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RESEARCH ARTICLE

Effect of *Trivrit Virechana, Yashtyadi Pratisarana* and *Panchaksheeri Vriksha Kashaya Gandoosha* in Periodontitis — A Case Series

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Abstract

Periodontitis is a localized inflammation of the teeth most commonly caused by a bacterial infection in the periodontal cavity. The disease is common in adults over the age of 30. The bacteria involved in periodontal disease are mainly Gram-negative anaerobes. According to *Ayurveda*, the specific symptoms of *upakusha* have similarities with periodontitis. The objective of this study was to evaluate the combined effect of *virechana*, *pratisarana* and *gandusha* in improving symptoms, gingival bleeding index, plaque index, and restoring normal salivary microbial profiles in patients with periodontitis. A group of 30 patients who met the inclusion criteria were recruited for the study. Each case was observed for prevalence by age, pain, gingival bleeding, halitosis, plaque index, gingival bleeding index. In the results, it was found that *Trivrit virechana, Yashtyadi choorna prathisarana* and *Panchaksheerivriksha kashya gandusha* showed significant reduction in pain, bleeding gums, halitosis, plaque index, bleeding gums and normalization of saliva pH and recovered the bacterial profile in saliva with an improvement of 100%, 100%, 98%, 100% and 100% respectively and was statistically significant with $p<0.0001$. So, *Trivrit virechana* purifies the *koshta* in turn keeps the oral cavity healthy and strengthen the periodontium. *Yashtyadi choorna* havs anti-inflammatory, antibacterial property inhibits the growth of periodontopathogen and *Panchaksheerivriksha kashaya* helps to normalize the pH of saliva and reduce the microbial load. Hence, *Ayurveda* management can be considered as a better alternative in the management of periodontitis.

Keywords: *Panchaksheerivriksha Kashaya*, Periodontal Pathogen, Periodontitis, Pratisarana

1. Introduction

Periodontitis is the most common localized inflammatory disease of the teeth caused by bacterial infection of the periodontal cavity associated with subgingival plaque and is a major cause of tooth loss in the elderly[1]. 47% of the adult population suffers from periodontitis. The disease is more common in adults over the age of 30. The overall prevalence of periodontitis increases with age, and the incidence increases sharply in adults in their 30 s and 40 s. The prevalence rates were 57%, 67.7%, 89.6%, and 79.9% in 12, 15, 35-44, and 65-74 years of age, respectively[2]. The main cause of periodontitis is the build-up of plaque due to poor oral hygiene. Unremoved plaque promotes bacterial growth towards the roots and causes gingivitis and periodontal pocket formation. If the progression of periodontal inflammation is not stopped, the supporting structures of the tooth, including the surrounding bones, are destroyed. Teeth become loose and lost or need to be extracted over time, which reduces dental function and quality of life.

A variety of microorganisms live in the human oral cavity. Over 700 different types of bacteria can live in an adult's mouth. Bacteria related to periodontal disease are mainly Gram-negative anaerobes[3]. A salivary pH of less than 7.0 indicates acidemia and an acidic salivary pH promotes the growth of pathogens that cause periodontitis.

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Periodontium can be considered as *dantamoola* and their disorders as *dantamulagata roga*, which are mainly caused by vitiation of *rakta* and *kapha dosha*[4]. *Vishesha lakshanas* of *upakusha* share similarities with the clinical symptoms of periodontitis such as swelling, bleeding gums, halitosis and pain.

Here, a study is carried out to assess the effect of *trivrit virechana, yashtyadi pratisarana,* and *pancha ksheeri vriksha kashaya gandoosha* in the management of periodontitis to evaluate the clinical and bacteriological improvement by assessing the saliva pre- and post-test.

2. Methods

30 patients reporting at the outpatient department of *Shalakyatantra* were diagnosed clinically as case of periodontitis with chronicity of less than 5 years, a minimum of three sites that bleed on probing and probing depth ≥3mm assessed by Williams probe along with pain, bleeding gums and halitosis were included in the study. Patients with alveolar bone destruction, those who received any chemotherapeutic medicines during the past 6 months, history of any uncontrolled systemic diseases, pregnant and lactating women, immune-compromised patients, alcoholics and smokers were excluded. The study procedure was explained to all patients participating in the study. The total duration of treatment was 44 days. The therapeutic intervention adopted in this study is summarized in Table 1.

Scores of subjective criteria, plaque index and gingival bleeding index were recorded before treatment and after treatment and were reassessed during the three follow-ups done once a month for the next 3 months. Assessment of Saliva pH and microbial profile were done before and after treatment only. Parameters used were the Loe and Silness plaque index and the Ainamo and Bay gingival bleeding index. Saliva pH was measured with a digital pH meter and Microbial assessment of saliva for colony formation unit (CFU/mL) and gram staining was done at Amrita Centre for Advanced Research in Ayurveda (ACARA) Laboratory, Amrita School of Ayurveda. Pre- and post-photographs were also taken showing the improved parameters.

Subjective parameters were assessed using the Wilcoxon sign rank test. Statistical significance of mean scores between before and after treatment was assessed using the paired t-test. Statistical analyses were performed with SPSS software.

2.1 Study Design

The study was designed as an open-label clinical trial. The study protocol was reviewed and approved by the Institutional Ethics Board Committee (IEC-AIMS-2021-AYUR-084) on research. Written informed consent in agreement with the Declaration of Helsinki was obtained from all enrolled individuals. Clinical Trial Registry (CTRI/2022/01/039130) was also done.

2.1.1 Subjective Parameters

All selected participants were observed before and after treatment visit and during the three follow-ups done once in a month for next three months. These consultations involved the assessment of Pain, Bleeding gums and Halitosis[5].

2.1.2 Objective Parameters

The Plaque score - scored from 0 to 3 was assessed using Loe and Silness plaque Index. This index measures the thickness of plaque on the gingival one-third6. Gingival bleeding was assessed using Gingival bleeding index on interdental space. Bleeding response to the horizontal pressure applied in the interdental area by a dental probe was recorded. After 30 s, bleeding at each gingival unit was recorded. Any change in gum color and oedema was noted[7]. Saliva pH was measured with the help of a digital pH meter. Saliva has a pH normal range of 6.2-7.6 with 6.7 being the average pH. For assessing microbial load, saliva samples were collected from each patient in a 50 ml wide mouth sterile plastic container. Patients were advised to avoid food with higher sugar or acidity, caffeine 1hr before sample collection also to rinse mouth with water for 5 minutes to remove food residue[8]. Then the collected saliva was inoculated directly into the nutrient agar media (catalogue number: 616936605001730). Plates were incubated at 35°C for 24 hrs. Counting of cells using colony counter and physiological identification of cells of bacteria with gram staining technique were done. Gram staining was done to assess the reduction in the number of gram-negative bacteria.

Table 1. Therapeutic interventions used in the study

Procedure	Medicine	Dose	Duration
1. *Deepanapachana*	*Vaiswanara choornam* with hot water	6 gm-0-6 gm	1 hr before food for 1-3 days
2. *Snehapana*	*Tiktaka grita*	*Shodananga snehapana*	Till attaining *samyak singdhata* for 4-9 days
3. *Abhyanga and Ushmasweda*	*Tila taila*	---	10-12 days
4. *Virechana*			
5. *Pratisarana*	*Trivrit lehyam*	30-40 gm	Based on *koshta* for 13 days
6. *Gandusha*	*Yashti, sarjakshara, shunti, Saindhava choornam* mixed with honey	650 mg	3 mins twice daily for 1 month
	Panchaksheerivriksha Kashaya	70 ml	5 mins twice a day for 1 month

2.2 Procedure of Gram Staining

Take a clean, grease-free slide and prepare to spread the suspension on the clean slide with a sample ring. Air dry and put on heat, then pour in Crystal Violet and keep for about 30 seconds to 1 minute and rinse with water. Flood the gram with iodine for 1 min and wash with water. Then wash with 95% alcohol or acetone for about 10-20 s and rinse with water. Then, let add safranin for about 1 min and rinse with water. Dry, blot dry and observe under the microscope. Gram-positive bacteria are purple, and Gram-negative bacteria are pink/red in color under the microscope[9].

3. Results

Of the 34 patients registered in this study, 4 of them were considered dropped out due to an irregular visit to the hospital for follow-ups. Each case was observed for prevalence according to age, pain, bleeding gums, and halitosis. It was observed that 46.6% of the patients were in the age group of 30-35 years.

Wilcoxon sign rank test showed a reduction in pain, bleeding gums, halitosis, plaque index and gingival bleeding index between before treatment, after treatment and 3 follow-ups, which is significant at all stages $p < 0.0001$. In subjective criteria, there is an improvement of 100%, 100% and 98% respectively. There is improvement in pain in all the 30 patients after

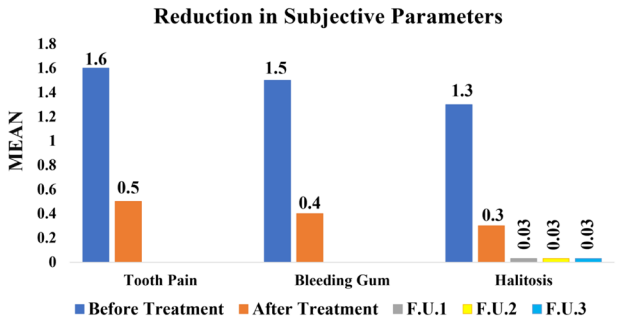

Figure 1. Statistical data showing reduction in subjective parameters during before-after treatments and further follow ups.

treatment, and the effect of treatment sustained during three follow-ups, all the 30 patients had improvement in bleeding gum during follow ups and out of 30 patients, 28 patients had improvement in halitosis after treatment, and only one patient had the symptom persisted during the follow up period. Statistical data showing reduction in subjective parameters before treatment, after treatment and further follow ups is shown as diagram (Figure 1).

Out of 30 patients, 28 patients had improvement in plaque index after treatment and all the 30 patients got improvement during first follow up and the treatment effect sustained in all patients during further follow-up periods. The results were significant at all stages with $p<0.0001$.

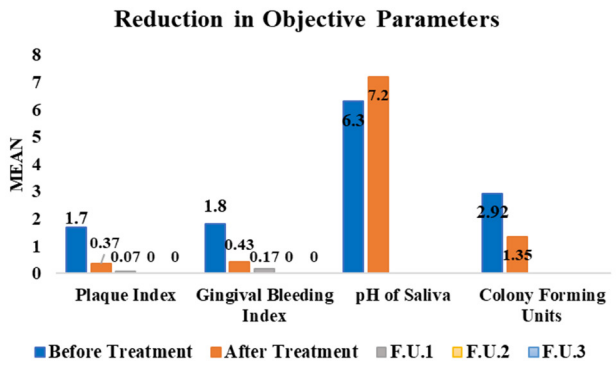

Figure 2. Statistical data showing improvement in objective parameters during before-after treatments.

Paired t-test was performed to evaluate the significant difference in the mean value of the saliva pH and Colony Forming Units before treatment and after Treatment. It was observed that there is a significant difference in mean values of saliva pH before (6.300) and after treatment (7.200) and mean values of colony forming units before (292.033) and after treatment (135.000). The result is statistically significant with $p<0.0001$. Effect of treatment on gram negative bacteria colonies assessed through staining. Paired t-test shows that in all 30 patients, the colonies of gram-negative anaerobic bacteria were reduced considerably after treatment and is statistically significant with $p < 0.0001$. Statistical data showing improvements in objective parameters before treatment and after treatment is shown as diagram (Figure 2).

Pre and post photographs taken before and after treatment showing the improved parameters are given as Figures 3-5.

4. Discussion

Oral cavity is the entrance to the gastrointestinal tract, oral inflammations can also affect the digestive environment, hence the need for Shodhana (purification). Shodhana is indicated in the upakusha treatment for kayashudhi and agni deepana[10]. *Trivrit (Operculina turpethum)* is considered *sukhavirechaka* and it soothes *kapha* and *pitta dosha*.

Pratisarana (tooth scrub) mainly has therapeutic effects like shodhana and ropana. The powder is

Figure 3. Photographs taken before and after treatment showing improvement in objective parameters.

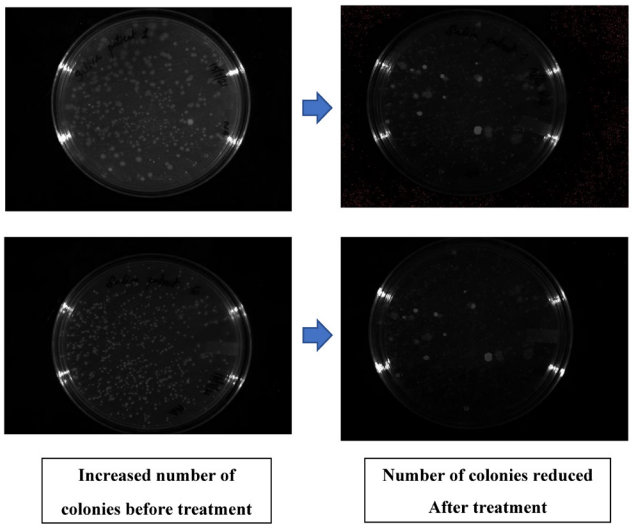

Figure 4. Microbial plate before and after treatment showing reduction in Colony forming units (CFU/ml).

made into a semi-solid form by adding the specified mediums in the formulation such as honey or water, and then massaging the gums with the fingertips using mechanical pressure. In this study, *Pratisarana* was made with *Yashtimadhu, Sarjakshara, Shunti* and *Saindhava* powder mixed with honey[11]. The *prathisarana* procedure increases blood circulation and improves gingival protection by strengthening the gingival fibers and maintaining periodontal health[12]. *Yashtimadhu (Glycyrrhiza glabra)* has *vrana ropana*, *kapha hara* and *shotha hara* properties that help in reducing gingivitis. The bioactive phytoconstituents of *Glycyrrhiza glabra* inhibit the growth of periodontal pathogens and reduce inflammatory markers at the site of infection. It also deactivates the osteoclasts responsible for the destruction of alveolar bone in periodontitis[13]. *Sarja kshara* has *vrana ropana*, *lekhana* and *krimighna* properties that can disrupt bacterial colonization thus preventing the formation and deposition of dental plaque. *Shunti (Zingiber officinale)* is kaphavata shamaka and has *jihwa shodhana* properties, so that plaque-forming bacteria that cause bad breath are eliminated from the oral cavity. *Saindhava* is *tridosha hara* that also has *sukshma*, *vyavayi* and *vikashi* properties, supporting the formula to reach even small areas of the gums and teeth to eliminate bacterial buildup. *Saindhava* is indicated in *aruchi chikitsa*. Here prathisarana choorna is mixed with honey as it is Yogavahi and promotes *lekhana, shodana, krimighna* and *ropana gunas*. In recent research, honey was shown to have antibacterial effects against Gram-positive and Gram-negative microorganisms[14]. Therefore, this formula will be beneficial in reducing the symptoms of periodontitis.

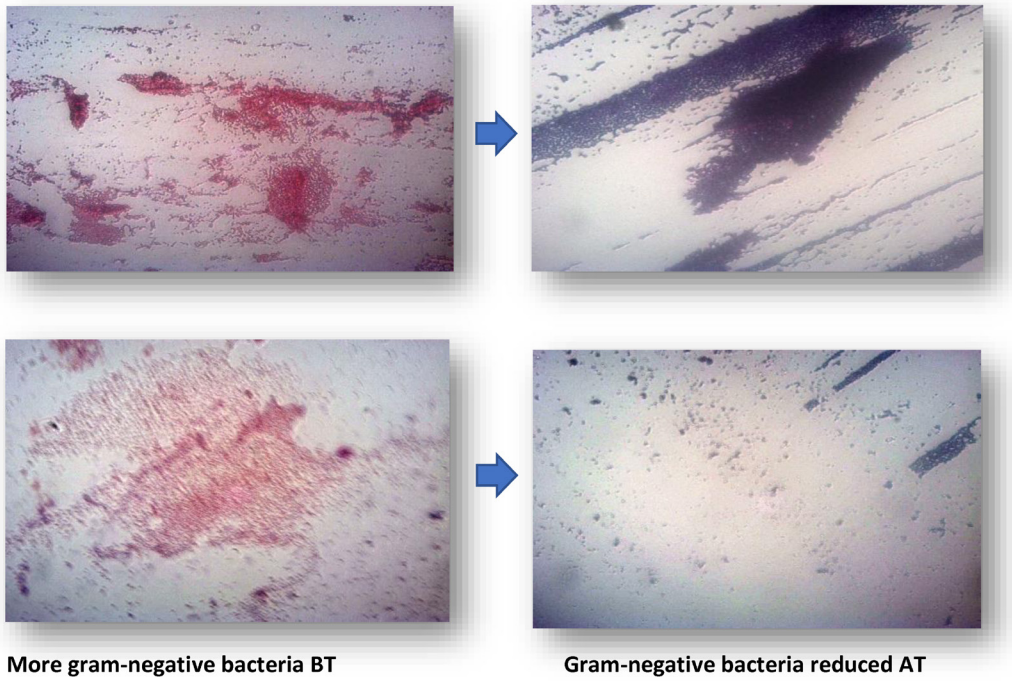

Figure 5. Microscopic images before and after treatment showing reduction in gram negative bacteria.

Gandusha is a procedure in which the mouth is filled with medicinal liquid to the maximum extent and is beneficial in controlling disorders of the oral cavity as it helps to calm the intoxication of *kapha dosha*. This procedure stimulates chemical receptors present in the mouth, thereby increasing saliva production. Lysosomes present in saliva have a bacteriostatic effect, which will not allow pathogenic microorganisms to grow further inside the oral cavity[15]. Here in this study, gandusha was performed with *Panchaksheerivriksha Kashaya. Panchaksheerivriksha* consists of the bark of five species of plants *Aswatha* (*Ficus religiosa* Linn.), *Nyagrodha* (*Ficus benghalensis* Linn.), *Udumbara* (*Ficus glomerata* Roxb), *Plaksha* (*Ficus lacor* BuchHam) *and Parisha* (*Thespesia Populara Soland ex Correa*). This formula is *kaphapittahara, sthambaka* and has the properties of, *varnya, vrana ropana* and *raktavishodaka*[16]. Due to the *kashaya rasa*, it has *rakta vishodhana*, *ropana, vedanasthapaka, shothahara* and *kledahara* properties that helps to relieve pain and bleeding gums. Pacify *rakta* and reduce inflammation through the attribute *ropana, vranashodhana* and *kleda hara*.

In a study conducted by Takahashi *et al.,* on the effect of pH on microbial growth, it was found that the major pathogens in periodontitis such as *Porphyromonas gingivalis, Prevotella intermedia, Fusobaterium nucleatum* grew at pH 6.5-7.0, 5.0-7.0, and 5.5-7.0 respectively[17]. This result is comparable with the present study, where the pH of saliva before treatment was about 6.0-6.5, so it can be inferred from previous studies that it must be microorganisms observed under the microscope after gram staining, during the evaluation of the microbial profile of saliva. The pH of *panchaksheerivriksha Kashaya* is 7.5, and it helps to reduce the acidity of the saliva and thereby reduce the growth of anaerobic Gram-negative microorganisms. Pharmacological activity of *panchaksheerivriksha* has anti-inflammatory and antibacterial properties. The active ingredient present in *panchaksheerivriksha Kashaya* tannin has antibacterial and wound-healing properties, which can greatly reduce the number of microorganisms, thus preventing halitosis and bleeding gums[18,19].

5. Conclusion

The ayurvedic treatment *trivrit virechana, yashtyadi pratisarana* and *panchaksheerivriksha Kashaya gandusha* is effective in improving subjective symptoms, gingival bleeding index, plaque index, pH of saliva and microbial profile of saliva in periodontitis.

The present study concluded that the administration of *trivrit virechana, yashtyadi pratisarana* and *panchaksheerivriksha Kashaya gandusha* was effective in reducing symptoms of periodontitis and showed significant improvement in gingival bleeding index, plaque index binds and normalizes the pH of saliva. This treatment also showed a significant reduction in the number of gram-negative bacteria. Treatment results were also sustained during follow-up. Therefore, Ayurvedic management can be considered as a better alternative in the management of periodontitis.

6. Acknowledgement

We acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript.

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