Review Article

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TOXICITY OF DENTAL AMALGAM : REVIEW

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ABSTRACT:

The subject of the toxicity of amalgam despite gave custody of which dates back to 1926, non-it is still the subject of debate and controversy between supporters and opponent of the claim that toxic as restored and re-toxicity of mercury compounds it contains.

The purpose of this Study to review scientific articles that talked about the subject, whether in favor or against the use of amalgam and confirmation to follow the scientific method installer evidence for truth.

Key Words: Amalgam, Amalgam toxicity, Mercury, Toxicity.

INTRODUCTION

The history of dental amalgam restoration containing mercury is along one, tin-mercury dental restoration have been used in china in A.D.600 [1]. And it was not presented to the western world until 1830s. In 1896 – DR G.V. Black published a detailed scientific report advocating the use of amalgam. And is still being used due to its low cost, ease of application, strength, durability, and bacteriostatic effect. The dental amalgam alloy is made up of mixture of silver, copper and tin, all in powder form which is mixed with liquid-mercury (process of mixing is called amalgamation). This liquid-mercury which is the Maine compound binds the other particles together is also one of the most and eldest poisons in the history. Dr Alfred stock in 1926 after he had been exposed to high mercury levels while working in his chemical laboratory he recognized the danger posed by the type of amalgam that was in use at that time [2] .

Since that time and the medical literature is full of articles that support or oppose the use of amalgam. All of that articles have a right point of view somewhere. So we will di an arbitration to find the good one and the truth about dental amalgam toxicity.

MERCURY AND AMALGAM TOXICITY:

Mercury: A heavy, silver element and the only metallic element that is liquid at standard conditions for temperature and pressure. Mercury and its compounds are everywhere in our environment, between 2700 and 6000 tons of mercury are released annually from the acean and the crust of earth into the atmosphere. Another 2000 to 3000 tons are released from human activities,

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primarily burning household and industrial waste and, especially, from burning fossil fuels such as coal. [3]

Hippocrates was aware of mercury toxicity. [4] Yet mercury still has a long history of use in medicaments; for example, calomel (mercurous chloride) was used well into the 21th century for the treatment of syphilis. But in 1969, a committee of international toxicology experts classified mercury and its compounds according to their order of decreasing toxicity. [5]

1.MERCURY TOXICITY COMPOUNDS:

We have two main types of mercury compounds accused of toxicological elements. Methyl mercury, Mercury vapor.

1.1. Methyl mercury:

Certain bacteria present in seawater are capable of transforming elemental mercury into methyl mercury. It then concentrates in the tissues of fish and other sea creatures and moves up the food chain; witch includes seafood-consuming humans. But also mercury is converted to methyl mercury in the human gastriointinal tract.

Methyl mercury, an organic form of the metal that attacks the nervous and immune systems, the intestinal functioning and the allergy-triggering mechanism. [6]

Methyl mercury on the red cells can give an idea of the degree of toxicity as well as progress of healing. It also inhibits complete saturation of oxygen, contributing to chronic fatigue. [7]

One of the diseases caused by chronic dose of methyl mercury poisoning, is mena Mata disease. That procured in central nervous system disturbances. It is estimated that the minimum dose needed to develop symptoms of mina-Mata disease was 5 milligram per day of methyl mercury.[8] The half-life of methyl mercury is about 70 days in adults and slightly longer in fetuses. [9] And approximately 15 % of the body burden of methyl mercury is in the brain.

This compound as it hard to the organic to throw away is one of the normal compounds in the normal body. Birke and colleagues reported no symptoms of poisoning with levels of 0.8 mg of methyl mercury per day for five years through the consumption of contaminated fish.[10]

1.2. Mercury vapor:

Elemental mercury or mercury vapor is the major fountain of dentist and patient fear. Toxicity of elemental mercury probably is result of its affinity for sulfhydryl groups on proteins. [11]

It has a high vapor pressure (0.005 mg of mercury at 37 C). And approximately 75% of inhaled inorganic mercury vapor will be absorbed through the lungs .[10]

Gastrointestinal absorption is low, with estimates ranging from 0.1 to 10%.[12] Elemental mercury accumulates in the

kidneys and brain and is excreted in the urine, secreted in bile and exhaled from the lungs. [13]

2.FACTORS AFFECTING THE TOXICITY:

2.1. Chewing:

A group of researchers analyzed the mercury content in the expired air of 40 people with amalgams and eight without fillings, those with amalgams released 15.6 times more mercury vapor after chewing. The expired air of the other subjects remained unchanged. [14]

Clinically significant effects (erythrism, tremor, gingivitis) have not been reported below air concentrations of 100 ug mercury \ m3. [15]

In a study conducted in Germany in 1996, researchers found that amalgam carriers who chewed gum had urinary mercury levels twice that of controls with a similar mercury burden who did not chew gum [17] the more you chew, the more mercury is released.

2.2. Number of restoration:

A 1997 Russian study found that the emission of mercury vapors in the oral cavity increased with the number of fillings .the concentration of mercury in the oral cavity depends primarily on the number of amalgam filling and less so on the fillings length of service. [16]

In 1992, Olsson and Bergman, arrived at an amount of 1 to 2 ug\day of mercury uptake for subjects with more than 8 amalgam restorations. [17]

2.3. Amalgam corrosion:

Amalgam corrosion is an oxidation-reduction in which the metals in the amalgam react with non-metallic elements in the environment to produce chemical compounds.[18]This is important because corrosion is a major factor in determining the amount of mercury that is released into the oral cavity. The corrosion of amalgam restoration is complex and actually decreases the baseline release of mercury. [20]

2.4. The surrounding environment:

The surrounding environment plays a large role in determining the concentration of mercury in the human body. It also has the greatest impact in determining the amount of mercury absorbed and raised. ex. (mina-mata disease). [19]

2.5. Magnetic field:

A study Published on the Pakistan journal of biological sciences investigate the relation between magnetic radiation and mercury release, the Results obtained show a significant increase of the mercury release after MRI and microwave radiation emitted from mobile phones. [21]

2.6. User-generation amalgam:

Modern generations of dental amalgam mercury reduced the risk of mercury

toxicity compared with older generations. The new generations, especially packaged into capsules and pre-calibrated to ensure the best properties with the least possible amount of mercury.

2.7. Other factors:

Breathing cycle, swallowing cycle play an important role in determining the amount of mercury compounds entering the respiratory tract or digestive.

3.HEALTH CLAIMS:

A lot of studies claimed that the mercury from amalgam restoration is the major reason for many diseases .the Australian Society of Oral Medicine and Toxicology (ASOMAT) .reports that controlled broad-scale scientific studies of the health effects of mercury released from dental amalgams have never been conducted. However ,amalgam fillings have been associated in the scientific literature with a number of ailments , including periodontal problems ,allergic reaction , oral lichen planes , immune system interference , multiple sclerosis ,fatigue ,cardiovascular problems ,skin rashes , endocrine disorders , eye problems , Alzheimer ,digestion and tiredness.[22,23]

4.DIAGNOSIS METHODS:

4.1. URIN and Blood:

It has many studies on mercury concentration in blood or urine to assess the impact of toxic amalgam .But no clear relationship was demonstrated between elevated urinary or bloody mercury concentration and kidney dysfunction. [24]

4.2. Hair:

One study suggested that the use of hair to determine mercury concentration, but based on the scientific reality demonstrates that hair grows very slowly ,so even samples taken close to the scalp may not reflect present bodily conditions. [24]

CONCLUSION:

The cardinal rule of toxicology is that (only that dose makes a poison) Mercury is a toxic substance since time immemorial. Even large doses lead to acute poisoning can result in death, but exposure to focus considerable and long-term patient suffers from symptoms of chronic mercury poisoning. But what concerns us in dentistry is exposure to relatively low concentration for long periods and is one of the most complex studies and research to the difficulty of diagnosis and measurement, and the length of time. Many of the research conducted were not accurate enough and the results were differentiated between studies and this is due to several reasons, including the surrounding environment and that some of the studies did not take into account, and the presence of another source of mercury poisoning or another type of poison that is difficult to be discovered and investigated.

Data strongly suggest that mercury levels many times higher than those associated with a mouth full of amalgam pose no risk of adverse health effects.

So we suggest some recommendations for the use of security as much as possible to amalgam fillings.

Follow the instructions:

A. Securing good protection for medical staff and the patient during the removal or the application of a new amalgam restoration Use a rubber dam and secure good ventilation because there is evidence that the mercury burden of the body is highest immediately after placement or removal of amalgam restorations. [24]

B. Good condensation of dental amalgam until surpasses the level of the prepared cavity about 2 mm then removes this inclement high mercury amalgam.

C. Don't use amalgam for conservative restoration; Use it when it is indicated.

D. The use of modern generation of amalgam (high cupper-low mercury) reduces the wearing of amalgam restorations.

E. Storing the remains of amalgam in an airtight container closure to prevent blowing out of vapour.

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