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Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
Maracaibo - Venezuela

Experience in the use of collagen phytoplates in the treatment of gingivitis

Anton Timoshin^{1*}

¹I.M. Sechenov First Moscow State Medical University (Sechenov University)
anton-timoshin007@yandex.ru

Andrey Sevbitov²

²I.M. Sechenov First Moscow State Medical University (Sechenov University)
avsevbitov@mail.ru

Elena Ergesheva³

³I.M. Sechenov First Moscow State Medical University (Sechenov University)
dryergesheva@mail.ac.ur

Sergey Mironov⁴

⁴I.M. Sechenov First Moscow State Medical University (Sechenov University)
snmironov@mail.ru

Sultan Kozhemov⁵

⁵I.M. Sechenov First Moscow State Medical University (Sechenov University)
sult13@mail.ac.ur

Inna Pustokhina⁶

⁶I.M. Sechenov First Moscow State Medical University (Sechenov University)
inna0193@mail.ru

Svetlana Danshina⁷

⁷I.M. Sechenov First Moscow State Medical University (Sechenov University)
svetti.danshina@yandex.ru

Abstract

According to the WHO, various forms of gingivitis account for more than 60% of all inflammatory periodontal diseases. Gingivitis is an initial inflammatory disease of periodontal tissues and may result in a severer disease – periodontitis – if not treated in a timely fashion. In its turn, periodontitis is a severer disease, which is as hard to treat as gingivitis. Furthermore, treatment may not result in a desired outcome. Therefore, gingivitis treatment is an urgent issue of practical dentistry. The aim of this study was to compare performance of different gingivitis medicines. Methods: We studied the local inflammatory conditions within the periodontium as a response to the Holysal gel on the basis of the clinical data relating to the oral cavity, and compared

the gingival inflammation therapeutic effect of the above gel with the product developed at the Sechenov Research Center of the Moscow Medical Academy – Farmadont. Results: The use of Farmadont resulted in a significantly reduced duration of gingivitis treatment. Conclusions: The use of Farmadont collagen phytoplates improves the efficient local treatment and prevention of gingivitis.

Keywords: gingivitis, inflammation, collagen, phytoplates, Farmadont.

Experiencia en el uso de placas de colágeno fito en el tratamiento de la gingivitis

Resumen

Según la OMS, varias formas de gingivitis representan más del 60% de todas las enfermedades inflamatorias periodontales. La Gingivitis es una enfermedad inflamatoria inicial de los tejidos periodontales y puede resultar en una enfermedad más severa-periodontitis-si no se trata de manera oportuna. A su vez, la periodontitis es una enfermedad más severa, que es tan difícil de tratar como la gingivitis. Además, el tratamiento puede no resultar en un resultado deseado. Por lo tanto, el tratamiento de la gingivitis es una cuestión urgente de la odontología práctica. El objetivo de este estudio fue comparar el desempeño de diferentes medicamentos contra la gingivitis. Métodos: se estudiaron las condiciones inflamatorias locales dentro del periodonto como una respuesta al gel Holisal sobre la base de los datos clínicos relativos a la cavidad oral, y se comparó el efecto terapéutico de inflamación gingival del gel anterior con el producto desarrollado en el Centro de Investigación Sechenov de la Academia médica de Moscú-Farmadont. Resultados: el uso de Farmadont resultó en una reducción significativa de la Duración del tratamiento con gingivitis. Conclusiones: el uso de fitoplates de colágeno de Farmadont mejora el tratamiento local eficiente y la.

Palabras clave: gingivitis, inflamación, colágeno, fitoplatos, Farmadont.

1. INTRODUCTION

Inflammatory periodontal diseases (IPD) are observed throughout the population regardless of age and socioeconomic status and represent one of the most complicated and urgent issues in dentistry. According to the WHO, the prevalence of periodontal diseases is very high, especially in age groups 15-19 (55-89%) and 35-44 years (65-98%). Complexity and insufficient treatment efficiency, lack of a reliable preventive system result in premature dental loss due to inflammatory lesions of periodontal tissues [Timoshin A.V., Sevbitov A.V., Ergesheva E.V.; 2018].

Gingivitis is an initial inflammatory disease of periodontal tissues and may result in a severer disease – periodontitis – if not treated in a timely fashion. In its turn, periodontitis is a severer disease, which is as hard to treat as gingivitis. Furthermore, treatment may not result in a desired outcome. This is the reason, why we paid our attention to this disease, the treatment whereof is efficient and helps prevent the developing periodontitis [Timoshin A.V., Sevbitov A.V., Platonova V.V.; 2018].

2. THEORETIC FOUNDATION

2.1. Etiology and pathogenesis of inflammatory periodontal diseases.

The etiological factor in the development of gingivitis – microbial. The main structural formation involved in the development of inflammatory periodontal diseases is plaque. In the mouth there is a 5-th zones of concentration of bacteria: language, cheek mucosa, supragingival plaque, subgingival plaque, saliva. Plaque is formed on the surface of the plaque, which is formed from saliva proteins. As part of the dental plaque there is a tooth pellicle, which is formed as a result of the interaction of the tooth with saliva, bacteria and products of their life are attached to it. The enzyme systems of bacteria contribute to the mineralization of plaque.

Subgingival plaque is a zone of colonization of bacteria. First, the bacteria are attached to the surface of the tooth, then located in the dentogingival sulcus and on the epithelial attachment, the formation of a surface bacterial plaque [Borisov V.V.; 2015]. Further, if you do not comply with adequate hygiene of the oral cavity, the process of forming a dental stone occurs:

Stage 1 – the accumulation of mineral components and the beginning of the growth of the nucleated crystals;

Stage 2 – growth and perfection of crystals of phosphate (up to 650-700 from 45-60 days);

Stage 3 – completion of the formation of Tartar (more than 700 days).

In relation to the marginal gum, there are light supragingival dental deposits (56-76% of the mineral component) and dark brown subgingival dental deposits. In 1965, Loy established a causal relationship between the onset of inflammation in the gums and the accumulation of microorganisms in the dental plaque.

3 hypotheses:

- Nonspecific;
- Specific;
- Exogenous

A specific theory states that certain types of microorganisms are specific in order to cause inflammation of the gums. Such microorganisms include gingival bacteroids, lactobacilli, actinomycetes, nuclear fusobacteria. Changes in diet affect the plaque. Chewing natural products prevents the accumulation of pathogenic bacteria [Timoshin A.V., Sevbitov A.V., Drobot G.V.; 2018]. In 1937, A. I. Evdokimov proposed a vascular theory, the essence of which is the morphological changes in the vascular walls. M. S. Schwartz in 1935 put forward a hypothesis about the special sensitivity of the vascular wall to vasoactive mediators.

In 1940 E. E. Platonov proposed the theory of disorders of nervous and trophic regulation of periodontal tissues. In 1993 N. K.

Loginova proposed a mechanical theory of the etiology and pathogenesis of periodontal disease, which does not reject the microbial factor as the cause of inflammatory periodontal disease. The evolutionary destruction of the human masticatory apparatus is substantiated. Microflora of dental plaque has a damaging effect on the periodontal tissue, resulting in an inflammatory reaction, which consists of successively developing phases:

- 1) Phase of alterations,
- 2) Exudation phase,
- 3) Proliferation phase.

The specific gravity of these phases may be different. If the phase of alteration prevails, then ulcerative-necrotic gingivitis develops. If the phase of exudation prevails, then catarrhal gingivitis develops. If the phase of proliferation prevails, then hypertrophic gingivitis develops [Ryakhovskii A.N.; 2006]. Treatment of catarrhal gingivitis is:

1. Elimination of local irritants, removal of hard dental deposits, filling of carious cavities with restoration of contact points;
2. Improvement of hygiene of the oral cavity;
3. Recommendations for the choice of hygiene products: toothbrush, interdental brushes, floss, irrigators;
4. Professional oral hygiene – polishing the surface of the teeth;

5. Using a solution of chlorhexidine 0.06% for oral baths for the period of hygiene training (7-10 days) – 3 minutes after brushing, in the morning and evening for inactivating plaque bacteria.

The purpose of our study was to investigate the local inflammatory conditions within the periodontium as a response to a well-known and well-established medicine – Holysal gel – on the basis of the clinical data relating to the oral cavity, and compare the gingival inflammation therapeutic effect of the above gel with the phytopreparation on the basis of collagen developed at the Sechenov Research Center of the Moscow Medical Academy – Farmadont. Holysal gel is a co-formulated topical antimicrobial, anti-inflammatory and analgesic medication. It is quickly absorbed from the application site; active substances reach nerve terminals and dwell there for a long time. This gel is pharmacologically more active against gram-positive bacteria and less - against gram-negative bacteria, as well as antibacterially efficient active against fungi and viruses [Makeeva I.M.; 2013].

2.2. The use of collagen in the treatment of inflammatory diseases of the oral mucosa

The use of collagen in medicine has a long history. Back in the mid-70 years of the XX century, the world's first scientists with a world name Professor Leonid Prokofievich Istranov and Elena Viktorovna Istranova developed a unique technology for producing

collagen from the tissues of mammals and fish. The obvious advantage of collagen and obtained on the basis of the collagen materials used in medicine is the lack of toxic and carcinogenic properties, the weak antigenic power to the maximum, high mechanical strength and resistance to tissue enzymes, adjustable rate of lysis in the application, the ability to form complexes with biologically active substances, stimulating the regeneration of native tissues.

Collagen is a soluble polymer and is subjected to resorption in the living body, the timing of which can be regulated within a wide range. Collagen can be widely used in combination with various drugs. It comes in connection with various substances - heparin, chondroitin sulfate, thrombin, antibiotics, antiseptics, vitamins, hormones and others. The appearance of collagen dissolution products (CDP) has expanded the possibilities of its wide application in various fields of medicine.

From CDP it is possible to receive collagen films, sponges, threads, tubes, etc. Collagen materials treat wounds, burns, trophic ulcers, then use for plasty of vessels, valves, trachea, closing of defects of skin burn or traumatic etiology, defects of bone tissue, a Dura mater, a cornea, a tympanic membrane, a liver and a spleen, and also as suture resorbable material, hemostatic means and tampons for filling of bone cavities, etc [Mamedov A.A.; 2004]. Collagen-based drugs have been successfully used for the treatment of inflammatory diseases of the maxillofacial region for more than a decade, which is pathogenetically justified. In 1983 Muminov, G. G., in his thesis

describes the successful application of the ointment “Bormental” – ointment piromekaina 3% on the basis of collagen for the treatment of diseases of the oral mucosa and periodontium.

2.3. The photographic plates scaffold based on collagen “Farmadont”

The Farmadont product consists of rectangular collagen plates saturated with extracts of medicinal herbs (Aloe, Hypericum, Plantago, Matricaria, Valeriana, Arnica). They also contain digestase – a complex of natural proteolytic enzymes derived from the red king crab’s hepatopancreas. On contact with the wet mucosa a plate starts to absorb the oral fluid, gradually transforms into a gas-permeable gel and thus adheres to the mucosal surface. The plate ensures retention of drugs exactly on the application site and protects the site of inflammation against aggressive environmental impact. The digestase and herbal extracts are gradually released and absorbed into the subjacent mucosa in a dosing fashion (Ajallooeian et al. 2015).

We used Farmadont III for this study. The choice was based on its broader antibacterial and antiviral properties. Farmadont III is designed to prevent and treat inflammatory diseases of the gingiva and the oral mucosa: gingivitis, periodontitis, alveolitis and stomatitis. Aloe contains around 80 nutrients, including 20 mineral substances, 19 amino acids, vitamins A, B1, B6, B12, C and E. This is a natural antiseptic capable of protection against bacteria, fungi and viruses.

Aloe features homeostatic properties: it alleviates inflammation and aids gingival cleaning, healing and recovery. Hypericum is very effective at reinforcing gingiva, alleviates inflammation, reduces pain and even improves mood. Plantago alleviates inflammation, pain and bleeding, heals wounds, reinforces gingiva and effectively fights periodontitis [Borisov V.V.; 2016].

3. METHODOLOGY

This work was done at Sechenov University with supported by the "Russian Academic Excellence Project 5-100".

We examined 33 patients diagnosed with acute gingivitis (K05.0) or exacerbated chronic gingivitis managed outpatiently at State Budgetary Institution “Peredelkino Geriatric Research Guidance Center” and the Center for Sports and Ballet Injuries and Rehabilitation at Federal State Budgetary Institution “Priorov National Medical Research Center for Traumatology and Orthopedics” from 2015 to 2018. We selected these patients on the basis of the current medical criteria (table 1).

Table 1: Study inclusion/non-inclusion/exclusion criteria

Study inclusion criteria (m/f)	Study non-inclusion criteria (m/f)	Study exclusion criteria (m/f)
Written informed consent to participate in the study	Inapplicable age group	Withdrawal from participation in the study

Age group 10-75 years	Breastfeeding	Pregnancy
Acute gingivitis or exacerbated chronic gingivitis	Chronic periodontal inflammation	Violation of prescriptions, medical checkup stages

The patients were divided into 2 groups. We used Farmadont III in group 1 and the Holysal gel in group 2. The patients underwent professional oral care before the treatment using medicinal products, therapeutic and surgical full mouth debridement in the course of treatment to remove all the possible causes of development of various periodontal pathologies. Antiseptic oral treatment was performed before administering any therapeutic anti-inflammatory agent. We applied Farmadont III plates to the injured site, flattened them carefully and pushed against the mucosa. We pretreated the oral cavity with an antiseptic (chlorhexidine). Residues of a previously placed plate were removed before applying a new plate.

The Holysal gel was rubbed into the inflamed site of the mucosa 2 times a day in a small amount. To treat gingivitis, we placed gel under or over the gingival edge 1-2 times a day. Patients experienced the mild burning effect. Both products were used between meals. The clinical course was controlled by means of the gingivitis index and the bleeding index (Laureano et al, 2018; Koskenoja, 2019).

4. RESULTS

The initial gingivitis index of the study subjects is included in table 2.

Table 2: Initial (pretreatment) gingivitis (Rimfjord) index of patient groups 1 and 2

Disease severity (points)	Group; number of patients (absolute and %)	
	Group 1 (n = 17)	Group 2 (n = 16)
Mild gingivitis (1 point)	2 (11.76%)	3 (18.75%)
Moderate gingivitis (2 points)	14 (82.36%)	12 (75%)
Severe gingivitis (3 points)	1 (5.88%)	1 (6.25%)
Total	17 (100%)	16 (100%)

Along with the gingivitis index, we studied the bleeding index (see table 3).

Table 3: Initial gingivitis bleeding index (BI) of patient groups 1 and 2

BI (points)	Group; number of patients (absolute and %)	
	Group 1 (n = 17)	Group 2 (n = 16)
0 points	-	-
1 point	9 (52.94%)	9 (56.25%)
2 points	6 (35.3%)	6 (37.5%)
3 points	2 (11.76%)	1 (6.25%)
Total	17 (100%)	16 (100%)

According to tables 2 and 3, we may conclude that all the patients suffered from mild or moderate gingivitis. We obtained the

following data by evaluating the gingival bleeding index post treatment (see table 4).

Table 4: Comparison of gingivitis BI throughout the treatment of patient groups 1 and 2

Follo w-up list	Group; number of patients (absolute and %) (points)							
	Group 1 (N = 17)				Group 2 (N = 16)			
	0	1	2	3	0	1	2	3
1	-	9 (52.9 4%)	7 (41.1 7%)	1 (5.8 8%)	-	9 (56.2 5%)	6 (37.5 %)	1 (6.2 5%)
2	2 (11.7 6%)	8 (47.0 6%)	6 (35.2 9%)	1 (5.8 8%)	-	7 (43.7 5%)	8 (50%)	1 (6.2 5%)
3	9 (52.9 4%)	4 (23.5 3%)	4 (23.5 3%)	-	4 (25%)	9 (56.2 5%)	3 (18.7 5%)	-
4	10 (58.8 2%)	5 (29.4 1%)	2 (11.7 6%)	-	8 (50%)	6 (37.5 %)	2 (12.5 %)	-
5	16 (94.1 2%)	1 (5.88 %)	-	-	10 (62.5 %)	5 (31.2 5%)	1 (6.25 %)	-
6	-	-	-	-	15 (93.7 5%)	1 (6.25 %)	-	-
7	-	-	-	-	-	-	-	-

According to table 4, gingival bleeding in patient group 1 (Farmadont III) ceased on day 5, in group 2 – on day 6 (Holysal gel). Furthermore, the bleeding index of 0 points was observed in 94.12% for patient group 1 and 93.75% - for patient group 2, respectively.

5. DISCUSSION

This study indicates high effectiveness of Farmadont III for gingivitis and gingival bleeding. The main benefit of this study is that it is the first comparative assessment of effectiveness of gingivitis treatment with Farmadont or well-known and well-established medicine – Holysal – in a large sample. Collagen-based have long been used to treat periodontal inflammatory diseases. E.G. Ezhova described effectiveness of using Emparkol for multimodality treatment of periodontitis in her PhD thesis in 2001. She made the following conclusions on the basis of the results obtained: the use of Emparkol for multimodality treatment of periodontitis results in a pronounced anti-inflammatory effect and normalizes regional circulation, including microcirculation and oxygen metabolism in periodontal tissues.

As a part of multimodality treatment, Emparkol positively affects parameters of microcirculation and leads to lasting normalization of oxygen metabolism in periodontal tissues by reinforcing oxygen delivery and consumption processes in gingival tissues. Tukhvatullina described the use of the Emalan gel to treat chronic periodontitis in 2007. The group of patients treated among other medicines with the collagen-containing Emalan gel featured a significant improvement in oral hygiene indices. The product used in this study (Farmadont III) contains mineral substances, vitamins and amino acids. This helps to significantly reinforce its anti-inflammatory and reparative effect as seen in the results of the study.

6. CONCLUSIONS

1. The use of the Farmadont collagen phytoplates improves efficient local treatment and prevention of gingivitis as an indispensable part of an etiopathogenetic therapy. The use of these periodontal products ensures lasting therapeutic effect in most cases and in a shorter term in comparison with conservative therapies.

2. The combination of antibacterial, anti-inflammatory, wound-healing and antiseptic properties of the Farmadont collagen phytoplates provides a comprehensive effect allowing their use for acute and exacerbated chronic pathologies of periodontal tissues.

3. The mode of administration of the active substances contained in the Farmadont phytoplates is a promising practical dentistry and deserves special attention due to dosed delivery of agents over a long period.

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