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Evaluation of khadiradikavalagraham in promoting oral hygiene among secondary and higher secondary school children

Dr. Ankush Jagota[1], Dr. Ankita Thakur[2], Dr. CharuSupriya[3], Dr. Jayan D[4], Dr. T.P. Sarasa[5]

[1]*Assistant professor P.G. Deptt.ofswasthavritta ,VYDSAM Khurja U.P.*

[2] *Lect. P.G. Deptt.Of Panchakarma ,RGGPGAC PaprolaKangra H.P.*

[3]*MD Scholar 2nd Year Deptt.RogNidan,RGGPGACPaprolaKangra H.P.*

[4]*Associate professor, Deptt.ofswasthavritta,Govt. Ayurveda College Kannur,Kerala*

[5]*Professor & HOD, Deptt.ofswasthavritta,Govt. Ayurveda College Tripunithura,Kerala.*

***Corresponding Author: Dr. AnkushJagota**

ABSTRACT

In current era, the oral problems are faced by people irrespective of age and gender due to the change in daily routine and food habits. Children are more prone to Oral problems as they consume food which is unhealthy. Oral problems include a number of period ontological issues leading to ill oral health. This constitutes a complex combination of different problems related to gingival, teeth and tongue hence the precise prevalence rate cannot be determined in particular age groups. *Acharyas* have explained the importance of *Dinacharya* in day today life. Here special reference about *Kavalagraham* has been mentioned. *AcharyaVagbhata* have indicated *Khadiradikavalagraham* for oral hygiene which contains drugs that comprises of *Katu, Tiktha* and *KashayaRasas* , possess the qualities of *DantaShodhana, VranaShodhana* and *Ropana* . Thus enables to overcome the ill oral health and maintains a good oral hygiene.

Design

Interventional pre-post test without control

Method

Present clinical trial was aimed to assess the *Khadiradikavalagraham* in promoting oral hygiene among secondary and higher secondary school children. Total 179 children were assessed on oral hygiene index to select the final 30, who match up with the inclusion and exclusion criteria. The duration of thetherapy was 30 days and assessment had done every month up to three months after therapy started. All subjects completed the treatment procedure. The results were statistically analyzed.

Findings

After 30 days of *KhadiradiKavalagraham* there was significant levels of reduction in symptoms like Halitosis ($p<0.001$), Anorexia ($p<0.05$), Tongue coating ($p<0.001$), Oral hygiene index ($p<0.001$), Plaque index (0.001), gingival index ($p<0.001$)

Motivation success rate (MSR) was 53.72, which falls into the category of $50 < MSR < 70$; OHMSI = 3 ; OHMSI, which implies that study was moderately successful in promoting the oral hygiene of school children.

Conclusion

Thepractice of KhadiradiKavalagraham was effective in promoting oral hygiene among selected secondary and higher secondary school children.

Keywords: Debris, Plaque, Calculus, Gingivitis, *KhadiradiKavalagraham*

INTRODUCTION

Oral diseases continue to bother mankind in spite of great advances made in the field of oral health in the last century. Dental and periodontal tissues are affected all over the world especially in populations with low oral hygiene. The diseases of teeth and its supporting structures affect almost every stages of life span. It is seen that 80% of the people suffer from one or the other dental problem [1]. Though dental problems are found in all ages, they are predominantly seen in childhood, young children and elderly persons. Most of the diseases of teeth and gums do not undergo natural remission or terminate, if left untreated. Ultimately unattended teeth lead to their losses. Hence utmost care has to be taken to maintain oral hygiene to avoid these dental problems and proper and timely intervention for controlling the prevailing dental diseases[2].

Although many dental diseases preventive techniques are used in practice, dental caries, periodontal diseases, malocclusion, oral cancer etc. are still a public health problem. As stated earlier, most of the diseases of teeth and supporting structures are preventable and controllable by promoting oral hygiene. Oral disease conditions can have effect on physical health and rest of the body because of systemic effect of bacteria in oral cavity. Poor oral hygiene is one of the main causative factors for dental diseases as well as diseases like bacteraemia related infective endocarditis[3]. Periodontal diseases can be a risk factor for cardiovascular diseases, diabetes, rheumatoid arthritis, rheumatic carditis and arthritis. Thus oral diseases affect quality of life and can be an indicator of good health. Oral diseases result in painful conditions, dysfunction, discomfort and disability[4]. However, they can be prevented or controlled by a positive dental health behaviour with stress on individual's oral health care.

Ayurveda has always focused primary attention towards prevention of disease. In order to attain that, *Acāryas* have given importance to various regimens to be followed every day and in each season. Mouth being the chief entrance or the main gateway to the body, it always should be kept healthy from the attack of enemies of health. Prevention of dental problems is possible only by maintaining health and hygiene of teeth and oral environment. In the context of *Dinacaryā, Acāryas* have mentioned different procedures like *Dantadhāvana, Kavala, Gaṇdūṣa*etc for the prevention of dental as well as oral diseases. Text books like *AṣṭāṅgaHrudaya, AṣṭāṅgaSaṅgraha, and Suśrutasamhitā*provide a deep insight into the prevention and management of dentalproblems. *Kāśyapasamhita* is considered as an authoritative text book of periodontics in *Ayurveda.*

According to modern dentistry, common preventive oral hygiene techniques include both mechanical and chemical methods. The effect of mechanical oral hygiene techniques on the salivary levels of microorganisms, especially mutant's streptococci is of great interest to dentists focused on preventive care. Although mechanical plaque control methods have the potential to maintain adequate levels of oral hygiene, clinical experience and population based studies have shown that such methods are not followed as accurately as they should be by a large number of people [4]. Therefore, several chemotherapeutic agents have been developed to control bacterial plaque, aiming at improving the efficacy of daily hygiene control measures[5]. Tooth brushing with fluoridated toothpaste is considered to be the bedrock of caries

prevention. However, tooth brushing alone is effective in reducing the bacterial counts in the mouth, but not dramatically[6].

Fluorides are abundantly used in dental creams and mouthwashes. Continuous usage of fluorides results in increased prevalence of dental fluorosis suggesting adverse health effects from fluorides. Commonly used synthetic dentifrices also contain other chemical agents, which are known to produce harmful side effects with prolonged use. Also wide scale misuse of chemotherapeutic agents can induce microbial drug resistance. These problems can be well managed using herbs possessing antibacterial and anti-inflammatory activities.

Dental caries in young children has a multifactorial etiology; therefore preventive measures usually involve a combination of dietary counseling, oral hygiene, and fluoride application.

According to *Ayurveda* brushing is contra indicated in the cases of mouth ulcer, fever, indigestion, those who have tendency to vomit, asthma, cough, thirst. Oil pulling can be used to clean the oral cavity in all these cases. *Gandusha* and *KavalaGraha* are two primary oral cleansing techniques; specialized therapy to treat as well as to prevent oral diseases.

Ayurveda, advises a number of herbs and different methods for regular practice to maintain optimal dental health. Although much work has been done for the development of new herbal formulations and several ancient classical formulations, their effect on various physiological parameters are yet to be explored. In *Cakradatta* alum and saline had been mentioned for *Kavala*. In a recent study, it was found that alum rinse is one of the most effective adjunctive oral hygiene measures in reducing the bacterial colony count. In another study it was proved that *Triphalā* which is mentioned in classics for*Kavala*etc is having a significant inhibitory effect on Streptococcus mutant's counts[7].

Hence the present study involves the evaluation of a traditional herbal composition *khadiradikavalagraham* mentioned in *AshtangaSamgraha*in the context of*Dinacaryā*.

METHODODOLOGY

Role of research methodology is to carry out the research work in a scientific and valid manner. Clinical study plays a very important role in the evaluation of efficacy of the treatment. Methodological approach is the backbone of research which refers to a systematic procedure for carrying out a scientific activity. Research methodology involves systematic procedures by which the researcher starts from initial identification of the problem to its final conclusion. The present study is an open clinical trial (pre & post) to evaluate *KhadiradiKavalagraham* in promoting oral hygiene among secondary and higher secondary school children.

Objective

To evaluate "*KhadiradiKavalagraham*" in promoting oral hygiene.

MATERIALS AND METHODS

Review of related literature

An authentic and detailed review of the subject will be collected from Ayurvedic classics, medical books, journals and internet. Relevant research data will also be included.

Drug preparation:-

Khadiradikavalagraham

Contents	**Part Used**
Khadira(Acacia catechu)	*-Kasthasaram*
Vata(Ficusbengalensis)	*-Bark*
Udumbara(Ficusglomerulata)	*-Bark*
Ashvatha(Ficusreligiosa)	*-Bark*
Plaksha(Ficuslacor)	*-Bark*
Parisha (Thespesiapapulnia)	*-Bark*
Arimeda (Acacia furnisiana)	*-Kasthasaram*

The drugs are taken in equal quantity and boiled in 16 times of water and reduced it to 1/4th as mentioned in *SharangdharaSamhita* (Sh.Sa.Mad.2/1-2) to prepare *Kashayam.*

Method of study

Selection of subjects

Children will be selected from secondary and higher secondary schools in Tripunithura area after consulting with principal or headmaster of the schools.

Inclusion criteria

Individuals selected among secondary and higher secondary schools in Tripunithura
Both sexes

With mean oral score >0.99 in Oral hygiene index
With mean gingival score >0.1 in Gingival index
With mean plaque score >0.1 in Plaque index

Exclusion criteria

Traumatic injuries
Cleft lip and cleft palate.
Poor nutritional status disorders.
Individuals undergoing treatment for any specific oral pathology.
Other systemic diseases
Individuals undergoing any antibiotic or steroid therapy.
Smoker's and tobacco chewers

Study frame

Study Design : Pre - Post test without control.
Selection of subjects : 30
Period of study : 18 months
Study Setting : Selected schools in Tripunithura .

Plan of study

Oral hygiene index was assessed in the previous day before starting the intervention and also after one month of intervention. Oral inspection was done using explorer (shepardscroock) and mouth mirror in adequate illumination. The surface area covered by debris and calculus was assessed. Both debris and calculus were scored on 3 surfaces (buccal, labial and lingual) of six representative teeth (16, 11, 26, 36, 31, and 46). The mean index was calculated by dividing the sum of number from scale by the total number of sites scored within the mouth. Likewise plaque and gingival index were calculated.

The patients found to have a low level of oral hygiene according to inclusion criteria were given 10 gm powder/use and the method of preparation of kashayam was taught.
Preparation of mouthwash-
Take a single packet of medicine
Add 120 ml of water into it and boil till it reduced to one fourth part i.e.=30ml
This lukewarm *Kashaya* has to be used as a mouthwash.

SUMMARY OF STUDY DESIGN

The selected patients will be subjected to observation and detailed clinical evaluation. The patients will use 30ml of *Kashayam* prepared of *Khadiradi* drugs every morning as *Kavalam* for 30 days. Patients will be periodically evaluated before and after treatment and during the follow-up using structured proforma.

ASSESSMENT CRITERIA

Subjective criteria

Halitosis (table-1)

Grade	Criteria
0	No odor present
1	Barely noticeable odor
2	Slight but clearly noticeable odor
3	Moderate odor
4	Strong offensive odor

Tongue coating (table-2)

Grade	Criteria
0	No visible tongue coating
1	Less than 1/3rd of tongue surface coating
2	More than 1/3rd but less than 2/3rd tongue surface coated
3	More than 2/3rd surface of tongue coated

Anorexia (table-3)

Grade	Criteria
0	No Anorexia
1	Mild
2	Moderate
3	Severe

Taste **perception (table-4)**

Grade	Criteria
0	Normal taste perception
1	Reduced taste perception
2	Presence of metallic taste, permanent sour, salty or bitter taste
3	Absence of taste perception

Objective criteria (table-5)

Variable	Method	Time of assessment
Oral hygiene index	OHI-S(simplified)Greene and Vermillion	Before and after intervention and at follow ups at 30^{th} and 60^{th} day after intervention.
Plaque Index	Silness and Loe index for plaque	Before and after intervention and at follow ups at 30^{th} and 60^{th} day after intervention.
Gingival Index	Loe and Silness index for Gingiva	Before and after intervention and at follow ups at 30^{th} and 60^{th} day after intervention.

CRITERIA FOR CLASSIFYING DEBRIS (table-6)

Scores	Criteria
0	No debris or stain present
1	Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered
2	Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.
3	Soft debris covering more than two thirds of the exposed tooth surface.

CRITERIA FOR CLASSIFYING CALCULUS (table-o7)

Scores	Criteria
0	No calculus present
1	Supragingival calculus covering not more than one third of the exposed tooth surface.
2	Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both

3	Supra gingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of sub gingival calculus around the cervical portion of the tooth or both.

Calculus Index = (The buccal-scores) **+** (The lingual-scores) **/** (Total number of examined buccal and lingual surfaces).

Mean score grading for oral hygiene

Very good- 0
Good -1(0.001-0.99)
Moderate -2(1-1.99)
Bad -3(2-2.99)
Very bad -4(>3)

PLAQUE INDEX (table-08)

Scores	Criteria
0	No plaque
1	A film of plaque adhering to the free gingival margin and adjacent Area of the tooth, which cannot be seen with the naked eye. But only by using disclosing solution or by using probe.
2	Moderate accumulation of deposits within the gingival pocket, on the gingival margin and/ or adjacent tooth surface, which can be seen with the naked eye.
3	Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

0.1 - 1 Mild plaque seen
1.1 - 2 Moderate plaque deposits
2.1 - 3 Severe plaque on tooth and gingival margin

PII = Total scores/ No. of surfaces examined

2. Population

PII = Total scores/No. of subjects examined

Calculation

1. Individual

GINGIVAL INDEX (table-9)

Scores	Criteria
0	No inflammation.
1	Mild inflammation, slight change in color, slight edema, no bleeding on probing.
2	Moderate inflammation, moderate glazing, redness, bleeding on probing.
3	Severe inflammation, marked redness and hypertrophy, ulceration, tendency to spontaneous bleeding.

0.1 - 1 Mild gingivitis
1.1 - 2 Moderate gingivitis
2.1 - 3 Severe gingivitis

Calculation

1. Individual

GI = Total scores/ No. of surfaces examined

2. Population

GI = Total scores / No. of subjects examined

Follow up

Follow up will be done at 30th day and 60th day after completion of intervention.

Assessment

Assessment will be made on 0th ,30th ,60th and 90th day by using clinical parameters. Specific case proforma will be used and the findings and results will be recorded periodically.

Outcome variables

Oral hygiene score (OHS)
PI + GI + CI = OHS
Motivation success rate (MSR)
[(OHS-1)-(OHS-2)] * 100 / (OHS-1)
OHS-1 is OHS before treatment and OHS-2 is after treatment.
Oral hygiene motivation success index (OHMSI)
MSR < 25; OHMSI = 1; OHMSI status is unsuccessful
25< MSR < 50; OHMSI = 2; OHMSI status is Poor
50<MSR<70; OHMSI = 3; OHMSI status is moderate
MSR > 70; OHMSI = 4; OHMS
I status is good

STATISTICAL ANALYSIS

The data collected and compiled from this clinical trial were sorted out and processed further by subjection to varied statistical methods and presented with tabular form. The information gathered on the basis of above observations was subjected to statistical analysis in terms of mean (x) and parametric paired 't' & non parametric, Wilcoxon signed rank test were carried out.

The obtained results were interpreted as:

Insignificant	-	P > 0.05
Significant	-	P < 0.05
High significant	-	P<0.01
Highly Significant	-	P < 0.001

Observation, analysis & interpretation

A total of 30 children meeting the inclusion criteria were screened and enrolled for the study. Children, irrespective of religion, sex, cast etc. were examined before and after the therapy according to the case sheet format given in the annexure. Changes in both, subjective and objective parameters were captured & noted and collected data is formulated in to tables and graphs for further analysis of the collected data and this chapter has been divided into four sections.

Section A: Data related to demographic characteristics
Section B: Data related to personal history
Section C: Data Related to therapy
Section D: Analysis

Section A: Data related to demographic Distribution

The distribution of 30 subjects as per socio demographic characteristics such as age, sex, socio-economic status; religion and domicile were as follows

Age

Table No: 10 -Distribution of children according to age

Age	No. of children	Percentage of children
12-13	12	40%
14-15	12	40%
16-17	06	20%

Sex

Table No: 11 Distribution of children according to sex

Sex	No. of children	Percentage of children
Female	16	53.3
Male	14	46.7

Domicile status

Table No: 12 Distribution of children according to their domicile status

Domicile	No. of children	Percentage of children
Rural	21	70
Urban	09	30

Religion

Table No: 13 Distribution of children according to Religion

Religion	No. of children	Percentage of children
Hindu	22	73.33
Muslim	4	13.33
Christian	4	13.33

Socio-economic status

Table No: 14 Distribution of children according to Socio-economic status

Economic status	No. of children	Percentage of children
Poor	02	6.7
Lower middle	15	50
Upper middle	09	30
Rich	04	13.3

Section B: Data related to Children's history

a. Data related to personal history

Diet

Table No: 15 Distribution of children according to diet

Diet	No. of children	Percentage of children
Mixed	27	90
Veg	03	10

Appetite

Table No:16 Distribution of Children according to their Appetite

Appetite	No. of children	Percentage of children
Good	8	26.7
Moderate	10	33.3
Poor	12	40

Sleep

Table No: 17 Distribution of children according to Sleep

Sleep	No. of children	Percentage of children
Good	6	20
Disturbed	15	50
Reduced	06	20
Excessive	03	10

Bowel habit

Table No: 18 Distribution of children according to their Bowel habit

Bowel habit	No. of child	Percentage of children
Regular	19	63.3
Constipated	11	36.7

Desha

Table No: 19 Distribution of children according to their Desha

Desha	No. of children	Percentage of children
Anupa	30	100
Jangala	0	0
Sadharana	0	0

Prakriti

Table No: 20 Distribution of children according to their Prakriti

Prakrithi	No. of children	Percentage of children
Vatakapha	24	80
Pithakapha	02	6.66
Vatapitha	04	13.33

Satwa

Table No: 21 Distribution of children according to Satwa

Satwa	No. of children	Percentage of children
Pravara	02	6.7%
Madhyama	20	66.7%
Avara	08	26.7%

Samhanana

Table No: 22 Distribution of children according to *Samhanana*

Samhanana	No. of children	Percentage of children
Pravara	0	0%
Madhyama	24	80%
Avara	06	20%

Agni

Table No: 23 Distribution of children according to Agni

Agni	No. of children	Percentage of children
Samagni	8	26.7
Vishamagni	10	33.3
Mandagni	12	40
Tikshnagni	0	0

Number of teeth

Table No: 24 Distribution of children according to no. of teeth present

Teeth numbers	No. of children	Percentage of children
26	9	30
28	15	50
30	6	20
32	0	0

Material of cleaning

Table No: 25 Distribution of children according to material of cleaning.

Diet	No. of children	Percentage of children
Tooth paste	27	90
Tooth powder	03	10

Frequency of cleaning

Table No: 26 Distribution of children according to frequency of cleaning.

Frequency	No. of children	Percentage of children
Once	24	80
Twice	06	20

Data related with presenting complaints

Subjective

Table No: 27 Distribution of Children according to presenting complaints

Presenting complaint	Grade 0		Grade 1		Grade 2		Grade 3		Grade 4		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Halitosis	3	10	4	13.3	8	26.7	11	36.7	4	13.3	30	100

Presenting complaints	Grade 0		Grade 1		Grade 2		Grade 3		Total	
	N	%	N	%	N	%	N	%	N	%
Anorexia	5	16.7	11	36.7	13	43.3	1	3.3	30	100
Taste perception	15	50	8	26.7	6	20	1	3.3	30	100
Tongue coating	10	33.3	12	40	7	23.3	1	3.3	30	100

The halitosis was graded as Grade0, Grade1, Grade2 and Grade3 based on organoleptic test. Amongst the 30 children, 3 child (10%), 4 child (13.3%), 8patients (26.7%), 11 children (36.7%), 4 children were Grade 0, Grade 1, Grade 2, Grade 3 and grade 4 respectively.

The Anorexia was graded as Grade0, Grade1, Grade2 and Grade3 based on the questionnaire. Amongst the 30 children, 9 children (30%), 21 children (70 %), 0 child (0%), and 0 child (0%) were Grade 0, Grade 1, Grade 2, and Grade 3 respectively.

The Taste perception was graded as Grade0, Grade1, Grade2 and Grade3 based on the questionnaire. Amongst the 30 children, 15 children (50%), 8 children (26.7 %), 6 children (20%), and 1 child (3.3%) were Grade 0, Grade 1, Grade 2, and Grade 3 respectively.

The Tongue coating was graded as Grade0, Grade1, Grade2 and Grade3 based on the area found to have coating. Amongst the 30 children, 10 children (33.3%), 12 children (40 %), 7 children (23.3%), and 1 child (3.3%) were Grade 0, Grade 1, Grade 2, and Grade 3 respectively.

Secti

Data Related to Therapy

Halitosis at different stages

Table No: 28 Distribution of children according to the Halitosis at different stages

Halitosis		Grade 0	Grade1	Grade2	Grade3	Grade 4	Total
BT	N	3	4	8	11	4	30
	%	10	13.33	26.67	36.7	13.33	100
AT	N	20	10	0	0	0	30
	%	66.7	33.3	0	0	0	100
FU1	N	15	10	3	2	0	30
	%	50	33.3	10	6.67	0	100
FU2	N	10	9	7	3	1	30
	%	33.33	30	23.33	10	3.33	100

Before therapy 3 (10.0%) children had Grade 0, 4(13.3%) child had Grade 1, 8(26.67%) children had Grade 2 , 11(36.7%) children had Grade 3 and 4(13.33) children were having grade 4 of halitosis.After therapy 20(66.7%) had Grade 0, 10 (33.3%) had Grade1, and none of children had Grade 2, 3 and 4 of halitosis.On first follow up 15 (50.0%) children had Grade 0, 10(33.3%) child had Grade 1, 3(10%) children had Grade 2 , 2(6.67%) children had Grade 3 and none of children had Grade 4 of halitosis.

On second follow up 10 (33.33%) children had Grade 0, 9(30%) child had Grade 1, 7(23.33%) children had Grade 2, 3(10%) children had Grade 3 and 1(13.33) child were having grade 4 of halitosis.

Anorexia at different stages

Table No: 29 Distribution of children according to Anorexia at different stages

Anorexia		Grade 0	Grade1	Grade2	Grade3	Total
BT	N	5	11	13	1	30
	%	16.7	36.7	43.3	3.3	100
AT	N	8	12	10	0	30
	%	26.7	40	33.3	0	100
FU1	N	8	11	11	0	30
	%	26.7	36.7	36.7	0	100
FU2	N	7	11	12	0	30
	%	23.3	36.7	40	0	100

Before therapy 5(16.7%) children had Grade 0, 11(36.7%) child had Grade 1, 13 (43.3%) children had Grade 2 and 1(3.3%) children had Grade 3 of anorexia.

After therapy 8 (26.7%) children had Grade 0, 12 (40%) children had Grade1, and 10 (33.3%) children had Grade 2 and no child do have Grade 3 of anorexia.

On first follow up, 8 (26.7%) had Grade 0, 11(36.7%) had Grade1, 11(36.7%) had Grade 2 and none of children and Grade 3 anorexia.

On second follow up, 7 (23.3%) had Grade 0, 11 (36.7%) had Grade1, 12 (40%) had Grade 2 and none of children had and Grade 3 anorexia.

Taste perception at different stages

Table No: 30 Distribution of 30 children according to Taste perception at different stages

Taste perception		Grade 0	Grade1	Grade2	Grade3	Total
BT	N	24	5	1	0	30
	%	80	16.67	3.3	0	100
AT	N	26	4	0	0	30
	%	86.67	26.7	0	0	100
FU1	N	26	4	0	0	30
	%	86.67	26.7	0	0	100
FU2	N	26	4	0	0	30
	%	86.67	26.7	0	0	100

Before therapy 24 (80%) children had Grade 0, 5(16.67%) child had Grade 1, 1(3.3%) child had Grade 2 and none of children had Grade 3 of Taste perception. After therapy 26 (86.67%) had Grade 0, 4(26.7%) had Grade1 and none of children had Grade 2 and Grade 3 of Taste perception.
Same grades follows even after first and second follow up.

Tongue coating at different stages

Table No: 31 Distribution of children according to the Tongue coating at different stages

Tongue coating		Grade 0	Grade1	Grade2	Grade3	Total
BT	N	10	12	7	1	30
	%	33.3	40	23.3	3.3	100
AT	N	22	8	0	0	30
	%	73.3	26.7	0	0	100
FU1	N	20	10	0	0	30
	%	66.7	33.3	0	0	100
FU2	N	17	13	0	0	30
	%	56.7	43.3	0	0	100

Before therapy 10(33.3%) children had Grade 0, 12(40%) children had Grade 1, 7(23.3%) children had Grade 2 and 1(.3%) children had Grade 3 of Tongue coating.

After therapy 22(73.3%) had Grade 0, 8(26.7%) had Grade1 and none of children had Grade 2 and Grade 3 of Tongue coating.

On first follow up, 20(66.7%) had Grade 0, 10(33.3%) had Grade1 and none of children had Grade 2 and Grade 3 of Tongue coating.

On second follow up, 17(56.7%) had Grade 0, 13(43.3%) had Grade1 and none of children had Grade 2 and Grade 3 of Tongue coating.

Section d: analysis

Analysis of effect of therapy on signs and symptoms

Related with clinical signs and symptoms

Halitosis

Table No: 32 Analysis of effect of therapy on Halitosis

Halitosis	N	Mean	Paired Differences			'z' value	'p' Value
BT	30	2.30	**Pair**	**Mean diff.**	**% Effect**		
AT	30	0.33	BT- AT	1.97	85.7	4.54	<0.001
FU1	30	0.73	BT- FU1	1.57	68.3	4.54	<0.001
FU2	30	1.20	BT- FU2	1.10	47.8	4.46	<0.001

When the assessed with Wilcoxon signed-rank test, compared to before therapy, the reduced severity of Halitosis up to up to second follow up is seen, to be highly significant statistically (P<0.001).

Anorexia

Table No: 33 Analysis of effect of therapy on Anorexia

Anorexia	N	Mean	Paired Differences			'z' Value	'p' value
BT	30	1.33	**Pair**	**Mean**	**% Effect**		
AT	30	1.07	BT-AT	0.26	19.54	2.52	<0.001
FU1	30	1.10	BT-FU1	0.23	17.29	2.37	<0.001
FU2	30	1.17	BT-FU2	0.16	12.03	2.02	<0.05

When the assessed with Wilcoxon signed-rank test, after therapy reduced severity of Anorexia was statistically significant (p< 0.001),

Up to first follow up reduction in anorexia was seen to be statistically significant (p<0.001) and the same was found to be significant after second follow (p<0.05).

Taste perception

Table: 34 Analysis of effect of therapy on Taste perception

Taste perception	N	Mean	Paired Differences			'z' value	'p' value
BT	30	0.23	**Pair**	**Mean**	**% Effect**		
AT	30	0.13	BT- AT	0.10	43.47	1.60	>0.05
FU1	30	0.13	BT- FU1	0.10	43.47	1.60	>0.05
FU2	30	0.13	BT- FU2	0.10	43.47	1.60	>0.05

When the assessed with Wilcoxon signed-rank test, compared to before therapy, the reduced severity of Taste perception up to second follow up is seen, to be insignificant statistically (P>0.05).

Tongue coating

Table No: 35 Analysis of effect of therapy on Tongue coating

Tongue coating	N	Mean	Paired Differences			'z' value	'p' value
BT	30	0.96	**Pair**	**Mean**	**% Effect**		
AT	30	0.26	BT- AT	0.70	72.9	3.92	<0.001
FU1	30	0.33	BT- FU1	0.63	65.6	3.72	<0.001
FU2	30	0.43	BT- FU2	0.53	55.2	3.41	<0.001

When the assessed with Wilcoxon signed-rank test, compared to before therapy, the reduced severity of Tongue coating up to up to second follow up is seen, to be significant statistically (P<0.001).

Related with Oral hygiene index (calculus + debris index)

Oral hygiene index

Table No: 36 Analysis of effect of therapy on Oral hygiene index

Stage	Mean	SD	No	% reduction in mean	Paired differences			Paired t	P
					Group	Mean	SD		
BT	**2.14**	**0.49**	**30**	**53.28**	**BT vs AT**	**1.13**	**0.34**	**18.4**	**<0.001**
AT	**1**	**0.27**	**30**	**43.92**	**BT vs FU1**	**0.94**	**0.34**	**15.23**	**<0.001**
FU1	**1.20**	**0.38**	**30**	**38.78**	**BT vs FU2**	**0.83**	**0.30**	**15.23**	**<0.001**
FU2	**1.31**	**0.37**	**30**	**-**	**-**	**-**	**-**	**-**	

Mean difference after the treatment (after 30 days) 1.13 with a standard deviation 0.34, the't' value was 18.4 which was statistically highly significant at p<0.001(p=0.001).

After 60 days the difference in mean has decreased to 0.94, with a standard deviation0.34 and't' value 15.23 implied the significance at p<0.001(p=0.001).

After 90 days the difference in mean has decreased to 0.83, with a standard deviation of 0.30 and 't' value 15.23 implied the significance at p<0.001(p=0.001).

Plaque score

Table No: 37 Analysis of effect of therapy on Plaque score:-

Stage	Mean	SD	No	% reduction in mean	Paired differences			Paired t	P
					Group	Mean	SD		
BT	**1.24**	**0.37**	**30**	**53.22**	**BT vs AT**	**0.65**	**0.41**	**8.98**	**<0.001**
AT	**0.58**	**0.19**	**30**	**41.93**	**BT vs FU1**	**0.52**	**0.33**	**8.74**	**<0.001**
FU1	**0.72**	**0.30**	**30**	**31.45**	**BT vs FU2**	**0.39**	**0.24**	**8.81**	**<0.001**
FU2	**0.85**	**0.27**	**30**	**-**	**-**	**-**	**-**	**-**	

Mean difference after the treatment (after 30 days) 0.26 with a standard deviation 0.30, the't' value was 4.89 which was statistically highly significant at p<0.001(p=0.001).

After 60 days the difference in mean has decreased to 0.25, with a standard deviation 0.31 and 't' value 4.31 implied the significance at p<0.001(p=0.001).

After 90 days the difference in mean has decreased to 0.24, with a standard deviation of 0.29 and't' value 4.52 implied the significance at p<0.001(p=0.001).

Gingival score

Table No: 38 Analysis of effect of therapy on Gingival Score:-

Stage	Mean	SD	No	% reduction in mean	Paired differences			Paired t	P
					Group	Mean	SD		
BT	**1.42**	**0.37**	**30**	**40.84**	**BT vs AT**	**0.58**	**0.47**	**6.76**	**<0.001**
AT	**0.84**	**0.21**	**30**	**24.64**	**BT vs FU1**	**0.35**	**0.24**	**7.99**	**<0.001**
FU1	**1.07**	**0.30**	**30**	**21.12**	**BT vs FU2**	**0.30**	**0.20**	**7.42**	**<0.001**
FU2	**1.12**	**0.35**	**30**	**-**	**-**	**-**	**-**	**-**	

Mean difference after the treatment (after 30 days) 0.58 with a standard deviation 0.47, the 't' value was 6.76 which was statistically highly significant at p<0.001(p=0.001).

After 60 days the difference in mean has decreased to 0.35, with a standard deviation0.24 and 't' value 7.99 implied the significance at p<0.001(p=0.001).

After 90 days the difference in mean has decreased to 0.30, with a standard deviation of 0.20 and 't' value 7.42 implied the significance at p<0.001(p=0.001)

Overall effect of thereapy on the basis of oral hygiene score

Oral hygiene score (OHS)
PI + GI + CI = OH
Motivation success rate (MSR)
[(OHS-1)-(OHS-2)] * 100 / (OHS-1)
OHS-1 is OHS before treatment and OHS-2 is after treatment.
Oral hygiene motivation success index (OHMSI)
MSR < 25; OHMSI = 1; OHMSI status is unsuccessful
25< MSR < 50; OHMSI = 2; OHMSI status is Poor
50<MSR<70; OHMSI = 3; OHMSI status is moderate
MSR > 70; OHMSI = 4; OHMSI status is good

Calculation of oral hygiene score

In this study, mean score of different indices before treatment is as follows:-
Plaque index (PI) = 1.24
Gingival index (GI) = 1.42
Calculus index (CI) = 1.1
So oral hygiene score before treatment (OHS-1) according to above formula =3.76

In this study, mean score of different indices after treatment is as follows:-
Plaque index (PI) = 0.6
Gingival index (GI) = 0.84
Calculus index (CI) = 0.3
So oral hygiene score after treatment (OHS-2) according to above formula =1.74

Calculation of motivation success rate (msr)

Motivation success rate (MSR), [(OHS-1)-(OHS-2)] * 100 / (OHS-1), OHS-1 is OHS before treatment and OHS-2 is after treatment, so according the above values of OHS-1(3.83) and OHS-2(2.18), MSR = 3.76-1.74* 100 / 3.76
MSR= 53.72

Status of oral hygiene motivation success index (ohmsi)

Oral hygiene motivation success index (OHMSI),MSR < 25; OHMSI = 1; OHMSI status is unsuccessful,25< MSR < 50; OHMSI = 2; OHMSI status is Poor, 50<MSR<70; OHMSI = 3; OHMSI status is moderate, MSR > 70; OHMSI = 4; OHMSI status is good,As to the above found value of MSR i.e. 53.72, which falls into the category of 50 < MSR < 70; OHMSI = 3; OHMSI, which implies that study was moderately successful in promoting the oral hygiene of school children.

DISCUSSION

ShastraSahitaTarka is essential for *JnanaSadhana*. Ayurveda is based on scientific ways of its kind. Facts mentioned in Ayurvedic classics not merely stands on imaginations or logical interpretations but are written after careful investigations, observations and experimentation.

But it is the characteristic of the present era that there is no place for blind faith in tradition & authority of *Shastras*, hence only those facts established by proofs after careful investigations, observations, experiments & supported by accurate data & reasoning can convince the people about validity. Even facts require the support of statistics. Ancient research methodology has also accepted the importance of *Upanayana* i.e. discussion preceding coming to any conclusion. A discussion based on *Shastras*, over any conceptual & practical oriented study definitely gives some fruitful conclusions.

Discussion on selection of the topic

The topic was selected with following views:Oral hygiene is an integral part of health of a person. Oral health when neglected, results in different types of oral ailments like calculus,gingivitis, caries and periodontal diseases. Oral disorders can significantly affect the general well-being of a person by causing considerable pain and discomfort, thus affecting their quality of life. Periodontal diseases are the common threats to oral health and are important public health problems because of their prevalence, their impact on individuals and society, and also because of the expense of their treatment.

The primary etiological factor for dental diseases are dental plaque, debris which in turn leads to calculus, caries and other irreversible conditions. The development of a plaque mediated disease, at a site may be viewed as a breakdown of homeostatic mechanisms that normally maintain a beneficial relationship between the resident oral microflora and the host. Hence it will be ideal to find some effective preventive measures. The preventive measures for these conditions are vague in modern dentistry, thus this study emphasise the importance of the promotive aspect of oral hygiene.

Discussion on selection of drug khadiradikavalagraham

Many local therapeutic applications have been mentioned in Ayurvedic classics to promote oral hygiene. At present, many dentifrices are available in the market comprising of therapeutic agents. The most commonly used therapeutic agent added to dentifrices is fluoride which aids in control of caries. They are described to inhibit carbohydrate utilization by oral microorganisms by blocking enzymes involved in the bacterial glycolytic pathway[8]. Studies have shown that prolonged use of fluoride may lead to adverse effects like dental fluorosis, skeletal fluorosis, and destruction of the epithelial layer of intestine[9]. Triclosan is also added in dentifrices as broad spectrum antibacterial agent. Synthetic dentifrices commonly contain chemical agents, which are known to produce harmful side effects[10]. Chlorhexidineis , thus far, the most studied and effective antiseptic for plaque inhibition. But in oral use as a mouth rinse chlorhexidine has been reported to have a number of side effects including brown discoloration of the teeth and mucosa, bitter taste, and some time sloughing of oral mucosa which restricts its general use[11].

Hence it is the need of the time to develop herbal products which has antimicrobial property and having no harmful effects even on daily usage. The herbal formulations help not only in protection against micro-organism but restoration and regeneration of dental health also[12].

Ayurveda recommends a number of herbs to help and maintain optimal dental health. In the present study, efficacy of one such formulation mentioned in the context of *dinacaryā* has been attempted.. This compostion is unique in its ingredients like *Khadira*, *arimeda*and *panchkshirivriksa*which are having a major role in dental hygiene as well as oral health. The majority of the ingredients are having *kaṭu, tikta,,kaṣāyarasas* and *laghu, rūkṣa*, *tīkṣṇaguṇas*.

Since mouth is one of the places of *kapha*, most of the ingredients exhibiting *kaphahara* action could be seen in the formulation.

Keeping this view in mind, the drug ***KHADIRADI KAVALAGRAHAM*** as a compound drug was selected as clinical trial drugs for the present study.

Discussion on clinical study

Present clinical trial was aimed to assess the *Khadiradikavalagraham* in promoting oral hygiene among secondary and higher secondary school children. Total 179 children were assessed on oral hygiene index to select the final 30 ,who match up with the inclusion and exclusion criteria.. The duration of thetherapy was 30 days and assessment had done every month up to three months after therapy started. All subjects completed the treatment procedure. The method adopted for the trial was Open clinical trial. In the present section the observations including demographic data,

presenting and personal history of the children along with the results are discussed.

Discussion on demographic data

On age (table no.10)

In the present study, 12 children (40%) were in the age group 12-13, 12 children (40%) were in the age group of 14-15, and 6 children(20%) in the age group of 15-16 .

On sex (table no. 11)

In the present study amongst 30 children selected for the study, 14 (46.7%) were male and 16 (53.3%) were female.

On domicile (table no. 12)

Out of the total 30 children taken up for the study, 21 (70.0%) hails from rural areas and 09 children (30.0%) were residing in urban areas.

On religion (table no. 13)

Amongst the total 30 children, 22(73.33%) children were Hindu, 4 children (13.33%) were Muslim and 4(13.33 %) children were Christian.

On Socioeconomic status (Table No. 14)

Amongst the 30 children taken up for the study, 2 children (6.7%) were in the Poor economic group.

DISCUSSION ON CHILDREN HISTORY

Related with personal history

On diet (table no. 15)

In this study 90% children were of mixed dietary habit and the rest 10% vegetarian.

On appetite (table no. 16)

In this study, 40% children had poor appetite, 33.3% and 26.7% children had moderate and good appetite respectively. Neglected oral hygiene and infectious focus of oral cavity are the main reasons for oral ill health, and this may contribute a disturbance in proper digestion subsequently may leads to nutritional imbalance and thus happens improper nourishment.

On sleep (table no. 17)

50% children were having disturbed sleep and 20 % each were having good and reduced sleep, remaining 10% were having excessive sleep.

On Bowel habit (Table No. 18)

63.3% and 36.7 % children had got regular and constipated bowel habit respectively.Constipation has a role to play in the cause of halitosis. New research from Denmark explains, many people with good oral health still suffer from bad breath. The research indicates that up to 25% of all cases of bad breath can be due by constipation[13].

On *desha*(table no. 19)

All children belonged to *Anupadesha* since this study was conducted in Kerala, which is a typical *Anupadesha*.

On *prakriti*(table no. 20)

Maximum number of children (63.04%) were having *VatakaphaPrakruti*.. Short term exposure to etiological factor can cause sudden manifestation of the disease in this group.

On *satwa*(table no. 21)

66.7% children were *Madhyamasatwa* followed by 26.7% *Avarasatwa*, 6.7 % got *Pravarasatwa*. *Madhyama* and *AvaraSattwa* persons cannot follow the healthy regimen and *Pathyapathya* regularly.

On *samhanana*(table no. 22)

80% children were having *Madhyamasamhanana* followed by 20 % *Avarasamhanana*.None of them were *Pravarasamhana*.

Onagni (table no. 23)

In this study, 40% of the children have reported *Mandagni* and 33.3% *vishamagni*, these are predisposing factors of the disease. Reduced food intake is responsible for abridged immunity which lacks to counteract the pathological factors.

On Number of teeth (Table No. 24)

Among the total 30 children, 15 children (50%) were having 28 teeth, 9 children (30%) were had 26, 6 children had 30 and none of them had 32.

On Material of cleaning (Table No. 25)

Amongst the 30 children, 27 children (90.0%) were found to be using tooth paste and 3 (10%) were using tooth powder as a material of cleaning.

On Frequency of cleaning (Table No. 26)

Amongst the 30 children, 24 (80.0%) children were used cleaning the tooth once in a day, 6 children (20.0%) were used to clean the teeth twice i.e. morning and evening .

Discussion on subjective and objective parameters:

Subjective parameters

Halitosis

In this study a highly significant reduction was observed at p level ($p<0.001$) in halitosis. Even during follow-up effect was statistically significant. The "gold standard" organoleptic assessment was done.

Anorexia

In thisstudy mean score reduced from 1.33 to 1.17 which was statistically significant at $p<0.05$. When the assessed with Wilcoxon signed-rank test, after therapy reduced severity of Anorexia was statistically significant ($p< 0.001$), Up to first follow up reduction in anorexia was seen to be statistically significant ($p<0.001$) and the same was found to be significant after second follow ($p<0.05$).

After intervention it shows a remarkable reduction in anorexia, but during follow up, the effect started to reduce gradually, even though it gave statistically a significant result.

Taste perception

On the analyzing the mean score of Taste perception obtained before therapy was 0.23. After therapy the mean score diminished to 0.13 (mean difference 0.10).

On further exploring Taste perception mean score on the first, second follow up, and mean difference along with mean score remains constant. When the assessed with Wilcoxon signed-rank test, compared to before therapy, the reduced severity of Taste perception up to second follow up is seen to be insignificant statistically ($P<0.125$).

The number of the subjects were limited to elicit any statistical significance.

Tongue coating

In this study a highly significant reduction was observed at p level <0.001. When the assessed with Wilcoxon signed-rank test, compared to before therapy, the reduced severity of Tongue coating up to up to second follow up is seen, to be significant statistically ($P<0.001$).

Coated tongue is the result of an overgrowth and swelling of the fingerlike projections (papillae) on the surface of the tongue. The appearance of the coated tongue is caused by the food debris, bacteria and dead cells that lodged in between the enlarged and sometimes inflamed papillae. Use of kavala helps to remove this lodged matter and anti-inflammatory action of thedrugs plays a role in the inflammed papillae.Removal of tongue coating itself, found to decrease halitosis considerably

Discussion on Oral Hygiene Index

In thisstudy mean oral hygiene score reduced from 2.14 to 1.31 which was statistically significant at $p<0.001$.

There has been observed a significant reduction in oral hygiene index which comprises of debris and calculus index.

Discussion on Debris index

For this index, debris is defined as soft, foreign matterconsisting of bacterial plaqueand food debris. Plaque is a layer that forms on the surface of tooth principally at its neck: composed of bacteria in an organic matrix. As the debris is loosely attached to the tooth surface gargling with the medication may be its active principles helping to detach this adhered matter.

Discussion on Calculus index

The contribution of calculus in complete oral hygiene index value was less owing to the teenage group, as this condition lies mostly in middle age. There was a very less change in calculus index before and after intervention in the study.

Discussion on plaque index

In this study plaque score was diminished from 1.24 to 0. 85 which is statistically significant at p level<0.001.

The formation of plaque on the teeth is characterized by progression from a limited number of bacteria to the complex flora of mature dental plaque. This progression involves initial adherence

of bacteria to the salivary pellicle and subsequent accumulation by growth. The primary acid-tolerant anaerobic bacteria associated with the plaque are Streptococcus mutans. Ultimately, the tooth surface gets coated with a dense, complex microbial community. So the main factors associated with cariogenicity include adhesion, acidogenicity and acid tolerance. Any agent which can prevent initial adherence of the bacteria will inhibit the formation of plaque[14].

Since the plaque formation was in its initial stage, because the study subjects were in teenage group, shows that the selected mouthwash was quite effective in declining the grades of plaque.

Discussion on gingival index

Mean gingival score in this study decreased from 1.42 to 1.12 which is statisticaly significant at p level< 0.001. This can be explained on the basis of anti-inflamatory action of the *panchkshirivriksha*..

In a study conducted by Avinashkadam et.al on the effect of Ayurvedic drugs on the control of plaque and gingivitis there was a significant reduction in plaque scores compared to the baseline value in each group.This study demonstrated potential role of ayurvedic herbs in the management of plaque and gingivitis[15].

Probable mode of action of kavala:-

On halitosis

Vitiated *Kapha*along with food debris causes *Dourgandhya* in oral cavity. *Kaphahara* action of the drugs and the aromatic property of the drugs like *Khadira,*A*arimeda* and might be responsible for the positive change . It may also be due to the increased salivary secretion which also aids in cleaning the oral cavity. Increase in saliva flow acts as a natural mouthwash by keeping the mouth moist washing away leftover food particle and bacteria and dissolving foul smelling volatile sulphur compounds.

On anorexia

Improvement in anorexiacould be due to the ingredients like *Khadira*and*PanchKshiriVriksha*which do have astringent action. Feeling of freshness reflects the efficacy of the formulation in oral cleanliness. As previously explained, action of *Kaţu, Lavana rasa* and *Laghu, Tīkşņa*, *Rūkşa, SūkşmaViśadaGuņas*have an action in this regard.

On tongue coating

The rasa predominance of the drugs of *KhadiradiKashaya* is *Kashaya ,Tikta and Madhura* .Tikta Rasa cleanses the mouth and reduces *Utklesha,Pitta and Kapha. Kashaya rasa* is also *Kaphagana*. Both these rasa are *KledoMedoVishosana*. They played an important role to scrape out the coating .The reduction in tongue coating can be attributed to the *Laghu,Rrūkşa* and *TīkşņaGuņas*. More over some drugs in the trial formulation possess *Kaţurasa* and the action of *Kaţurasa* which is mentioned in C*arakaSamhita* as '*Mukhavaiśadyakara*' that which cleans the oral cavity[16].

On debris and plaque

Reduction in debris scores could be attributed to the antibacterial property of each of the ingredients in the formulation. These drugs can hinder the growth of bacteria and manipulate the adhesions of bacteria to the tooth surface.

*Chēdana*and *Lēkhana* properties of the drugs used in the formulations could be the reason for reduction in debris score. Moreover, *Laghu,Rūkşa* and *Tīkşņa, Guņas* of the drugs also contribute to the same.

Medicated fluids are kept in the mouth incompletely and asked to rotate in the mouth for a specific time and then asked to split it out. So it is mainly possessing three types of therapeutic efficacy:

Śodhana(cleaning by pressure)

Stimulation of Salivary glands

Absorption (Direct absorption in gingival epithelium)

Śodhana

Keeping the medicated liquid in full blown mouth possibly increases pressure on the gums. So, impacted food particles may get dislodged and get mixed within retained fluid thus it helps in removing the food debris and deposition of gums and regain the oral hygiene. Retained liquid medicine dissolves the debris and loosens the attached plaque or calculus.

Stimulation

By pressure, it may stimulate the Salivary glands and promote the defence mechanism of gingiva by increased Salivation at immune level.

Absorption

Retained medicine gets mixed with gingival fluid and gets absorbed in gingival epithelial cells which may promote the keratinization, and may regain gingival health.

Action of Khadiradikashayam

The drug *Khadiradikashayam* is seen to be predominantly, *Kashaya* (71.43%) *Rasa, Laghu* (71.43%) *Guna, Sheeta* (57.14%) *Vīrya and MadhurVipāka* by virtue of these properties the *Kwātha is Pittaśāmaka* (71.43%), *Kaphaśāmaka* (100%). Thus it increases the efficacy of *Khadiradichoornam* and help to eliminate debris and calculus.

The ingredients of *Kwātha* are *Mukhaśuddhikara.* By virtue of cleansing action and anti- inflammatory property so it may act on microorganism and might be helpful in alleviating gingivitis.

Absorption of drug

Absorption is the process by which drugs enter the systemic circulation. Absorption of a drug from various sites, its movement among various body compartments and its distribution within the cells are all determined by the properties of a series of biological membranes in the body.

- Any substance which dissolves in saliva is amenable for oral absorption.
- Aqueous solubility-the drug given as watery solutions absorb faster than solid or oil form.
- Permeability of buccal mucosa is 4-4000 times greater than that of skin.
- Higher the concentration gradient greater the absorption rate.
- Absorption is 3-10 times faster than oral administration due to rich blood supply and lymphatic drainage of oral mucosa.
- The temperature of medicine is another factor which enhances circulation and hence absorption.
- The thrust of medicine on the oral mucosa also facilitates the absorption.
- Absorption through buccal mucosa is shown to increase when carrier pH is low and decrease with a higher Ph.
- Smaller the molecular weight greater the absorption[17].

Simple or passive diffusion

Diffusion is bidirectional. Rate of transfer proportional to concentration gradient.

a) Aqueous diffusion:-most biological membranes are relatively permeable to water.
b) Lipid diffusion:-lipid soluble drugs transfer through simple diffusion after dissolving in lipid of cell membrane. Lipid or aqueous partition coefficient of a drug decides the rate of absorption.

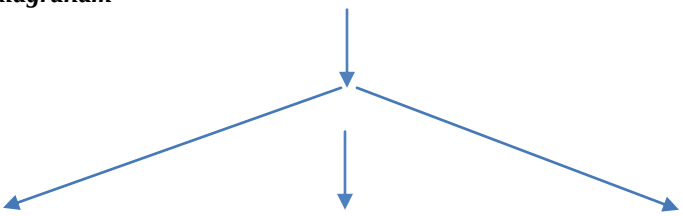
Trans membranous transporters

These are proteins which pick up an endogenous substance or drug at one face of the cell and release at another.

a) Facilitated diffusion:- where a carrier protein spanning the cell membrane moves molecules down the chemical concentration gradient or electrical gradient.
b) Active transport:- which requires input of energy.

1. Where a carrier protein moves molecules against chemical or electrical gradient.
2. Via ion channels in the cell membrane.
3. By endocytosis-receptor mediated endocytosis and pinocytosis.

Khadiradikavalagraham



Kashaya ,Kaṭu, Tikta rasa

Laghu, Ruksa, guna

Krimighna prabhava

Chedana of Kapha
Śodhana of Rakta
Mukhaśuddhi

Reduction in symptoms like, Halitosis, Tongue coating etc. and Normal gingiva

Increase keratinization & regeneration of Normal gingival tissue

Proper oral Hygiene

Restoration of normal tissue

Remove food Particles, Plaque & calculus

Reduction of local inflammation

No secondary infection

Massage + Pressure

Anti-inflammatory

Antibacterial

CONCLUSION

A safe, convenient, user friendly and cost effective formulation of *Khadiradikashaya*is prepared to find out its effect in promoting oral hygiene. It helps cure symptoms like Halitosis, Tongue coating effectively. It is effective in prevention of debris, plaque and gingivitis effectively but reduction in calculus stood very slender. *Khadiradikashaym*is effective in primary prevention of periodontal diseases if its habitual administration commences at early age as it does in this study. *Khadiradikavalagraham*has a role in promoting oral hygiene.

REFRENCES

[1]. Hiremath S S, Textbook of preventive and community dentistry. 2nd ed. Chennai: Elsevier;14, 2011, Oral health education; 172.

[2]. MithraSatheesh, Scope of dentistry in Ayurveda, *Jeevanamrutham*, 01(1), 2007, 25.

[3]. Lockhart P B et al, Poor oral hygiene as a risk factor for infective endocarditis-related bacteremia, *J Am Dent Assoc*. 140(10), 2009, 1238-44.

[4]. Mathur J S, A comprehensive text book of community medicine. 1st ed. New Delhi: CBS publishers and distributors,Chapter12,2008, Communicable diseases; 275-279.

[5]. Aswinisomu C et al. Efficacy of a herbal extract gel in the treatment of gingivitis *Journal of ayurveda and integrative medicine.* 3(2), 2012, 85-90

[6]. Rupesh S, Venugopal Reddy N, Arun Prasad Rao, Comparative evaluation of the effects of an alum containing mouth rins and a saturated saline rings on salivary levels of mutan streptococci in children during four weeks of supervised use. *Jeevanamrutham*, 01(1), 2007, 27-31.

[7]. Indian J Dent Res. 23(5), 2012, 696. doi: 10.4103/0970-9290.107423.

[8]. Aswinisomu C et al. Efficacy of a herbal extract gel in the treatment of gingivitis *Journal of ayurveda and integrative medicine.* 3(2), 2012, 85-90

[9]. Suseela A K, A treatise on fluorosis. Delhi: Fluorosis reseach and rural developmental foundation,2003, 43 – 57.

[10]. Sunitha A, Malini J, Prakash S T, Prahlad S, Clinical evaluation of a novel herbal dental cream in plaque formation: A double blind, randomized, controlled clinical trial. *Journal of experimental Pharmacology*, 2010; 2: 105-109.

[11]. Nidhal Abdul Wahid Ali, Evaluation of Antibacterial Activity of CinnamomumZeylanicum Extract on Cariogenic Microorganisms of the Dental Plaque In-Vitro Study and Scanning Electron Microscopic Assessment.*MD J* 6(4), 2009, 334-342

[12]. SunithaAmruthesh, Dentistry in Ayurveda V-An evidence based approach. *Int journal of clinical dental science*,2(1),2011, 3-7

[13]. http://www.dentalhealthpress.com/bad-breath-can-be-caused-by-constipation

[14]. Gupta L P, Guru L V, Positive health through Ayurveda. 1st ed. New Delhi: Choukhamba Sanskrit pratishtan, Delhi. 1, 2000, 5-12.

[15]. Aswinisomu C et al. Efficacy of a herbal extract gel in the treatment of gingivitis *Journal of ayurveda and integrative medicine.* 3(2), 2012, 85-90

[16]. http://www.webmd.com/oralhealth/news/20070518/smoking-and-sleep-affect-oral-health

[17]. R.S.Satoskar , S.D. Bhandarkar, PharmacologyandPharmacotherapeutics