ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

USE OF HERBAL DRUGS IN THE MANAGEMENT OF PERIODONTAL DISEASE

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Manuscript Info

Manuscript History:

Received: 19 June 2015
Final Accepted: 23 July 2015
Published Online: August 2015

Key words:

Emblica officinalis, dental caries, periodontitis, Terminalia chebula, Triphala

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Abstract

Ayurveda is considered as the "science of life," because the ancient Indian system of health care focused views of man and his illness. India has an age-old heritage of traditional herbal medicine. Conventional drugs usually provide effective antibiotic therapy for bacterial infections, but there is an increasing problem of antibiotic resistance and a continuing need for new solutions. Hence, now herbal drugs are being preferred to synthetic antibiotics. 'Triphala' is a well-known powdered preparation in the Indian system of medicine (ISM). It consists of equal parts of the Emblica officinalis, Terminalia chebula, and Terminalia belerica. Currently, Triphala is being extensively researched for its various therapeutic effects including its anti-caries, antioxidant, anti-collagenase, and anti-microbial activities. The present review will focus on the comprehensive appraisal of Triphala and its several applications in dentistry.

INTRODUCTION

Ayurveda is considered as the "science of life." The ancient Indian system of health care focused on views of man and his illness.[1] India has an ancient heritage of traditional herbal medicine. Long before the advent of modern medicine, herbs were the mainstream remedies for nearly all ailments. Herbal medicines are being used increasingly as dietary supplements to fight or prevent common diseases.[2] Herbal medicines were in great demand in the developed as well as in developing countries for primary health care because of their wide biological and medicinal activities, higher safety margin, and lower costs.[3] The World Health Organization estimates that about 80% of the populations living in the developing countries rely almost exclusively on traditional medicine for their primary health care needs. Conventional drugs usually provide effective antibiotic therapy for bacterial infections, but there is an increasing problem of antibiotic resistance and a continuing need for new solutions. Hence, now a days, herbal drugs are preferred to synthetic antibiotics.[2]

'Triphala' is a well-known powdered preparation in the Indian system of medicine (ISM), being used in Ayurveda since ancient time. Triphala consists of equal parts of the *Emblica officinalis*, *Terminalia chebula*, and *Terminalia belerica*.[4]

In Ayurvedic text (Sushruta Samhita) "Periodontium" is described as "Dantamula" and their disorders are as "Dantamulagata rogas", ". "Dantamulagata rogas" are simulated with the "Periodontal diseases. We can correlate them according to their clinical features[17].

Shitada, Dantapupputaka, Danavestaka, Shaushira, Mahashaushira paridara, Upakusha, Dantavaidarbha vardhana, Adhimansa, Dantanadi (5)- Vatika, Paitrika, Kaphaja Sannipathka, shalayaj. Out of 15 Dantamulagata rogas only first 8

are seems to like similar with periodontal diseases (Chronic gingivitis and chronic periodontitis) on the basis of differentclinical features.[17]

Triphala

It is the combination of ripe, healthy and dried fruits in equal quantities of

1. –*Amalaki (Emblica officinalis)*
2. –*Haritaki (Terminalia Chebula)*
3. –*Vibhitaki (Terminalia Belerica)*

Ingredient-Wise Main Chemical Constituents Of Triphala

Tannins

"Tannin" is a general descriptive name for a group of polymeric phenolic substances capable of tanning leather or precipitating gelatin from solution, a property known as astringency. This group of compounds, especially green teas and red wines, has received a great deal of attention in recent years since they can cure or prevent a variety of ills. Many human physiological activities, such as stimulation of phagocytic cells, host-mediated tumor activity, and a wide range of anti-infective actions, have been assigned to tannins. One of their molecular actions is to complex with proteins through so-called non-specific forces such as hydrogen-bonding and hydrophobic effects, as well as by covalent bond formation. Thus, their mode of anti-microbial action may be related to their ability to inactivate microbial adhesins, enzymes, and cell envelope transport proteins.[12]

Quinones

Quinones are aromatic rings with two ketone substitutions. They are ubiquitous in nature and are characteristically highly reactive. The individual redox potential of the particular quinine-hydroquinone pair is very important in many biological systems. Vitamin K is a complex naphthoquinone with anti-hemorrhagic activity. In addition to providing a source of stable free radicals, quinones are known to complex irreversibly with nucleophilic amino acids in proteins, often leading to inactivation of the protein and loss of function. For that reason, the potential range of quinone anti-microbial effects is great. Probable targets in the microbial cell are surface-exposed adhesins, cell wall polypeptides, and membrane-bound enzymes. Quinones may also render substrates unavailable to the microorganism.[12]

Flavones, flavonoids, and flavonols

Flavones are phenolic structures containing one carbonyl group (as opposed to the two carbonyls in quinones). The addition of a 3-hydroxyl group yields a flavonol. Flavonoids are also hydroxylated phenolic substances, but occur as a C6-C3 unit linked to an aromatic ring. Since they are known to be synthesized by plants in response to microbial infection, it should not be surprising that they

have been found *in vitro* to be effective anti-microbial substances against a wide array of microorganisms. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell walls. More lipophilic flavonoids may also disrupt microbial membranes. These compounds have been shown to inhibit *Vibrio cholera O1*, *Shigella*, *Streptococcus mutansin vitro*. Inhibition of isolated bacterial glucosyltransferases in *S. mutans*, and reduction of fissure caries by about 40% has also been demonstrated.[12]

Gallic acid

Gallic acid is a common phyto-constituent present in all three herbs used in Triphala. It is reported to possess hepatoprotective and antioxidant activity. It also suppresses growth of cancer cells.[11]

Vitamin C

Fruit juice of *Emblica officinalis* (EO) contains the highest vitamin C (478.56 mg/100 mL) content. The fruit when blended with other fruits boosted their nutritional quality in terms of vitamin C content. Vitamin C in EO accounts for approximately 45-70% of the antioxidant activity.[13] Evidences have been reported for the relation between vitamin C and periodontal disease. Significant gum bleeding can occur in vitamin C deficiency. Vitamin C along with bioflavonoid helps to speed up the healing process.[14]

Terminalia belerica (Bibhitaki)

(Individual chemical ingredient: Vitamin C, carotene, nicotinic acid, riboflavin, and tannins).[15]

Amalaki is known by the botanical name *Emblica officinalis* and also known in Sanskrit as Dhatri (The nurse), which is a reference to its incredible healing properties. Amalaki can be taken individually in powder form, a decoction or as a confection. Amalaki fruit is known to be one of the best rasayanas in Ayurveda, with anti-oxidant and anti-aging properties. It has its beneficial role in cancer, diabetes, liver treatment, heart trouble, ulcer, anemia, and various other diseases. Similarly, it has application as immunomodulatory, anti-pyretic, analgesic, cytoprotective, anti-tussive, and gastroprotective agent. Additionally, it is useful in memory enhancing, ophthalmic disorders, and lowering cholesterol level. It is also helpful in neutralizing snake venom and as an anti-microbial agent against *Escherichia coli*, *K. ozaenae*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *S. paratyphi A*, *S. paratyphi B* and *Serratiamarcescens*. The drug is not reported to have any side-effects even after prolonged use.[13]

Terminalia chebula (Hiritaki or Black myrobalan)

(Individual chemical ingredient: Tannins, anthraquinones, and polyphenolic compounds).[15]

Terminalia chebula is a plant species belonging to the genus Terminalia, family Combretaceae. The fruit of the tree has been used as traditional medicine for household remedy against various human ailments, since antiquity. *Terminalia chebula* has been extensively used in Ayurveda, Unani, and Homoeopathic medicine and has become a cynosure of modern medicine. *Terminalia chebula* is rich in tannin. The chief constituents of tannin are chebulic acid, chebulagic acid, corilagin, and gallic acid.

Terminalia chebula exhibited anti-bacterial activity against a number of Gram-positive and Gram-negative human pathogenic bacterial species. It also exhibits anti-fungal and anti-viral properties. It has also shown anti-mutagenic/anti-carcinogenic activity, antioxidant activity, adaptogenic and anti-anaphylactic activities, immunomodulatory activity, cytoprotective and radioprotective activity. It is also effective in hypolipidemia/hypercholesterolemia, improving gastro-intestinal motility with anti-spasmodic activity, diabetes, retinopathy, and wound healing.[10]

Terminalia belerica *(Bibhitaki)*

(Individual chemical ingredient: Gallic acid, tannic acid, and glycosides).[15]

Terminalia bellerica Roxb. (Combretaceae), commonly known as “belleric myrobalan” and locally as “bahera,” is a large deciduous tree, found throughout central Asia and some other parts of the world. Its fruit is used in folk medicine to treat asthma, cancer, colic, diarrhea, dysuria, headache, hypertension, inflammations, and pain. The plant is reported to contain termilignan, thannilignan, anolignan B, gallic acid, ellagic acid, í-sitosterol, arjungenin, belleric acid, bellericosidem, flavonoids, and tannins. *T. belerica*possesses antioxidant, anti-spasmodic, bronchodilatory, hypercholesterolemic, anti-bacterial, cardioprotective, hepatoprotective, hypoglycemic, and hypotensive properties.[16]

Material and Methods

In this clinical study 60 cases of either sex and different age with different stages of inflammatory periodontal diseases were selected on the basis of clinical presentation and diagnostic criteria. These patients were divided into 3 equal groups.

1. Group I: Treated Group (T.G) – 20 patients were treated with triphala decoction used as mouthwash twice daily and triphala powder orally taken 3 gms twice daily for1 month.
2. Group II: Control Group (C.G) – 20 patients were treated with pure modern medicine – Metronidazole 400 mg thrice daily orally for 7 days along with triphala decoction used as mouthwash twice daily for one month.
3. Group III: Control Group (C.G) – 20 patients were treated with pure modern medicine – Metronidazole 400 mg thrice daily orally for 7 days along with chlorhexidine 0.2% mouthwash twice daily for one month.

All the 60 patients suffering from inflammatory periodontal disease were subjected to a detailed history and clinical examination.

History was taken with special reference to complaints of oral cavity –(1) Bad breath(Halitosis) (2) Bleeding gums on brushing (3) swelling of gums (4) mobility of tooth and (5) sensitivity of teeth alongwith duration of diseases.

Local Examination procedures

Recording of 1- Periodontal status 2- Bacterial dental plaque 3- Bleeding gums 4- swelling of gums 5-Tooth mobility 6- Hot and Cold sensitivity to tooth.

The periodontal condition of each subject was examined by using a plane mouth mirror and specially designed light weight probe called UNC 15 probe. This probe was used as a sensing instrument to determine – periodontal pocket depth, to detect the subgingival calculus and bleeding response8. The treatment given in all these 3 groups for 4 weeks (1 month) and the patients were again called for subsequent follow up after one month.

In vitro antibacterial effect of triphala decoction

Lawn culture of Bacteria on Muller –Hinton agar plate was done and one loopful of triphala decoction was put on the plate. The plates were incubated overnight at 37oC and reading was taken as-

1. Sensitive: No growth of bacteria at the drop site (16 out of 22) –Escherichia coli NCTC 10418, Pseudomonas aeruginosa NCTC 10662, *Serratia marscescense, Vibrio parahaem-olyticus, V. Cholerae, citrobacter freundii, enterobacter spp, S. Paratyphi B, Plesiomonas shigelloides,*3 *aeromonas hydrophila, shigellasonnei, Sh. Dysenteriae - 1 proteus vulagaris, P. mirabilis, S. Paratyphi-A, streptococcus fecalis.*

2. Resistant: Positive growth of the bacteria at the drop site – (6 out of 22) – *Klebsiella pneumoniae edwardisellia tarda, salmonella typhi, S, Typhumurium, Sh, boydii, providencia retgerii.*

Results

Sixty subjects were entered into the study for 4 weeks (1 month) treatment and one month followup. The effect of the triphala presented in table, in such a way as to show the comparative results of the three different treated groups. After the complete assessment of clinical parmeters patients were given particular treatment according to their categorization and they were asked to attend our O.P.D. regularly after every 7 days for 4 times and followed by one month check up.

All the registered cases of periodontal diseases (chronic Gingivitis and chronic periodontitis) were detected in our O.P.D. with the calculus. The calculus (Bacterial dental plaque) were removed mechanically before staring of our trial drug in all 60 cases (Table 2).

Observation

Table 1: Distribution of the patients according to different clinical features.

Discussion

Clinical features	TG/Group –I (N=20) N (%)	CTG/Group –II (N=20) N (%)	CG/Group –III (N=20) N (%)	Total (N=60) N (%)
Tooth mobility				
-Not mobile	4(20)	5(25)	5(25)	14(23.33)
-Grade I	13(65)	13(65)	11(55)	37(61.66)
-Grade II	3(15)	2(10)	4(20)	9(15.00)
Caculus				
-Supraginigival	5(25)	5(25)	4(20)	14 (23.33)
-Subgingival	6(30)	7(35)	5(25)	18 (30.00)
-Both (Mixed)	9(45)	8(40)	11(55)	28 (46.66)
Depth of Periodontal pocket				
-Grade I	16(60)	9(45)	11(55)	32(53.33)
-Grade II	5(25)	7(35)	4(20)	16(26.66)
-Grade III	3(15)	4(20)	5(25)	12(20.00)
Bleeding gum	20(100)	20(100)	20(100)	60(100)
Hot & Cold sensitivity	12(60)	10(50)	9(45)	31(51.66)

Halitosis (Bad breath)	18(90)	16(80)	20(100)	54(90.00)
Swelling gum	16(80)	14(70)	15(75)	45(75.00)

N.B: Grade I Tooth mobility = Just discernible Grade II = Less than I mm labbiolingual movement

Table 2: Effect of drug on different group at the end of 4 week treatment

Clinical features		TG/Group –I		CTG/Group –II		CG/Group –III	
		Impd. N(%)	Not Impd N(%)	Impd. N(%)	Not Impd N(%)	Impd. N(%)	Not Impd N(%)
mobility							
-Grade I	B.T.	-	13(100)	-	13(100)	-	11(100)
	A.T.	6(46.15)	7(53.85)	13(100)	-	9(81.82)	2(18.18)
-Grade II	B.T.	-	3(100)	-	2(100)	-	4(100)
	A.T	1(33.33)	2(66.67)	2(100)	-	(25.00)	3(75.00)
Depth of Periodontal pocket	B.T.	-	12(100)	-	9(100)	-	11(100)
-Grade I	A.T	4(33.30)	8(66.67)	7(77.78)	2(22.22)	3(27.27)	8(72.73)
	B.T.	-	5(100)	-	7(100)	-	4(100)
-Grade II	A.T	1(20.00)	4(80.00)	3(42.86)	4(57.14)	1(25.00)	3(75.00)
	B.T.	-	3(100)	-	4(100)	-	5(100)
-Grade III	A.T	-	3(100)	1(25.00)	3(75.00)	1(20.00)	4(80.00)
Bleeding gum	B.T.	-	20(100)	-	20(100)	-	20(100)
	A.T	10(50.00)	10(50.00)	18(90.00)	2(10.00)	12(60.00)	8(40.00)
Hot & Cold sensitivity	B.T.	-	12(100)	-	10(100)	-	9(100)
	A.T	7(58.33)	5(41.67)	10(100)	-	4(44.44)	5(55.56)
Halitosis	B.T.	-	18(100)	-	16(100)	-	20(100)
	A.T	9(50.00)	9(50.00)	14(87.50)	2(12.50)	12(60.00)	8(40.00)
Swelling gum	B.T.	-	16(100)	-	14(100)	-	15(100)
	A.T	8(50.00)	8(50.00)	12(85.71)	2(14.29)	9(60.00)	6(40.00)

N.B: B.T = Before Treatment. Impd = Improved

A.T = After treatment T.G = Treated Group

C.T.G = Combined treated Group C.G = Control group

Table 3: The rate of recurrences of different clinical features after the follow up of one month

Clinical features	TG/Group –I	CTG/Group –II	CG/Group –III

	Cases Impd.	Recurrence N (%)	Cases Impd.	Recurrence N (%)	Cases Impd.	Recurrence N (%)
Tooth Mobility -Grade I -Grade II	 6 1	 2(33.33) 1(100)	 13 2	 2(15.38) 1(50.00)	 9 1	 3(33.33) 1(100)
Calculus	20	7(35.00)	20	3(15.00)	20	6(300.00)
Periodontal pocket -Grade I -Grade II -Grade III	 4 1 -	 1(25.00) 1(100) -	 7 3 1	 1(14.28) 1(33.33) 1(100)	 3 1 1	 2(66.67) 1(100) 1(100)
Bleeding gum	10	4(40.00)	18	2(11.11)	12	5(41.67)
Hot & Cold sensitivity	7	3(42.86)	10	-	4	2(50.00)
Halitosis	9	4(44.44)	14	2(14.28)	12	4(33.33)
Swelling gum	8	3(37.50)	12	2(16.67)	9	3(33.33)

Discussion

Observation shows that when there are gingival inflammation and periodontal pockets, the number of organism increases. Despite a great deal of research no specific organism or group of organisms has yet been identified as causals. It is assumed that the toxic products of bacterial origin, produce periodontal disease, However, there is some evidence that specific microorganisms may be involved9. Bacterial plaque is known to have an etiologic role in inflammatory periodontal disease, and bacterial invasion may be an important aspect of chronic periodontal disease.

The history of knowledge about Dantamulagata rogas in Ayurveda is traced back to the period of syshruta, Regarding these diseases we may consider eight Dantamulagata roga which have close
relation to the chronic gingivitis and chronic periodontitis.

For many regions the satisfactory treatment of the periodontal disease has not been achieved by the practioners till now. It is chiefly contributed to by – (1) Paucity of knowledge concerning the details of the definitive mechanism that plays role in the creation of such disease, (2) Difficulty to maintain proper oral hygiene, (3) Side effects of the modern drugs which limit their prolonged use for the permanent cure ofdisease. Under these circumstances this study is a trial to explore unique herbal drug which has efficacy to help the patients of periodontal disease without unwanted side effects.

Sushruta has described that triphala pacifies that kapha and pitta dosha, which are the main causative factors of the periodontal diseases. He has also emphasize that the triphala has hemostatic, anti-inflammatory, analgesic and wound healing properties. Haritaki is most efficacious for bleeing gums and gingival ulcers and carious teeth. On the other hand Amalaki contains enormous vitamin 'C' which is most essential to prevent the bleeding from gums.

In this clinical study it has been observed that the signs and symptoms of the periodontal disease subsided quickly in the control group (CG), in comparison to other treated group. But the recurrence of previous signs and symptoms were observed during follow up period after stopping the treatment (Table 3).

The efficacy of the drug, triphala in relieving the signs and symptoms in patients of periodontal disease was proved as identical to comparison the modern drug. The drug is effective against many signs and symptoms of the periodontal disease. A bacteriological study was done with the
triphala decoction. The study has demonstrated that triphala has a good6 antibacterial property and it is sensitive to 16 (72.7%) bacteria out of 22.

Although triphala cured periodontal disease without any side effects or toxicity. Yet a detailed scientific enquiry is required into various aspect of its pharmacological and clinical effects. In before this drug could be recommended for the treatment of periodontal disease. It is also to be mention here that a broad antibacteriogical study can be made upon various bacteria. Thus we
can listed this drug as a broad spectrum antibiotic for treating the infection diseases (local and systemic use). Therefore considering all the above observations it can be concluded the drug

triphala or metronidazole, alone is capable to provide partial relief but when both are used combinedly, more effective for the treatment of periodontal disease. However, it is further suggested that triphala and metronidazole as a combined treatment regimen should be used for local (like gargling and mouthwash) and systemic administration.

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