Evaluation of the effect of the combination of hyaluronic acid, herbal extracts and coenzyme Q10 on the soft tissues in the oral cavity

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ABSTRACT

Objective: To evaluate the effectiveness of the gel in healing soft tissues in the oral cavity in comparison to competing products.

Methods: The study included the Stomatoestika Kulis centre patients with aphthous or traumatic ulcerations in the oral mucosa, periodontal diseases or complications after dental extraction. Questionnaires and patient opinions were used to assess the efficacy of the gel in treating soft oral tissue, in comparison to previously used products.

Results: The study surveyed 64 patients. 47 patients (73.5%) were very satisfied with the effects of the tested gel, 15 patients (23.5%) were satisfied and 2 patients were dissatisfied, accounting for only 3% of all the patients who participated in the survey.

Conclusion: The study showed that 97% of patients were very satisfied or satisfied with Oraflogo® gel, and that the gel is more effective in comparison to products that were commonly used by patients to treat soft tissue in the oral cavity.

Keywords: oral ulceration, gingivitis, periodontitis, postoperative conditions, gingivoplasty, hyaluronic acid, gel

INTRODUCTION

The purpose of the study is to determine the effect of locally active gel, which is composed of hyaluronic acid and added plant extracts, on the affected soft tissues in the oral cavity. The focus is particularly on the effect of this gel when applied to damaged tissue due to periodontal disease, on oral ulcerations, postoperative lesions or on wounds after tooth extraction.

The secondary aim of the study is to compare the effect of this gel with the products for gum care that the patients have been using up until now.

The tested product (Oraflogo® gel) is used to heal gums (gingivitis, gum erosion, burns, aphthae, injuries, mucosal ulcerations), or to heal the deeper periodontal tissues (periodontitis). The active ingredients of the gel are known to accelerate the healing of wounds in the mucous membrane, and to reduce bleeding, pain and oedema in the oral cavity *(Table 1)*.

Hyaluronic Acid (Hyaluronate)
Aloe barbadensis (Aloe Vera)
Coenzyme Q10 (Ubiquinone)
Macadamia alternifolia (Tea tree seed oil)
Centella asiatica
Cupressus sempervirens (Mediterranean cypress)
Thymus vulgaris (Garden thyme oil)
Trigonella foenum graecum (Fenugreek)
Aesculus hippocastanum (Horse chestnut)
Panthenol
Allantoin
Ascorbic acid (Vitamin C)
Tocopheryl acetate (Vitamin E)

Table 1 - Oraflogo® gel ingredients

Description of the ingredients in the tested gel:

Hyaluronic acid (hyaluronate) is a glycosaminoglycan with anti-inflammatory and anti-oedematous properties (1). It is a linear polymer of glucuronic acid and N-acetylglucosamine. The effects of hyaluronic acid on the recovery processes in cellular tissues are well studied, but its mechanism of action is less well known. In the organism, it can be found in the eyes, blood vessel walls, skin, joints and in many other organs and tissues.

Due to its osmotic nature, hyaluronic acid promotes lubrication of the tissues (2,3) in inflammatory processes, and its viscosity impedes the passage of viruses and bacteria through the cell membranes.

The low molecular weight of the hyaluronic acid oligosaccharides allows for an accelerated angiogenesis and stimulates collagen synthesis in endothelium (4).

The first clinical tests with the use of hyaluronic acid in stomatology were performed by Pagnacco and Vangelisti in 1997 (5). Hyaluronic acid showed anti-inflammatory, anti-oedematous and anti-bacterial effects in the treatment of

periodontitis which had been caused due to the presence of bacteria in subgingival plaque [6].

[Many clinical studies of the local application of hyaluronic acid have shown excellent results in periodontal disease [5,6,1].

Aloe barbadensis [Aloe vera] is a plant with sword-shaped leaves, native to northern Africa.

The mucilaginous material in its leaves contains polysaccharides, tannins, sterols, saponins, fibres, minerals, gamma-linolenic and arachidonic acids. Numerous studies of aloe gel demonstrate a statistically significant improvement in the healing of wounds [7,8], as well as its anti-inflammatory action [9, 10]. Aloe vera has proven to be useful in the treatment of gingivitis [11].

Coenzyme Q10 [ubiquinone]

Coenzyme Q10 is present in all living cells in the process of cellular energy production and in protecting the body against free radicals. It participates in the respiratory chain process, or the electron transfer chain, which is powered by coenzyme Q10 as an electron transporter. It is a powerful antioxidant. The research of local application in periodontal disease has shown a reduction in bleeding index and gingivitis. [12,13]

Macadamia alternifolia [tea tree seed oil]

It is acquired by steam distillation of the leaves of certain species of Australian trees which are part of the genus Melaleuca [Myrtaceae - myrtle family]. The essential oil is composed of almost 100 different compounds. The quality essential oil which meets the requirements of the European Pharmacopoeia contains at least 30% terpinen-4-ol and no more than 15% of 1,8-cineole.

The most important features are its antibacterial and antifungal properties [14], as well as its anti-inflammatory [15,16] and antiviral effects on the Herpes simplex virus [17,18].

Centella asiatica

It is an important medicinal plant in Ayurvedic medicine. It contains saponins [also called triterpenoids], the most effective of which are asiaticosides and asiatic acids [19]. These are responsible for healing wounds and inhibiting scar formation due to their vascular effects. Centella asiatica also promotes angiogenesis and improves capillary circulation [20].

Trigonella foenum graecum [fenugreek]

Fenugreek [scientific name Trigonella foenum-graecum] is a plant found commonly in Asia, Africa and the Mediterranean countries. Studies in rats have shown it has an analgesic effect similar to NSAIDs [21, 22], and an antithrombotic effect [23].

In comparison with similar products, Oraflogo® gel contains 50% more hyaluronic acid and stronger active ingredients. Due to its high viscosity, it exhibits a long-lasting attachment to the site of application and consequentially has a prolonged effect [24].

Symptoms of inflamed gums appear as discoloured gums from a light pink to red, with swelling and sensitivity to touch, or when biting into harder food, and as increased bleeding while brushing.

Untreated gingivitis does not bring only functional, aesthetic, temporal and financial implications, but also systematically impacts the health of the whole organism. Therefore, any chronic inflammation of the oral mucosa encountered during the survey was regarded very seriously.

MATERIALS AND METHODS

The study was conducted at the Center Stomatoestetike Kulis under the leadership of Chief Mag. Marko Kulis, and lasted for five months.

The study included 64 patients with an average age of 56 years old and with the following pathologies:

- periodontal disease
- oral ulceration
- surgical wounds wounds [surgical lesions, tooth extraction] *[Chart 1, Table 2]*

Indications

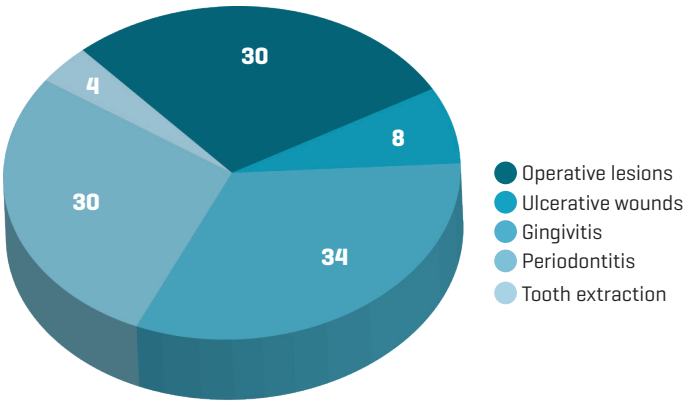


Chart 1: Number of cases treated with Oraflogo® gel
[Some patients had multiple indications simultaneously]

TREATED CONDITIONS	
Operative lesions 25 subjects	10 gingivitis 18 periodontitis 2 gingivoplasty 1 gigantocellular epulis 2 tunnelling procedures 1 premolarisation 4 alveolitis sicca [after extraction of wisdom teeth]
Periodontal disease (unoperated) 32 subjects	25 gingivitis 7 periodontitis
Ulcerative wounds 7 subjects	1 decubitus ulcer 1 palatal burn 2 aphthae 2 herpes cases 1 angulus infectiosus oris

Table 2: Studied subjects

The patients were included in the study after being clinically examined by their dentist. All of them have already been using various products to help alleviate their problems. A

dentist at the clinic demonstrated how to apply the gel, and then the patients used the gel at home, following the dentist's instructions.

After 3-7 days, the patients re-visited the clinic and their satisfaction with the product was assessed (healing, pain reduction, oedema and reduction in bleeding).

Patients were required to express whether they were dissatisfied, satisfied or very satisfied with the gel in terms of pain reduction, bleeding, oedema and rapid healing of the gums and soft tissue in the oral cavity.

The gel was also compared to products which they had previously used to alleviate their problems. These included propolis, herbal teas with salt, or herbal drops *(peppermint essential oil, fennel essential oil, menthol, phenyl salicylate, clove essential oil, tormentil tincture, sage essential oil, eucalyptus essential oil, cinnamon bark essential oil and chamomile essential oil)*.

Since the effect of the tested gel also depends on its proper use, or the application of the gel on the soft tissues in the oral cavity, patients in the survey were also informed of the most appropriate way to use the gel for different indications in order to achieve optimum results.

(P. 6)

RESULTS

The results have shown that 47 patients (73.5%) were very satisfied with the effects of the tested gel, 15 patients (23.5%) were satisfied and 2 patients were dissatisfied, which amounts to 3% of all the patients who participated in the survey *(Chart 2)*.

Assessment by patients

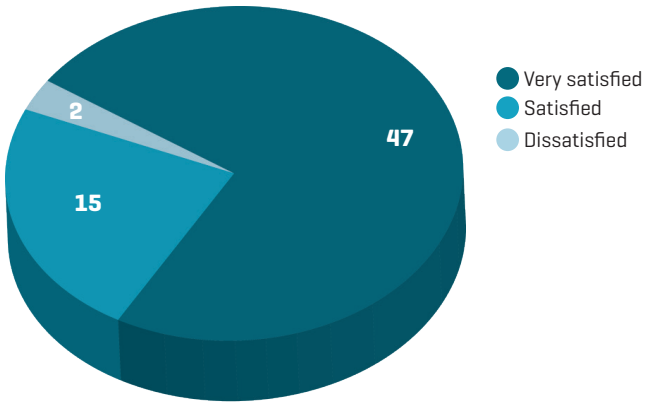


Chart 2: Assessment of satisfaction with Oraflogo® gel by all patients participating in the
(figures in the chart represent the number of patients).

97% of the survey participants, or 62 patients respectively, said that the tested gel was better regarding healing time, route of administration and duration of effective action in comparison to the other products they had used. Only 3%, or 2 patients, did not notice any difference.

The gel indications were divided into three groups (some patients had multiple indications simultaneously):

1. OPERATIVE LESIONS

We observed 25 patients who were using the gel with hyaluronic acid and herbal extracts post-surgery. The study included: 18 cases after periodontal surgery, 12 cases after gingivoplasty, 1 case after removal of gigantocellular epulis, 2 cases after tunnelling, 1 case after premolarisation and 4 alveolitis sicca after the extraction of wisdom teeth.

The first application of the tested gel onto a postoperative lesion was performed by a dentist immediately after surgery, then the dentist demonstrated to the patient the correct way to use the gel, and the patient continued with the treatment at home using the gel 3-5 times per day. After 7 days, during their examination at the clinic, the patients assessed the effect of the gel (Chart 3), and compared it with the products which they had previously used to alleviate problems in their oral cavity.

Assessment by patients (operative lesions)

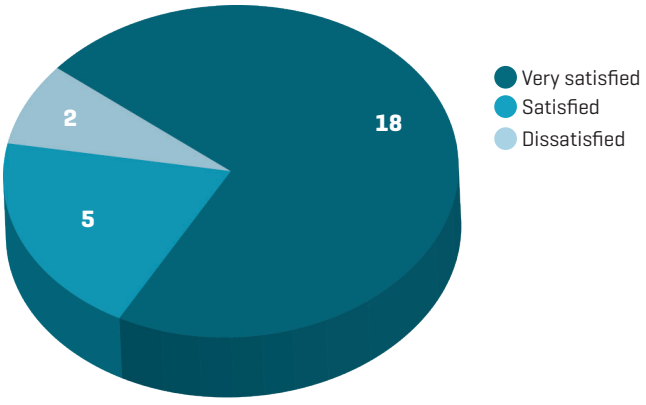


Chart 3: 72% of the patients who had been operated on were very satisfied with the effect of Oraflogo® gel, 20% were satisfied and only 2 patients, or 8%, were dissatisfied
(figures in the chart represent the number of patients).

Figure 1 shows a clinical case of a patient prior to surgery *(1a)*, the surgical wound immediately after the operation *(1b)*, and the fully healed wound on day 7 after surgery and after the application of the tested gel *(1c)*.

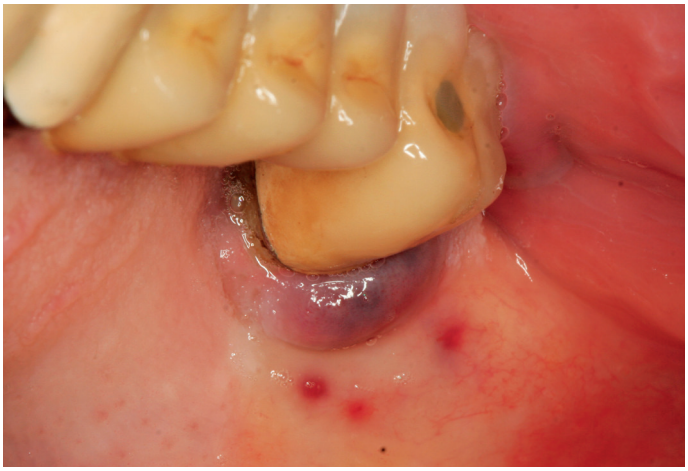


Figure 1a - Periodontitis with a deep pocket (6mm), bleeding, wobbly tooth, pain on pressure

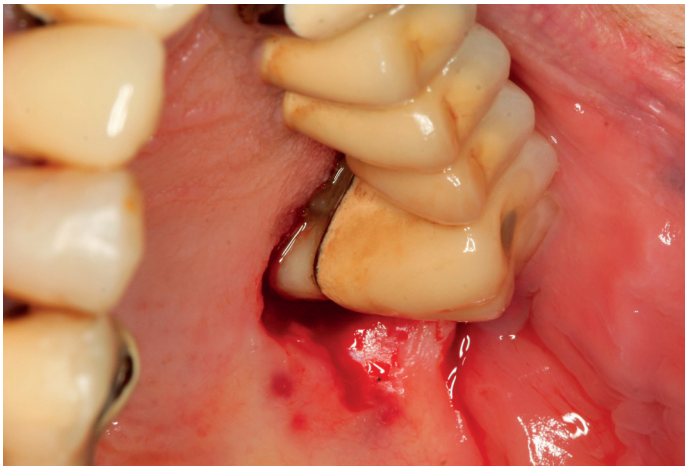
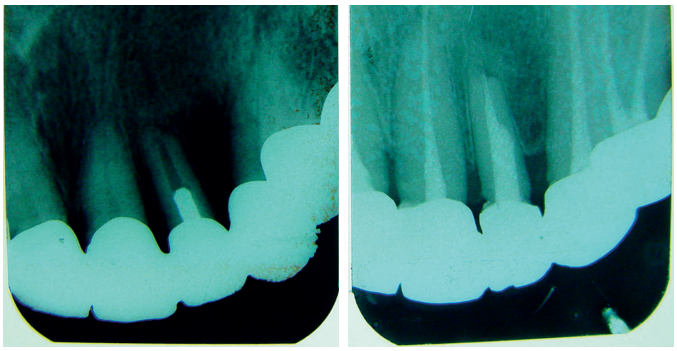


Figure 1b - Surgical wound of gingiva following gingivoplasty and cleaning of root surfaces



Figure 1c - Completely healed wound, day 7 after surgery, with the use of gel containing hyaluronic acid and herbal extracts



Figures 2a and 2b

a) Example of a patient with bruxism and chronic periapical periodontitis on tooth 12, and dead teeth 11, 13, 14 due to bruxism. A ready-made pin in the endodontically untreated lateral incisor is visible under the total bridge, since the patient wanted to keep it.
b) Situation after 5 months: the teeth were endodontically treated, gingivectomy was performed and granulation from periodontal pockets was removed, after surgery the patient used the tested product. No peri- or para-apical processes can be discerned in the image. Composite materials have enabled preservation of the total bridge. During the course of treatment, the patient abandoned her bruxing habits.

2. PERIODONTAL DISEASE

We observed 32 patients with gingival diseases, 7 of which had periodontitis and 25 gingivitis.

The patients used the tested gel 3 times a day and after seven days they had a control examination.

81% (25 patients) were very satisfied, 19% (6 patients) were satisfied and 0% dissatisfied *(Chart 4)*. After seven days of using the tested gel the gums had become more solid and there was less pain and bleeding.

Assessment by patients (periodontal disease)

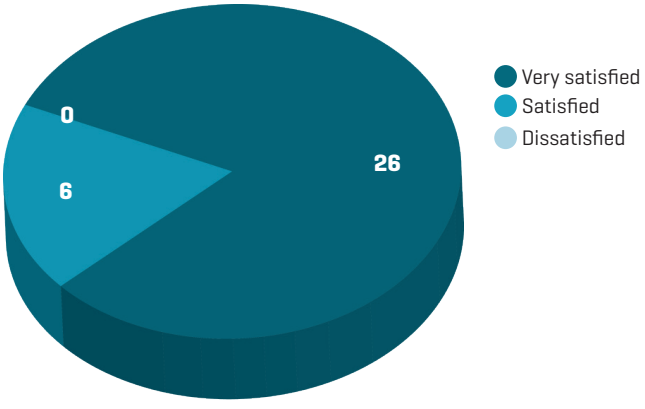


Chart 4: Assessment of satisfaction with Oraflogo® gel by patients with periodontal disease
(figures in the chart represent the number of patients).

Figure 3 shows an example of a patient with gingivitis before using the gel *(Fig. 3a)*, and after the removal of hard and soft dental deposits and after seven days of using the gel *(Fig. 3b)*.



Figure 3a - Hard and soft dental deposits, inflamed gums.



Figure 3b - One week after the removal of hard and soft dental deposits and after using Oraflogo® gel. The teeth were connected together because they were wobbly.

3. ULCERATIVE INJURIES

The study involved 7 patients with decubitus ulcer (1), herpes (2), aphthae (2), angulus infectiosus oris (1), and a palate burn (1). They re-visited the clinic for a follow-up examination after 3-7 days. 3 patients, or 43%, were very satisfied with the product tested, 4 patients, or 57%, were satisfied, and 0 patients were dissatisfied *(Chart 5)*. The pain was gone, the wounds were healed. Aphthous ulcers disappeared, aphthae no longer propagated and herpetic lesions decreased.

Assessment by patients (ulcerations)

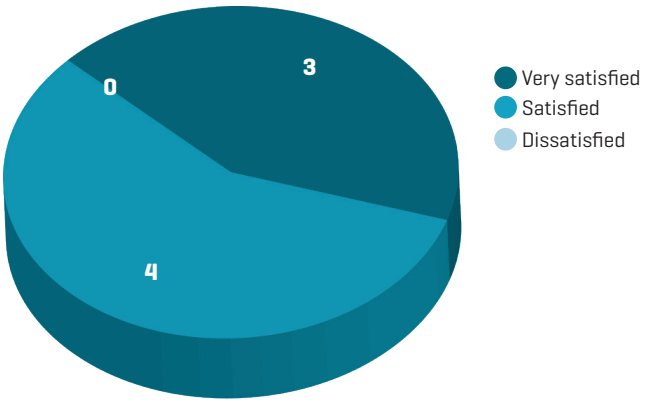


Chart 5: Assessment of satisfaction after using the gel by patients with ulcerative damage
(figures in the chart represent the number of patients).

Figure 4 shows an example of a patient with an ulceration of the hard palate prior to using the gel *(Fig. 4a)*, and the healed ulceration after 5 days, with the help of the gel *(Fig. 4b)*.



Figure 4a - Ulceration (burn)



Figure 4b - Ulceration healed after 5 days of gel application.

CORRECT USE OF ORAFLOGO® GEL

Oraflogo® gel is most effective when combined with good oral hygiene and drying the affected area prior to applying the gel.

For best results, we recommend that an oral hygienist or a dentist removes hard and soft dental deposits and plaque on the tongue and mucous membranes before using the gel.

The study also found that it is important that the therapist and the patient apply the gel correctly in order to ensure better and faster results. In addition to basic instructions for applying the gel, we have therefore added specific instructions for the indications described below.

Basic instructions:

Squeeze a sufficient amount of gel (to cover the affected site) on the tip of your clean index finger or thumb, and gently apply directly onto the wound. To speed up the effect, it is recommended to pre-dry the affected area.

Periodontal disease:

Rub the gel on the teeth in the direction of the gums. Fill the pockets with gel.

After tunnelling, premolarisation:

Fill the space between the roots with gel squeezed directly from the tube.

Following tooth extraction:

- After *tooth extraction* and sewing the wound, wait for 10 minutes for coagulum to form, and then gently apply the gel onto the wound.
- *Alveolitis sicca:* occurs after a few days, if no coagulum appears on the extraction wound, and it is often filled with food and very painful. Clean the wound, fill the empty alveolar cavity with the gel directly from the tube (easier application). The patient is advised not to suck the gel content from the wound, and to apply the gel into the wound several times a day. For a few days, it is recommended to eat liquid food.

Use prior to temporary cementation of provisionals:

In the case of gingivoplasty and production of temporary crowns, the gel can be administered directly into the provisional crowns. The provisional is placed on the prepared tooth and gently pressed to settle. The gel is also then applied under the elements and in the interdental spaces, in the direction from the mucosa towards the provisional crown. The dentist repeats the procedure every day. After three days, when the inflammation calms down, the dentist cements the provisional with temporary cement. The patient then applies the gel on the provisional orally according to the instructions. The gel is applied in the direction from the mucosa towards the provisional.

Decubitus ulcers, abrasions (due to dentures or orthodontic appliances)

Localize the decubitis site on a prosthesis or an orthodontic appliance. Properly sand the site, apply the gel onto the sanded area and insert the prosthesis or orthodontic appliance in the mouth.

Oral ulceration

Aphthae, angulus infectiosus oris, stomatitis, herpes, burns or contusions should be gently dried and the gel applied onto them several times a day.

DISCUSSION AND CONCLUSION

The study included 64 Stomatoestetika Kuliš patients who had ulcerations, inflammation of the periodontal tissues, or were recovering from surgery in the oral cavity.

The survey results show significantly greater patient satisfaction with the gel (hyaluronic acid, Q10 and herbal extracts) when applied to heal wounds in the oral cavity, alleviate pain, reduce bleeding and oedema, compared with previous products the patients had been using to alleviate their problems.

47 patients (73.5%) were very satisfied with the effects of the gel,15 patients (23.5%) were satisfied, and 2 patients were dissatisfied, which accounts for 3% of all patients who participated in the survey *(Chart 2)*. The vast majority (97%) was therefore very satisfied or satisfied with the product.

In postoperative conditions, 92% of patients were satisfied or very satisfied with the effect of the gel, while only 2 patients were dissatisfied *(Chart 3)*.

In terms of periodontal disease *(Chart 4)* and ulcerations *(Chart 5)*, 100% of patients were satisfied or very satisfied with the effects of the gel.

The gel tested in the study favourably affected the healing of postoperative wounds, periodontal tissue inflammation and the healing of oral ulceration. 97% of the patients felt that Oraflogo® gel is better than previous products they have used.

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