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Research Article

EVALUATION OF THE USE OF GLYCOSAMINOGLIKANS IN ELIMINATION OF BONE TISSUE CHANGES IN CHRONIC DISEASE PERIODONTITIS

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ABSTRACT

The continuous development of modern periodontology, its enrichment with new scientific materials makes it possible to identify the leading links in the pathogenesis and features of the most frequent clinical manifestations of periodontal diseases, to provide the most etiologically and pathogenetically accurate periodontal care. In recent years, traditional complex treatment regimens require new constructive ideas.

KEYWORDS

Gingivitis, periodontitis, bone resorption, gingival epithelium, glycosaminoglycans.

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INTRODUCTION

Glycodent gel and other preparations for the local treatment of gingivitis and periodontitis are an important part of the complex treatment of local drug therapy - gingivitis and periodontitis.

Purpose: to determine the effectiveness of Glycogent gel in the treatment of gingivitis and periodontitis.

MATERIALS AND METHODS

The study included 45 patients with periodontal diseases of the regional dental clinic. As a control group, 30 people without periodontal pathology.

More than 50% of the population has symptoms of gingivitis and periodontitis, and more than 10% have symptoms of stage III periodontitis.

Statistics show that the highest incidence is in the 35-44 and 15-19 age groups. The pathogenesis of inflammatory and inflammatory-dystrophic diseases of periodontal tissue is a systemic and complex process, because the development of pathological changes in periodontal tissue causes many and varied processes at the level of the whole organism, i.e. cells, biological fluids (blood, saliva), periodontal tissues (cell organelles, extracellular component) [1,7].

Pathochemical, morphological, immune, and biological changes that occur in the periodontium are accompanied by metabolic disorders, leading to disruption of protein synthesis in periodontal tissues, which in turn leads to the onset and development of periodontal tissue destruction. Infectious factors play a key role in the development of inflammatory processes in periodontal tissues.

The diverse microflora located on the surface of the mammary epithelium is able to actively interact with the tissue elements located under the epithelium. the calculated tooth and all its components cannot be considered separately [5]. . From the point of view of infectious theory of the mechanisms of occurrence of periodontal disease, the concept of endo-periodontal syndrome, in particular, the possibility of infection of the intact tooth pulp from periodontal tissues, has long been on the list of current controversial issues of periodontology.

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It is known that one of the main moments in the development of inflammatory and inflammatory-dystrophic diseases of periodontal tissue is the violation of the structural and functional components of the periodontium - proteoglycans, which are gradually broken down under the influence of bacterial hyaluronidases. This leads to a violation of the barrier function of periodontal connective tissue and a decrease in the number of functional molecules of proteoglycans sulfated by glycosaminoglycans.

It is these changes that negatively affect the functional state of the protective barrier to the entry of bacteria into the internal structures of the gum stroma and alveolar bone structures and, accordingly, slow down the repair of tissues. However, several data indicate the successful experimental use of drugs containing sulfated glycosaminoglycans for the topical treatment of gingivitis and periodontitis. In 2007, Dubna-Biopharm LLC (Russia) introduced Glycodent periodontal gel based on glycosaminoglycan (chodroitin sulfate) with the addition of peppermint oil and chlorhexidine bigluconate. and tests are being conducted extensively to determine the effectiveness of other common tools [3,4].

In the pathogenesis of some diseases of the skeletal system (osteopenia, osteoporosis, osteomalacia), as well as disorders of the process of reparative osteogenesis lie a violation of calcium homeostasis in the body. There is data in the literature on the treatment of bone defects under the influence of calcium-containing drugs, including the drug "Calcemin".

Complex treatment of general periodontitis includes the following stages:

I. Elimination of etiological factors and factors affecting the periodontium, professional hygiene, treatment of symptomatic gingivitis with local drugs, correction of traumatic occlusion, grinding of moving teeth;
II. Surgical treatment with subsequent rehabilitation measures;
III. Treatment of dentures by prosthetics and permanent grinding of teeth;
IV. Maintenance therapy, including dispensary monitoring of periodontal tissue status.

RESULTS

Its main functions are to reduce microbial infection, eliminate the inflammatory process, reduce swelling and pain, restore normal

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homeostasis, stimulate reparative processes and restore normal function of periodontal tissues.

Antibacterial agents in solution form are widely used among various drugs that have a local effect on non-specific inflammatory foci in periodontal tissues.

Special requirements have been developed for all antiseptic drugs used in periodontology.

First, it has a wide range of antibacterial effects, without adverse effects on the body; decreased or lost resistance of strains as a result of the use of drugs, as well as the ability to destroy bacterial biofilms..

They also take into account the long-term effects of drugs with low toxicity, high adsorption and the ability to fully restore the oral biocenosis [8].

The results of conservative treatment of inflammatory and inflammatory-dystrophic periodontal disease as a result of the use of various types of drugs-pastes, gels, ointments and films are very successful, their prolongation is achieved by immobilization of active substances in various polymer carriers. These topical agents ensure uniform release of the active substance from the drug form, which allows its application in the systemic circulatory system without a sharp increase, while achieving a high therapeutic concentration in the field of local application.

Gel forms of drugs used in periodontology are soft compositions for topical application, which are single, two and multi-phase dispersed systems with a liquid dispersion medium. Their rheological properties are due to the storage of gel-forming substances at low concentrations.

Among the gel forms are widely used drug "Metrogil Denta" (Unique Pharmaceutical Laboratories) and many analogues of other manufacturing companies. These drugs are based on chlorhexidine and metronidazole, sometimes with the addition of other plant and synthetic active substances in different concentrations produced.

Glycosaminoglycan-based pharmaceuticals have been used successfully in local treatment of gingivitis and periodontitis in recent years.

According to various authors, ready-made dosage forms (pastes, gels, ointments) have anti-inflammatory, anti-inflammatory, periodontal protection and promote wound healing.

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A number of studies have linked the use of drugs based on hyaluronic acid. The researchers 'interest in the properties of hyaluronic acid is explained by the fact that almost all cells in the human body produce it.

It is formed in the cell membrane and is pushed directly into the extracellular matrix. The matrix enriched with hyaluronic acid stimulates cell migration, enhances neoangiogenesis and affects the function of keratinocytes. Due to its high viscosity, hyaluronic acid performs protective functions and slows down the penetration of bacteria and viruses, which are crucial in wound healing.

In the work of Chepel and co-authors, a positive assessment of the clinical efficacy of medicinal compounds consisting of sorbent silicon, antiseptic miramycin and hyaluronic acid.

In the mid-1990s, the firm Gedeon Richter developed a drug called Kuriozin, a combination of hyaluronic acid and zinc, which was originally designed to treat trophic leg ulcers of various etiologies.

In foreign periodontal practice, the drug is used correctly, both in pure form and in combination with other drugs [11].

Hyaluronic acid-based product formulation adapted for dentistry is Gialudent gel (Omega Dent, RF).

In recent years, the Italian drug "Gengigel" (Ricerfarma, Italy) containing 0.2% hyaluronic acid is being actively studied.

Gengigel reduces the permeability of microtubules, improves oxygen supply to tissues, normalizes energy metabolism, reduces the level of tissue hypoxia, provides protective function by improving the structure of the gingival epithelium.

There is little research in the literature on the use of topical preparations based on chondroitin sulfate. In particular, there is evidence that the use of the above-mentioned Glycodent gel, which contains chondroitin sulfate, glycerin, chlorhexidine bigluconate, peppermint oil and hydroxyethylcellulose, has shown positive results.

Dulaeva and co-authors demonstrated the experience of clinical evaluation of Glycodent periodontal gel in the treatment of periodontal tissue injuries from ligature splints in jaw fractures. The researchers, who observed positive

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dynamics, noted that bimaxyl accelerated the rehabilitation of patients after tire removal.

Conservative treatment of gingivitis and periodontitis is not limited to the use of local means.

Among the many physiotherapeutic methods, the study of the effects of laser light on periodontal tissue remains an urgent task of modern periodontal science.

Lasers provide the formation of electromagnetic radiation in different optical ranges. They have high levels of monochromaticity, coherence, polarity, and intensity.

However, different duration of pulses leads to a number of factors that do not tend to create local potentially hazardous conditions in cells or in specific locations of the target cells [11].

The first starting point for the biological effects of low-intensity laser radiation is a local heating factor that leads to a thermodynamic effect rather than a photobiological reaction.

Local heating leads to the release of calcium ions from the intracellular depot, after which Ca 2+ copper is excited in the cytosol of the cells and initiates calcium-dependent processes. Later, a complex of adaptive and compensatory reactions to the less studied surface in tissues develops secondary effects.

Basic cell reactions to laser radiation:

Activation of cell metabolism and increase their functional activity.

Enhance blood microcirculation and improve tissue nutrition.

Numerous studies show that laser radiation plays a sensitizing and stimulating role not only in periodontal tissue, but also in cellular reactions aimed at restoring and normalizing the bioenergetic state of the whole body.

Laser radiation increases enzymatic activity, catalase activity, and membrane permeability, which significantly accelerates transport processes in tissues.

Increased oxygen metabolism leads to a decrease in hypoxia, which of course leads to inflammatory processes. In pathological conditions, low-intensity laser radiation enhances reparative processes by altering the cell composition in the area of inflammation by increasing the number of neutrophils.

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In addition, hormonal, mediated connections of natural adaptive mechanisms are activated [6].

After exposure to laser radiation, the body's immune system protection is enhanced, which is confirmed by an increase in hemagglutinin, hemolysins, lysozyme titer, activation of interferon, increased synthesis of immunoglobulins, changes in the structure and function of lymphocyte plasma membranes.

Low-intensity laser radiation reduces the concentration of lipid peroxidation products in the blood. At the same time, by activating the antioxidant system, radiation increases the level of catalase in the serum and activates the cellular elements of mononuclear phagocytes (macrophages).

As a result, the morphofunctional state of erythrocyte cell membranes and the recovery of the lipid spectrum of lymphocyte membranes are accelerated. When laser radiation affects periosteal tissue, it has a significant effect on the blood circulating in the lacunae of bone tissue.

This provides a local and intensive effect due to the generality of the blood circulation. Based on modern evidence-based medical trends, many questions today are related to the antimicrobial effects of laser radiation.

There is no clear idea about the effect of therapeutic lasers on the oral microflora. Therefore, the bactericidal effect of laser radiation in this direction is of only experimental and theoretical importance.

In recent years, a new physiotherapeutic method is used in medical and dental practice - photophoresis, which involves a combination of laser radiation and drugs applied to the skin or mucous membranes. In order to increase osteoregeneration in facial skull injuries, Gerasimenko and co-authors 5% along the fracture lines of the lower jaw bone

Photophoresis (infrared laser radiation) and thin application of "Chondroxide" ointment used ultraphonophoresis [4].

We concluded that photophoresis enhances microcirculation as a result of regression of the inflammatory component, helps reduce pain, and activates trophic and osteoreparative processes in fracture projection.

While studying the penetration of chondroxide ointment using semiconductor membranes, the

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authors found that the penetration of chondroitin sulfate increased by 6–8% after 2 min when exposed to an initial laser radiation power of 5–15 mW compared to the conventional application method. , And after 10 minutes they found that it was 12-15% higher. At an initial power of 25–30 mW, this difference was 16–17% after 2 min and reached 19–20% after 10 min.

In the clinical phase of the study, the authors found that the maximum increase in radiation during the passage through biological tissues (ear, cheek) at a starting power of laser beams in the red and infrared range from 1 to 50 mW corresponds to a power of 10-15 mW. identified. These properties allowed the researchers to hypothesize that the ointment interacts with a biological object and that its penetration into tissues under appropriate conditions is significantly higher than normal diffusion. Chondroxide ointment by Gerasimenko et al. Is intended for external use only on the skin surface.

Ointment should not be applied to the mucous membrane in inflammatory processes of the oral cavity.

According to the literature, tissue permeability is much lower when photographed with ointments than with gel-shaped agents.

Through mathematical modeling, Prikuls et al found that the rate of photoinduced diffusion at 3 minutes of photophoresis of gel-containing agents was 50% higher than that of drugs without laser irradiation in the application method.

Such evidence suggests that drug molecules applied to the gum surface require additional energy to overcome the potential barrier at the mucosal layer tissue and the outer cavity boundary.

This is due to the relatively low permeability of the mucous membrane tissue membranes to the molecules of the drug composition [3].

The combination of low-intensity laser beams and preparations that synergistically enhance each other's efficiency stimulates cell membrane molecules, thereby increasing its permeability. In the complex treatment of gingivitis and periodontitis, in addition to local drugs, it is advisable to use drugs that have a general effect. Given the high role of microbial factors, antibiotic therapy plays a key role in the complex treatment.

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The peculiarity of the use of antibiotics is that they not only show antibacterial activity, but also neutralize the effect of collagenase of microbial strains formed in damaged periodontal tissues.

In turn, disorders of local metabolic processes of alveolar bone tissue in general chronic periodontitis require the use of targeted osteotropic therapy to normalize periodontal bone tissue repair and osteometabolism.

Alveolar tumors of the jaws should be considered the youngest bone otnogenetic form of the organism, because the appearance and formation of skeletal bones occurs in the prenatal period, while alveolar tumors of permanent teeth occur at 6 years of age.

This fact confirms the significant weakness of the alveolar tumor bone tissue and its high sensitivity to internal and external factors.

In the pathogenesis of general periodontitis plays an important role in the alveolar tumors of the jaws: impaired bone metabolism: increased osteoclastic resorption rate, decreased osteoblast activity, imbalance between resorption and bone tissue formation.

Consequently, an increase in catabolic processes and a decrease in biosynthesis lead primarily to changes in the organic parts of periodontal tissue as well as all components of this complex.

Against the background of osteoporotic changes in skeletal bones, inflammatory-dystrophic diseases of the periodontium are increasing. Today, there are three directions among the general principles of treatment of patients with such periodontal changes:

The etiological direction involves the treatment of this underlying disease.The pathogenetic direction involves the normalization of bone formation processes.

Symptomatic direction, including pain relief and others.In turn, the pathogenetic therapy of osteoporotic processes includes less than three groups of drugs [7].

Means that reduce resorption processes in bone tissue (antiresorbents): bisphosphonates, calcitonins, estrogens, selective modulators of estrogen receptors.

Drugs that enhance bone formation: synthetic parathyroid hormone, fluorides, anabolic

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steroids, androgens, somatotropic (growth) hormone.

Drugs that affect the processes of bone regeneration: strontium ranelate, vitamin D and its active metabolites, ossein-hydroxyapatite complex, ipriflavon.

Bisphosphonates (BP) are first-line drugs in the treatment of osteoporosis, stopping osteoclast activity and potentiating antirheumatic factors. The ability of bisphosphonates to suppress pathological resorption and stimulate bone formation determines their therapeutic effect in osteoporosis.

To date, there are several hypotheses on the effects of strontium on bone condition, which are being studied.

Thus, the antirheumatic effect of strontium ranelate manifests itself by reducing the differentiation of preosteoclasts into osteoclasts, enhancing bone formation by stimulating the replication of preosteoblasts and increasing the number of osteoblasts, as well as increasing the expression of osteoprotein in osteoblasts.

However, the effect of this drug on the jaw bones has not been adequately studied.

The main link in the prevention and treatment of chronic generalized periodontitis is the maintenance of normal levels of calcium and vitamin D3 in the body. Calcium is involved in the regulation of a number of physiological processes, including protein biosynthesis.

It has been proven that disorders of calcium metabolism in the body can occur not only in the processes of osteoporosis, but also in a number of somatic diseases. Calcium deficiency in the diet leads to an increase in parathyroid hormone levels, which enhances the processes of bone resorption and calcium excretion.

As a result, osteopenic changes develop in the bones, leading to impaired calcium metabolism and the onset of osteoporosis.

Hormonal drugs, including calcitonin drugs (myacaltic, calcitriol, sibacalcin) play a key role in the treatment of alveolar bone resorption in the treatment of disseminated periodontitis [9].

These drugs have a strong effect on the regulation of the entire endocrine system. The literature contains data on the effect of glycosaminoglycans, including glucosamine hydrochloride-based drugs, on the inflammatory-dystrophic process of periodontal tissues. Glucosamine is a specific

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substrate that reduces the formation of superoxide radicals and tissue-damaging enzymes (collagenases, phospholipases), prevents the action of glucocorticoids on chondrocytes and disrupts glucosaminoglycan synthesis.

Glucosamine is actively involved in the construction of collagen fibers and the intercellular matrix in general, stimulates the proliferation of chondrocytes and other connective tissue cells, increases their biosynthetic activity and improves vascular microcirculation in tissues. Due to the chemical structure of its molecule, it has an antioxidant effect, which is characterized by high reactivity and the predominance of reducing properties over oxidizers. Unlike drugs containing glucosamine hydrochloride, the attention of researchers is drawn to pharmaceuticals based on chondroitin sulfate, which have proven themselves in various areas of practice.

Chondroitin sulfate is a high molecular weight mucopolysaccharide that reduces the activity of enzymes that break down the composition of connective and connective tissues, as well as enhances regeneration processes.

Chondroitin sulfate reduces the activity of the inflammatory process in the early stages and helps to reduce the pain reaction. In the Western literature, chondroitin sulfate has been found to increase OPG expression in human subchondral bone osteoblast cells, leading to an increase in OPG / RANKL ratio and a decrease in bone resorption.

This is of great importance because it helps to prove the hypothesis that osteoporosis is an inflammatory disease. There is insufficient data in the literature on the use of chondroitin sulfate-based drugs for the treatment of dental diseases, including periodontal disease. Anisimova has developed a treatment regimen that includes Calcemin (a calcium-based vitamin-mineral complex) and Teraflex (glucosamine XS) for the treatment of lower jaw fractures against the background of periodontitis. The best indications for the treatment of bone injuries and stabilization of periodontal tissue were better in the group of patients receiving these drugs than in the group of patients treated according to the general treatment regimen.

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CONCLUSIONS

In-depth analysis of new methods of organizing the problems of development and course of inflammatory-dystrophic diseases of the periodontium, pathogenetic mechanisms of their development and the search for complex therapeutic approaches in accordance with complex medical and social realities is a requirement of today.

The increase in morbidity against the background of osteopenic conditions also requires the development of an optimal strategy of complex treatment, which includes the impact on the main joints of the pathogenesis of general periodontitis, osteopenia and osteoporosis. It requires a more in-depth study of local and general action drugs used in the treatment of gingivitis and periodontitis, as well as biocomposite osteoplastic materials based on sulfated and non-sulfated glycosaminoglycans.

All of the above allows us to conclude that the science of periodontology for many years has come a long and effective path of highly specialized analytical development, and has also developed methods and tools, theoretical concepts, technologies for the effective treatment of gingivitis and periodontitis. Having reached a new stage of development, periodontology returns to a comprehensive theoretical and practical approach to integrative medicine.

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