicing poor mercury hygiene, the urinary mercury levels of office personnel were elevated significantly. In the United States, at least 10% of offices had air levels of mercury vapor in excess of the threshold limit value of 50 micrograms / millimeter of room air, the established occupational safety level⁽⁷⁾.

The purpose of this study was to evaluate the mercury hygiene level among dentists of Mosul city.

MATERIALS AND METHODS

A questionnaire consist of 18 questions covering the all important points related to mercury manipulation, it was mainly derived from dental mercury hygiene recommendations from A.D.A. ⁽⁷⁾ The questionnaire contains the following points; The amount of mercury storage in the clinic, the type of mercury container, the position of the container in the clinic, the method of mixing amalgam, the uses of amalgam capsules, the uses of rubber gloves, the touching of amalgam (freshly mixed), the squeezing method, the wearing of the facemask, the uses of high vacuum suction during removal of amalgam restoration, the uses of water spray with turbine during amalgam removal, the method of collection of access amalgam & it's fait, the ventilation of clinic, the position of amalgamator & it's covering, checking the tightness of the covers of mercury container, the method of sterilization for plastic instruments & amalgam carrier, the smoothness of working field & floor, and the need for more information about mercury hygiene. A sample consist of 98 dentists was selected randomly from a total of 120 dentists handling mercury in their work (private clinic), the questionnaire was given to each dentist to fill it carefully.

RESULTS AND DISCUSSION

The data was collected & the percentage of each point was calculated. The results shows that 100% of dentists included in this study were stored less than 1 KG of mercury in their private clinics, this mean that at least each clinic contain 250 gm or more which is the least amount in markets that subjected to broken or evaporation in the clinic. Seventy percent of dentists storage this mercury in plastic unbreakable container, but unfortunately 30% storage in glass container. About 60% keep it in usually closed containers. While 40% in open container & no one storage in tightly closed container. This mean that about 40% of dentists storage their mercury in unhygienic method. All the dentists keep it away from source of heat.

About the use of manual or mechanical amalgamator 53% of dentists uses mechanical amalgamator (electrical), & 47% using manual mulling, this mean that about half of the dentists exposed to evaporated mercury during mixing by manual & also in risk from the danger of small droplets of mercury which can be splashed from mortar to the floor or came in contact with the skin.

When the respondents asked about the use of amalgam capsule, it be found that 33% were using capsules, 27% usually use capsules while 6% occasionally. This result indicates that 1/3 of the dentists use this type of supply (capsule), which is the most hygienic method. About the uses of rubber gloves 93% of the respondents work without gloves, while 7% only use it when work in their clinics. This explains the high chance of mercury to contact with skin especially when pistol & motor are used. Sixty percent of the respondents were touch the freshly mixed amalgam or squeeze it directly by finger without gloves, while 40% avoid this unhygienic manner. This data also revealed high incidence of skin contact.

When the respondents asked about the uses of facemasks unfortunately 80% of dentists did not wear face masks during removal of an old amalgam restoration, while only 20% wearing it. This means that 80% of dentists exposed to maximum vapor & inhaled mercury during amalgam removal. Because the critical times are when metallic mercury exists in liquid or vapor form, rather than bound in a set dental amalgam. As a vapor, metallic mercury can be inhaled and absorbed the alveoli in the lung at 80% efficiency⁽¹⁾. Fortunately 100% use water cooling system during removal of an old amalgam, while high volume evacuation were used by 13% only which is also one of factors reducing mercury inhalation by the dentist. It is common where high-speed burs contact tooth structure for surface temperature to increase 200C⁰⁽¹⁾. This is above the temperature needed for melting the Ag-Hg phase and vaporizing mercury. Rubber dam, high volume evacuation, and water-cooling should be used to control this situation. Because, all the dentists include in the survey leave the access of the freshly mixed amalgam either in dappen dish or put it in west container which is continue to give evaporated mercury. Non of the dentists keep the scraped dental amalgam from condensation in x-ray fixer (which is reduces the mercury evaporation to minimum) which is the most hygienic method.

The simplest method to minimize exposure of the dentists to mercury vapor is the ventilation. Fortunately 80% of dentists were ventilated their clinics & 20% did not, from this 80% of dentists 53% routinely do it & 27% some times do it. Concerning the dental amalgamator, the results revealed that 30% of the respondents put their amalgamators away from the source of the heat, while 20%

put it near hotairoven. Twenty percent of the respondents usually check the tightness of the cover of mercury container in amalgamator, and 80% did not check it at all, and no one uses amalgamator cover in the clinic. Forty seven percent of the dentists sterilize their amalgam carrier, and plastic (carving) instrument in hotairoven, which give maximum vapor from heat that may reach 160C⁰ for 1 hour. These instruments are better to be disinfected by chemical methods like 5% chlorhexdin or 2% gluteraldehyde.

When the respondents asked about the smoothness of field of work 67% of the dentists work on smooth surface easy for cleaning from mercury & amalgam scrap, while 33% work in rough surfaces like stage, counter, & carped, which enhance trapping of mercury droplet & amalgam particles that are very difficult to be removed. Fortunately 63% of the dentists consider mercury is toxic metal and hazardous material & occupational risk factor in the clinic & 33% consider it non-toxic material. This results means that about two thirds of dentists consider that mercury in the clinic is toxic & danger but they don't follow the hygienic manner in their clinic. This results agree with the results of Echeveria *et al.* who found that about 82% of dentists consider amalgam work as ahazardous & risky factor in the clinic.⁽⁹⁾ But not coincide with the results of Windstorm who found that in Scandinavian countries only 27% of dentist consider that amalgam work as an occupa- tional risk factor in their work place, while 73% consider that amalgam work is not very much risky factor⁽⁸⁾. Finally the results showed that about 80% of respondents need additional information on mercury hygiene & 20% considered that they didn't need such an information. This means that 80% of dentists know that they complain from shortage in this field, In comparison of this results with results of developing countries we found that up to 1997 only one country has shown concern towards mercury toxicity for dentists and auxiliaries who are regularly exposed to mercury vapour⁽⁸⁾. So this indicates that seminars or lectures are very important for refreshment of the dentists' information.

CONCLUSION

From these results we can concluded that the dentist should change & shift his work from this unhygienic manner to the most hygienic methods starting with the simplest & cheapest points to minimizing as much as possible the toxicity of mercury. We must concentrate on the important point that the critical times are when metallic mercury exists in liquid or vapor form rather than bound in a set dental amalgam. Also seminars & lectures of continuous education about mercury toxicity are mandatory for all dentists & dental staff.

REFERENCES

- 1-.Sturdevant CM: The art and science of operative dentistry. Third edn. The C.V. Mosby Company 1995; p. 230 - 232.
- 2-Maryniuk GA: In search of treatment longevity a 30 years perspective. *JADA* 1984; 109: 739-44.
- 3-Mjor IA, Qvisit JA: Longevity of posterior restorations. *Int Dent J* 1990; 40: 11-17.

- 4-Charbeneau GT: Principles and Practice of Operative Dentistry. Second edn. Lea & Febiger Philadelphia 1981; p. 268 - 270.
- 5-Scuully C: The Dental Patient. Volume 1. Heinemann Medical Books 1988; p. 242.
- 6-Jokstad A, Mjor IA: Replacement reasons and services time of class II amalgam restorations in relation to cavity design. *Acta Odontol Scand* 1991; 49:109-26.
- 7-Mandel ID: Amalgam hazard. *JADA* 1991; 122: 56 -72 .
- 8-Windstrom E: Dental amalgam and mercury. *The Dental Advisor* 1991; 8 (2): 1; cited by: Mjor IA, Pakhomov GN :Dental Amalgam and Alternative Direct Restorative Materials. Oral Health Division of Non Communicable Diseases. World Health Organization . 1997: p. 198 - 199, 245 .
- 9-Echeveria D, Heyer NJ, Martin MD: Behavioural effects of low level exposure to mercury among dentists. *Neuro-toxicology and Teratology* 1995; 17: 161-168 .