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The changes of oral cavity biocenosis in removable denture wearers including their influence on the changes of select peripheral blood parameters

The loss of teeth significantly disturbs the functions of the occlusion. There are various ways of restoring the masticatory system, depending on different factors. In the case of significant loss of teeth and toothlessness, partial, complete and frame dentures are commonly used. According to many authors, the most common reaction of tissues adjacent to removable dentures is the inflammation of mucosa which, in dentistry, is referred to as prosthetic stomatopathy (1, 2, 5, 6, 7, 10). Food and epithelial cells debris, denture plaque, restricted amount of air and saliva disturb the buffering action of saliva and cause PH changes. Dampness and the rise of temperature facilitate the proliferation of aerobic and anaerobic microorganisms. This may lead to the inflammation of mucosa under a denture, periodontitis or caries of the remaining teeth (3, 8, 9).

The aim of the study was to determine the essence of the disturbances of oral cavity biocenosis, which stem from wearing dentures, including aerobic and anaerobic microorganisms and fungal flora. The proliferation of aerobic and anaerobic microorganisms of much pathogenicity may be the cause of effective immunization of the organism (4, 11, 12). Moreover, the relationship between peripheral blood parameters and the dynamics of patients immune systems (the activity of complement components C_3 , C_4 , the mean values of IgA, IgM, IgG) and the presence of pathogenic oral flora was analysed. The aim of the study was also to determine the important differences of the evaluated parameters between the group of patients wearing complete or partial dentures and those wearing frame dentures, including the clinical assessment of periodontum.

MATERIAL AND METHODS

The study group comprised 46 patients who reported to the Department of Prosthetic Dentistry, Medical Academy of Lublin. Healthy denture wearers without any apparent predisposing factors of prosthetic stomatopathy (diabetes, allergy, ailments causing immunodeficiency) were examined.

During the anamnesis the attention was paid to aches occurring at that moment, the feeling of oral dryness, smarting, taste disturbance; their occurrence, duration and the applied treatment were taken into consideration.

In the intraoral examination, the type and the quality of dentures, the state of mucosa adjacent to dentures acc. to Newton classification in Spiechowicz modification, and periodontal status acc. to SBI indexes, acc. to Muhlemanna and Sona, and API acc. to Lang were examined.

The study group was divided into the following groups: patients wearing complete or partial dentures (O), patients wearing frame dentures (SZ), patients with all their teeth having vital pulp without any aches and clinical changes in oral cavity (a control group K). All the patients underwent bacteriological examination of blood with leucocyte smear acc. to Schilling, the level of Fe determination, the activity of component, C_3 , C_4 complement components, the level of CRP and the levels of IgA, IgM, IgG determination.

RESULTS AND DISCUSSION

The study revealed that periodontitis, the inflammation of tissues adjacent to dentures and the subjective aches are more common in patients wearing complete and partial dentures. The values of API, SBI indexes in patients wearing complete and partial dentures were twice as high in juxtaposition with patients wearing frame dentures, and they surpassed the results achieved in the control group. Complete, partial as well as frame dentures lead to the proliferation of fungi, aerobic and anaerobic microorganisms in oral cavity. In patients wearing frame dentures the occurrence of anaerobic microorganisms (*Eubacterium lentum*, *Veillonella spp.*) was more frequent (Fig. 1). The study revealed that in peripheral blood of patients wearing frame dentures the percentage of monocytes was lower than that in the control group; this indicates that there exists the local activity of monocytes in the inflammatory area of tissues adjacent to dentures.

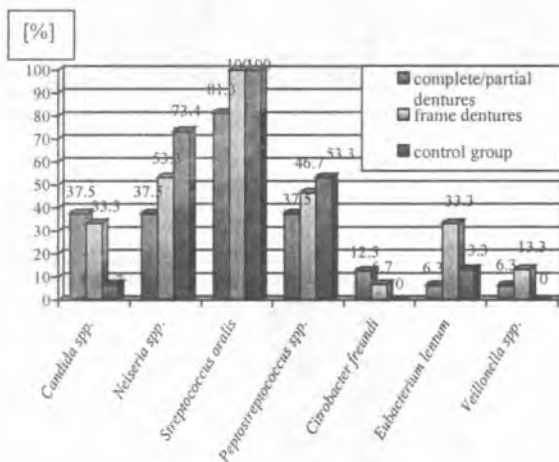


Fig. 1. The frequency of different microorganisms in oral cavity in patients wearing removable dentures

In most cases, the changes of the rest of morphological parameters showed statistically significant differences, depending on the type of dentures. The study revealed that in patients wearing complete, partial or frame dentures the values of CRP, the fraction of C_3 complement component were higher (Fig. 2, 3), and the IgA level in blood serum was lower in comparison with the control group (Fig. 4). The higher concentration of the fraction of C_3 complement component along with slight concentration of C_4 in blood serum of patients wearing removable dentures testify to the greater importance of the alternative way of complement system activation in bacterial and fungal infections.

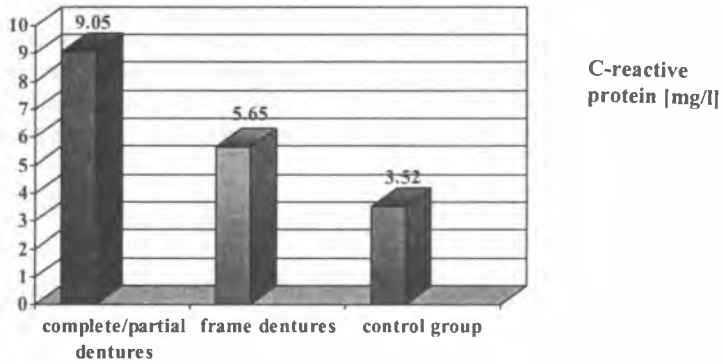


Fig. 2. The level of CRP in blood serum in patients wearing different kind of removable dentures

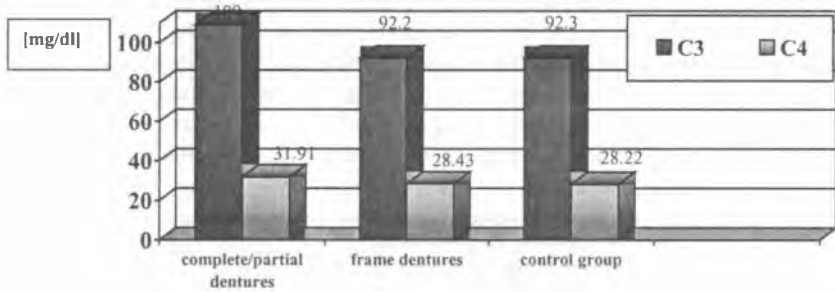


Fig. 3. The values fraction of C₃ and C₄ complement in blood serum in patients wearing removable dentures

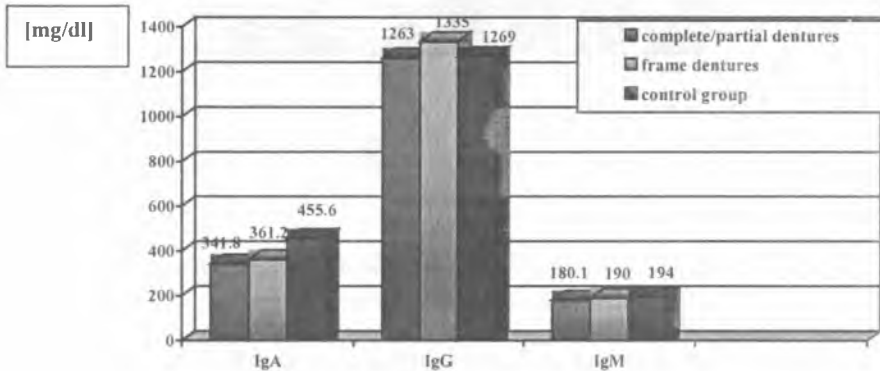


Fig. 4. The level of IgA, IgG i IgM in blood serum in patients wearing different kind of removable dentures

In the case of patients wearing complete, partial and frame dentures the lower level of IgA may stem from hydrolytic action of enzymes produced by the colonies of *Candida spp.* The disturbance of humoral immunity as *locus minoris resistentiae* (lower level of IgA, IgM) leads to bacterial and fungal infections of mucosa under dentures.

The observed changes of immune system parameters indicate active participation of the organism in the reaction caused by dentures. Illnesses with immunodeficiency and secondary immunodeficiency (the use of cytostatics, immunosuppressants) may facilitate the negative influence of dentures on adjacent tissues, and deteriorate the health of patient's organism.

CONCLUSIONS

1. Complete, partial as well as frame dentures lead to the proliferation of fungi, aerobic and anaerobic microorganisms in oral cavity.
2. Periodontitis, the inflammation of tissues adjacent to dentures, the subjective aches and the changes of immune system parameters (CRP, C₃, IgA) are more common in patients wearing complete and partial acrylic dentures.
3. Depending on the type of dentures, the changes of the rest of morphological parameters proved statistically insignificant.

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SUMMARY

The aim of the study was to determine the essence of the disturbances of oral cavity biocenosis in removable denture wearers, taking into consideration the changes of peripheral blood parameters and patient's immune system (the level of CRP, IgA, IgG, IgM, C₃ and C₄ complement components). All the patients underwent bacteriological examination and morphological examination of blood, also the level of Fe, the activity C₃, C₄ complement components in blood serum, the level of CRP and the levels of IgA, IgM, IgG were determined. The study revealed that periodontitis, the inflammation of tissues adjacent to dentures and the changes of immune system parameters (CRP, C₃, IgA) are more common in patients wearing complete and partial acrylic dentures. The observed changes of immune system parameters indicate its active participation in the reaction caused by dentures. Complete, partial as well as frame dentures lead to the proliferation of fungi, aerobic and anaerobic microorganisms in oral cavity, yet, the proliferation is more intense in patients wearing complete and partial acrylic dentures. Depending on the type of dentures, the changes of the rest of morphological parameters proved statistically insignificant.

Zmiany w składzie flory bakteryjnej jamy ustnej u pacjentów użytkujących różne rodzaje ruchomych uzupełnień protetycznych i ich wpływ na wybrane parametry krwi obwodowej

Celem pracy było określenie zaburzeń w biocenozie jamy ustnej u użytkowników ruchomych stomatologicznych uzupełnień protetycznych, przy uwzględnieniu zmiany parametrów morfologicznych krwi obwodowej oraz układu odpornościowego pacjenta (poziom CRP, IgA, IgM, IgG, C₃ i C₄ dopełniacza). We wszystkich badanych przypadkach pobierano materiał do badań bakteriologicznych, we krwi badanych osób wykonywano badania morfologiczne, poziomu żelaza, w surowicy oznaczano aktywność dopełniacza, frakcje C₃ i C₄ dopełniacza, poziom białka CRP, IgA, IgG i IgM. Badania wykazały, że protezy osiadające częściej powodują stany zapalne przyzębia i tkanek podłoża protetycznego oraz zmiany niektórych parametrów układu odpornościowego (CRP, C₃, IgA). Zmiany w układzie odpornościowym wskazują na jego czynny udział w reakcji na warunki stwarzane przez ruchome uzupełnienia protetyczne. Zarówno protezy osiadające, jak i szkieletowe powodują zwiększenie ilości gatunków bakterii tlenowych i beztlenowych oraz grzybów w jamie ustnej, przy czym są one bardziej nasilone u użytkowników protez osiadających. Zmiany parametrów morfologicznych krwi w zależności od użytkowanych ruchomych uzupełnień protetycznych okazały się nieistotne statystycznie.