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RESEARCH ARTICLE

KNOWLEDGE AND AWARENESS ABOUT ORAL GALVANISM AMONG THE FINAL YEAR DENTAL STUDENTS IN CHENNAI

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ABSTRACT

Background: Galvanism is having dissimilar metals in the teeth (e.g.-amalgam, or gold and mercury, or stainless steel and mercury) causes galvanic action, electrical currents, and much higher mercury vapour levels and levels in oral Mercury and other metals accumulate in the oral cavity in fibroblasts, macrophages, and multinuclear giant cells of connective tissue, in blood vessel walls. Such mercury including that in the commonly formed amalgam tattoos moves to other parts of the body over time in significant amounts. Such metals are documented to cause local and systemic lesions and health effects and also are dispersed to other parts of the body. The aim of this study is to emphasise the recent updates on galvanism in prosthodontics and to review on various literatures available for effects of galvanism on oral cavity and their clinical significance.

Materials and Methods: A questionnaire based study consisting of 10 questions and was distributed among local population. The sample size was 50. The research was done among the dental final year students in Chennai.

Result: From the survey we come to know that more than 90% dental students were aware of oral galvanism but nearly 70% of the students were not aware of adverse effects and some specific conditions in oral galvanism.

Conclusion: It is necessary for a dental student to be aware of adverse effects of oral galvanism and some specific conditions so that they will be able to diagnose and treat patients with rare and idiopathic condition better.

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INTRODUCTION

There is a wide range of dental alloys like pure gold and gold-based alloys to silver-based alloys, titanium, iron, cobalt, palladium, nickel etc., Gold alloys are the main materials of choice in dentistry because of their good corrosion resistance, high mechanical properties, and excellent biocompatibility (Messer and Wataha, 2002; Taher and Al Jabab, 2003). Biocompatibility is an important measuring property which should be noted first. The word biocompatibility is defined as the ability of a material to perform with an appropriate host response in a specific situation (Black, 1992). Biological compatibility of dental alloys is considered separately from the other properties since biocompatibility is related to other important properties of the alloys such as corrosion resistance and oral galvanism which is detewrmined by measuring the release of the corrosion products. The higher the corrosion rate of the alloy, the greater the metal ion release and the greater the risk of unwanted reactions in the mouth. These reactions leads to conditions like metallic tastes, allergy and other irritations (Hanawa, 2004). The probability of galvanic corrosion is one of the problems associated with the use of metallic materials inside the mouth (Taher and Al Jabab, 2003; Hanawa, 2004; Horasawa *et al*., 1999; Sutow *et al*., 2004; Nihon HifukaGakkaiZasshi, 1989; Skinner). Galvanic corrosion is either a chemical or an electrochemical corrosion in nature. Oral galvanism is related to a potential difference between two different metals connected through a circuit for current flow from more active metal which is more negative potential to the more noble metal which is more positive potential (Taher and Al Jabab, 2003; Hanawa, 2004; Fovet *et al*., 2000; Venugopalan and Lucas, 1998; Horasawa *et al*., 1999; Sutow 2004).

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Complications of galvanism

Allergy to dental metal alloys has been reported occasionally, and it causes dermatitis, stomatitis, lichen planus and

pustulosispalmaris and plantaris. According to Faraday's law of electrolysis, when electric current flows into an anode, cationic metal ions dissolve in parallel with the amount of the electric current. Therefore, when patients is hypersensitive to metals will suffer from the above mentioned persistent dermatose (Skinner).

Types of galvanism

1. The best example of dental galvanism is that of a silver amalgam placed in opposition or adjacent to a tooth restored with gold. These dissimilar metals in the presence of saliva and body fluids constitute an electric cell. When brought into contact, the circuit is shorted, the flow of electrical current passes through the pulp, and the patient experiences a mild pain.
2. A second potential pathway for these currents may occur between teeth of the same arch but not when in contact with one another.
3. The third and most widely seen form of electrolytic action which is a source of a patient's pain and discomfort is the rather classic one of dissimilar metals coming into contact when the mandibular and maxillary teeth occlude.
4. A fourth type of galvanic situation occurs when two adjacent teeth are restored with dissimilar metals and the current flows from metal to metal through the dentine, bone and tissue fluids of both teeth (Greener; Craig, 1980; Grosgogeat *et al*., 1999).

Factor involved in galvanic corrosion

(1) Potential
(2) Polarization
(3) Electrode areas
(4) Resistance and galvanic current,
(5) Electrolyte medium
(6) Aeration, diffusion and agitation of the electrolyte (Buchner *et al*., 1980).

Treatment for oral galvanism

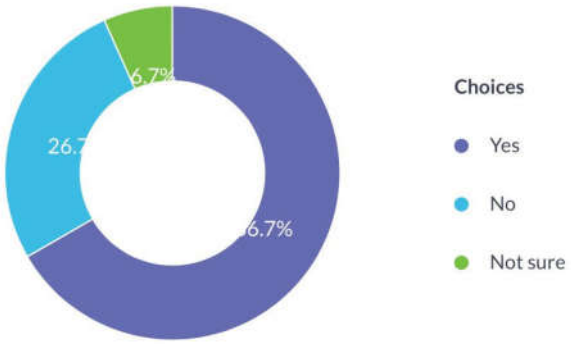
The most common methods to treat oral galvanism are by removing the metals causing galvanism. A coat of resin is painted on the filling to act as a insulator which will not let the circuit complete. In the cases where the combinations of metals are used the amalgam filling can be removed to prevent galvanism. (Grosgogeat *et al*., 1999; Buchner *et al*., 1980)

MATERIALS AND METHODS

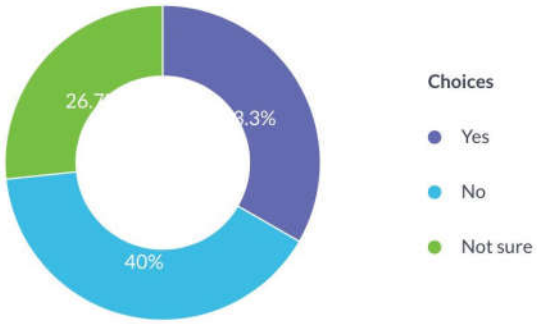
A questionnaire based study consisting of 10 questions and was distributed among local population. The sample size was 50. The research was done among the dental final year students in chennai. In this survey there were no right or wrong answers and no time limit was given to them. The people were asked to answer only the questions which they know or only the questions which they can understand and the remaining questions were asked to skip. After the completion of questions by the people the responses were interpreted in accordance with the norms.

RESULTS

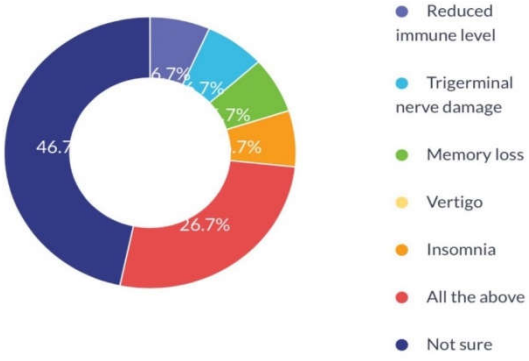
1) Do you know what galvanism in oral cavity is?



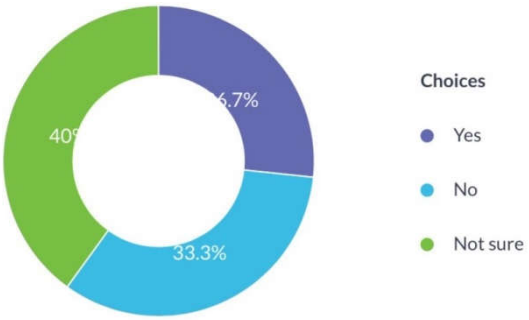
2) Do you know what tarnish and corrosion are?



3) What do you think the adverse effects of oral galvanism in idiopathic conditions?



4) What is lichen planus in oral cavity?



DISCUSSION

Different articles give different techniques for the management of oral galvanism. According to HamoonZohdi *et al* of TarbiatModares University, Iran key method used to evaluate galvanic corrosion behaviour of dental alloys is Zero Resistance Ammetry. It is shown new generation of implants and prosthesis like metallic glasses (ribbons) can be used which are of excellent corrosion properties. To improve corrosion resistance of substrates these materials can be coated over them (HamoonZohdi *et al*.,). In the research which was carried on by Larry Hanus *et al*, he has said that another way you treat this problem is to remove the both metals from the mouth. He has said that there is evidence to support the belief that metal elimination in the oral cavity results in a reduction of oral electro-galvanism, which in turn may result in improved overall health and this was supported by anecdotal based evidence which is real clinical patient results, and includes decreases in both gum tissue inflammation and occurrence of periodontal disease (Oral Electro-Galvanism, LarryHanus). In reference to another article by Procházková *et al* the occurrence of pathologically acting galvanic effects is not only because of the composition and combination of different dental alloys, but to a significant degree also by the quality of materials and processing used. Better quality leads to reduced incidences of oral galvanism and corrosion (Procházková *et al*.,). In a research by Lisa M Butler it is given that there are plenty of non-metallic choices for fillings, inlays/on-lays, crowns, bridges and dental implants which will prevent oral galvanism. A best way is to use biocompatible dental materials. Currently, there are two such companies, and they are both located in Colorado. This procedure needs a prescription from a dentist or physician with the test kit and then take it to a local lab. This is similar to an allergy test that uses a blood sample (LISA M. BUTLER). Recent finding says that the white composite fillings has eliminated the risk of galvanic shock as well. These white fillings effectively fill cavities without completing electrochemical circuits. Thus dentists can easily create new fillings for your mouth without the complications caused by metal amalgam. The most common methods to treat oral galvanism are by removing the metals causing galvanism. A coat of resin is painted on the filling to act as a insulator which will not let the circuit complete. In the cases where the combinations of metals are used the amalgam filling can be removed to prevent galvanism (Grosgogeat *et al*., 1999). According to a research done by Allauddin Siddiqui *et al* the choice of the materials used for the implant and implant borne structure materials become important, and their galvanic corrosion properties can be evaluated. If the structural stabilization and implant bio-acceptance are understood, implant failures because of galvanism will become a rare occurrence, provided that they are used properly and placed in sites for which they are indicated (Buchner *et al*., 1980).

This experiment was conducted to know the percentage of awareness about galvanism in oral cavity among dental students. In this questionnaire questions about tarnish and corrosion, adverse conditions of galvanism, lichen planus and metal combinations were also included. From this study we come to a conclusion that more than 90% of dental students were aware about galvanism in oral cavity and hoe to treat it and some have treated patients with galvanism during their dental practice. They were also aware of what tarnish and corrosion are. But nearly 70% of students were not aware of the adverse effects of galvanism and certain conditions like lichen planus. Therefore awareness about the adverse effects of oral galvanism should be created in order to understand the condition better and proceed with better treatment.

Conclusion

To summarize, only when the dental students are aware of side effects and adverse effects of oral galvanism in idiopathic conditions and certain rare conditions like lichen planus, amalgam tattoos, leukoplakia can be diagnosed appropriately and treated.

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