Histopathological Experimental Data About Minimally Invasive Treatment of Pulpal Inflammation Through Pastes Based on Royal Jelly

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Abstract

Introduction: Royal jelly is the most interesting of trio products that comes from bees. The 10-hidroxydeconoic acid is a precious ingredient of royal jelly that exerts antibacterial and antitumor activities. It looks like a white-yellow cream, with a pH around 4.4.5.

Purpose: To define through histopathological slides, the anti-inflammatory and regenerative actions of pastes based on royal jelly in vital amputations in the near future.

Methodology: 16 patients, ages 35-60 years old, were taken for 16 planned teeth extractions due to orthodontics and prosthetics purposes. Patients were treated at the University Clinic of Aldent, Tirana. The teeth were divided into four groups, where three groups were treated with pastes based on royal jelly and the fourth group served as a control group. Pulpal disease diagnosis was acute partial pulpitis based on clinical data. The coronary vital amputation was used in removing the inflamed pulp while aiming storage of the radicular pulp.

Results: From clinical examination, patients did not display concerns for pain, pulse, reactions to percussion or changes to the surrounding tissue in conjunction with treated teeth. After 30 days of treatment, the histopathologic examination was observed as normal pulp with odontoblasts proliferation well expressed a cell proliferation and lack of inflammation at the 1st group.

Keywords: Anti-Inflammatory; Propolis; Regeneration; Royal Jelly; Vital Amputation

Introduction

The propolis is a mixture of substances and other elements as: taninas, propolis resin, wax of bees, essence, pollen, different vitamins, microelements, etc. [2,10]. Being a secondary product of bees, it is known for its antitumor, antioxidant, antimicrobial, anti-inflammatory, and immunomodulatory effects [1,7].

A hive well maintained can produce in 5-6 months of spring-summer seasons about 500 grams of royal jelly. This is the most interesting trio product that comes from bees.

Royal jelly is one of the most valuable products of the bee hive. It is excretion of hypopharynx glands and jaw of bees. The precious ingredient of royal jelly is 10-hidroxydeconoic acid which exerts antibacterial and antitumor activities [4,9].

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It contains 70% water, 30% dry substances, from which 15% are proteins, 12% carbohydrates and 3% lipids. It also contains enzymes, cholinergic factors, vitamin B1, B2, B6, PP, Biotin, B5, B9, B12, inositol, minerals and 28 oligoelements, antitoxic factors, antibiotic (royalizina), a growth factor that is biopoterin, and antitumor cytostatic factor (neopterin), etc, [5,6,14].

It is a stimulant that facilitates the cellular metabolism, strengthens the immune defense and resistance to stresses, which will operate on depression and fatigue (Table 1). It looks like a white - yellow cream, with perfume and more pungent flavor. Its PH is 4-4.5.

<table>
<thead>
<tr>
<th>General revitalizer</th>
<th>Stimulate the level of anti-anemic senile (aging)</th>
<th>Stimulant of appetite</th>
<th>Stimulant of humor</th>
<th>Equilibrator of neurovegetative and psychological systems</th>
</tr>
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<tbody>
<tr>
<td>Immunomodulatory (incentive to anticorps)</td>
<td>Antibacterial</td>
<td>Anti-hypertensive</td>
<td>Antiviral</td>
<td>Antitoxic</td>
</tr>
</tbody>
</table>

Table 1: Properties of royal jelly.

Aim

To define through histopathological slides, the anti-inflammatory and regenerative actions of pastes based on royal jelly in Vital amputations in near future.

Materials and Methods

We took 16 patients, ages 35-60 years old, 7 of which were women and 9 were men. We planned 16 teeth extractions for orthodontic and prosthetic purposes. A sub-agreement with the patients for the method of treatment and dental extractions was done before interventions. Patients were treated at the University Clinic of Aldent, Tirana. The teeth were divided into four groups. Three groups were treated with pastes based on royal jelly and the fourth group served as a control group (untreated) (Table 2). Pulpal disease diagnosis was acute partial pulpitis based on clinical data. As a technique, we used the coronary vital amputation removing the inflamed pulp and aiming storage of the radicular pulp. Anesthesia in all cases was infiltrative with 4% Articaine. Cavity opened by traditional techniques.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
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<tbody>
<tr>
<td>Zinc oxide + royal jelly</td>
<td>Zinc oxide + royal jelly + 5% propolis dissolved in propylene glycol</td>
<td>Ca(OH)₂ + royal jelly + 5% propolis dissolved in propylene glycol</td>
<td>Control group - untreated, with partial pulpitis</td>
</tr>
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</table>

Table 2: Therapeutic pastes taken in treatment based on royal jelly.

Pastes prepared ex-tempore, approved royal jelly obtained from the pipe (Figure 1) in the consistency of mashed were applicable in the cavity. Hemorrhage was banned in most of cases with saline. After drying the cavities under sterile conditions, an application of paste was done without pressure on the radicular pulp in a thickness of 2 mm. We then set the layer of cement without pressure above, to a definitive composite filling.

Patients were observed for a period of 30 days. After 30 days, the extractions of teeth were then fixed in 10% formalin. EDTA was used as decalcification in the Histopathologic Laboratory of the QSU “Hospital Center University of Mother Teresa” Tirana. Stains were used Hematoxylin - Eosin and Masson’s Trichrome. Slides were also performed longitudinal and transversal.

Results of the Treatment

Clinical examinations show subjective as well as objective patients did not exhibit concerns (pains, pulses, reactions on percussion or changes to the surrounding tissues) in conjunction with treated teeth.

In 1st group, as intended, was to see the action of royal jelly mixed with an indifferent powder. It was not radio-transparent such as zinc oxide. After 30 days of treatment and observation by histopathologic examination, there were normal pulp with odontoblasts proliferation well expressed and proliferation and lack of inflammation in the pulp a cell (Figure 2-4).

Figure 1: Pipe with royal jelly, taken for the preparation of pastes.

Figure 2: Longitudinal slide of pulp with Hematoxylin-Eosin stain, normal histological structure.
The 2nd group, treated with the paste based on oxide zinc + royal jelly + 5% propolis dissolved in propylene glycol, was observed to have normal pulp, odontoblasts borders in 50% of cases, while the rest of cell structure prevailed from fibrocytes and fibrotic tissue with calcic clusters in spherical shapes after 30 days of treatment (Figure 5-7).

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**Figure 5:** Normal pulp after 30 days of treatment of paste based on ZnO + royal jelly + 5% propolis dissolved in propylene glycol. Hematoxylin-Eosin stain.

**Figure 6:** It was noted in this transverse slide, the presence of fibrosis and calcification of the pulp. Hematoxylin-Eosin stain.

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The 3rd group, treated with paste based on calcium hydroxide + royal jelly + 5% propolis dissolved in propylene glycol, in the longitudinal slide was observed to exhibit fibrotic pulp prevailing fibrocytes, while in the transversal slide was measured fibrosis and calcium gatherings after 30 days of treatment. In one of the cases, the preparation stained with the Masson’s Trichrome discerned superficial demineralization lesion and expressed tissue fibrosis. In this group we noticed the presence of sclerotic pulp with calcic foci (Figure 8-11).
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**Figure 9:** Fibrosis and micro calcic, with Masson’s Trichrome stain.

**Figure 10:** Fibrosis + canalar structure of dentin, after 30 days of treatment. Masson’s Trichrome stain.

In the 2nd group, treated with the paste based on zinc oxide + royal jelly + 5% propolis dissolved in propylene glycol results were better. While in the 3rd group, calcium hydroxide was present with no noticeable change even though the pulpal tissue presented more fibrosis, radicular pulpal calcifications and pulpal sclerosis.

**Discussion of Results**

As noted in the beginning, the purpose of this study was to determine the anti-inflammatory and regenerative action of royal jelly in inflamed pulpal tissue after coronary amputation. This was confirmed from the analysis of the first group, were we only implemented the composition of royal jelly. Literature is well known for reporting the dentinal bridge stimulated by calcium hydroxide is incomplete, porous and does not provide long-term protection of pulp [8].

Today, calcium hydroxide does not hold the position of glory as a single recovery pulp agent [3].

Our modest work in creating a suitable terrain in pulp over the curative material allows for healing and opens researches for new alternative efforts. Our histopathological results showed that we respected the conditions of radicular pulp to be healthy [12].

Various biological treatments; preparations based in antibiotics, sulfanilamide, glucocorticoids, antiseptic, proteolytic enzymes, and bio-substrates, etc... have been used.

These preparations in a number of cases reduce inflammation, but do not stimulate the reparative dentin, and may even annihilate the dentine-genesis (such as glucocorticoids) [8].

Royal jelly is an albumin metabolic bio-stimulator and cell regenerative processes [11,15]. Decenovic acid is the main factor of antimicrobial action of royal jelly. It shows a high level of antimicrobial activity compared to gram positive microorganisms. It further shows
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an antiviral action appearing in water fractions of jelly, especially in albumin substance such as gamma globulin. The active factor of royal jelly, showing antibacterial function and antiviral and antitoxic, are fatty acids. It is particular to decenovic acid, as well as the albumin substance [9]. Paste with royal jelly positively influenced over radicular pulpal tissue, haste the healing and stimulated the odontoblasts. It is important to note that, medicinal paste without the presence of calcium hydroxide stimulated the odontoblasts that are linked to the presence of royal jelly, which is a biocatalyst of vital processes of the cell [13, 15].

Conclusion

In conclusion, we managed with royal jelly composed in the pastes combined with propolis to have an expressed action of:

- analgesic,
- anti-inflammatory,
- odontoblasts stimulant,
- regeneration.

Recommendation

For biological medications by diagnosis, we recommend 2nd and 3rd pastes in permanent teeth (we do not exclude the use in temporary teeth).

Bibliography


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