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Mercury Level And Some Physiological Problems In Dentists

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ABSTRACT

Estimation of mercury level was carried out in the saliva and blood samples of dentists in relation to the number of amalgam filling in their mouth and comparing it to a control group who were not dentists and had no amalgam fillings in their mouth and to which extent it may lead to physiological problems. A case control study, a total of 141 subject were divided into 90 patients and 51 persons control group. The patients were dentists with or without amalgam fillings in their mouths working at the Specialized Center for Dentistry and the Dental Units in Primary Health Care Centers in Hilla city , Babylon Governorate , Iraq from November, 2012 to March, 2013. Patients distribution consisted of (11 patients) had no amalgam filling in their mouths, (13 patients) had one amalgam filling in their mouths, (31 patients) had two-four amalgam fillings in their mouths and (35 patients) had more than five amalgam in their mouths and the control group consisted of (51 healthy person) who were not dentists and with no amalgam filling, chosen as healthy, without any history of exposure to mercury previously. There is slight positive correlation between Hg level in relation to age, number of amalgam filling and duration of Job. Physiological problems such as allergy, constipation, numbness, ringing in ears , muscular spasm ,fatigue and amnesia show there is a clear increase among most groups compared to the control group.

Keywords: Mercury level, Physiological problems in Dentists.

INTRODUCTION

Amalgam is the commonly used "silver" filling material. Its actual composition is approximately 50% silver alloy (containing silver, copper, tin zinc and other metals), and 50% is liquid mercury. Most of the controversy surrounding amalgam concerns the mercury content. A dentist has no wright to suggest or diagnose a relationship between the presence of these fillings and any medical condition or symptoms, so leaving or replacing an amalgam filling with another type of filling materials is a pure choice of the patient [1].

The New England's Children Amalgam Trial (NECAT) concluded in a randomized trial of 534 aged from six to ten years old children, there was no evidence that exposure to mercury from dental amalgam was

associated with any adverse neuropsychological effects five years from placement [2]. A separate randomized trial was conducted by a joint research team from the University of Lisbon, Portugal and the University of Washington which included 507 children from eight to ten years of age. This trial concluded there were no statically differences of neurobehavioral assessments between children receiving amalgam and composite restorations seven years after placement [3]. United States Environmental Protection Agency (US-EPA) chose benchmark dose (BMD) analysis as the most appropriate method of quantifying the dose-effect relationship in the studies. The benchmark dose lower limit ($BMDL_{05}$, the lower 95% confidence limit of the BMD_{05}) was calculated and ranged from 46 to 79 ppb in maternal blood for different neuropsychological effects in the offspring at 7 years of age, corresponding to a range of maternal daily intakes of 0.857 to 1.472 μg kg^{-1} b.w. day^{-1} [4]. EFSA (2004) agreed with the JECFA and US-EPA evaluations that the developing brain should be considered the most sensitive target organ for methyl mercury toxicity.

MATERIALS AND METHODS

Patients and controls: The study was conducted during the period from November, 2012 to March, 2013 at The Specialized Center For Dentistry and The Dental Units in Primary Health Care Centers in Hilla city, Babylon Governorate, Iraq. Total of 90 patients who were dentists with or without amalgam fillings in their mouths were included from urban and rural area (48 males and 42 females). 11 patients had no amalgam filling in their mouths (8 males and 3 females), 13 patients had one amalgam filling in their mouths (7 males and 6 females), 31 patients had two-four amalgam fillings in their mouths (12 males and 19 females) and 35patients had more than five amalgam in their mouths (20 males and 15 females). The age of the patients was ranging between 23-57 years old (mean 32.444 ± SD 8.110). All patients under went full history.The history for all patients included, age, sex, residence, smoking and existance of chronic disease. The control group consisted of 51 healthy person, who were not dentidts, no amalgam filling in their mouths and they didn't have any history of previous exposure to mercury. The age of control group was varying between 20-51 year (mean 34 ±SD 8.46) from urban and rural area (48 males and 3 females). All patients and control were asked about history of allergies, trouble sleeping bouts with depression or anger or any psychological problem, digestive problems like acid reflux, irritable bowl syndrome, colitis, constipation & other questioners.

RESULTS AND DISCUSSION

Mercury level and allergy: There is an increase in the problem of allergy in group III and IV in comparison to group I, II and control groups in which allergic problems amount to 13% and 9% in group III and IV respectively as shown in figure 1

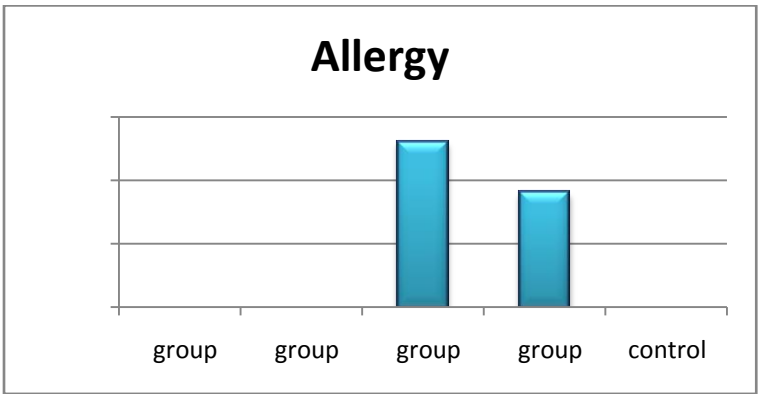

Figure 1. Percentage of allergy in the different groups**.**

Mercury concentration and psychological problem: There is an increase in psychological problem in group IV in relation to other groups as shown in figure 2.

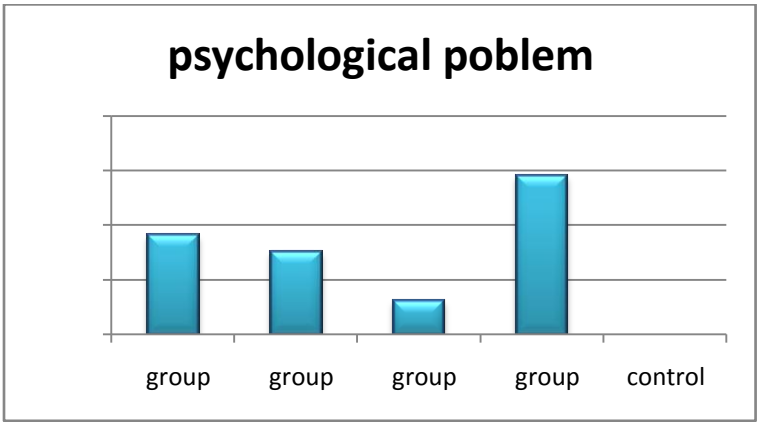

Figure 2. Percentage of psychological problems in the different groups.

Hg concentration and GIT problems

Acid reflux: 49% of group IV shows an increase in acid reflux compared to 18%, 8% and 16% in groups I, II and III respectively as shown in figure 3.

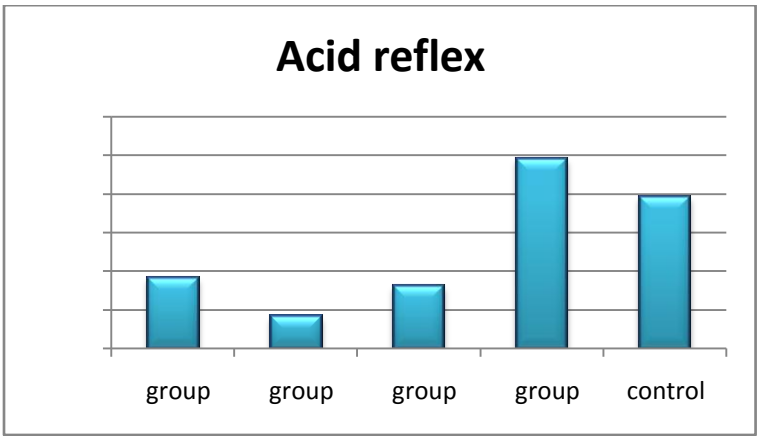

Figure 3. Percentage of acid reflux in the different groups.

Irritable bowl syndrome (IBS): Percentage revealed that 37% of group IV shows an increase in IBS compared to 18%, 8% and 13% in groups I, II and III respectively as in figure 4.

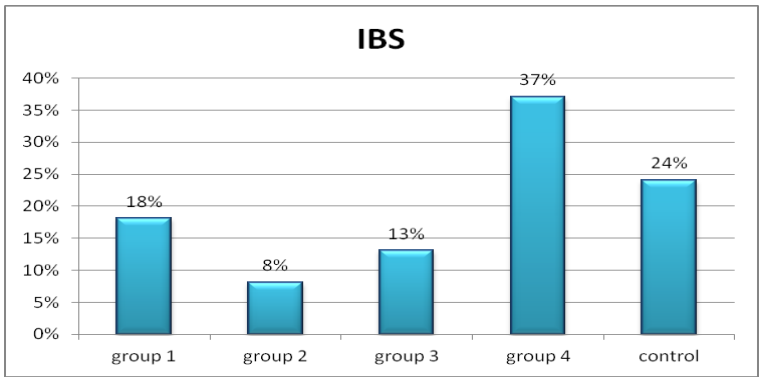

Figure 4. Percentage of irritable bowl syndrome in the different groups**.**

Constipation: All groups show an increase in constipation when compared to the control group as shown in figure 5.

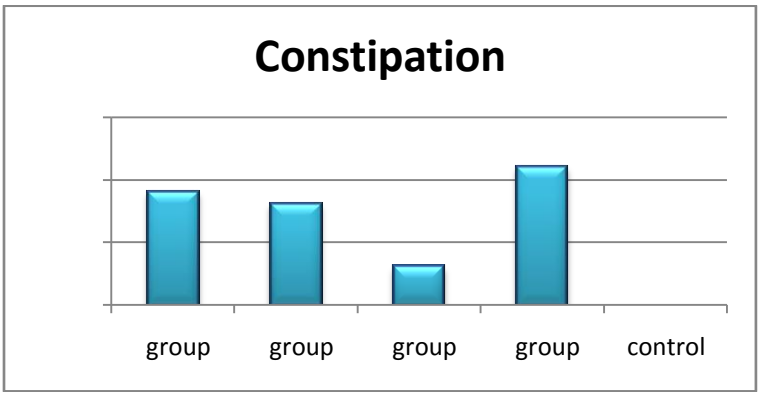

Figure 5. Percentage of constipation in the different groups**.**

Grinding teeth during sleep: Grinding teeth during sleep appears more obviously in group IV in relation to other groups as shown in figure 6.

Hg levels and numbness: Although there is no relation between numbness and Hg levels in different groups, there is a clear increase in all groups compared to the control group as shown in figure 7.

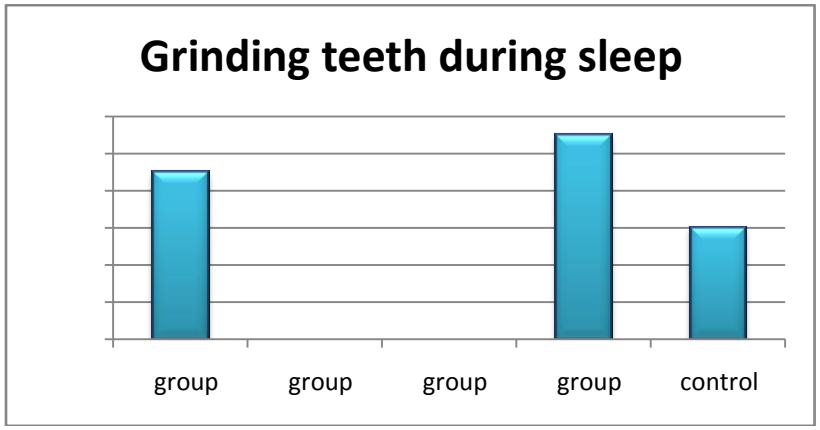

Figure 6: Percentage of grinding teeth during sleep in the different groups.

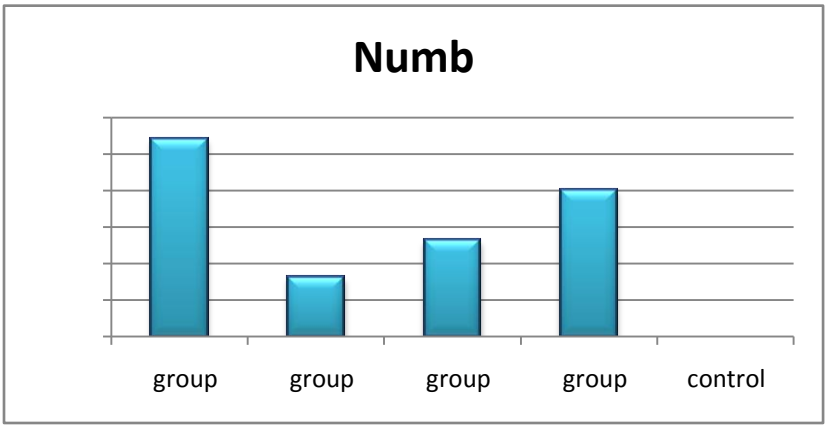

Figure 7. Percentage of hands or feet tingle or numbness in the different groups.

Hg concentration and rheumatological problems: The control group shows highest percentage of rheumatological problems indicating that there is no relationship between Hg concentration and rheumatological problems as shown in figure 8.

Mercury level and some physiological problems

Mercury level and allergy: Metals, such as mercury and gold, can generally produce immunological specific reaction or induce autoimmunity in susceptible strains of experimental animals [5]. Patients with certain allergic diseases, such as atopic eczema, often show increased stimulation by low doses of inorganic mercury in vitro. The patients often report clinical metal hypersensitivity, especially to nickel [6]**.** Mercury-containing amalgam may be an important risk factor for patients with autoimmune diseases. This may explain the increase in allergic response in groups III and IV in this study, and this result has came to be compatible with Masoud Neghab and his reported findings in increment in allergic response[7].

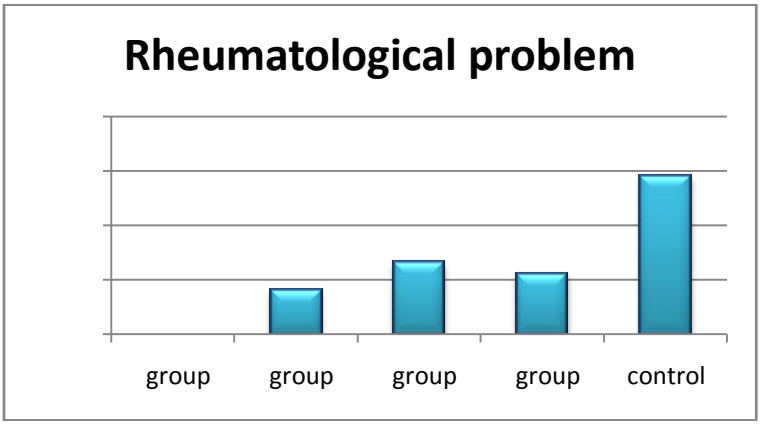

Figure 8. Percentage of rheumatological problems in the different groups.

Mercury concentration and psychological problem: Chronic anxiety, depressive disorders are frequently present. The appearance of low percentage in a group of patients with similar exposure time and number of fillings does not support a simple dental amalgam filling explanation. Our findings suggest that for most patients disputes about the etiology of symptoms can be considered as reflections of different attributions made by patients [8]. However, the possibility that mercury or other heavy metal (e.g., copper (Cu), silver (Ag) and tin (Sn)) vapor from the fillings may have a causal role in some patients with a special sensitivity to such metal exposure which cannot be ruled out. So, our findings are in a good agreement with data reported by others [7,9,10].

APPLICATIONS

Mercury concentration and G.I.T. Problems

Acid reflux and Irritable bowl syndrome: These two symptoms appear in all groups showing that mercury concentration may have no effect on it, Ulrik reached the same result[9].

Constipation: All groups show an increase in constipation when compared to the control group indicating a direct relation between mercury and constipation. Hence, this result appears in close relation with that of Vearrier [13].

Grinding teeth during sleep: An increase in the percentage of grinding teeth (pruxisim) associated with the increase number of amalgam fillings could be attributed to low dose mercury poisoning (group IV). This result is in line with previous observations which show that grinding teeth percentage is mercury dose poisoning dependant [10,12,13].

Hg levels and numbness: Numbness in hands appears in all patient groups and disappears from the control group indicating that dentists are more subjected to the hazardous effect of mercury, and this finding is well documented by other studies [10, 14].

Hg concentration and rheumatological problems: No significant relation is observed between Hg concentration and rheumatological problems. More over, the relation is not logical. This may be related to the absence of clinical investigations of patient group and the control group, and also may be related to non-real claim of the question eared people as well.

Hg concentration and ringing in ears: Obtained data show that there is a positive correlation between amalgam filling data and auditory thresholds which appear in groups II, III and IV indicating an association between more amalgam fillings and poorer hearing efficiency. These data are supported by a number of studies who have mentioned similar results [15, 16].

Hg concentration and muscle spasm: Neuromuscular symptoms, such as muscle weakness or spasm and poor daily living activities have been presented by Ayla Akbal [10] chronic mercury exposure accelerates motor deficits and cerebellar damage. Masoud also reported the same conclusion [7].

Hg concentration and fatigue: Muscle weakness and fatigue appear in all groups. The association of mercury with chronic fatigue syndrome and neuropsychiatric symptoms is a well-known entity. This result appears to agree with many researchers who have referred to muscle weakness and fatigue syndrome (7, 10, 13, 14).

Hg concentration and amnesia: It is clear that the result of Hg concentration and amnesia shows that there is a loss of memory associated with chronic mercury intoxication resulted from inhalation of Hg vapour. Hence, the result of the current study matches the findings of Ayla Akbal [10] and Liu XL [17] who has observed the same results.

Chelators such as 2,3-dimercaptosuccinic acid (DMSA)are effective in removing all forms of mercury from the body, but they cannot reverse central nervous system damage.

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