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Current Trends in the Treatment of Patients with Periodontal Diseases.

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ABSTRACT

The human body is known to contain approximately 980-990 g of calcium (24 890 mmol) with 98% contained in the bone tissue as hydroxyapatite, 0.4% - in the tooth enamel and dentine, 0.51% - in soft tissues, and only a small proportion is contained in the extracellular fluid. The body needs vitamin D3 to maintain normal calcium homeostasis and for bone remodeling. The synthesis of vitamin D is provided by the ultraviolet irradiation effect and depends on skin pigmentation, region location, latitude, weather conditions, and a season. Application of osteotropic preparations allows obtaining favourable outcomes and eliminating progressive loss of the alveolar bone tissues of the upper and lower jaws, as well as stimulating processes of reparative regeneration, in the treatment of patients with periodontal diseases as complications of diabetes mellitus.
Keywords: generalized chronic periodontitis, type 2 diabetes mellitus, calcitonin, vitamin D.

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RATIONALE

The microelement "calcium" is reported to perform the main function in regulating activity of cardiac muscle cells, the muscle tissue, skin, the central and peripheral nervous systems, and, the most important, the bone tissue. Ionized calcium acts as a mediator in regulating hormone and enzyme functions, the fact being extremely essential. Adequate calcium intake with food products undoubtedly provides the needed bone tissue density in the body. Process of metabolism of the body bone tissue will be stable enough only after it reaches the peak bone mass, i.e. the rate of bone resorption and the rate of bone formation must be similar. The necessity of calcium application as a biologically-active supplement in special preparations is addressed individually depending on its proportion in daily ratio and the health status of an individual.

In turn, calcium preparations were recommended for use in complex with other treatment options of pathogenetic events. The body needs vitamin D3 to maintain normal calcium homeostasis and for bone remodeling. Under physiological conditions its daily intake is within the range from 250-450 IU in adults to 650-750 IU in the elderly people.

"Alphacalcidol" composed of calcium and active forms of the vitamin D, "Calcemin Advance", "Calcium-D3 Nycomed" may be applied to reduce terms of retention and improve reconstructive processes in the periodontal tissues. Therefore, application of osteotropic preparations allows obtaining favourable outcomes and eliminating progressive loss of the alveolar bone tissues of the upper and lower jaws, as well as stimulating processes of reparative regeneration, in the treatment of patients with periodontal diseases as complications of diabetes mellitus. Research in this sphere seems to be currently important.

The aim of study was to assess efficiency of the complex treatment with application of the vitamin-mineral complex "Calcemin Advance" as a specific therapy aimed at the restoration of the bone tissue in case of bone resorption in patients with type 2 diabetes mellitus.

METHODS

The study was performed in the Department of Propaedeutic Dentistry, Voronezh N.N. Burdenko State Medical University. The study included 60 patients with chronic generalized mild and moderate periodontitis with compensated and sub-compensated type 2 diabetes mellitus. They were given an orthopedic treatment for partial loss of teeth in the upper and lower jaws.

Group 1 included 15 patients with removable laminar prosthesis based on acrylic polymer "Ftorax".

Group 2 included 15 patients with bugel prosthesis with clammer fixation or splinting bugel prosthesis made of cobalt-chromium alloy and acrylic polymer "Ftorax".

Group 3 included 15 patients with bugel prosthesis with clammer fixation or splinting bugel prosthesis made of thermoplastic polymers.

Group 4 included 15 patients with bugel prosthesis with clammer fixation or splinting bugel prosthesis made of thermoplastic polymers who also received complex treatment consisting of application of an anti-inflammatory bioresorptive adhesive film PPA-RAD (ППА-РАД in Russian) – an antibacterial dressing paste for periodontal disease prevention – and "Calcemin Advance" preparation.

An antibacterial dressing paste PPA-RAD for removable dentures was developed in the Department of Propaedeutic Dentistry, Voronezh N.N. Burdenko State Medical University. It consists of the two-layered hydrophilic-hydrophobic biodegradable film based on polysaccharides that has an antibacterial, antifungal, anti-inflammatory and wound healing effect; it provides acceleration of tissue regeneration due to presence of ether resins, ether oils, wax and biologically active substances.

The complex therapy in patients of group 4 also included "Calcemin Advance" – a vitamin-mineral complex with the therapeutical effect determined by the ingredients composing it. Calcium, a component of the preparation, participates in the bone tissue formation, decreases resorption and increases density of the bone tissue, prevents skeletal-muscular disorders, enables strengthening the bone tissue and joints. Cholecalciferol

(vitamin D3) regulates exchange of calcium and phosphorus in the body, participates in the formation of the bone skeleton, supports the bone structure, increases absorption of calcium in the intestine and reabsorption of phosphorus in the renal tubules. The "Calcemin Advanced" preparation was administered to patients of group 4, dosage 1 tablet/2 times daily during the afternoon (at lunchtime and with the evening meal) for 12 months, after consultation with an endocrinologist. Application of the combined preparation of calcium and vitamin D is the most preferable, since one tablet of this preparation contains minimum 500 mg of calcium and 200-400 IU of vitamin D. Administration of 2 tablets completely supplies daily needs of the body in the indicated substances. Collagen degradation products and enzymes secreted by osteoclasts appear to be the markers of bone resorption. These metabolites are released into the blood stream and excreted with the urine. Certain metabolites are specific for the bone tissue. Calcium fasting test is the cheapest method of the bone resorption assessment, since it is reported to be the bone resorption marker. This method is effective to reveal considerable intense resorption.

The patients were examined before the administration of the "Calcemin Advanced" preparation and in 6 and 12 months after its application. The preparation was administered in the dose 1 tablet/2 times daily during the afternoon (at lunchtime and with the evening meal) for 12 months, after consultation with an endocrinologist. The body needs vitamin D3 to maintain normal calcium homeostasis and for bone remodeling. Under physiological conditions its daily intake is within the range from 200-400 IU in adults to 600-800 IU in the elderly people, and to 1000 IU for people living in regions of the Extreme North.

Concentration of the intermediate metabolite [25-(OH)D3] in the blood serum is considered to be the most reliable indicator of the total exchange of vitamin D, that is why, this indicator may be used to determine body supply in vitamin D. It is also essential to reveal causes of the calcium pathological concentration in the blood serum. The adequate [25-(OH)D3] content maintains calcium absorption and bone metabolism. The content of [25-(OH)D3] lower that the targeted level of 30 ng/ml results in the decrease of calcium in the blood plasma and increase PTH secretion and, consequently, osteoclastic bone resorption, deprivation of remodeling processes and the bone tissue mineralization, reduction of the bone tissue density and changes of the bone architecture.

RESEARCH RESULTS

All patients were examined to detect the content of ionized calcium before treatment. The analysis of these findings demonstrated decrease of its quantitative content in patients of all groups. Moreover, the content of ionized calcium before treatment and in 6 and 12 months were practically similar in patients of groups 1, 2 and 3. It should be noted that changes of the investigated parameter manifested only in patients of group 4, who received the "Calcemin Advance" preparation for 12 months after consultation with an endocrinologist.

Thus, in 6 months after administration of the "Calcemin Advance" preparation the content of ionized calcium increased and constituted 1.44±0.05 mmol/l in patients of group 4; this value fell within the normal range 1.10-1.50 mmol/l.

In 12 months after administration of the "Calcemin Advance" preparation the content of ionized calcium constituted 1.49±0.03 mmol/l; this value fell within the normal range.

Therefore, treatment of pathogenetic events aimed at the normalization of bone remodeling processes, namely suppression of the processes of alveolar bone resorption in the upper and lower jaws, which consisted of administration of the "Calcemin Advance" preparation containing calcium and cholecalciferol (vitamin D3), allowed increasing the ionized calcium content. This fact, undoubtedly, resulted in the improved quality of life in patients with type 2 diabetes mellitus complicated by the partial tooth loss.

The body needs vitamin D3 to maintain normal calcium homeostasis and for bone remodeling. The analysis of the [25-OH D] indicator before the orthopedic treatment demonstrated vitamin D deficiency in patients of all 4 groups. All patients had a moderate level of vitamin D deficiency. Moreover, the content of vitamin D before treatment and in 6 and 12 months were practically similar in patients of groups 1, 2 and 3.

In patients of group 1 this parameter constituted 25.4±1.1 nmol/l, 25.1±1.2 nmol/l and 25.07±1.2 nmol/l on the first day of treatment, in 6 and 12 months, respectively.

In patients of group 2 this parameter was similar to that in patients of group 1 and constituted 26.1±1.8 nmol/l, 25.3±1.9 nmol/l and 25.1±1.9 nmol/l on the first day of treatment, in 6 and 12 months, respectively.

In patients of group 3 this parameter constituted 26.2±1.6 nmol/l, 25.6±1.1 nmol/l and 25.5±1.3 nmol/l on the first day of treatment, in 6 and 12 months, respectively.

It should be noted that changes of the investigated parameter manifested only in patients of group 4, who received the "Calcemin Advance" preparation for 12 months after consultation with an endocrinologist.

In 6 months after administration of the "Calcemin Advanced" preparation patients of group 4 demonstrated significant increase of the vitamin D content that constituted 34.4±1.9 nmol/l. In 12 months after administration of the preparation this parameter constituted 43.4±2.3 and was within the normal range.

Thus, the study performed to reveal the vitamin D content in patients who received the "Calcemin Advance" preparation for 12 months was reason enough to give practical recommendations for therapeutical use. This preparation may be applied as a part of pathogenetic treatment aimed at suppression of the bone tissue resorption and, as a consequence, increased efficiency of the orthopedic treatment in patients with type 2 diabetes mellitus complicated by the partial tooth loss.

CONCLUSIONS

Therefore, we can conclude that it is significant to apply the vitamin-mineral complex "Calcemin Advance" in treatment of patients with periodontal diseases complicated by type 2 diabetes mellitus. This will result in favourable outcomes and enable elimination of the progressing loss of the bone tissues. This fact, in turn, allows increasing clinical efficiency of the orthodontic treatment and, undoubtedly, improving the quality of life.

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