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IMMUNOLOGICAL ORAL HEALTH STATUS OF THE POULTRY PLANTS EMPLOYEES

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Abstract

Study of periodontal diseases gives us grounds for making a generalized conclusion that an appearance of abnormal changes in tissues holding teeth takes place on change of overall health and as a result of the influence of a set of internal and external factors, which define an approach to the treatment and prevention of these diseases. Despite automation and mechanization of poultry plants, much more poultry plants employees are influenced by adverse factors of production that leads to occupational diseases, partially to periodontal diseases. The aim of our work was to investigate a condition of the local nonspecific immunity among poultry plants employees having periodontal diseases. In research 50 poultry breeders having generalized periodontitis, who made a basic group, and 20 persons with generalized periodontitis forming a comparison group, who were not in contact with birds, took part. Findings were compared with data of 20 somatically healthy persons from the control group. In order to study a condition of the local resistance at generalized periodontitis under the influence of harmful factors of poultry production, certain immunity factors of capillary blood of gums and oral fluid were examined: IgM, IgG, IgA, SIgA, phagocytic index (PhI) and phagocytic number (PhN). The most significant changes in the local nonspecific protection factors were found among patients of the basic group: content of serum IgA was significantly below normal: 1,82±0,11 g/l. Increase in production of IgM and IgG at decreasing content of IgA among persons from the basic group was indicative of functional

tension of immunity humoral arm on antigen stimulation with streptococcal infection. A significant deficiency of SIgA in oral fluid (0,62±0,03 g/l) was detected that was two times less than values of the control group and by 1.3 less than in the comparison group. Phagocytosis percent, phagocytic number, and phagocytic index among the patients of the basic group were much higher if to be compared with the comparison and control groups. That was indicative of decrease in appropriate immune response among them. Thus, the findings have shown that permanent immunodysfunctions among the poultry plants employees having generalized periodontitis are increasing under the influence of the occupational pathogens related to poultry production.

Key words: periodontal diseases, poultry plants employees, immunological oral health status.

Rationale. Periodontal diseases are the uppermost among dental diseases, multifactorial etiology and multipathogenicity of which form different by nature components: pathological processes concerning an overall organism, its cells and environments; alveolar tissues, biochemical reactive substrates [5, 11]. A significant influence of adverse environmental factors on the state of organs and systems of a person has been approved by a tendency of increase of periodontal disease incidence in industrially advanced countries, that is from 80 % up to100 % depending on the age group [17, 18, 19].

In this regard, employees of agricultural enterprises are expectedly included into the risk group with predisposition to periodontal diseases as in the course of their work they are affected by occupational pathogens of different nature, intensity, and time of exposure [1, 16]. Poultry production is one of the branches of agroindustrial complex of Ukraine that has been rapidly growing recently. It is currently topical for modern poultry plants to search for new conduction of technical processes that would be safe for employees' health. Despite automation and mechanization of poultry plants, much more poultry plants employees are influenced by adverse factors of production such as dust concentration, microclimate, gas pollution (ammonia, hydrogen sulphide, high concentrations of carbon dioxide, formaldehyde), bacterial and fungal air pollution of the working area, in-plant noise, high humidity. Continuous intake of occupational related to poultry production harmful factors by an organism causes an appearance of imbalance in the system of systemic and local immunity, induces an activation of endogenous intoxication phenomena that, in its turn, affects the state of periodontal tissues causing an excess incidence and complications of inflammatory dystrophic diseases of periodont [1, 9, 10, 16].

Aim. Therefore, we set an aim to investigate a state of the local nonspecific immunity of oral cavity among poultry plants employees having periodontal diseases.

Materials and methods of the research. In research 50 poultry breeders having generalized periodontitis, who made a basic group, and 20 persons with generalized periodontitis forming a comparison group, who were not in contact with birds, took part. Findings were compared with data of 20 somatically healthy persons from the control group.
In order to study a condition of the local resistance at generalized periodontitis under the influence of harmful factors of poultry production, certain immunity factors of capillary blood of gums and oral fluid have been examined: IgM, IgG, IgA, SIgA, phagocytic index (PhI) and phagocytic number (PhN) [2, 4, 15]. Principle of quantification of immunoglobulins in blood serum by using the method of radial immunodiffusion of globulins is based on the interaction of an antigen (of the serum under examination) and an antibody (antiserum to immunoglobulin). The used method is that the samples of the serums under examination are put into test wells cut out in the agar that has antibodies against IgM, IgG, IgA (conventional monospecific serums against human immunoglobulin). When interacting with correspondent antibodies, immunoglobulins, which are diffused into agar, form precipitin rings, the size of which depends on the serum content consisting of immunoglobulins of one or another class. Secretory immunoglobulin A (SIgA) is the main humoral evidence of the local immunity. Its availability in oral fluid has been determined by using the method of radial immunodiffusion according to Mancini. The conventional monospecific antiserum has been used in reaction. Determination of the absorbing capacity of neutrophil granulocytes.: for research 0.1 ml blood of a person under examination has to be taken, then a solution of conventional latex polystyrene particles in concentration 110^7/ml of Medium Eagle has to be inserted. Blood and latex have to be mixed by stirring, gathered into capillary tube, and incubated 30 min. at 37°C. Then a test tubes with blood have to be centrifuged dutring 5 min at 1500 rpm. At the edge of plasma – erythrocytes a white cell suspension appears, from which the swabs are to be taken. They are fixed with methanol and coloured according to the method of Romanowsky-Giemsa stain. The absorbing capacity of neutrophil granulocytes is determined by calculation of 100 cells, taking to account such values as phagocytic index (PhI) that is a percentage of phagocytizing neutrophil granulocytes and phagocytic number (PhN) that is an average quantity of latex microparticles in one phagocytizing cell [6, 8, 9, 13, 14, 20].

Results of the research. The most significant changes in the local nonspecific protection factors have been found among patients of the basic group: content of serum IgA

was significantly below normal: 1,82±0,11 g/l. The value of this indicator in the comparison group was 2,24±0,04, and in control group it was 2,86±0,25 g/l, that is by 1.2 and 1.3 times respectively bigger, $p<0,01$. The value IgM in the basic group was 1,20±0,04 g/l and was by 1.4 times bigger than in comparison group, and exceeded by 2.9 times the value of the control group, $p<0,01$. The numerical value IgG in patients of the basic group was 13,59±0,23 g/l and was actually by 1.1 higher than the same in the comparison group and by 1.2 higher than in the control group. The increase of production of IgM and IgG under decrease of IgA content among persons of the basic group indicates functional tension of immunity humoral arm on antigen stimulation with streptococcal infection and shows persistent process and long-lasting antigen load. These factors are indicative of inadequacy of the compensatory ability of an organism at periodontal diseases. A significant deficiency of SIgA in oral fluid (0,62±0,03 g/l) was detected and was two times less than values of the control group and by 1.3 less than in the comparison group, $p<0,01$. In assessment of the organism ability for reaction, phagocytosis as an indicator of nonspecific immunity is of great importance. Analysis of the dependence of phagocyte activity of neutrophils has allowed establishing the fact that the most significant phagocyte deficiency of blood cells is formed under the influence of an anaerobic infection. Phagocytosis percent, phagocytic number, and phagocytic index among the patients of the basic group were much higher if to be compared with the comparison and control groups. That was indicative of decrease in appropriate immune response among them. The results of the research of nonspecific factors of immune defense of the oral cavity among the poultry plants employees are indicative of a significant decrease of barrier and microbiocidal function of periodontal tissues in that patient population that complies with the data of modern professional literature [2, 12, 16, 19].

Conclusions. Thus, the findings have shown that permanent immunodysfunctions among the poultry plants employees having generalized periodontitis are increasing under the influence of the occupational pathogens related to poultry production. The assessment of the influence of factors of poultry production on different components of immune system can be used as an early immunodiagnosis of periodontal diseases and for development of the treatment and preventive schemes.

References:

1. Andriievskyi Yu. O., Stovbun A.V. Suchasnyi stan okhorony pratsi v Ukraini / Yu. O. Andriievskyi, A. V. Stovbun // Okhorona pratsi i pozhezhna bezpeka. – 2011. – № 4. – S. 24–30.

2. Basanets A.V. Problemy professyonalnoi patolohyy v Ukrayne y puty ykh reshenyia na sovremennom etape /A.V. Basanets, O.P. Krasniuk, I.P. Lubianova // Hihiienichna nauka ta profilaktyka na rubezhi stolit: materialy XIV zizdu hihiienistiv Ukrainy.– Dnipropetrovsk, 2003.– S. 38-40.

3. Belyakov I.M. Immunnaya sistema slizistyh / I.M. Belyakov // Immunologiya. – 1997. – № 4. – S. 7–13.

4. Biohimicheskie markery vospaleniya tkanej rotovoj polosti: metodicheskie rekomendacii / A. P. Levickij, O. V. Den'ga, O. A. Makarenko [i dr]. – Odessa: KP OGT, 2010. – 16 s.

5. Borisenko A.V. Sovremennye klassifikacii zabolevanij parodonta / A.V. Borisenko // Sovremennaya stomatologiya. – 2007. – № 4. – S. 38–44.

6. Bulgakova A. I. Vliyanie mestnogo immuniteta desny i rotovoj polosti na techenie hronicheskogo parodontita / A. I. Bulgakova // Novoe v stomatologii. – 2002. – № 10. – S. 90−94.

7. Vavilova T. P. Ispol'zovanie pokazatelej smeshannoj slyuny v ocenke sostoyaniya tkanej parodonta / T. P. Vavilova // Rossijskij stomatologicheskij zhurnal. – 2010. − № 1. – S. 10−12.

8. Gazhva S.I. Analiz kliniko-immunologicheskogo statusa polosti rta u pacientov s hronicheskim generalizovannym parodontitom legkoj i srednej stepenej tyazhesti pri ispol'zovanii antibakterial'nyh sredstv / S.I. Gazhva, A.I. Voronina, O.V. SHkarednaya // Stomatologiya. – 2010. – № 3. – S. 30–33.

9. Hodovana O.I., Zabolotnyi T.D., Lutsyk B.D. Imuno-mikrobiolohichni aspekty perebihu zapalnykh zakhvoriuvan parodontu v umovakh shkidlyvoho vyrobnytstva // Ukr. stomat. almanakh. – 2002. – №1. – S. 12-17.

10. Dobrovolska M. K. Stan biotsenozu klinichnykh zuboiasennykh kyshen khvorykh na heneralizovanyi parodontyt / M. K. Dobrovolska, V. M. Helei, N. I. Helei // Klinichna stomatolohiia. – 2014. – № 2. – S. 17–19.

11. Zabolotnyi T.D. Heneralizovanyi parodontyt / T.D. Zabolotnyi, A.V. Borysenko. – Lviv: HalDent, 2011. – 240 s.

12. Prokudina N. O. Profesiini zakhvoriuvannia robitnykiv u ptakhivnytstvi, shcho vyklykani patohennymy hrybamy ta umovno-patohennoiu mikrofloroiu / N. O. Prokudina // Suchasna vet. medytsyna. – 2013. – № 1. – S. 22–25 ; № 2. – S. 30–33.

13. Shinkevich V. I. Rol' kletochnyh faktorov immuniteta v remodelirovanii tkanej desny pri hronicheskom generalizovannom parodontite / V. I. Shinkevich, I. P. Kajdashev // Stomatologiya. – 2012. − № 1. – S. 23−27.

14. Almaceli M. Dendritic cells: a new player in osteoimmunology / M. Almaceli, Y. T. Teng // Carr. Mol. Med. – 2009. – Vol. 9. – P. 893−910.

15. Atler A. Y. Immunologia / A. Y. Atler. – Wroclaw: WMUP, 2007. –364 p. Aurer A. Markers of periodontal destruction in saliva of periodontitis patients / A. Aurer, A. Stavlejenic–Rukavina, J. Aurer-Kozeli // Acta Med. Croatica. 2005. – Vol. 59. – P. 117−122.

16. Bradberry S. M. Mechanisms of toxicity, clinical features, and management of acute chlorophenoxy herbicide poisoning: a review / S. M. Bradberry, B. E. Watt, A. T. Proudfoot // J. Toxicol. Clin. Toxicol . – 2000. –Vol. 38, N. 2. – P. 111–122.

17. Chen F. M. Periodontal Tissue Engineering and Regeneration: Current Approaches and Expanding Opportunities. Review / F. M. Chen, Y. Jin // Tissue Eng. Part B. – 2010. – Vol. 14. – P.591−596.

18. Costa F. O. Impact of different periodontitis case definitions on periodontal research / F. O. Costa, A. N. Guimaraes // J. Oral Sci. – 2009. – Vol. 5(2). – P. 199−206.

19. Degenerative periodontal-diseases and oral osteonecrosis: the role of geneenvironment interactions. Review / D. Baldi, A. Izzotti, P. Bonica [et al.] //Mutât. Res. – 2009. – Vol. 667. – P. 118−131.

20. Global goals for oral health 2020 / M. Hobdell, P. E. Petersen, J. Clarkson [et al.] // J. Int. Dent. – 2003. – Vol. 53. – P. 258−288.

21. Immunohistochemical analysis of inflammatory infiltrate in aggressive and chronic periodontitis: a comparative study / L. Artese, M. J. Simon, A. Piattelli [et.al.] // Clin. Oral Investig. – 2010. – P. 341−352.