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PHARMACOTHERAPEUTIC SIGNIFICANCE OF ANTI-INFLAMMATORY, ANTIPLATELET, AND ANTICOAGULANT DRUGS IN DENTISTRY

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ABSTRACT

This scientific study is devoted to a comprehensive evaluation of the pharmacotherapeutic significance of anti-inflammatory, antiplatelet, and anticoagulant drugs in dentistry. During the research, the role of these medications in the pathogenesis of oral diseases, as well as their pharmacodynamic and pharmacokinetic properties and clinical effectiveness, were analyzed. Particular attention was given to the specific features of their use in periodontal diseases, dental surgical interventions, and implantology. The obtained results confirm the important role of these drug groups in комплекс treatment approaches.

ФАРМАКОТЕРАПЕВТИЧЕСКОЕ ЗНАЧЕНИЕ ПРОТИВОВОСПАЛИТЕЛЬНЫХ, АНТИАГРЕГАНТНЫХ И АНТИКОАГУЛЯНТНЫХ ЛЕКАРСТВЕННЫХ СРЕДСТВ В СТОМАТОЛОГИИ

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ABSTRACT

Данная научная работа посвящена комплексному изучению фармакотерапевтического значения противовоспалительных, антиагрегантных и антикоагулянтных лекарственных средств в стоматологии. В ходе исследования был проведён анализ роли этих препаратов в патогенезе заболеваний полости рта, а также их фармакодинамических и фармакокинетических свойств и клинической эффективности. Особое внимание уделено специфике их применения при пародонтальных заболеваниях, стоматологических хирургических вмешательствах и в имплантологии. Полученные результаты подтверждают важную роль данных групп препаратов в комплексном лечении.

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STOMATOLOGIYADA YALLIG'LANISHGA QARSHI , ANTIAGREGANT VA ANTIKOAGULYANT DORI VOSITALARINING FARMAKOTERAPEVTIK AHAMIYATI

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ABSTRACT

Mazkur ilmiy ish stomatologiyada yallig'lanishga qarshi, antiagregant va antikoagulyant dori vositalarining farmakoterapevtik ahamiyatini kompleks tarzda o'rganishga bag'ishlangan. Tadqiqot davomida ushbu preparatlarning og'iz bo'shlig'i kasalliklari patogenezidagi o'rni, farmakodinamik va farmakokinetik xususiyatlari hamda klinik qo'llanish samaradorligi tahlil qilindi. Ayniqsa, periodontal kasalliklar, stomatologik jarrohlik aralashuvlari va implantologiyada ushbu dorilarni qo'llashning o'ziga xos jihatlari ko'rib chiqildi. Olingan natijalar ushbu dori guruhlarining kompleks davolashdagi muhim rolini tasdiqlaydi.

Introduction. The advancement of modern dentistry necessitates not only a local but also a systemic approach to the treatment of oral diseases. Inflammatory processes represent a key pathogenic component in the majority of dental pathologies. At the same time, disturbances in the blood coagulation system and microcirculation are considered important contributing factors in the development of periodontal diseases.

Anti-inflammatory drugs reduce clinical symptoms by suppressing inflammatory mediators. Antiplatelet and anticoagulant agents, in turn, improve the rheological properties of blood and enhance tissue oxygenation.

Recent studies have demonstrated that the combined use of these drug groups significantly increases the effectiveness of dental treatment. Therefore, an in-depth evaluation of their pharmacotherapeutic significance remains a highly relevant issue.

Scientific sources indicate that anti-inflammatory drugs, particularly nonsteroidal anti-inflammatory drugs (NSAIDs), are among the most widely used agents in dentistry. NSAIDs exert their effects primarily by inhibiting cyclooxygenase (COX) enzymes responsible for prostaglandin synthesis, whereas corticosteroids suppress a broad range of inflammatory mediators by altering gene transcription.

However, these same mechanisms can also interfere with physiological homeostasis, leading to adverse effects that range from mild discomfort to life-threatening complications. Considering that many inflammatory conditions are chronic in nature, prolonged use of these medications further increases the risk of

toxicity. Therefore, a thorough understanding of their side effect profiles is essential to ensure safe and evidence-based clinical application [1]. Microcirculatory disturbances are observed in periodontal diseases, which provides a scientific rationale for the use of antiplatelet agents. Studies have demonstrated the effectiveness of acetylsalicylic acid and clopidogrel. Anticoagulants, on the other hand, play a particularly important role in the dental management of patients with cardiovascular diseases. However, improper use of these drugs can increase the risk of bleeding.

Materials and Methods. This study investigated the pharmacological properties and clinical efficacy of anti-inflammatory, antiplatelet, and anticoagulant drugs commonly used in dentistry. Data from contemporary scientific literature, clinical guidelines, and randomized clinical trials were analyzed for this research.

Additionally, a group of patients experiencing inflammatory processes associated with periodontal diseases, gingivitis, and post-dental surgical interventions was studied both retrospectively and prospectively. Clinical parameters of the patients were assessed, including the degree of inflammation, bleeding index, pain syndrome, and the rate of tissue regeneration. The pharmacodynamic effects of the drugs—namely, inhibition of prostaglandin synthesis, reduction of platelet aggregation, and influence on the coagulation system—were analyzed. Pharmacokinetic parameters, including absorption, distribution, metabolism, and excretion, were also evaluated in detail.

For statistical analysis, mean values, standard deviations, and confidence indicators were calculated. The results were assessed based on clinical efficacy criteria.

Analysis and Discussion. The pharmacological properties of anti-inflammatory drugs indicate that NSAIDs serve as the primary agents in dentistry for pain relief and inflammation control. Their mechanism of action is based on blocking COX enzymes, thereby reducing prostaglandin synthesis. Advantages include rapid onset, effective pain reduction, and efficient control of inflammation. In contrast, corticosteroids suppress the entire inflammatory cascade at multiple levels. They inhibit the activity of phospholipase A_2, preventing the formation of prostaglandins and leukotrienes, and downregulate cytokines such as interleukin-1 (IL-1), tumor necrosis factor-alpha (TNF-α), and interferon-gamma.

These potent effects, while beneficial for controlling inflammation, simultaneously suppress immune responses, alter carbohydrate and protein metabolism, and disrupt the balance of the endocrine system and bone homeostasis. As a result, widespread systemic complications may occur [2]. Limitations include potential damage to the gastric mucosa and negative effects on kidney function.

The role of antiplatelet agents in dentistry primarily involves reducing platelet adhesiveness and improving capillary blood flow. This helps restore trophic support in periodontal tissues.

Clinically, they are used in cases of gingivitis and periodontitis and contribute to faster tissue regeneration following implant placement. The adverse effect of antiplatelet drugs is an increased risk of bleeding.

Anticoagulants and Dental Safety. Anticoagulants inhibit thrombin formation and are commonly prescribed for patients with cardiovascular diseases. Key considerations for dental practitioners include monitoring INR before procedures, temporarily adjusting dosages, ensuring hemostasis, and managing complex pharmacotherapy.

Research indicates that the following combinations are effective: NSAIDs with local antiseptics, antiplatelet agents combined with physiotherapy, and cautious surgical approaches in patients on anticoagulants.

Results. Based on observations conducted on 120 patients, the following results were obtained: In patients treated with anti-inflammatory drugs, signs of inflammation (such as hyperemia and swelling) decreased by 68–75% within 5–7 days. Pain intensity, measured using the Visual Analog Scale (VAS), decreased from an average of 7.2 ± 0.8 to 2.9 ± 0.6, representing approximately a 60% reduction. Furthermore, in dental procedures—particularly in cases of nerve inflammation in the teeth (neuritis and neuralgia)—these drugs demonstrated high efficacy. This highlights the importance of the temporal aspect of their action: early suppression of inflammation in neuritis prevents irreversible structural damage to the myelin sheath, while timely control of neurogenic inflammation in neuralgia reduces abnormal nerve firing and sudden pain attacks.

Therefore, when evaluating treatment approaches, pharmacokinetic parameters—particularly the onset of action, tissue penetration, and half-life—must be carefully considered [6].

The bleeding index decreased by 55–62%, indicating a reduction in the inflammatory process. In the group of patients receiving antiplatelet therapy, platelet aggregation decreased by 30–40%, and microcirculation in periodontal tissues improved by 25–35%. Tissue regeneration rates were observed to increase by 1.5-fold.

In cases where anticoagulant therapy was applied, postoperative thrombotic complications decreased from 18% to 6%. However, when used without proper monitoring or at incorrect doses, bleeding events occurred in 4–7% of cases.

For example, although clopidogrel is less ulcerogenic than aspirin, it can still contribute to gastrointestinal bleeding, especially when used as part of dual antiplatelet therapy (DAPT). Dyspepsia, nausea, abdominal pain, and diarrhea are relatively common side effects, though they are generally mild.

The risk of gastrointestinal bleeding can be reduced by co-administration of proton pump inhibitors (PPIs); however, potential drug interactions—particularly between clopidogrel and omeprazole, which are both metabolized via CYP2C19—must be carefully evaluated.

Ticagrelor and prasugrel can also pose gastrointestinal risks; however, their reversible and faster

pharmacodynamic properties may somewhat influence the likelihood of bleeding [3].

In patients receiving combination therapy (anti-inflammatory + antiplatelet + anticoagulant), the average duration of clinical recovery decreased from 10–12 days to 6–7 days (≈40%). Periodontal pocket depth reduced from 1.8 ± 0.4 mm to 1.1 ± 0.3 mm. Overall clinical condition and quality of life indicators improved by more than 70%.

Moreover, the results of the study demonstrated that anti-inflammatory drugs—particularly nonsteroidal anti-inflammatory drugs (NSAIDs)—significantly reduce inflammatory processes in the oral cavity. They alleviate pain and improve the overall condition of patients.

Antiplatelet agents have been observed to reduce platelet aggregation and improve microcirculation in periodontal tissues. This enhances tissue nutrition and accelerates regenerative processes. Anticoagulants, in turn, help reduce the risk of postoperative thrombosis by regulating the coagulation system. However, improper use of these drugs can increase the risk of bleeding. Additionally, other adverse effects of antiplatelet and anticoagulant drugs must be considered.

In dentistry, it is essential to take a thorough patient history before prescribing or recommending any medication. One of the most common adverse effects of these drugs is allergic reactions. In particular, when aspirin or ticagrelor is administered, reactions may manifest as rashes, urticaria, or angioedema (Quincke's edema). Aspirin-induced asthma is another significant hypersensitivity reaction, resulting from the shunting of arachidonic acid metabolism toward leukotriene production, and it often occurs in individuals with pre-existing respiratory allergies [4].

In patients receiving combination pharmacotherapy, a more rapid reduction in signs of inflammation was observed, along with decreases in swelling and hyperemia, as well as a shorter duration of clinical recovery.

Conclusions. The results indicate that the use of anti-inflammatory, antiplatelet, and anticoagulant drugs in dental practice demonstrates high clinical efficacy and significantly improves treatment outcomes. Anti-inflammatory agents can reduce inflammatory processes by up to 70% and alleviate pain by approximately 60%. Furthermore, for the rational use of anti-inflammatory drugs in cases of neuritis and neuralgia affecting teeth and dental structures, it is essential to have a deep understanding of the underlying neuroinflammatory processes, the pharmacological properties of available medications, and patient-specific clinical factors. While NSAIDs remain the first choice for mild to moderate inflammation, corticosteroids are indispensable in acute immune-mediated nerve injuries due to their potent anti-inflammatory effects [20].

Antiplatelet agents improve microcirculation by up to 30% and accelerate regeneration of periodontal tissues. Anticoagulants can reduce the risk of thrombosis by up to threefold, but they must be used with caution. When combination pharmacotherapy is applied, treatment efficacy increases by

1.5–2 times, recovery time shortens by 35–40%, and the likelihood of complications decreases by 2–3 times. Therefore, in dentistry, the use of these drugs should be guided by an individualized approach, taking into account the patient's overall condition and hemostatic system parameters.

The study results also confirm the significant pharmacotherapeutic importance of anti-inflammatory, antiplatelet, and anticoagulant drugs in dentistry. These agents exert a comprehensive effect on the pathogenesis of oral diseases, playing a key role in reducing inflammation, improving microcirculation, and regulating the hemostatic system. At the same time, their use must take into account the patient's individual characteristics, overall somatic condition, and coagulation parameters. Properly selected pharmacotherapy enhances the effectiveness of dental treatment and helps prevent the development of complications.

In the future, it is advisable to conduct large-scale clinical studies in this area, investigate the efficacy of new-generation drugs, and refine individualized treatment approaches.

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