The change of tissue of inhibitor metalloproteinase 1 (timp-1) after rosella (hibiscus sabdariffa) extract gel application on artificial crown patients with gingivitis

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Abstract

Objective: This study was to investigate the increase of TIMP-1 gingival clavicular fluid ater application of rosella flower extract gel on gingiva as the standard treatment of gingivitis after acrylic crown insertion.

Material and Methods: This research type was pure experimental research using randomized design pre- and post-t-test with control group (the randomized pretest-posttest control group design). Clinical test (in vivo test) were done to determine the effect gel therapeutic containing rosella extract as therapy on standards gingivitis treatment in patients with artificial crown.

Results: Antimicrobial test of Rosella flower extract on P. gingivalis and S. Sanguis bacteria showed that antimicrobial effectiveness of Rosella flower extract was found at concentration of 10%.

Conclusion: 10% rosella gel extracts can be used as an alternative ingredients in standard gingival inflammation treatment due to artificial acrylic crown using.

Keywords: Rosella gel extract, TIMP-1

Introduction

Acrylic crown is commonly used as a restoration to covering tooth temporarily and after tooth preparation. Distribution and frequency care with artificial crown based on age range, the most frequent age is 20-29, on vital teeth (24.7%) and non-vital teeth (45.2%). Restoration material character as surface roughness, can influence bacteria layer attachment that caused by availability surface for bacteria attachment and protect bacteria colonization. Even in some research currently focus on researching relationship between denture and periodontal tissues inflammation and not on periodontal damage.

Tissue inhibitor metalloproteinase-1 (TIMP-1) is inhibitors from matrix metalloproteinase-8 (MMP). TIMP-1 have various biological activity formed cell proliferation modulation, migration and invasion cell, anti-angiogenesis, and anti-proapoptosis. Most of the activity comes from the inhibition of MMP-8, as extracellular matrix catabolism regulation (ECM) which may affect the cells. Tissue inhibitor metalloproteinase-1 (TIMP-1) is to promote proliferation on all cell type and act as an anti-apoptotic. Paalike and alba suggested that TIMP-1 is more effective on inhibiting the activity of collagenase interstitial or matrix metalloproteinase-8 (MMP-8).

The use of natural ingredients in the world of health tends to increase from year to year, not least in the field of dentistry. Proper scientific evaluation of these herbal medicines is imperative in order to establish their efficacy and safety. Rosella (Hibiscus Sabdariffa) is an annual dicotyledonous shrub, grows to a height of about two meters with yellow or reddish flower and the leaves have three to five lobes. Many parts of the plant are of value with the leaves, seeds and calyces widely used as either food or drug. Rosella (Hibiscus sabdariffa) contains flavonoids with antioxidant activity. The dominant compounds in rosella flowers include quercetin, sianidin, β carotene and vitamin C. The presence of certain bioactive agents, such as phenolics, ascorbic acid, certains sugars and trace metallic elements with proven intrinsic wound healing activities make rosella a agent potential for wound healing.

From the previous study, fever entails enhanced formation of cytokines such as interleukins (IL), interferons and tumour necrosis factor-a (TNF-a). The Hibiscus Sabdariffa extract may be involved in the inhibition of some of these substances, resulting also in an anti-inflammatory effect. The flavonoids, polysaccharides and organic acids might be the compounds responsible for the pharmacological activity. In a more recent study the ethnical extract from the calyces also showed antinociceptive effect in a rat model. Another in vivo study showed that the two fractions of the crude aqueous-ethanolic extract of the dried Hibiscus Sabdariffa exhibited impressive immunostimulatory activity by increasing the production of IL-10 and
acrylic crown on maxillary anterior teeth with gingivitis. Control was maxillary anterior tooth using acrylic crown treated with non rosella gel and povidone iodine.

Figure 2 and figure 3 showed the study sample that consist of 9 people were divided into 3 groups. Group 1: therapy with rosella extract gel, group 2: treatment with a base gel (without rosella) as negative control as much as 3. Group 3: therapy with povidone-iodine as positive control as much as 3 people.

Results

Prior to clinical trials, an antimicrobial test was initially performed to determine the concentration of Rosella flower extract to be used in gel preparation. The result of antimicrobial test of rosella flower extract on P. gingivalis and S. Sanguis bacteria showed that antimicrobial effectiveness of rosella flower extract was found at concentration of 10%.

Subject study as many as 9 people with gingivitis after artificial acrylic crown insertion, were divided into 3 groups assessment randomly; each 3 people to treatment group (given rosella extract gel), 3 to negative control group (given a base gel) and positive control group (given povidone-iodine). Clinical observation such as plaque index score and gingivitis index examination and GCF was done before and after gel application (pre and post test) to examine the expression changing of TIMP-1 mRNA gene. The result was displayed with systematic as following.

Table 2 showed that on negative control group (base gel) there was no significant change in TIMP-1 mRNA expression of GCF (p>0.05); but on treatment group (rosella extract), although there was no significant increase (p>0.05), but showed an increase of 4.132 (2.316 ) ie from pretest of 9.998 (1.684) to posttest at 14.130 (0.752) while on positive control group (povidone-iodine), although increased to 3.448 (1.149) from 12.003 (2.387) to -

Material and Methods

This research Type was pure experimental research using randomized design on pre- and post-t-test with control group (the randomized pretest-posttest control group design). Clinical test (in vivo test) were done to determine the effect gel therapeutic containing Rosella extract as therapy on standards gingivitis treatment in patients with artificial crown. Study design in this study was pre-post test with control group experimental figure 1.

Population for this study was all patients who attending to Department of Prosthodontic the Hospital of the Faculty Dentistry Hasanuddin University using acrylic crown. Sample for this research is all patients who meet criteria that used...
Table 1  Demographics characteristics of subject research

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Treatment (Rosella B gel extract)</th>
<th>Group Negative Control (Base Gel)</th>
<th>Positive control (Povidon Iodine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>20 (n=2)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>21 (n=4)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>25 (n=3)</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Gender</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Female (n=6)</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2  Comparison of expression changing in TIMP-1 mRNA of GCF based on group

<table>
<thead>
<tr>
<th>Group</th>
<th>Expression changing in TIMP-1 mRNA of GCF</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Change</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosella B gel extract</td>
<td></td>
<td>9.998 (1.684)</td>
<td>14.130 (0.752)</td>
<td>-4.132 (2.316)</td>
<td>0.091</td>
</tr>
<tr>
<td>Base gel</td>
<td></td>
<td>13.222 (0.201)</td>
<td>13.352 (0.335)</td>
<td>-0.129 (0.176)</td>
<td>0.332</td>
</tr>
<tr>
<td>Povidon iodine</td>
<td></td>
<td>12.003 (2.387)</td>
<td>15.452 (3.311)</td>
<td>-3.448 (1.149)</td>
<td>0.035</td>
</tr>
</tbody>
</table>

Figure 2  Antimicrobial test flowchart (preliminary test)
15.452 (3.311) but statistically significant (p<0.05).

Figure 4 showed the improvement on treatment group and positive control regarding expression changing in pre test and post test of TIMP-1 mRNA of GCF while on negative control group did not show any change at all.

Discussion

Expression changing in TIMP-1 gene on this study were TIMP-1 improvement after 10% rosella extract gel application. This was supported by phytochemical that contained in Rosella like Anthocyanins and antosianitidin that have wound healing function. Previous study showed that there was difference in gingivitis healing rapidity postscaling between treatment group (rinsing with rosella flower tea) with controls group (p<0.05).

So it结论 that rinsing with rosella tea is more effective to accelerate gingivitis healing postscaling. It could be seen that povidone iodine also able to increase TIMP-1, povidone iodine did not have healing wound effect.

Based on box plot chart, application of rosella extract gel on gingivitis area after artificial acrylic crown placement evidently could increase TIMP-1 level so that TIMP-1 activity could inhibit further damage caused by MMP-8.

Conclusion

The results showed in accordance with the study hypothesis so that it can be concluded: effect of 10% Rosella extract gel on gingivitis area after acrylic crown placement evidently could improve TIMP-1 mRNA, 10% Rosella gel extracts can be used as one alternative ingredients in standard gingival inflammation treatment due to artificial acrylic crown usage.

Aknowledgment

The authors would like to acknowledge all parties involved in this study.

Conflict of Interest

The authors report no conflict of interest.

References


