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CLINICAL EFFECT OF COMMERCIALLY AVAILABLE TWO HERBAL DENTIFRICES ON THE CONTROL OF PLAQUE AND GINGIVITIS.

Periodontology

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ABSTRACT

Background & Objectives: Main aim of this study was to evaluate the anti-plaque and anti-inflammatory effect of commercially available two herbal dentifrices that is Colgate herbal and Patanjali dantkanti.

Method and material: This was a cross-over study.34 participants were selected and were randomly assigned to the group A [patanjali dantkanti followed by colgate herbal] (n=17) and group B [colgate herbal followed by patanjali dantkanti] (n=17). After phase 1 therapy, allocated toothpaste was given to the participants. Clinical parameter like plaque score, gingival inflammation score and approximal plaque score were measured at baseline and after 15 days. After 1 week washout period again this parameter were recorded and then after 15 days.

Result: In group A plaque score was significantly reduced from 1.30±0.16 to 0.53±0.19, gingival inflammation score reduced from 1.37±0.20 to 0.57±0.17 and approximal plaque score reduced from 0.83±0.12 to 0.36±0.12. In group B plaque score was significantly reduced from 1.33±0.21 to 0.57±0.26, gingival inflammation score reduced from 1.34±0.25 to 0.59±0.24 and approximal plaque score reduced from 0.77±0.16 to 0.35±0.09. It was seen that the inter-group differences in terms of plaque score (p=0.908), gingival inflammation score (p=0.448) and approximal plaque score (p=0.147).

Conclusion: Both the herbal toothpaste showed significant reduction in terms of plaque score, gingival inflammation score and approximal plaque score but when intergroup analysis was performed significant difference among both the groups was not seen.

KEYWORDS

Herbal toothpaste, Gingivitis, approximal plaque score.

Introduction:

A biofilm is a complex accumulation of individual bacteria and 3-dimensional arrangement of bacteria.[1] In oral cavity , bacterial biofilms are found on tooth surfaces , oral mucous membranes and prosthesis. Plaque is considered as the precursor of gingivitis and periodontitis.[2] Optimal plaque control forms the basis for prevention and control of dental caries and as well the periodontal disease.[3] Although, brushing teeth twice a day and daily flossing is highly effective in plaque reduction, over 50% of adults have gingivitis on an average of 3 to 4 teeth.[4] Self-performed mechanical plaque removal is one of the most accepted methods of controlling plaque and gingivitis.[5] The fact that most people experience difficulty in maintaining adequate levels of plaque control, particularly at interproximal sites, necessitates the use of chemicals for control of plaque as an adjunct to mechanical plaque control procedures.[6] As some of these chemical substances may have undesirable side effects, such as tooth staining, taste alteration, abrasion of teeth, ulceration of oral mucosa.

The rising field of different medicine has shown that dentifrices based on plant extracts are accessible in the market. A number of controlled clinical trials have demonstrated that tooth brushing with herbal dentifrices reduces supragingival plaque and gingivitis. [5,7,8] Herbal toothpaste has anti-microbial, anti-plaque, anti-inflammatory, anti-oxidant activity. Present study selected colgate herbal and patanjali dantkanti. Colgate herbal contain active ingredient like Myrrh extract, Chamomile extract, Tea tree oil, Saga oil, Eucalyptus oil and Eugenol in aqueous base. Patanjali dantkanti contain Akarkara, Neem , Babool, Tomar, Pudina, Laung, Pippli, Vajradanti, Bakul, Vigang, Haldi, Pilu, Majuphal. Anti-microbial properties of these herbal ingredients may help in reducing the plaque and gingival inflammation. So the purpose of the present study was to compare anti-plaque and anti-inflammatory efficacy of commercially available two herbal dentifrices.

Material and method:

The study design was cross over randomized controlled clinical study. Dental students and interns of K.M.Shah Dental College and Hospital were selected for study. Base on sample size formula Z = 2*(Z*SD/d)^2 Where, Z = 2.482, SD = 0.25 and d = 0.12) sample size was 34. Out of dental students, 34 participants who met the inclusion criteria were included in the study. Participants who were regular users of toothbrush and toothpaste for maintaining oral hygiene and willing to participate formed the study participants. Participant's age should between 18 to 20 years with gingivitis. Participants with known systemic illness, chronic periodontitis, recent antibiotic and anti-inflammatory therapy, history of allergy to toothpaste, who were undergoing orthodontic treatment, who wore prosthodontic appliances and using oral hygiene aids other than toothpaste and tooth brush were not included in the study. Allocation was done by experienced specialist [guide] by a coin flip method to receive either colgate herbal or patanjali dantkanti and was recorded and kept concealed from the primary investigator. Primary investigator was blinded about the allocation. PhaseI therapy of the included participants, written consent, data collection and keeping of collected data at baseline and after 15 days were done by the primary investigator. Each participant was receiving initial periodontal treatment, including oral hygiene instructions, plaque control, and scaling and root planning. Clinical examination was carried out to assess plaque using Silness and Loe plaque index (PI) , Modified approximal plaque index (API) by Lange and Gingivitis by Loe and Silness gingival index (GI) .After recording the indices participants were subjected to prophylaxis to render them plaque, stain and calculus free. Following the prophylaxis, the study participants were divided into 2 groups. Group A – Patanjali dantkanti toothpaste followed by colgate herbal. [n=17] and Group B – Colgate herbal toothpaste followed by patanjali dantkanti. [n=17] This study was cross over study so 1st 15 days group A was received patanjali dantkanti and group B was received colagte herbal. Clinical parameter measured at the baseline and after 15 days. After 1 week wash out period group A was received colgate herbal and group B was received patanjali dantkanti. Again clinical parameter measured at the baseline and after 15 days. The participants were taught for uniform tooth brushing technique. [i.e modified bass brushing technique]. Furthermore, participants were instructed to brush twice daily (morning immediately after waking up and night before going to bed) for 2 minutes using the toothbrush and toothpaste given to them. Tick chart was given to check compliance of the study participants towards frequency of tooth brushing. In addition, the participants were asked to bring the dentifrice tubes at the end of the trial, to confirm whether the participants had used the products or not. Participants were also instructed to refrain from any other oral hygiene aids (like dental floss, tooth pick, etc.) during the study duration.

Statistical method:
Descriptive statistics was used to summarize the results. The data were analyzed using independent t-test and paired t-test.

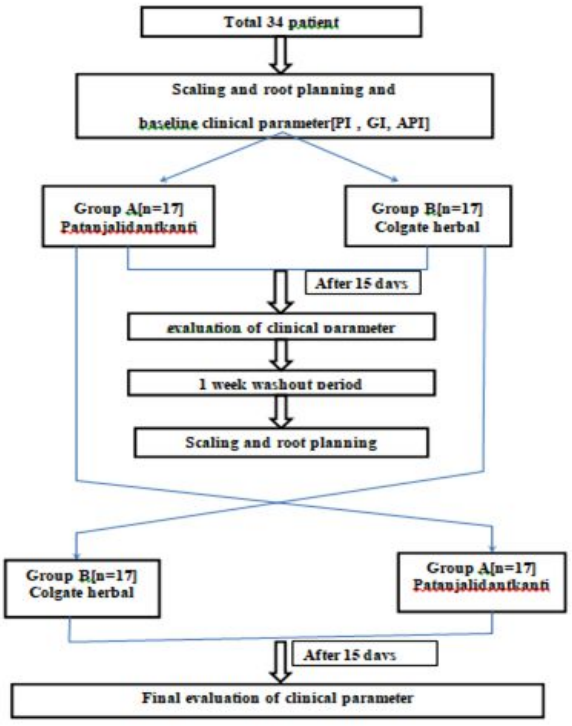

Chart 1: Study design

Result:
In this randomized cross over study, total 34 participants were included. Mean age of the participants was 24.85 ± 0.35. All the participants completed the follow up and analyzed in statistical test. For intragroup analysis paired T-Test and for inter group analysis was done using independent t test. Plaque reduction in group A was from 1.30±0.16 to 0.53±0.19 **(table 1)** Mean plaque reduction from baseline to 1 month was 0.76±0.29. **[Table 3]**.The change in plaque score was statistically significant with p value <0.001. Gingival inflammation reduction was from 1.37±0.20 to 0.57±0.17 **(table 1)** Mean gingival inflammation reduction from baseline to 1 month was0.74±0.26 **[Table 3]**. The change in gingival inflammation was statistically significant with p value <0.001. Approximal plaque reduction was from 0.83±0.12 to 0.36±0.12 **(table 1)** Mean approximal plaque reduction from baseline to 1 month was 0.42±0.12. **[Table 3]**.The change in plaque score was statistically significant with p value <0.001. Plaque reduction in group B was from 1.33±0.21 to 0.57±0.26 **(table 2)** Mean plaque reduction from baseline to 1 month was 0.77±0.16. **[Table 3]**.The change in plaque score was statistically significant with p value <0.001. Gingival inflammation reduction was from 1.34±0.25 to 0.59±0.24 **(table 2)**.Mean gingival inflammation reduction from baseline to 1 month was 0.79±0.21 **[Table 3]**. The change in gingival inflammation was statistically significant with p value <0.001. Approximal plaque reduction was from 0.77±0.16 to 0.35±0.09 **(table 2)** Mean approximal plaque reduction from baseline to 1 month was 0.47±0.13 **[Table 3]**.The change in approximal plaque score was statistically significant with p value <0.001.

Table 1: Result of clinical parameter of group A: [Patanjali dantkanti]

Group A		PI	GI	API
		Mean +/ Standard deviation	Mean +/ Standard deviation	Mean +/ Standard deviation
	Baseline	1.30±0.16	1.37±0.20	0.83±0.12
	After 1 month	0.53±0.19	0.57±0.17	0.36±0.12
	P value	<0.001	<0.001	<0.001

Table 2: Result of clinical parameter of group B: [Colgate Herbal]

Group B		PI	GI	API
		Mean +/ Standard deviation	Mean +/ Standard deviation	Mean +/ Standard deviation
	Baseline	1.33±0.21	1.34±0.25	0.77±0.16
	After 15 days	0.57±0.26	0.59±0.24	0.35±0.09
	P value	<0.001	<0.001	<0.001

Table 3 : Comparison of mean difference of clinical parameter among both the groups.

Mean difference	Group	Mean± Std. Deviation	P value
Plaque index	*Group A*	0.76±0.29	0.908
	Group B	0.77±0.16	
Gingival index	*Group A*	0.74±0.26	0.448
	Group B	0.79±0.21	
Approximal Plaque index	*Group A*	0.42±0.12	0.147
	Group B	0.47±0.13	

Discussion:
Dental plaque is the main culprit for gingival inflammation. The chronic periodontitis starts as a plaque inducing gingivitis when it left untreated it may further develop in the periodontitis. So the initial periodontal therapy is to remove the primary etiological factor supra and subgingival plaque. Hence plaque and gingivitis control helps in maintenance of healthy oral cavity. This can be achieved effectively by mechanical plaque control using tooth brush and medicated toothpaste. Currently, there has been a budding interest in natural products. So, main aim of study was to evaluate the anti-plaque and anti-inflammatory effect of commercially available two herbal dentifrices. The chief components of the toothpaste used in this study may have many medicinal properties. Present study selected colgate herbal and patanjali dantkanti. Colgate herbal contain active ingredient like Myrrh extract, Chamomile extract, Tea tree oil, Saga oil, Eucalyptus oil and Eugenol in aqueous base . Patanjali dantkanti contain Akarkara , Neem , Babool, Tomar, Pudina, Laung, Pippli, Vajradanti, Bakul, Vigang, Haldi, Pilu, Majuphal.

Basri DF et al [9] in 2004 did a study to check antimicrobial effect of aqueous and acetone extracts galls of quercus infectoria against gram positive and gram negative bacteria and author concluded that both aqueous and acetone extract have a similar antimicrobial activity against bacteria. Bimstein E in 1999 [10] suggested that Babool is having which stated as in our ancient texts, it also Kashaya Rasa Raktastambha have the astringent effect due to which it is helpful to reduce the bleeding and infection also in gingivitis. Prashant et al.,Wolinsky et al., Siswomihardjo et al., Bhuiyan et al., Almas et al., and Subramaniam et al [11,12,13] have carried out in vitro studies which showed the effectiveness of neem extract against plaque forming bacteria. Tiwari S, Sarkar B, Dubey G, Jain A in 2011[14] suggested that pilu has anti-oxidant properties. Motamayal FA in 2011[15] suggested that Eucalyptus oil has antimicrobial activity against some microorganisms such as Vibrio cholerae, Aspergillus flavus and S. aureus and also inhibit biofilm formation of plaques. Mali AM in 2012 [16] suggested that haldi has anti-inflammatory, antioxidant, and antimicrobial properties, along with its hepato-protective, immunestimulant, antiseptic, anti-mutagenic. Basheer A et al in 2013 [17] investigate the anti-microbial activity of pudina againt periodontal pathogen and suggested that pudina extract has effective against periodontal pathogen and can be used for plaque control. Almekhlafi S et al 2014 [18] suggested that myrrh has anti-inflammatory, antibacterial, antioxidant, hepatoprotective, antimalarial, anticandidal, antimycobacterial and antischistosomal activities. Moon SE in 2011 [19] concluded that the clove oil could be active as a natural antibacterial agent against periodontopathogenic bacteria.

Group A showed significant plaque reduction, gingival inflammation reduction and approximal plaque reduction from baseline to 1 month. Singh K in 2016 [20] has shown significant reduction in debris index, calculus index and gingival index. This study has shown favoring outcomes in clinical parameters during use of patanjali dantkanti compared to non-herbal toothpaste. Group B also showed significant plaque reduction, gingival inflammation reduction and approximal plaque reduction from baseline to 1 month. Ozaki F in 2006 [21] has shown significant reduction in mean plaque and gingival score. This study has shown the use of colgate total and non-fluoridated toothpaste

has similar improvement in all clinical parameter. When the both group were compared at end of the study in terms of plaque reduction, gingival inflammation reduction and reduction in approximal plaque index **(table 3)** the differences between the groups was not significant with the p value 0.908, 0.448, 0.147 respectively. With our best knowledge there was no any study that direct compared patanjali dantkanti and colgate herbal. Pannuti CM in 2003 [22] concluded that there was no difference between the herbal toothpaste and non-fluoridated tooth paste in reduction of plaque and gingivitis. George J et al in 2009 [7] concluded that the herbal-based toothpaste was as effective as the conventionally formulated dentifrice in the control of plaque and gingivitis. Rao S in 2008 [23] suggested that herbal toothpaste as safe and effective as fluoride contain toothpaste. Conventional toothpaste contain various chemical components n they might cause abrasion of the teeth, staining of teeth, alternation of the taste and ulceration of the oral mucosa. Nayak A in 2011 [24] and mazumdar in 2013 [25] proven the medicinal values of herbal products and also stated that herbal dentifrices do not cause any adverse effects on the oral cavity and are effective in maintenance of oral hygiene and gingivitis. In this study also both toothpaste does not cause any adverse effect.

The strength of the study was its cross over randomized controlled design. Allocation and blinding was also done. The limitation of the study is its small sample size. In future, such a study has to be designed with larger sample size to further validate the present study results. Besides, experimental period of 30 days may not be sufficient to show conclusive evidence of efficacy of both herbal toothpastes. Another limitation is this study include only dental students and interns so, it may be attributed behavior change –hawthorne effect.

Conclusion:

Within the limits of this clinical study, regular use of these both herbal toothpastes provides the significant reduction in plaque accumulation and improved the gingival health of the participants. Both toothpaste contained herbal component and they don't have any side effect. Thereby, both the herbal toothpaste can be used for the maintenance of the oral hygiene.

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