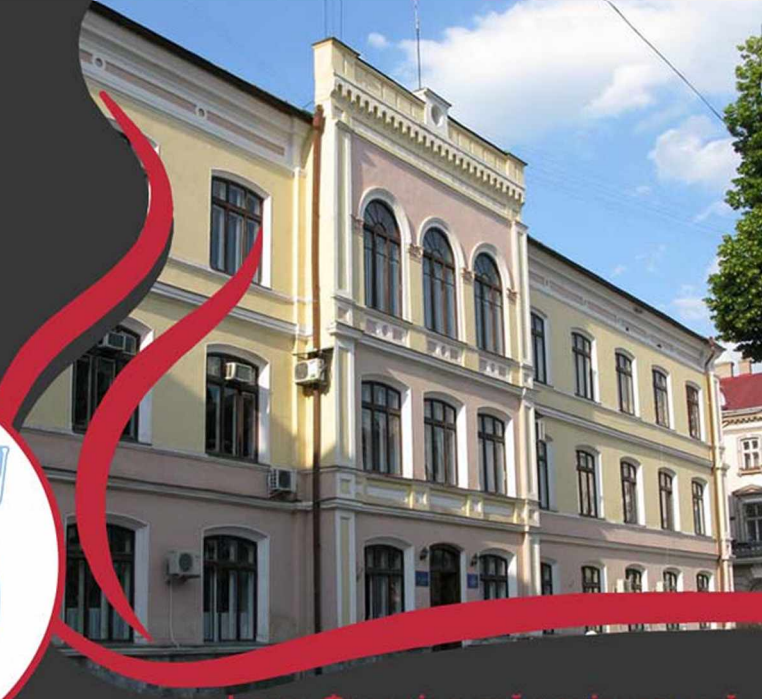


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«ІННОВАЦІЙНІ ТЕХНОЛОГІЇ В СУЧАСНІЙ СТОМАТОЛОГІЇ»

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A STUDY OF THE EFFECT OF A GLASS-CERAMIC COATING ON THE METAL COMPONENTS OF REMOVABLE DENTAL PROSTHESES ON SALIVA PARAMETERS IN PATIENTS WITH ALLERGIC CONDITIONS

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Analysis of clinical trial results has shown that between 15% and 43% of people who are forced to use orthopaedic structures exhibit 'intolerance' to certain materials used in crowns and dentures. It is believed that this phenomenon is caused by the corrosion of metals in orthopaedic devices within the oral cavity, leading to the generation of galvanic currents and the body's sensitisation to them, with the subsequent development of allergic conditions. The aim of this study was therefore to investigate the effect of prosthetic materials on oral fluid parameters and to improve the quality of orthodontic treatment for patients with allergies by using alternative biocompatible glass-ceramic materials to coat the metal components of removable dental prostheses. A total of 263 patients with defects in the upper and lower dental arches and a history of allergic conditions were examined, underwent prosthetic treatment and had their oral fluid analysed; these patients had been fitted with clasp-retained dentures with a cobalt-chromium alloy framework.

Study results. The study showed that in the first two stages, the pH of oral fluid in both groups was within the physiological norm (ranging from 6.73±0.42 to 6.98±0.23) and no statistically significant difference ($p>0.05$) was found between the values. We observed the first clear statistically significant ($p < 0.01$) differences in pH values when comparing the results of Group II at stages II and III – (6.73 ± 0.42) and (5.09 ± 0.31) respectively, after 1 month of using the fabricated dentures. At this same stage, the pH values of Group 1 were also compared – (6.91±0.29) and (6.02±0.3) – the differences were significant, albeit at the lowest level ($p<0.05$).

Measurement of galvanic currents revealed a significant ($p < 0.001$) difference between Group 1 and Group 2 as early as Stage 1 – (1.05 ± 0.21) μA and (14.38 ± 0.62) μA, respectively. One day after

the placement of clasp dentures, we observed a statistically significant ($p < 0.001$) difference between the first and second stages in both groups: Group 1 – (1.05 ± 0.21) μA and (5.13 ± 0.18) μA; Group 2 – (14.38 ±0.62) μA and (18.53 ±1.12) μA. Repeated measurement of galvanic currents after 1 month of using clasp dentures revealed a significant ($p < 0.001$) increase in readings in Group 1 to (23.4 ± 1.92) μA, and in the second group to (38.4 ± 2.56) μA at the third stage of the study.

When determining the electrical conductivity of oral fluid, a statistically significant ($p < 0.001$) difference was observed between the values for stages I and II in group 1 – (2.15 ± 0.03) μS/cm and (2.98 ± 0.05) μS/cm respectively, and in group 2 – (3.09 ± 0.02) μS/cm and (3.56 ± 0.1) μS/cm. Analysis of this parameter in the subsequent Stage III again revealed a highly significant ($p < 0.001$) increase in values to (4.05 ± 0.48) μcm/cm in Group 1 and to (5.54 ± 0.54) μcm/cm in Group 2.

The data obtained indicate clear changes in the properties of oral fluid in the presence of metal orthodontic appliances in the oral cavity; furthermore, a statistically significant difference ($p < 0.05$) in pH values was found between the 1st (6.02 ± 0.3) and 2nd (5.09 ± 0.31) groups at stage III of the study, a statistically significant difference at the $p < 0.001$ level at stages I, II and III stages between galvanic current values, and also a significant ($p < 0.001$) difference in electrical conductivity values at stages I and II in both groups, which once again confirms the significance of the number of metal elements in the oral cavity and their influence on the main physical parameters of oral fluid.

At stage IV of the study, one week after the removal of clasp dentures from the patients' oral cavities, a return of oral fluid pH to normal levels was recorded in both groups – (6.84±0.24) in group 1 and (6.53±0.19) in group 2 – to physiological normal levels, which is a statistically significant ($p<0.05$) difference compared with the previous stage.

Measurements of galvanic currents at the fourth stage revealed a statistically significant ($p < 0.001$) difference from the previous results in both groups and a marked improvement in the patients' condition. Specifically, a value of (7.22 ± 0.35) μA was recorded in Group 1 (for comparison, at the previous stage (23.4±1.92) μA) and (19.31±1.1) μA in the second study group (in the previous stage – (38.4±2.56) μA). Furthermore, there is a clear statistically significant difference (99.9%) between the readings of the first and second groups.

The study of electrical conductivity one week after the removal of clasp dentures in patients also showed a positive trend – the pH and electrical conductivity values in both groups at this stage did not differ significantly ($p > 0.05$) from the results of the first stage. In the first group, the values decreased from (4.05 ± 0.48) μS/cm to (2.53 ± 0.28) μS/cm (compared to stage III), which is statistically significant at the $p < 0.01$ level. As for the second group, the difference in values is also statistically significant, $p < 0.05$, with values of (5.54 ± 0.54) μcm/cm and (3.72 ± 0.46) μcm/cm between the previous and current stages, respectively. The difference between the indicators of both groups at the fourth stage is statistically significant at the $p < 0.05$ level.

In stages V and VI of the study, measurements were taken immediately after fitting and after one month of use of clasp dentures with glass-ceramic-coated metal parts, respectively. In terms of oral fluid pH, the results obtained for both groups ranged from (6.99±0.39) to (7.03±0.09), which corresponds to normal physiological values and does not differ significantly ($p>0.05$) from the values of the first stage, indicating complete adaptation to the dentures.

A similar result was obtained when determining galvanic currents – from (0.95 ± 0.12) μA in stage V to (0.91 ± 0.09) μA in stage VI in group 1 (there is no significant difference ($p > 0.05$) either between the last stages or between stages VI and I, $p > 0.05$). In group 2 – (13.85 ± 0.98) μA and (13.91 ± 0.83) μA respectively in stages V and VI, $p > 0.05$, and also between VI and I – $p > 0.05$.

Electrical conductivity values also returned to the level of stage I and range from (2.26 ± 0.05) μS/cm to (3.12 ± 0.28) μS/cm, which in both groups does not differ significantly either between stages V and VI ($p > 0.05$), nor between stages VI and I ($p > 0.05$).

Thus, this study has made it possible to improve the quality of orthopaedic treatment for patients with allergies by using alternative biocompatible materials in the fabrication of removable dental prostheses. Further research will therefore focus on exploring ways to use glass-ceramics in the manufacture of fixed prosthetic structures to improve the quality of life for this category of patients.

Keywords: prosthetic treatment, intolerance, allergic status, clasp dentures, glass-ceramics, oral fluid.