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Malaysia

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IO_008

Saliva Tests and Dietary Assessment for Caries Evaluation and Treatment Planning

E.M. FAWZI

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Objective: Patients often return to dentists with new carious lesions and are mostly blamed for inappropriate oral hygiene measures. Certain parameters could have been overlooked by dentists during caries assessment such as dietary and salivary data. This can lead to leaving the causative factor untreated. Accordingly, the aim of this study was to determine if information obtained from saliva tests and dietary questionnaire during caries assessment could modify the line of treatment presented to the patient. Method: Informed consent was obtained from 25 participants. Dental caries was assessed using DMFT index. Chair side GC saliva-Check testing kits were used to evaluate saliva level of pH, consistency, quantity and buffering capacity. Test kits from Iovoclar Vivadent were also used for Mutans streptococci and lactobacilli count and tests were performed under standardized conditions. Result: Each patient provided a set of own data. Dietary information indicated that the frequency of intake, form, consistency, retention time and the position of cariogenic food consumed in a meal are contributing factors to dental caries and need to be identified and controlled. Spices consumption showed lack of caries activity in spite of the altered saliva tests parameters. It was also found that low level of hydration and sticky and frothy saliva need to be identified and corrected. Mutans streptococci and lactobacilli count correlated with caries status and impose a specific line of treatment. Conclusion: Dentists should not only depend on explorers but need other tools such as saliva tests and diet assessment as adjuncts to select the correct treatment modalities for caries and develop strategies for prevention of newer lesions. Also, mouth rinses, pH neutralizers, disinfectants and remineralizing agents could be prescribed according to results of saliva tests and not blindly.

IO_009

Area Level Deprivation and Dental Caries

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Faculty of Dentistry, Universiti Teknologi MARA, Shah Alam, Malaysia

Objectives: To investigate the effect of area level deprivation on having dental decay in the United Kingdom population. Methods: A national representative UK Data from Adult Dental Health Survey 2009 was used in this study. In this survey, clinical examination was done to measure active dental decay. In this study participants were categorised into two having and not having active decay. Area level deprivation was measured using Index of Multiple Deprivation (IMD) 2010. There are six domains, income, employment, health deprivation and disability; education, skills and training; housing; and geographic access to services that determine the IMD score. IMD scores were divided into quintiles with higher quintiles indicating higher deprivation. Multivariate logistic regression was used to find the effect of Area level deprivation on the probability of having dental decay. Results: A total of 8964 individuals were examined and 1926 (21.8%) had at least one active dental decay. In lowest IMD quintile 35.7%, 2nd quintile 33.1%, 3rd quintile 29.8%, 4th quintile 27.8% and highest quintile 24.5% of individual had at least one active decay. Multivariate logistic regression analysis result shows significantly higher odd ratios for having dental caries in higher IMD quintile than lower quintile after controlling age, gender, individual level socioeconomic status and mental status. The highest IMD quintile had a significantly high odds ratio of 1.7 (CI = 1.39.2.05) followed by 4th quintile 1.5 (CI = 1.23.1.84) and 3rd quintile 1.37 (CI = 1.12.1.67). However, 2nd quintile didn’t have significantly higher odd ratio than lowest quintile. Conclusion: People living in deprived areas in UK have higher chances of having dental caries than people living in more affluent areas after adjusting the effect of individual level socioeconomic status.

IO_010

Bioactivity of Stichopus Hermanii to BMP-2 Expression in Repase Orthodontic

N. PRAMESWARI, S. REVANTI, and A. BRAHMANTA

Hanyu Tuah University Dentistry Faculty, Surabaya, Indonesia

Objective: The aim of this study is to investigate bioactivity of Stichopus hermanni to BMP-2 (Bone Morphogenetic Protein-2) expression to prevent relapse in orthodontic treatment. Method: The experiment was held by Post Test Only Group design. Thirty two male Cavies Cobaya were divided into four groups. K(-) group as negative control group (without treatment), K(+) group as positive control group which is given with orthodontic mechanical forces, and the other groups, P1, P2, were given with orthodontic mechanical forces and stichopus hermanni 2.5% and 3% respectively. After treatment the rats were sacrificed. BMP-2 expression was examined with immunohistochemistry. Result: This study showed means and SD in K(-), K(+), P1, and P2 were 7.13±1.71, 3.75±1.68, 13.38±2.5, and 21±1.3. BMP-2 expression was significantly different in group P2 compared to K(-) and K(+), group P1. P1 and P2 showed increased BMP-2 expression whether P2 has the best expression. Conclusion: Stichopus hermanni 3% had the best bioactivity so BMP-2 expression can be increased to prevent relapse in orthodontic.
BIOACTIVITY OF STICHOPUS HERMANII TO BMP-2
EXPRESSION IN RELAPSE ORTHODONTIC
(Fulltext of Oral Presentation)

By

Noengki Prameswari*, Syamsulina Revianti**,
Arya Brahmanta*

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Faculty of Dentistry Hang Tuah University
Surabaya - Indonesia

Presented in 28th Annual Scientific Meeting of the International Association for Dental Research (IADR) SEA Division, Kuching, Malaysia 13-14 Agustus 2014
BIOACTIVITY OF STICHOPUS HERMANII TO BMP-2 EXPRESSION IN RELAPSE ORTHODONTIC

Noengki Prameswari*, Syamsulina Revianti**, Arya Brahmanta*
*Laboratory of Orthodontics ; **Oral Biology
Faculty of Dentistry Hang Tuah University
Surabaya - Indonesia

Background: Relapse Orthodontic is the return, following correction, any change from the final tooth position at the end of treatment relapse, could be a return to the original teeth position, caused by periodontal, occlusal, soft tissue factor and growth. Stichopus hermanii is one of the best fishery commodities in Indonesia. It is natural and contain various active ingredient such as hyaluronic acid, chondroitin sulphate, cell growth factor, EPA DHA, flavonoid that might reduce relapse orthodontic.

Objectives: The aim of this study is to investigate bioactivity of Stichopus hermanii to BMP-2 (Bone Morphogenetic Protein-2) expression in Relapse orthodontic

Material and Method: The experiment was held by Post Test Only Group design. Thirty two male Cavia Cobaya were divided into four groups. K(-) group as negative control group (without treatment), K(+) group as positive control group which were applied with relaps orthodontic forces, and the other groups P1, P2, were applied with relaps orthodontic forces and stichopus hermanii 2.5 % and 3 %. After treatment the cavia cobaya were sacrificed. BMP-2 expression is examined with immunohistochemistry

Results: This study showed means and SD in K(-), K(+), P1, and P2 are 7.13±2.17; 3.75±1.98; 13.38±2.5 and 21±1.3. BMP-2 expression was significantly differences in group P2 compare to K(-) and K(+), group P1. P1 and P2 showed increased BMP-2 expression whether P2 has the best expression.

Conclusion: Stichopus hermanii 3 % had the best bioactivity so can increased the BMP-2 expression to prevent relapse orthodontic.

Keywords: Stichopus hermanii, BMP-2, orthodontic relaps movement.

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INTRODUCTION:

Relapse Orthodontic is the return, following correction, any change from the final tooth position at the end of treatment relapse, could be a return to the original teeth position, caused by periodontal, occlusal, soft tissue factor and growth. Orthodontic treatment are potentially unstable although a number of factors can be cited as influencing long term-result Orthodontic relapse is a complex problem (Proffit, 2007; English, 2009). Studies have shown that stability and relapse following orthodontic
treatment are unpredictable, with a relapse tendency of 33–90 per cent after at least 10 years post-treatment (Franzen, 2011).

One major reason is the gingival and periodontal tissues are affected by orthodontic tooth movement and require time for reorganization when appliance are removed (Proffit, 2007; English, 2009). Stretching of supraalveolar gingival fibres, the transseptal fibres, in particular, has been suggested as the cause of relapse (Yoshida, 1998). Orthodontic tooth movement is achieved following remodelling of the alveolar bone and a reaction of the periodontal ligament (PDL) to mechanical stimuli. Tooth movement occurs in the direction of force when there is a multifaceted bone remodelling response, with bone resorption on the compression side and bone apposition on the tension side of the periodontal ligament (Khrisnan and Davidovitch, 2009). The periodontal ligament reorganization is important for stability because of the periodontal contribution to the equilibrium that normally controls tooth position (Proffit, 2007).

Relapse occurred in all appliance following the end of active orthodontic treatment. There was a rapid relapse initially following appliance removal but after 3 days, both relapse rate and the percentage of relapse began to gradually decrease. After appliance removal, the teeth began to relapse in the direction of their original position. Following the tooth movement, a lengthy retention is required for stability as new bone forms. Bone resorption occurs through osteoclastic activity by osteoclast thus creating cavity in bone known as lacunae that later will be filled in by osteoblast cells to cover the cavity. Two processes involved in bone resorption are the solubilisation of minerals and the degradation of the organ matrix, which mainly consists of type I collagen. These processes will stabilized the tooth movement. The role of osteoblast in forming a new bone can be seen by BMP-2 as a parameter (Franzen, 2011; Iravani G, 2014; Arifin, 2011).

Instability or a tendency toward relapse should be anticipate. Patients should be advised of potential for relapse prior treatment and the need to stay in long-term retention (English, 2009). Beside retention, fiberotomy is also known for diminished relapse (Young, 2013).

Many but there is no natural has been used for relapse orthodontics. Stichopus hermani is one of the best fishery commodities in Indonesia. It is natural and contain various active ingredient such as collagen, hyaluronic acid, chondroitin sulphate, cell growth factor, EPA DHA, flavonoid that has been proved as (Sendih, 2006) that might reduce relapse orthodontic. Previous research showed that stichopus hermanii stimulated the activation and proliferation of fibroblasts, and enhanced rapid production of collagen fiber network with shorter healing time. The level of proinflammatory cytokines; IL-1α, IL-1β, and IL-6, were significantly reduced in Stichopus hermanii treated wounds and stimulation tissue regeneration. (Zohdi, 2011). Stichopus hermanii at 5 mg/ml and 10 mg/ml can increased osteoblast cell function. The other study show that studies have shown that the extract of Stichopus species also affects viability or proliferation of human fibroblasts and osteoclast cells in a negative manner. (Shahrulazua, 2013). So, in this study, is to investigate the effect of Stichopus hermanii to BMP-2 expression as a marker of bone apposition in relapse orthodontic.

**Material and Method:**

This study was performed on 32 male Cavia Cobaya 2,5 months old with 200-300 g weight. The Wistar rats was divided into 4 groups. K(-) group as negative control group
(without treatment), K(+) group as positive control group which were applied with relaps orthodontic forces, and the other groups P1, P2, were applied with relaps orthodontic forces and Stichopus hermanii 2,5 % and 3 %.

**Preparation of Relapse orthodontic**

Relaps orthodontic forces was produced with giving applied separator by separating plier in mesial left insisivus maxilla cavia cobaya 14 days and after day 15 separator was removed 2 days for becoming relapse orthodontic. Separator forces was 0,0474 kN, measured by autograph

**Preparation of Powder Stichopus Hermanii**

Stichopus hermanii were used in this study from coastal regions around Sumenep, East Java Indonesia. Stichopus hermanii was cleaned by making a longitudinal incision 3-5 cm on the ventral side of stichopus hermanii without damaging the internal organs using scalpel. Sticopus hermanii was dried but not be in direct sunlight for 7 days. After this, Stichopus hermanii was blender until get the powder.

**Preparation and Applied Stichopus Hermanii gel**

Stichopus hermanii gel 2,5% was made from 0,25 gr Stichopus hermanii powder was diluted with NaCMC 2% in DMSO 5 % until 10 ml. Stichopus hermanii gel 3% was made from 0,3 gr Stichopus hermanii powder was diluted with NaCMC 2% in DMSO 5 % until 10 ml. Stichopus hermanii gel was applied in gingival sulcus with insulin syringe 0,025 ml once per day

The research was conducted in Biochemistry Laboratory Medical Faculty of Airlangga University. After 16 days of treatment, the cavia cobaya were sacrificed. The jaw was sectioned. BMP-2 (Bone Morphogenetic Protein-2) expression as a osteoblast marker were examined with immunohistochemistry method in tension side.

The research data result tabulated and planned to analyze by descriptive statistic test, normality distribution test to know if the data that obtained come from population with normal distribution, ANOVA test (analysis of varians) to analyze the difference of each variable compared with control. Then the data were tested with LSD Test

**Results:**

The aim of this study is to investigate the effect of Stichopus hermanii to osteoclast tension activity in relapse orthodontic. The result in this experiment show the the expression of BMP-2(osteoblast) in relaps orthodontic as shown as table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean± Standart Deviation</th>
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<tr>
<td>K(-)</td>
<td>7,13±2,17</td>
</tr>
<tr>
<td>K(+)</td>
<td>3,75±1,98</td>
</tr>
<tr>
<td>P1</td>
<td>13,38±2,5</td>
</tr>
<tr>
<td>P2</td>
<td>21±1,3</td>
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</table>
Table 1 shows means and SD in K(-), K(+), P1, and P2 are 3.38±1.19; 12.38±2.33; 11.13±2.75 and 3.38±1.51. Then the data were tested with normality test, homogeneity test and showed the data was homogen and have a normal distribution. ANOVA test (p=0.05) for the expression of BMP-2 as osteoblast activity in relaps orthodontics Cavia Cobaya applied with Stichopus hermanii showed significantly differences. With the LSD test, showed that BMP-2 expression: P1 and P2 showed increased BMP-2 expression whether P2 has the best expression as seen as Table 2.

Table 2: LSD Test expression BMP-2 as osteoblast activity in relaps orthodontics Cavia Cobaya applied with Stichopus hermanii

<table>
<thead>
<tr>
<th>Group</th>
<th>K(-)</th>
<th>K(+)</th>
<th>P1</th>
<th>P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>K(-)</td>
<td>0.019</td>
<td>0.003</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>K(+)</td>
<td>0.019</td>
<td></td>
<td></td>
<td>0.000*</td>
</tr>
<tr>
<td>P1</td>
<td>0.003</td>
<td></td>
<td>0.000*</td>
<td>0.000*</td>
</tr>
<tr>
<td>P2</td>
<td>0.000*</td>
<td>0.000*</td>
<td></td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*Significantly different

So, the expression of BMP-2 was significantly increased in P2 compared to K(+), K(-) and P1.

Discussion

The aim of this study was to investigate the effect of Stichopus hermanii to BMP-2 expression in relapse orthodontic. The means and standard deviations of BMP-2 as marker of osteoblast showed that K(-), K(+), P1, and P2 are 7.13±2.17; 3.75±1.98; 13.38±2.5 and 21±1.3. It means in relaps orthodontic, there is decreasing BMP-2 expression compared to K(-), P1, and P2. By giving Stichopus hermanii 2.5% and 3% in gingival sulcus tension site, BMP-2 was increased. P1 and P2 showed increased BMP-2 expression whether P2 (stichopus hermanii 3%) has the best expression.

Relapse in cavia cobaya models occurs rapidly. The left first insisivus compressed towards the distal side during 14 days orthodontic tooth movement and relapsed toward the mesial side. There was a rapid relapse initially following 2 days appliance removal. Increasing BMP-2 expression by applying Stichopus hermanii during relapse period means there are processes bone apposition. Periodontal ligament plays a central role for remodeling periodontal ligament dan alveolar bone.

The bone morphogenetic proteins (BMPs) included BMP-2, is the second family of growth factors, unique: these are the growth factors involved in the process of osteoblast differentiation that drive the process of bone formation and mineralization. Since the late 1980s, BMPs have been known to stimulate new bone formation. BMPs represent molecular targets used to identify and develop new agents to simulate the bone-forming process. Much is understood about the signal transduction pathway for the BMPs. BMP-2 stimulates the differentiation of mesenchymal cells into osteoblasts and chondrocytes. BMP-2 binds to its receptor, a Ser/Thr kinase, which phosphorylates and activates the intracellular signaling molecules Smad 1 and Smad 5. This in turn leads to the expression of the transcription factor Cbfa1 (Runx2), which results in the expression...
of several proteins critical for bone formation. Wnt/LRP5 pathway is also linked to the BMP pathway by a cascade of anabolic transcriptional events. The signal starts at the Hedgehog signaling pathway, moving through the BMPs and Wnt/LRP5, and ultimately leads to expression of the critical genes involved in osteoblast differentiation. This pathway provides multiple potential molecular targets that may be manipulated in the process of bone formation. (Mundy, 2006) The process that been needed to prevent orthodontic relapsing

Stichopus hermanii contain various active ingredient such as collagen, hyaluronic acid, chondroitin sulphate, cell growth factor, EPA DHA, flavonoid (Sendih, 2006). In a previous in-vitro study showed that there was a positive promoting effect of stichopus hermanii water extract on osteoblast functional activity when 1.6mg/ml, 3.1mg/ml, 6.3mg/ml, 12.5mg/ml, and 25mg/ml of stichopus hermanii concentrations were used. Microscopic examination showed adequate cell confluency in the wells with stichopus hermanii concentration from 1.6 mg/ml up to 25mg/ml. Previous studies showed that the water extract of Stichopus contains high amino acid concentrations (37%) as well as calcium, magnesium, iron and zinc that may play an important role in osteoblast molecular activities (Shahrulazua, 2013).

The effect of glycosaminoglycan (GAG) such as chondroitin sulphate, oral administration had been shown to increase the total calcium pool and intestinal absorption of calcium, which may lead to an increased capacity for injured bone to regenerate during osteogenesis (Shahrulazua, 2013). Condroitin Sulphate on the surface of osteoblasts or bone matrix binds to cell adhesion molecule such as integrin on the pre-osteoclastic cells and inhibits the differentiation into osteoclasts so bone formation can occurred (Miyazaki, 2010).

Flavonoid, inhibits osteoclast differentiation and bone resorption in vitro but also stimulates human osteoblast differentiation. In vivo, flavonoid increases bone mass in immobilized rats and also the biomechanical properties of rat bone (Mundy, 2006). Flavonoid treatment resulted in a significant elevation of alkaline phosphatase (ALP) activity, collagen contents and osteoblast differentiation genes [ALP, collagen, osteopontin (OPN), osteoprotegerin (OPG) and osteocalcin (OC)] and bone morphogenetic protein (BMP) genes (BMP2, BMP4 and BMP7) (Kim, 2013). Flavonoid activated BMP signaling by inducing Smad1, 5 phosphorylation, as well as Id1 and Id2 protein expression in a dose-dependent manner (Vrijens, 2013). Bone formation could be resistant to resorption and countered the relaps orthodontic (Shetty, 2006)

**Conclusion**: Stichopus hermanii 3 % can increased BMP-2 expression as parameter of osteoblast activity to prevent relapse orthodontic.

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References


Miyazaki,2010. Effect of Chondroitin sulphate-E on the Osteoclastic Differentiation of RAW264 cells


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hereby certifies that

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