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EFFECT OF DHANYAMLA GANDOOSHA WITH TILAKALKA IN DANTAHARSHA

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ABSTRACT

Background and objectives: Dentinal hypersensitivity is a persistent dental problem frequently encountered by the dentists. Although many advances have occurred in modern dentistry, the requirements for an ideal dentin desensitizing agent are not yet fulfilled. In comparison to the costly and invasive treatments of modern dentistry, *Tila*(black sesame seed) is natural, cost effective, easily available, without any side effects and has structural benefits to the teeth. *Dhanyamla,* when used as *gandoosha*, improves oral hygiene. The formulation specifically mentioned for*dantaharsha* in mukharogachikitsa chapter of Arogya Raksha Kalpadruma was selected as the intervention. **Materials and Methods:** For this study, 30 subjects satisfying inclusion and exclusion criteria from OPD and IPD of Govt Ayurveda College Tripunithura, were subjected to*DhanyamlaGandoosha*with *Tilakalka* for 1month. 12g of*tilakalka* mixed with 150ml of lukewarm *dhanyamla* was divided into 3 parts 50ml each/according to the subject's mouth capacity and the subjects were asked to hold this *gandoosha* after brushing in the morning. The subjective and objective parameters were assessed before and after treatment and on the follow up period. The data collected were statistically analysed. **Results and discussion:**Majority of the subjects had teeth sensitivity towards cold and sour than sweet, hot and touch. The intervention showed extremely significant result with p value<0.001 in reducing the teeth sensitivity to sweet, sour, touch and cold (15 degree and 20 degree) and highly significant result with p value <0.01in reducing the teeth sensitivity to hot (30 degree and 35 degree).

Keywords: *Dantaharsha; Gandoosha; Dhanyamla; Tilakalka*

INTRODUCTION

Gandoosha is one among the *dinacharya* procedures as well as an effective detoxifying measure in oral diseases. In*gandoosha* a medicated fluid is held mouthful for a specific time till the subject feels as the quantity of fluid increased in the mouth, or there starts discharge from nose and watering from eyes. [1-3]*Gandoosha*has cleansing action and increases the defense mechanism in the oral cavity.Description of *dantaharsha* coincides with dentinal hypersensitivity which is characterized by distinctive short, sharp pain arising from exposed cervical dentin in response to various external stimuli that are typically thermal, evaporative, tactile, electrical, osmotic, or chemical, which cannot be ascribed to any other form of dental pathology, defect, or disease.[4]The prevalence of dentinal hypersensitivity has been reported as 3.8-74% depending upon the population, study setting and study design. While dentinal hypersensitivity can affect the patient of any age, it mostly affects individual at the end of their third decade and a rise again when in their 50's.[5]In the absence of an effective remedy in allied science for dentinal hypersensitivity, the prevailing situation obviously calls for the revalidation of the *gandoosha*formulations mentioned in Ayurvedic classics. This study is a *dinacharya* procedure which can be performed by patient at home daily, when proven effective,will be highly beneficial to the suffering patients.

OBJECTIVE

To evaluate the effect of *DhanyamlaGandoosha*with*tilakalka*in*Dantaharsha* among 30-60 years age group.

METHODOLOGY:

- Study design - Open clinical trial
- Study setting - Government Ayurveda College, Tripunithura
- Study population - Subjects satisfying the inclusion and exclusion criteria from the OPD and IPD of Government Ayurveda College Hospital, Tripunithura
- Sampling technique - Purposive Sampling
- Sample size - 30
- Study period **-** 18 months

INCLUSION CRITERIA:

- Subjects of both genders among the age group 30-60years
- Subjects with their teeth sensitive to touch, cold, hot,sweet and sour items
- Subjects willing to refrain from any form of dental treatments during the study period
- Subjects fit for gandoosha karma
- Subjects with informed consent

EXCLUSION CRITERIA:

- Subjects with systemic diseases which may alter the structure of teeth
- Subjects with cleft palate, facial palsy,bleeding gums,mouth ulcers
- Subjects with active dental caries and unmanaged cavities
- Subjects using any other mouth wash
- Subjects with dental prosthesis,extensive dental restorations and reconstructions

INTERVENTION:

- Medicine **–** Tilakalka in lukewarm Dhanyamla as gandoosha
- Dose **-** 12g of tilakalka in 150ml of lukewarmdhanyamla
- Time **-** Morning after toothbrushing
- Procedure-After brushing in the morning, the subject was asked to wash mouth with lukewarm water.12g of tilakalka mixed with 150ml of lukewarm dhanyamla was divided into 3 parts 50ml each/according to the subject's mouth capacity. The subject was asked to sit in a chair and hold the medicated drava in mouth till secretions fill in the mouth, and then it was spat out. The process was repeated thrice.
- Duration of treatment**-** 1month

PREPARATION OF TILAKALKA:

Tilakalka was made by grinding the required quantity of krishnatila with the help of a stone or chewing with the help of teeth.

PREPARATION OF DHANYAMLA:

The ingredients,Thandula, Prithuka, Kulatha (5parts each),Kangubija,Kodrava,Jambeera(2parts each), Nagara, Deepyaka (1part each), Laja (20parts) and ushnodaka(100parts)were tied in a clean cloth and made into loose bundles. These were kept immersed in hot water in an earthen pot which was kept closed and heated gently in moderate fire. This was repeated for 7 days and an optimum temperature was maintained during this period. From 8th day onwards dhanyamlawas taken as per the required amount and was replenished by adding the same amount of boiled water to the pot.[6]

Table1:CHEMICAL ANALYSIS OF DHANYAMLA + TILAKALA

PARAMETERS	**RESULT**	**UNIT**
Calcium	85.30	mg/100g
Potassium	28.64	mg/100g
Sodium	48.78	mg/100g
Iron	1.62	mg/100g
pH	4.78	

OUTCOME VARIABLES:

•**Subjective** Teeth sensitivity to sweet and sour items

•**Objective** Teeth sensitivity to cold, hot items and touch

ASSESSMENT:

The outcome variables were assessed before and after treatment and on the follow up period (0th, 31st and 61st days)

ASSESSMENT CRITERIA:

a)Subjective(Teeth sensitivity to sweet, sour items)

Table2:Grading of subjective and objective criteria

0	No significant discomfort
1	Discomfort, but no severe pain
2	Severe pain during application of stimulus
3	Severe pain during application and continuing after application of stimulus

b)Objective(Teeth sensitivity to cold, hot items)-Water stimuli test

i. **Sensitivity at 15 degree,20degree,30 degree,35 degree Celsius**

(The water in the above temperatureswas slowly flowed on the teeth surface from a disposable plastic syringe and subject's response was scored)

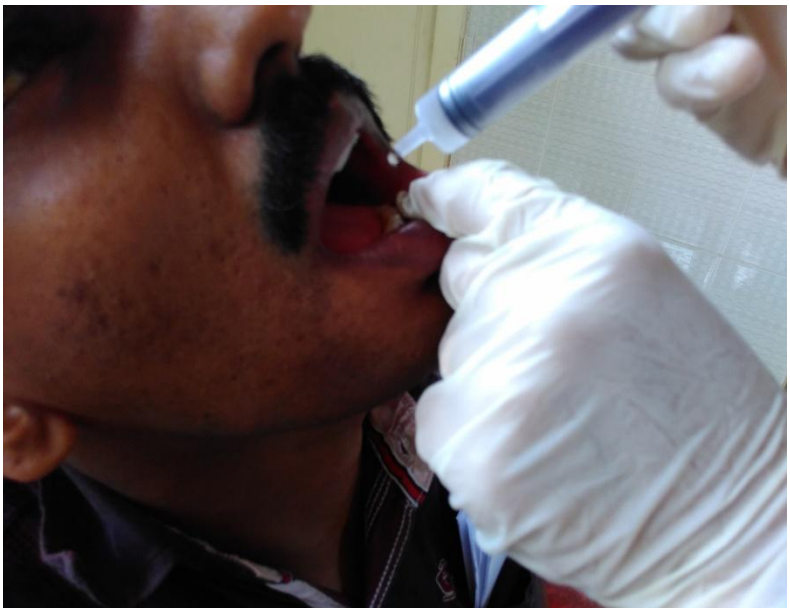


Figure1: Water stimuli test

ii. Teeth sensitivity to touch-Tactile stimuli test

(By using tactile stimuli given with a dental explorer/probe)

Figure2: Tactile stimuli test

RESULTS:

The effectiveness of the intervention was calculated by comparing the scorings of teeth sensitivity before and after treatment. To analyze the before – after effect of therapy, Wilcoxon signed rank test was done and the significance was expressed in terms of 'p' value. The overall assessment of the intervention was done by using Friedman test with post-test (Dunn's multiple comparisons test). To make calculations easy and without manual errors GraphPadInstat software was used.

Table3: Before – after effect of therapy- Wilcoxon signed rank test

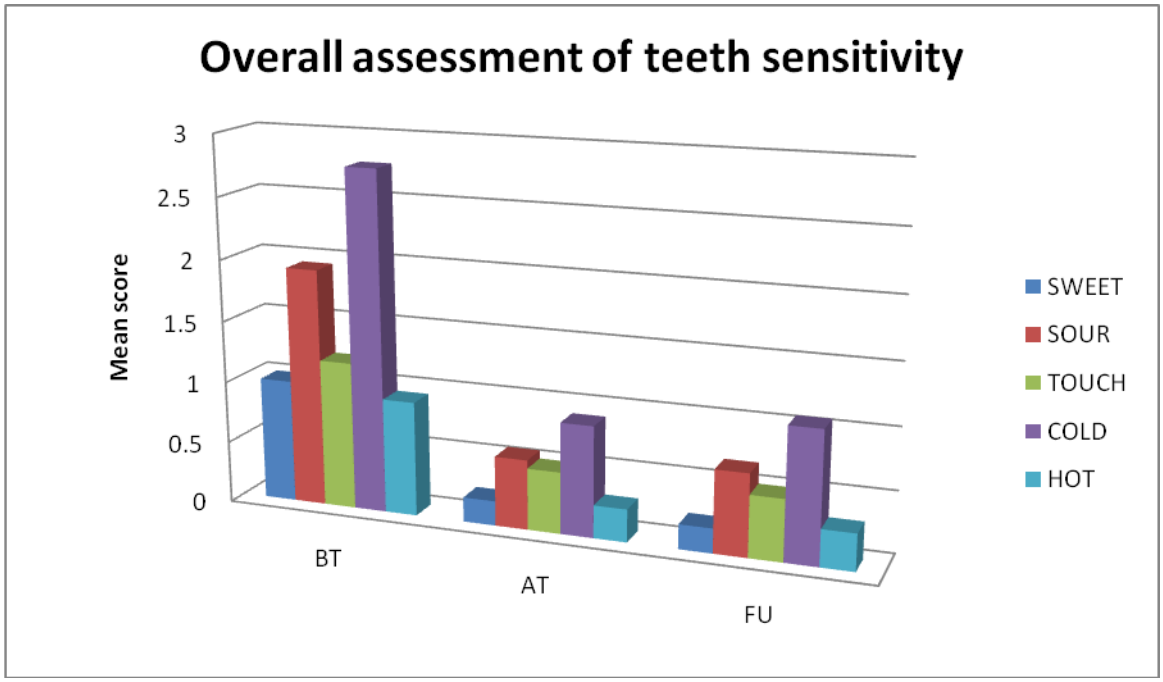
OUTCOME VARIABLES	MEAN SCORES			BT-AT
	BT	AT	FU	
SWEET	1	0.2	0.2	p<0.001
SOUR	1.933	0.5667	0.6667	p<0.0001
TOUCH	1.2	0.5	0.5	p<0.001
COLD	2.767	0.9	1.067	p<0.0001
HOT	0.9333	0.2667	0.3	p<0.01

Table4: Overall assessment - Friedman test

OUTCOME VARIABLES	OVERALLASSESSMENT (FRIEDMAN TEST)
SWEET	p<0.0001
SOUR	p<0.0001
TOUCH	p<0.0001
COLD	p<0.0001
HOT	P=0.0001

Table5: Post–test (Dunn's multiple comparisons test)

OUTCOME VARIABLES	PAIRED COMPARISON	
	GROUP	p-VALUE
SWEET	BT-AT	p>0.05
	BT-FU	
	AT-FU	
SOUR	BT-AT	p<0.001
	BT-FU	p<0.01
	AT-FU	p>0.05
TOUCH	BT-AT	p>0.05
	BT-FU	
	AT-FU	
COLD	BT-AT	p<0.001
	BT-FU	p<0.001
	AT-FU	p>0.05
HOT	BT-AT	p>0.05
	BT-FU	
	AT-FU	



Graph1: Analysis of effect of treatment on teeth sensitivity to sweet, sour, touch, cold and hot

DISCUSSION

Discussion on selection of topic

The difficulty found in treating dentinal hypersensitivity is expressed by the enormous number of techniques and therapeutic alternatives to relieve it. Several materials, such as varnishes, liners, restorative materials, dentinal adhesivesand mouthwashes are used to reduce dentinal sensitivity. Although there are many techniques and therapeutic alternatives available for relieving dentinal hypersensitivity, the professionals are confused and have lack of confidence to approach this pathological process effectively.[7]

Discussion on selection of the intervention (procedure *gandoosha*)

When compared to the chemicals used in desensitizing mouthwashes, *gandoosha* is performed with natural substances. Also, the retention time in *gandoosha* is more when

compared to the desensitizing mouthwashes. As long as the roots are nourished by the tissues around it, the teeth will remain healthy and this is possible through*gandoosha*which is a simple revitalizing therapy. Early degenerative changes due to lack of proper oral hygiene, subjecting one to undergo invasive dental procedures can be prevented; the progression of the dental diseases can be arrested at an early phase by practicing *gandoosha* as a daily routine.

Discussion on selection of gandooshaformulation

For strengthening the teeth, both internal and external use of tila is mentioned in various contexts in Ayurvedic texts. Dhanyamla, already mentioned in the texts for gandoosha, is an acidic medium which may enhance the absorption of tila than water medium.

Discussion on samprapthi

In asthi dhatu kshayalakshanas, deformities of danta like *satana, roukshya, paarushya, bhanga and prapatana*are mentioned. In asthivahasrotodushtilakshana also, bheda, soola and vivarnata of danta is mentioned. Asthi dhatu and vata dosha are related to each other by *asrayaasrayee bandha*. Asthi, composed of prithvi and akasha mahabhoota, is the substrate of vayu. The khara attribute of vata is related to the demineralization diseases especially in advanced age, the vata predominant stage of life. Among the prakupitavata karmas, vyadha, harshaetc are mentioned.

While analysing the samprapti, it can be understood that in dantaharsha, rooksha, laghugunas of vata increase. Roukshya, meaning *"snehaabhava"* is the condition leading to the dessication of natural snigdata from the body constituents. This forms the prime cause for vatika diseases like dantaharsha, as the body is the essence of sneha (*"Sneha saaroyampurushah"*) and the depletion of sneha causes the disease.

Vata provoking nidanas like mithyahara*(rooksha, khara, sushka, atiseeta, vatalanam seva, ksheeraghritaanabhyasa)* and mithyavihara*(ativyayama, atisamkshobha, asthanaamativighattanat)* lead to vatakopa. The prakupitavayu causes decrease of the density leading to sushiratva of asthi. Thusdhatukshaya occurs. This causes further excitation of vata and further progression of the pathogenesis.Enhanced rooksha and seetaguna in combination leads to chaya of vata dosha. This is the first kriyakala, the initial

phase where there is an opportunity to provide an active intervention and prevent further progression to other kriyakalas. This pathogenesis is clear in vatikadantarogas especially in dantaharsha. As a result of the rookshaguna and reduced poshana, the soshana karma of vata acts, the dantabala decreases and in later stages, the disease sets in. Thus, doshagunasamaahara vihara and dhatu vigunaahara vihara are the prime causative factors for asthivahasrotodushti. So the principle of treatment should be vatasamana, dantya and nourishing.

Description of dantaharsha coincides with dentinal hypersensitivity which is characterized by a short sharp pain in response to heat, cold, tactile stimuli, sweet or sour foods. While considering the pathogenesis of dentinal hypersensitivity, the most accepted Hydrodynamic theory explains the mechanism of dentinal hypersensitivity as, the presence of lesions involving enamel loss of teeth and the consequent opening of dentinal tubules to the oral environment, under certain stimuli, allows the movement of dentinal fluid inside the tubules, indirectly stimulating the extremities of the pulp nerves,causing the pain sensation.[8]

Spontaneous cure may occur by the natural remineralization process in the mouth, which promotes natural tubular occlusion of dentin, but pain may return because of the smear layer removal by faulty tooth brushing and carbonated drinks thus explaining the cyclic characteristics of dentinal hypersensitivity.The natural process also involves formation of reparative dentin by pulp.[9] In modern dentistry, the treatment options involveeither occluding the dentinal tubules or blocking the neural transmission. Acidulated sodium fluoride can form precipitates deep inside the tubules. Hence acidic formulation is recommended or else the precipitates formed by sodium fluoride can be mechanically removed by the action of saliva or mechanical action. Desensitizing agents include toothpastes, mouthwashes or chewing gums with potassium oxalate, ferric oxalate, calcium chloride, calcium phosphateetc as contents. Calcium silicate cement derived from Portland cement helps in the management of dentinal hypersensitivity by occluding the dentinal tubules by remineralization.Iontophoresis is another treatment in which solutions containing potassium, zinc ions are forced into dentinal tubules by applying electrical force through electrodes. Potassium salts act by diffusion along the dentinal tubules and decreasing the excitability of the intradental nerve fibers by blocking the axonic action.[10]

Discussion on overall assessment of teeth sensitivity

The assessment of reduction in teeth sensitivity to sweet, sour, touch, cold (15 degree and 20 degree) and hot (30 degree and 35 degree) showed statistically significant results between before and after treatment using Wilcoxon signed rank test. Hence the intervention showed a significant change in teeth sensitivity after treatment, when compared to before treatment.Overall assessment of reduction in teeth sensitivity to sweet, sour, touch, cold (15 degree and 20 degree) and hot (30 degree and 35 degree) showed statistically significant results using Friedman test, suggesting the significant change in teeth sensitivity by the intervention. When the difference between treatment periods was analysed by post-test (Dunn's multiple comparisons test), only two parameters namely teeth sensitivity to sour and cold showed statistically significant difference between BT and AT and between BT and FU. Although mean score reduction occurred and clinically significant results were obtained after treatment, statistical significance was not obtained for teeth sensitivity to sweet, touch and hot between BT and AT and between BT and FU. However during follow up period, all the parameters namely teeth sensitivity to sweet, sour, touch, cold (15 degree and 20 degree) and hot (30 degree and 35 degree) showed statistically insignificant with $p>0.05$, suggesting the absence of sustained effect for the intervention which supports the importance of *gandoosha* to be practiced as a daily routine especially in a *yapyaroga* like *dantaharsha* in which complete cure is impossible.[11]

Discussion on probable mode of action

Tila possesses madhura rasa, ushna, snigda, guru, sookshma and vyavayigunas and has ushnaveerya. It helps in alleviating vata. Also from the karmas attributed to tila like *dantya*, *balya, kesya,* imparting strength to the teeth, it is evident that tila has a special action on asthivahasrotas.[12] Also tilakalka is balapushtida.[13]It is one among the 24 vicharanasneha also, which shows the easy absorption of its snigdamsha even without the requirement of jataragnipaka.[14,15]All these actions might have improved the vitiated vata dosha, thereby subsiding the kupitavata karmas like soshanatwa and harsha, thus relieving dantaharsha. Also, tila is a rich source of calcium, phosphorus, iron, sodium and potassium.[16]

Dhanyamla has amla rasa and laghu property.[17]Since it is derived from grains, it is nourishing.[18]By gandoosha dharana, it alleviates abnormal taste, foul smell, dirt and

dryness of mouth and also exhaustion.[19] The nourishing property might have helped in relieving dantaharsha. Moreover, the laghu and srotosodhana action of Dhanyamla might have acted as a medium to easily deliver the properties of tila.

While considering the mechanism of sublingual absorption, the absorption of some drugs via oral mucosa is shown to increase when carrier pH is lowering (more acidic) and decrease with higher pH (more alkaline).[20]The acidic stimulation of the salivary glands, with the accompanying vasodilation, facilitates absorption and uptake into the circulatory system. As the study drug also possess acidic pH of 4.78, it might have helped in absorption of the drug. The temperature of the medicine is another factor which enhances circulation and hence absorption. The thrust of medicine on the oral mucosa also facilitates the absorption. Moreover, compared to the mouthwashes the retention time is more in gandoosha.

The combination of dhanyamla and tilakalka, when chemically analysed, showed the presence of sodium, potassium, calcium and iron. Potassium salts in this might be acting by diffusion along the dentinal tubules and decreasing the excitability of the intradental nerve fibers by blocking the axonic action as they do in the desensitizing agents of modern dentistry. Sodium, potassium, calcium and iron are also included in the contents of many of the desensitizing tooth pastes and mouthwashes currently in use. Moreover, calcium, the major constituent of the study drug might be acting by supporting the natural remineralisation process of dentin and thus promoting natural tubular occlusion of dentin.

CONCLUSION:

- Majority of the subjects had teeth sensitivity towards cold and sour than sweet, hot and touch, and the intervention showed extremely significant resultwith p value<0.001 in reducing the teeth sensitivity to sweet, sour, touch and cold (15 degree and 20 degree) and highly significant result with p value <0.01in reducing the teeth sensitivity to hot (30 degree and 35 degree).
- Some of the subjects had halitosis which was relieved after the intervention. Tobacco staining seen in some subjects also reduced after the intervention. This was an additional finding of the study.

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CONFLICT OF INTEREST: Nil

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