

THEORETICAL AND PRACTICAL ASPECTS OF OF APPLICABILITY OF "ORAL GALVANISM" CONCEPT AMONG DENTAL TECHNICIAN SPECIALISTS - PRELIMINARY STUDY

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Abstract: Through this study, we tried to bring into discussion a highly topical issue, among practitioners, dental specialists and especially dental technicians, namely oral galvanism. We have tried to point out the complexity of this issues, particularly in this material, especially among the dental technicians who have solid theoretical knowledge on this issue, but in terms of practical applicability of the concept of oral galvanism, prove mostly carelessness that can cost very seriously dental specialist - dental technician team.

INTRODUCTION

We are at this time in 2016, more exactly we passed half of the second decade of the XXI century, and we found talking with both dentists and the dental technicians, who work both in Bucharest and in other regions, urban and rural areas, that they failed to find a practical applicability of the oral galvanism concept.

Starting initially only from some simple discussions on this issue, we were very intrigued that many of the subjects that we talked defined the oral galvanism very precisely in theoretical terms, but when this topic was wider discussed, especially in terms of practical applicability, we figured out how redundant this subject is considered among dental teams [by dental medicine team, we referred here to dentists who work in the dental office, both privately and in the state system (dentistry units of some ministries, units of dentistry in school networks and not least higher dental education institutions) and the dental technicians who work under similar conditions with dentists previously remember, namely in private and state dental laboratories] working both in urban areas (including Bucharest) and in rural areas.

But to better understand this phenomenon of galvanism oral, we believe that it is necessary to make some clarifications on some of these concepts, we consider extremely interesting, especially very important for practical work in dentistry (clinical dental activity, and dental technique) and the general health of patients, where dental specialists have not taken into account the implications of non-compliance with the oral galvanism concept.

Specifically, the effects of oral galvanism, but also the action of metal ions ingested by patients through the application in the mouth of their prosthetic restorations made from materials of different metallic alloys (or the existence of silve based amalgam fillings, which come into contact with different dental metal alloys used in prosthetic restorations they have), can cause to subjects various symptoms due to electro-corrosion processes. Thus, the most important part of electrochemical corrosion from the oral cavity, is caused by the galvanic attack produced by the alloy-saliva contact (it is known that saliva is a powerful

electrolyte solution), and especially the presence of two or more metal alloys with different electrical potential, which are located in the same salivary environment.(1-8)

Based on this information, we can conclude that the interrelationship electrode-electrolyte, of fixed or mobile prosthetic restorations with metallic component (infrastructure) can be electrical loaded in the oral cavity. Overall the intensity of electric potentials depends on a number of factors, such as:

- the type of alloy used for the prosthetic restoration;
- the composition of the metal alloy, and of the saliva of the patient;
- casting and solidification conditions of the alloy;
- the age of prosthetic restoration and the existence of cracks in the coating material;
- exposed surface of the metal component;
- the presence of plaque and soft deposits;
- relationship with anatomic substrate.

Permanent circulation of the saliva in the oral cavity, prevent the achievement of a dynamic ionic balance, the alloy having an amount higher or lower of ions, based on the voltage and the intensity of the galvanic current between two metal alloys (in fact, the electrochemical measurements identified the concentration of metal ions in saliva, which has a certain electrolytic stability under normal conditions).(1-5) Thus, in the oral cavity, depending on the formation mode, there can be several types of electric cells, such as:(1-5)

- electric cells due to heterogeneity of structure of metallic material;
- electric cells similar chemically but different physically, due to different treatment and processing of the same dental alloy;
- electric cells of which the electrodes are chemically different, but form a galvanic couple.

PURPOSE

The effects of oral galvanism on patients can be counted very concise both by subjective symptoms (metallic taste, salivation, burn feeling on the tongue, pulp or nerve pain)

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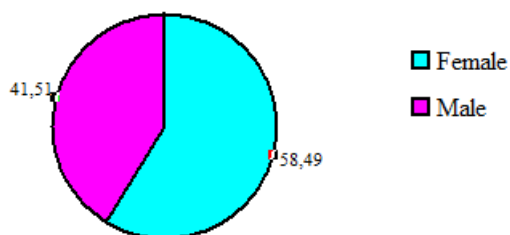
or by objective symptoms (gingivitis more or less severe, glossitis, hypertrophy of lingual papillae etc.)(1-5) However, patients may experience tenderness due to the oral galvanism, from the electrical intensity values of 10 μ A, reaching up to 100 μ A; the average is 20-50 μ A.(1-5) However, according to some well based studies electrical corrosion speed of an alloy placed in the oral cavity, appears to be highest within the first two months (approximately 60 days), after which it seems to be obtained a certain neutralization of the alloy, settling to a flat level values. For these reasons, many patients accuse effects of oral galvanism (sour, sweet or metallic taste), only during the initial insertion of prosthetic restorations in the oral cavity.(1-5) However, there are other studies that support the emergence of symptoms due oral galvanism after periods much longer, even years after applying of prosthetic restorations fixed or removable in the oral cavity, made of different dental alloys.

Thus, the obvious purpose of this study was to empowering dental teams, dental practitioner - dental technician in choosing metal alloys materials for adequate prosthetic restorations, based on prosthetic works already existent in the mouth of patients at that moment to effectively avoid side effects, sometimes very unpleasant that can occur due to appearance of oral galvanism. In fact, here we talked about the medical team because responsibility before the patients belong to dental practitioner, but it is of great importance, as based on the observations sent from clinical compartment (dental office), dental technicians choose the best dental alloys from which to manufacture fixed or mobile prosthetic restorations that have been requested. It is very important that the dental technician knows very precisely the chemical and electrochemical properties of metallic biomaterials that he uses.(1-5) Chemical corrosion, oxidation, electrochemical corrosion potential, but also processes mechanisms of electrochemical corrosion are only a few parameters, which guide the dental technician during the realization of prosthetic restorations.(1-8) The results are very suggestive expressed through well-designed graphics.

MATERIALS AND METHODS

For this study, we consider very thoroughly, we used the questionnaire as method of investigation. The questionnaire included 7 questions, applied of 53 subjects, dental technicians, in Bucharest and Ilfov County. All subjects were aged between 30 and 60 years, with actual practical experience of at least 5 years in a dental laboratory, public or private. Between the subjects to which the questionnaire has been applied to, 31 (representing 58.49%) were females, while the remaining 22 subjects (representing 41.51%) were males (figure no. 1).

Figure no. 1. The gender distribution of the study group.

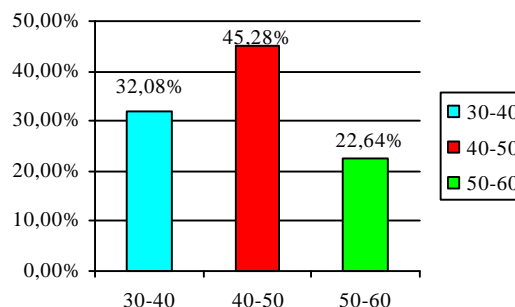


However, by age group, subjects were divided as follows (figure no. 2):

- For the age range 30-40 years, there were 17 subjects (representing 32.08%);
- For the age range 40-50 years, there were 24 subjects (representing 45.28%);

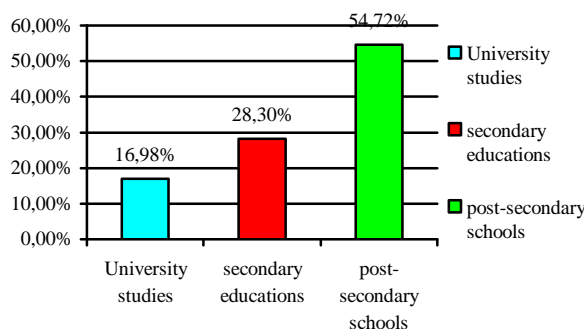
- For the age range 50-60 years, there were 12 subjects (representing 22.64%).

Figure no. 2. Distribution by age of the subjects



In terms of the educational institution attended, 9 subjects (representing 16.98%) were graduates of university studies dental technique specialization, within Universities of Medicine and Pharmacy; 15 subjects (representing 28.30%) were graduates of secondary education (colleges) dental technique, while the remaining 29 subjects (representing 54.72%) were graduates of post-secondary schools of dental technique (figure no. 3).

Figure no. 3. Distribution of subjects by type of dental technique graduated education.



Next, we present the questionnaire applied to the 97 dental technicians:

1. Are you aware or are you familiar with the oral galvanism concept?
 - a. Yes;
 - b. No.
2. Do you consider the practical applicability of the oral galvanism concept as a subject useless, unimportant and unworthy to be considered in the activity of dental laboratory?
 - a. Yes;
 - b. No.
3. Dentists with whom you collaborate and for whom you made fixed or mobile prosthetic restorations with metal structure have ever brought to your attention, cases of patients who were found some symptoms related to oral galvanism?
 - a. Yes;
 - b. No.
4. When you are being asked from the clinical compartment (dental office) to make of prosthetic restorations with metal structure the dentist that you work with writes in the laboratory notice or directly tells you the type of metal alloy from which to make the prosthetic restorations depending on

CLINICAL ASPECTS

what other metal alloys (amalgam fillings, fixed or movable prosthetic restorations with metal structure) the patient has in the mouth?

- a. Yes;
- b. No;
- c. Occasionally.

5. In case of appearance of specific phenomena due to oral galvanism to patients to whom you made fixed or removable prosthetic restorations with metal component, if it is not mentioned by the dentist in laboratory notice of existence in the oral cavity of patients of other metal alloys (from amalgam fillings, fixed or removable prosthetic restorations with metal structure), are you disposed to remake the prosthetic restorations without requiring additional costs for maintaining a good future collaborations?

- a. Yes;
- b. No.

6. When you manufacture a prosthetic restoration with metal components, do you condition the dentist to mention in the laboratory notice what other metal alloys (amalgam fillings, fixed or removable prosthetic restorations with metal components) has the patient in the mouth?

- a. Yes;
- b. No;
- c. Occasionally.

7. Are you interested to deepen your knowledge on the oral galvanism concept studying articles, books or participating in courses and conferences focused on this issue?

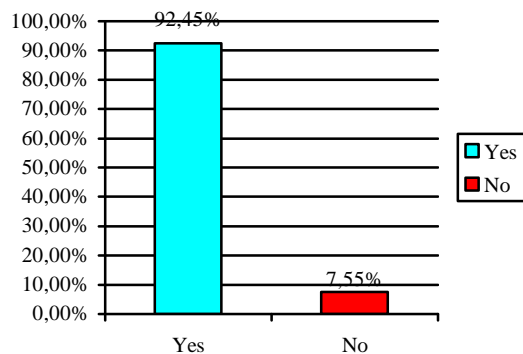
- a. Yes;
- b. No;

RESULTS

After applying the questionnaire to dental technicians study group, we have obtained a number of extremely interesting results, expressed through suggestive graphics.

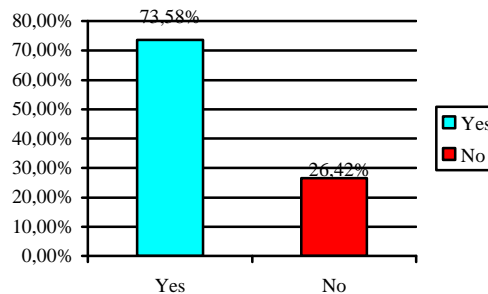
For the first question of the questionnaire relating to whether they have knowledge about the concept of oral galvanism, 49 subjects (representing 92.45%) responded affirmatively (point a.), While the remaining 4 subjects (representing 7.55%) responded through a negation (point b.) (figure no. 4).

Figure no. 4. Do you have knowledge about oral galvanism?



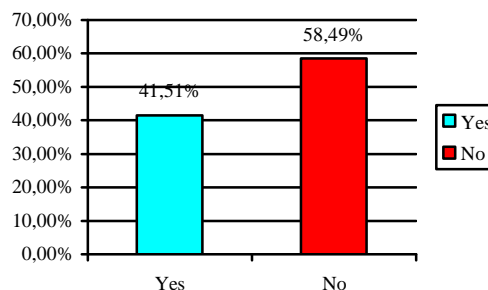
The second question of the questionnaire, if “do you consider practical applicability of oral galvanism concept as a subject useless, unimportant and unworthy to be considered in the work of the dental laboratory”, 39 subjects (representing 73.58%) have answer yes, while 14 subjects (representing 26.42%) responded negatively (figure no. 5).

Figure no. 5. Do you consider the practical applicability of oral galvanism as an unimportant topic?



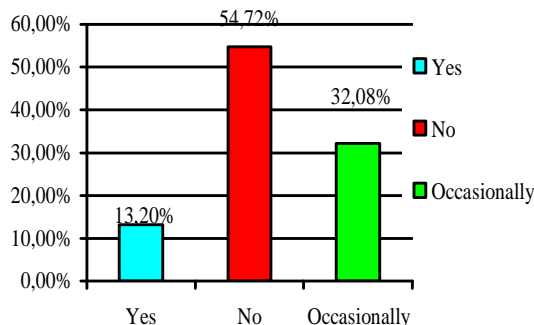
For the third question in the questionnaire, in which subjects are asked “if they were signalled by dentists who work with and for which they made fixed or removable prosthetic restorations with metal structure, cases of patients who were found some symptoms related to oral galvanism”, 22 dental technicians (representing 41.51%) responded affirmatively (point a.), while 31 subjects (58.49%) responded through a negation (point b.) (figure no. 6).

Figure no. 6. Doctors that you work with have reported cases of patients with oral galvanism?



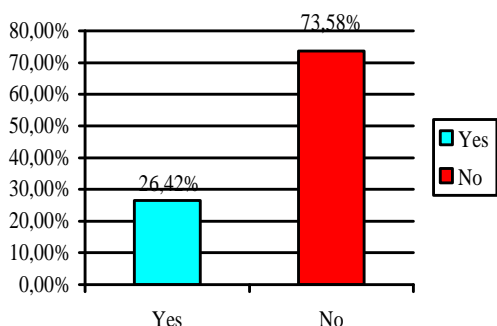
The fourth question of the questionnaire relating to the fact that “when being asked by clinical compartment (dental office) to made prosthetic restorations with metal structure dentist with whom they collaborate write in the laboratory notice or communicate verbally the type of alloy for the prosthetic piece that should be made taking into account what other metal alloys (amalgam fillings or prosthetic restorations of fixed or removable with metal structure) the patient has in the mouth, 7 subjects (representing 13.20%) responded yes (paragraph a.), 29 subjects (representing 54.72%) responded negatively (point b.), while the remaining 17 subjects (representing 32.08%) answered “occasionally” (paragraph c.) (figure no. 7).

Figure no. 7. Doctors that you cooperate with ask for the use of a particular type of alloy for metal structure of prosthetic restorations?



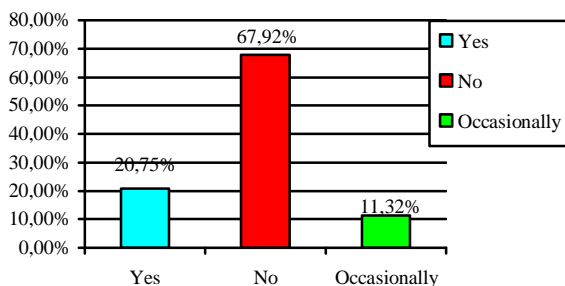
For the fifth item of the questionnaire, which refers to “the occurrence of specific phenomena due oral galvanism in patients treated by dental surveyed technicians with fixed or removable prosthetic restorations made with metal components, if unspecified by dental specialist in the laboratory notice of the existence in the oral cavity of patients of other metal alloys (amalgam fillings, fixed or removable prosthetic restorations with metal components), they are willing to remake prosthetic restorations without requiring additional costs for keeping a good further collaboration” 14 subjects (representing 26.42%) responded affirmatively (point a.), while the remaining 39 subjects (representing 73.58%) responded negatively (point b.) (figure no. 8).

Figure no. 8. Are you willing to remake a prosthetic restoration for a patient with signs of oral galvanism with another type of alloy no extra charge?



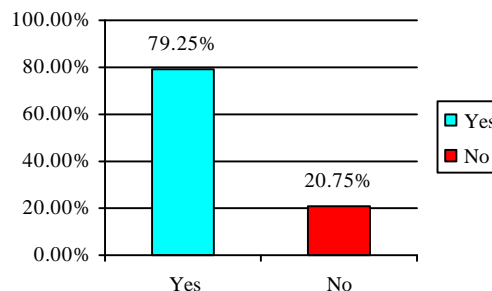
For the sixth question in the survey, which refers to the fact that “when it manufactured a prosthetic restoration with metal parts, dental technicians to whom the questionnaire was applied, condition the dental specialist to indicate in laboratory notice what other metal alloys (fillings amalgam, fixed or removable prosthetic restorations with metal structure) has the patient in the mouth”, 11 subjects (representing 20.75%) responded affirmatively (point a.), 36 subjects (representing 67.92%) responded by negation, while the remaining 6 (representing 11.32%) subjects answered “occasionally” (paragraph c.) (figure no. 9).

Figure no. 9. Before manufacturing a prosthetic restoration do you ask the dentist about other metal alloys that the patient is in the mouth within dental works or fillings?



To the last question of the questionnaire that asks subjects “if they are interested to deepen their knowledge on the oral galvanism concept form studying articles, books or participating in courses and conferences focused on this issue”, 42 subjects (representing 79.25%) responded affirmative (point a.), while 11 subjects (representing 20.75%) responded negatively (point b.) (figure no. 10).

Figure no. 10. Are you interested in improving your knowledge concerning the oral galvanism?



After obtaining and studying the results, we can bring the following aspects:

First, over 90% (49 subjects representing 92.45%) of subjects to whom the questionnaire was applied, answered affirmatively that “they know and are familiar with the concept of oral galvanism”, and only one percent below 10% (7.55%) responded through a negation.

However, over 70% (73.58%) of dental technicians to whom the questionnaire was applied consider the practical applicability of the oral galvanism concept as a subject useless, unimportant and unworthy to be considered in the activity of dental laboratory, which rightly challenges us to deep concern over this relative indifference of specialized personnel in technical compartment (dental laboratory).

For the third question of the survey, in which subjects were asked “if they were signalled by dentists who work with and for which they made prosthetic restorations fixed or removable with metal structure, cases of patients who were found some symptoms related to oral galvanism”, 41.51% answered in the affirmative, that these phenomena have been reported, which indicates and confirms also a very important thing, namely that the concept of oral galvanism is not a useless, unimportant and unworthy to consider topic, on the contrary, is a very actual issue, with a great involvement in what we call “biocompatibility of metal alloys”.

The fourth question of the questionnaire relating to the fact that “when prosthetic restorations with metal structure are requested by the clinical compartment (dental office) the dentist with whom they collaborate write in the laboratory notice or communicate verbally the type of alloy the prosthetic piece should be made of depending on what other metal alloys (amalgam fillings, fixed or removable prosthetic restorations with metal component) has the patient in the mouth”, only 13.20% of respondents answered positively in while over 50% of the interviewed subjects responded by negation, which shows an indifference or even ignorance of the staff working in clinical compartment (dental office).

For the question which refers to “in case of the occurrence of specific phenomena due oral galvanism in patients receiving fixed or removable prosthetic restorations with metal components made by dental technicians surveyed, if undefined by the dentist in laboratory notice of existence in the mouth patients of other metal alloys (amalgam fillings, fixed or removable prosthetic restorations with metal structure) they are willing to remake prosthetic restoration without requiring additional charge for maintaining a good further collaboration”, only 26.42% of respondents said yes, while most, 73.58% answered through a negative. Here we can find a very important and extremely simple majority of dental technicians are not so willing to make concessions to dental practitioners if they are

guilty, even at the risk of losing collaboration with that dental office.

However, the question item in the questionnaire which refers to the fact that “when manufacturing a prosthetic restoration with metal parts, dental technicians to whom the questionnaire was applied, conditional dentist to mention in laboratory notice what other metal alloys (amalgam fillings or prosthetic restorations with metal component) has the patient in the mouth”, only about 20% of subjects showed a great professionalism, responding positively to the issue, while 65% of subjects responded negative for them, above all, the most important is order taking in dental laboratory, regardless of conditions.

In terms of improving knowledge about the oral galvanism the concept, most subjects indicated their willingness to study this topic through articles, books or attending courses and professional conferences.

CONCLUSIONS

Following the completion of this study, even if it was only a preliminary one, we make several conclusions, some very interesting, as follows:

- must be insisted from university on the biocompatibility mechanisms of materials used in dental medicine, including dental technology, for both future dentists, and especially for future dental technicians;
- for those studying dental technology at the University of Medicine and Pharmacy in Romania, university studies of 3 years, should be facilitated further study, through deepening master classes, concerning biocompatibility of materials in dentistry, which will allow the dental technicians for future acquisition of essential knowledge in this noble profession, concepts such as: chemical corrosion, oxidation, electrochemical corrosion, corrosion potential or mechanisms of electrochemical corrosion processes;
- The quality of healthcare depends in a decisive measure on both the level of training and the moral standing of each member of dental team: dentist - dental technician;
- Responsibility of the medical dental act before patients, including manoeuvres made in the dental lab, willy-nilly belongs to the dental practitioner.

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