Assessing the Effectiveness of Periodontitis Treatment using Syzygium Aromaticum and Angelica Dahurica

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ABSTRACT----
Objects: to assess the effectiveness of periodontitis treatment using syzygium aromaticum and angelica dahurica.

Methods: descriptive – comparative design.

Results: the conditions of gum tissue was well improved after treatment. After 1-4 weeks of treatment, the percentages of good, medium and poor effectiveness were respectively 59.9%, 32.7%, 7.4%. OHI-S index was improved significantly after 1-4 weeks after treatment, the percentages of good, medium and poor effectiveness were respectively 68.8%, 22.3% and 8.9%. The decreasing of periodontal attachment loss after 1 and 4 weeks of treatment were respectively 0.11mm and 0.08mm (p>0.05). The decreasing of the depth of periodontal pocket after 1 and 4 weeks of treatment were respectively 0.32mm and 0.25mm (p>0.05).

Conclusions: Conservation treatment for periodontitis using the mouthwash extracted from syzygium aromaticum and angelica dahurica was remarkably effective in improving periodontal indexes, such as decreasing of the depth of periodontal pocket, improving the gum indexes and oral hygiene at the time after treatment.

Keywords--- periodontitis, syzygium aromaticum, angelica dahurica…

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1. INTRODUCTION

For a long time ago, it was known to use syzygium aromaticum, angelica dahurica in medicine for treatment of inflammatory diseases and creating scents. In Vietnam, Hai Thuong Lan Ong also used the flowers of syzygium aromaticum with angelica dahurica, cinnamon, ginger, pomelo leaves, mistletoe leaves (equal amounts of 10-20g each). They were grinded, fried and used to treat sprain and luxation. [1]

Today, periodontal disease is the common problem of oral diseases. The periodontitis is now considered to be an infectious disease because of the close relation between bacteria and the proportion of periodontal disease and the severity of disease [2].[7].

The main component of the essential oil extracted from flower buds of syzygium aromaticum are Eugenol. This first component of essential oil had been proved to be an anticeptic and analgesic agent used in dentistry that was still used to day. Its properties on different radicals such as superoxide anion and acid, hydroxyl and aloperoxyl had been reported. [3]

And the main component of angelica dahurica is essential oil that includes: α-pinene, β-pinene, camphene, myrcene, α-phelandrene, α-terpinene, terpinolene, caryophylene, ligustilide… and sesquiterpene. Besides, the roots of angelica dahurica also include coumarin derivatives. Decoction and essential oil extracted from angelica dahurica just only have antimicrobial activity againt strains of Diplococcus pneumonia, Streptococcus hemolyticus, Streptococcus mutans, Staphylococcus aureus, Bacillus subtilis, Shigella Sonnei, Shigella flexneri, Shigella shiga, Shigella dysenteriae, Enterococcus, Vibrio cholera and typhoid bacillus. In addition, angelica dahurica also has anti-viral effect and reducing pain.

Because of the important biological properties of syzygium aromaticum and angelica dahurica and their widespread application, we conducted a study entitled "Assessing the effectiveness of periodontitis treatment using sygygium aromaticum and angelica dahurica".

2. SUBJECTS AND METHODS

1. Subject research:

1.1. Inclusion criteria: the patients aged over 18 years old that be cooperative without mental illness and be diagnosed with periodontitis (pocket depth >3mm)

1.2. Exclusion criteria: the patients that used antibiotics in recent 3 months; or be suffering from systemic diseases; or cannot widely open their mouths; or be uncooperative.

1.3. Location of research: Department of Pharmcy; Department of Odonto-Stomatology of *Binh Duong Medical College - Vietnam*

1.4. Duration research: from Aug 2014 to Dec 2015

2. Methods: open clinical trials, prospective uncontrolled study

2.2. Sample size:

Formula for calculating sample size: $n = Z^2_{(1-\alpha/2)} \frac{p.q}{d^2}$

After calculating, the sample size was 71 people and we selected 101 subjects to conduct our study.

2.3. Materials:

- Dental chair and machines
- The set equipment of common oral examination includes: tray, mirror, tweezers, probe, periodontal probe, ultrasonic scaler.
- Distillation toolkit.

2.4. Method of conducting

Step 1: Recording the information of patients:

* Full name , age, gender of patient.

* Inquire the patient's medical history, complants and performing a physical examination on the patient to select the subject matched inclusion/exclusion criteria (mentioned above).

* Perform a examination and clinical assessment for each tooth, then record the results into the research tables. All information of clinical characteristics of periodontitis that described in this study was obtained at the time before treatment. The clinical characteristics and the methods of collecting data will be presented in the following order.

a) Depth of gingival pocket: The unit of values is mm
b) Clinical attachment loss: The unit of values is mm
c) Gingival Index with codes: 0, 1, 2, 3).
d) Simplified Oral Hygiene Index with codes: 0, 1, 2, 3, 4, 5, 6.

Step 2: Evaluating and comparing according to those above criteria

+ GI: Good (<1); medium (1-2); bad (>2).
+ OHI-S: Good (<1.3); medium (1.3-3); Poor (>3).

Step 3: Extracting essential oils from Syzygium aromaticum and Angelica dahurica.

- *Use the method of distilling water.*
- Put approximately 50 gram of bud of syzygium aromaticum into a 100 ml spherical bottle. Add 50 ml of water and a few of limestone. Mark the water level so that the amount of water that be lost during distillation can be supplemented and the sample is prevented from being dried. Boil the mixture until the distillation began to be stabilize. Sometime, need to check the water level and add more water. During the first of distillation, the distilled products would look darkened. This is because of the presence of essential oil in distilled products that mixed with water. When distillation was almost finished, the distilled products will look more transparent. For angelica dahurica, we also performed similar extraction method [5].

Step 4: Mixing components include: Angelica dahurica, syzygium aromaticum, ethanol 50% and solvent.

Step 5: Treatment method: at 0 and 7 days after cleaning plaque using ultrasonic scaler, a 5ml plastic syringe with 45 degree bending of its needle (the distance between the vertex of this angle and the tip of needle is 7mm in order to the bevel face of needle tip could contacts with the surface of tooth) was placed into the gingival pocket. Pump the mixing solution includes the essential oils of syzygium aromaticum and angelica dahurica to the bottom of pocket. Each patient was distributed with a bottle of mixing solution and instructed to mix it with water and use it 3 times a day for 7 days. After rinsing mouth, he/her have to not eat or drink within 15 minutes.

- Mixing the mouthwash: 40 drops of the solution was mixed with 10 ml water. Then hold it in the mouth for 2-3 minutes every morning and evening after brushing.

Step 6: All patients were given appointment for re-examination after 1, 4, 12 weeks of these interventions. In each appointment, we performed examination and re-assessed the indexes in order to evaluate the treatment results.

Fig 1. Syzygium aromaticum

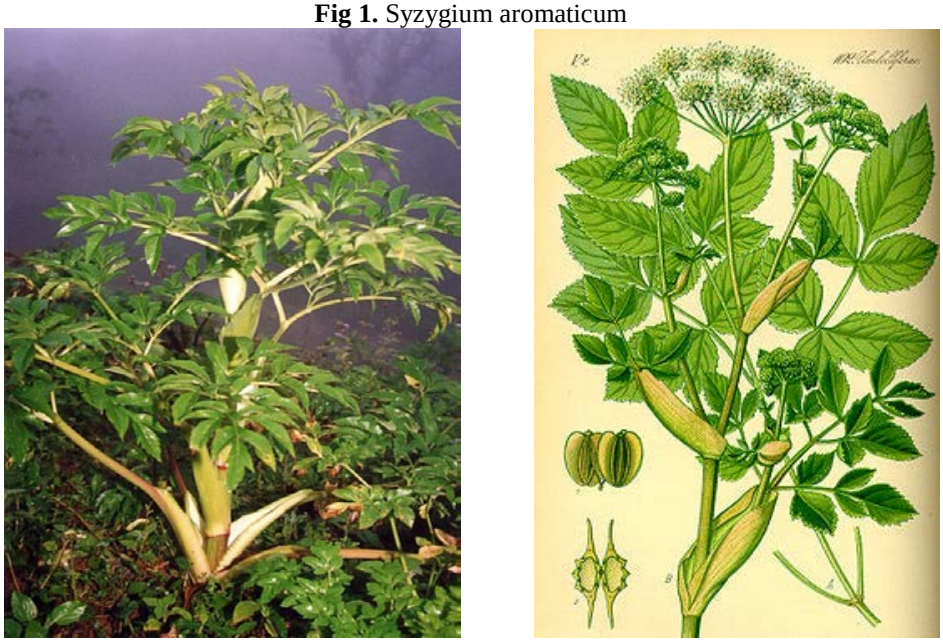

Fig 2. Angelica dahurica

2.5. Evaluation criteria:

- GI: Good (decreased 2 levels); Medium (decreased 1 level); Poor (not decreased)
- Depth of gingival pocket: Good (decreased>0.8mm); Medium (decreased 0.3-0.7mm); Poor (decreased<0.3mm).
- Clinical Attachment Loss: Good (increased>0.8mm); Medium (increased 0.3-0.7mm); Poor (increased<0.3mm).

*** Data processing:** The obtained data was processed by the medical statistical method using EPI-INFO 6.04 software. All mean values were calculated and then comparing mean values was performed using Student's t-test. The percentages were also calculated and then comparing them was conducted using Chi-square test.

3. RESULTS

3.1. Clinical characteristics of patients with periodontitis

3.2. Depth of periodontal pocket

Table 3.1. Depth of periodontal of research subjects

Gender	n	%	Depth mm ($\overline{X}$ ±SD)	p
Male	43	42,6	3,28 ± 1,03	> 0,05
Female	58	57,4	3,19 ± 1,13	
Total	101	100,0	3,23 ± 1,09	

3.3. Clinical attachment loss

Gender	n	%	CAL ($\overline{X}$ ±SD)	p
Male	43	42,6	4,11 ± 1,55	> 0,05
Female	58	57,4	3,90 ± 1,92	
Total	101	100,0	3,93 ± 1,70	

3.4. The depth of periodontal pocket with Simplified Oral Hygiene Index (OHI-S) and Gingival Index (GI)

Table 3.3. The depth of periodontal pocket with OHI-S and GI

Gender	*OHI-S* $\overline{X}$ ± SD	*GI* $\overline{X}$ ± SD
Male	2,56 ± 0,91	1,80 ± 0,78
Female	2,90 ± 0,73	2,25 ± 0,91
Total	2,59 ± 0,95	1,95 ± 0,79

3.5. Assessment of results after treatment:

3.5.1. The changes of GI after treatment

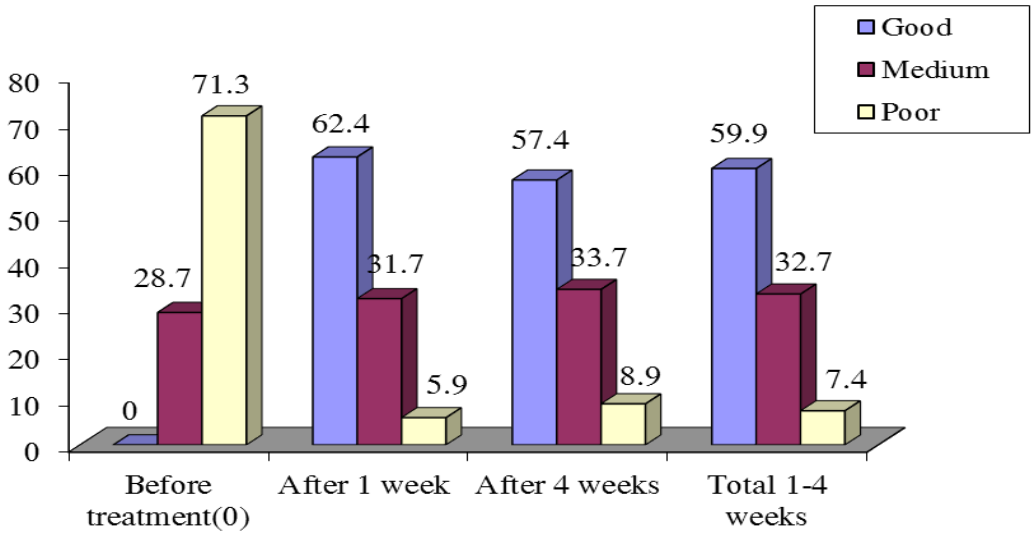

Chart 3.1. The improvement of GI after treatment

- The number of patients with good GI was increased after treatment. After 1- 4 weeks, the percentage of patients with good, medium and poor effectiveness were 59.9%, 32.7% and 7.4%, respectively.

- When we compared the treatment results after 1 and 4 weeks, we found that the percentage of patients with good GI increased from 0% to 62.4% after 1 week and tended to decrease after 4 weeks (57.4%). There were differences in percentages of patients with good GI after 1 and 4 weeks of treatment compared with before treatment ($p<0.001$).

- Although the improvement of GI after 4 weeks was lower than after 1 week but this difference was not statistically significant ($p>0.05$).

3.5.2. The changes of OHI-S after treatment

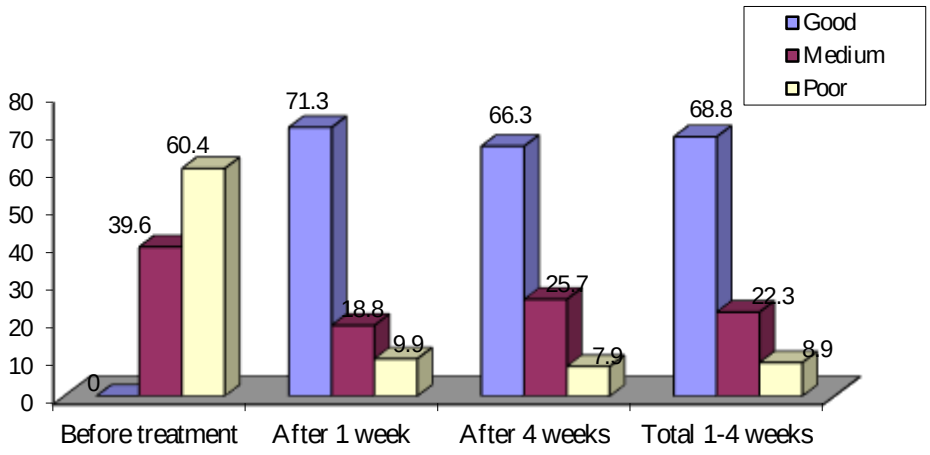

Chart 3.2. The improvement of OHI-S after treatment

- OHI-S was clearly improved after 1 week and 4 weeks. After 1- 4 weeks, the percentage of patients with good, medium and poor effectiveness were 68.8%, 22.3% and 8.9%, respectively.

- When we compared the treatment results after 1 and 4 weeks, we found that the percentage of patients with good OHI-S increased from 0% to 71.3% after 1 week and tended to decrease after 4 weeks (66.3%). There were differences in percentages of patients with good GI after 1 and 4 weeks of treatment compared with before treatment (p<0.001).

- Although the improvement of OHI-S after 4 weeks was lower than after 1 week but this difference was not statistically significant (p>0.05).

3.5.3. Decreasing the depth of periodontal pocket (PP) after treatment

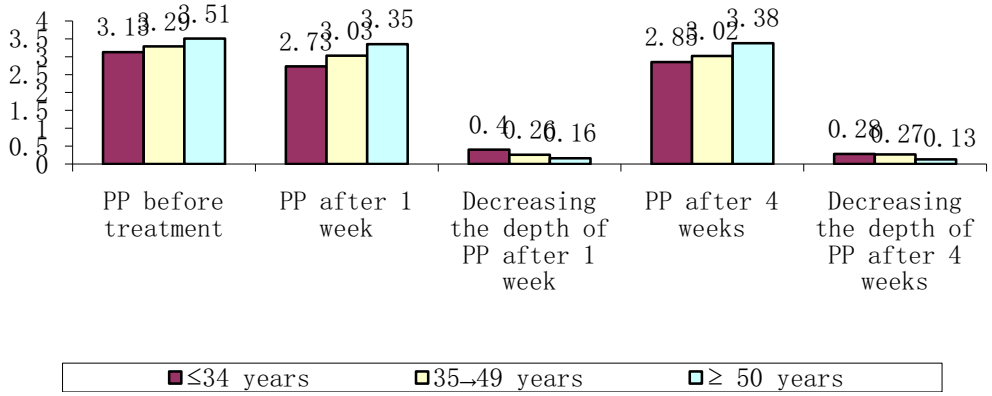

Chart 3.3. Decreasing the depth of periodontal pocket after treatment

- The average of decreasing the depth of periodontal pocket after 1 week was 0.32mm, and after 4 weeks, it was 0.25mm. There was no difference between them (p>0.05).

There was difference in the depth of peridontal pocket after 1 and 4 weeks of treatment compared with before treatment (p<0.001).

- Assessing by age group, it can be seen that the decreasing the depth of periodontal pocket reduces with age. The older people are, the less decreasing the depth of periodontal pocket they have. The difference was statistically significant (p<0.001).

3.5.4. Decreasing the clinical attachment loss after treatment

Table 3.4. Decreasing the clinical attachment loss after treatment

Time / Gender	Before treatment (0)	After 1 week (1)	Decreasing after 1 week	After 4 weeks (4)	Decreasing after 4 weeks
Male	3,69±1,39	3,53 ± 2,18	0,16 ± 0,21	3,59 ± 2,13	0,10 ± 0,31
Female	4,10±1,95	4,04 ± 2,63	0,06 ± 0,38	4,03 ± 2,44	0,07 ± 0,47
Average	3,93±1,70	3,82 ± 2,39	0,11± 0,57	3,58 ± 2,23	0,08 ± 0,33
p	p(0-1) > 0,05			p(0-4) > 0,05	

The average of decreasing the clinical attachment loss after 1 week and 4 weeks of treatment were 0.11mm, 0.08mm, respectively. There was no different between them (p>0.05).

There was no different in decreasing the clinical attachment loss after 1 week and 4 weeks of treatment (p>0.05).

- Assessing by age group, it can be seen that the decreasing the clinical attachment loss reduces with age. The older people are, the less decreasing the clinical attachment loss they have. The difference was not statistically significant (p>0.05).

4. DISCUSSIONS

4.1. The changes of Gingival Index after treatment:

From the results in chart 3.5.1, we found that there was an obvious improvement in gingival index after treatment compared with before treatment:

- Good GI: before treatment, the number of patients with good GI was 0 but after 1 week, it was 63 (occurred 62.4%) and after 4 weeks, it was 58 (57.4%).

- The number of patients with poor GI before treatment was 72 (71.3%). After 1 week, this number was 6 (5.9%) and after 4 weeks, it was 9 (8.9%).

Thus, the improvement of gingival after 1 and 4 week of treatment was very positive. However, these results tended to decrease when time of treatment was prolonged.

There was no difference in gingival index after 1 week and 4 weeks of treatment (p > 0.05). We thought that it could be because some patients had good results but they did not come for re-examination after 4 weeks or because patients started to have poorer oral hygiene care when they found that their gingival conditions had been improved.

4.2. Changes of oral hygiene index after treatment

From the results of chart 3.5.2, we found that the oral hygiene index was improved obviously after treatment. Similar to the results with gingival index, in the improvement of OHI-S index between 1 week and 4 weeks after treatment, the percentage of patients with good OHS-I reduced meanwhile its average value increased:

The percentage of patients with good OHI-S: after 1 week, it was 71.3% but after 4 weeks, it was 66.3%.

The percentage of patients with medium OHI-S: after 1 week, it was 18.8% and after 4 weeks, it was 25.7%.

The percentage of patients with poor OHI-S: after 1 week, it was 9.9% and after 4 weeks, it was 7.9%.

Therefore, the effectiveness of treatment in oral hygiene condition after 4 weeks of treatment started to decreased compared with that after 1 week of treatment. However, the difference between these two time after treatment was not stastitical significance in the 95% confidence interval (p > 0.05). We thought that because our post-treatment observation was still limited, so that we could not assess the real improvement of treatment included in this study. Our results were also similar to the study of Thi Hang Le [6].

4.3. Decreasing the depth of periodontal pocket after treatment

The results in Table 3.24 showed considerable effectiveness of decreasing the depth of periodontal pocket after treatment:

The average of decreasing the depth of periodontal pocket after 1 week and after 4 weeks were 0.32mm and 0.25mm, respectively. There was no difference between them (p>0.05).

There was difference in the depth of peridontal pocket after 1 and 4 weeks of treatment compared with before treatment (p<0.001).

Therefore, the average of the depth of periodontal pocket after treatment reduced considerably compared with before treatment (p<0.01). However, the levels of decreasing were different at age groups (p < 0.01). Because people get older and with deeper periodontal pocket, decreasing the depth of periodontal pocket is also lower.

4.4. Decreasing the clinical attachment loss after treatment

The average of decreasing the clinical attachment loss after 1 week and 4 weeks of treatment were 0.11mm, 0.08mm, respectively. There was no different between them (p>0.05).

There was no different in decreasing the clinical attachment loss after 1 week and 4 weeks of treatment (p>0.05).

From the entire sample, we found that decreasing of the clinical attachment loss was not statistically significant (p > 0.05). We thought that our observation time after treatment was still limited. Besides, after treatment, some patients need more active intervention, such as periodontal curettage, gingival flap surgery, alveolar bone grafting, guided tissue regeneration...

5. CONCLUSIONS

After conducting our study on 101 patients with periodontitis, and initial assessing our results of treatment, we indicated the following conclusions:

The conservative treatment of periodontitis using mouthwash solution made of Syzygium aromaticum and Angelica dahurica had have obvious effectiveness in improving periodontal indexes such as the depth of peridontal pocket, improving gingival index and oral hygiene index:

- Average of decreasing the depth of periodontal pocket after treatment was 0.32 mm.

- The improvement of GI: the percentage of patients with good, medium and poor effectiveness were 59.9%, 32.7% and 7.4%, respectively.

- The improvement of OHI-S: the percentage of patients with good, medium and poor effectiveness were 68.8%, 22.3% and 8.9%, respectively.

- Results of treatment showed that the clinical attachment loss after treatment reduced compared with before treatment but the difference was not significant ($p>0.05$); the degree of loosening of teeth was improved clearly after 1 and 4 weeks of treatment ($p<0.001$).

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