

Available online on 15.11.2019 at <http://jddtonline.info>

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

© 2011-18, publisher and licensee JDDT, This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited

Open  Access

Research Article

Clinical Appraisal on Therapeutic Efficacy of *Tankana* and *Sphatika Bhasma* with *Madhu Pratisarana* in *Tundikeri*

Itishree Sahoo^{1*}, Sanjay S More¹, Vinod Jadhav¹, Sujit Dalai², Manoj Sahoo³

1. P.G. Deptt. of Shalakyta Tantra, SVM Ayurvedic Medical College, ILKAL, Karnatak, India

2. Deptt. of Rasashatra & B.K, Bharati Ayurvedic Medical College & Hospital, Durg, India

3. P.G Deptt. of Basic Principle, GAC, Balangir, Odisha, India

ABSTRACT

The clinical study was carried out to find out the efficacy of *Tankana* & *Sphatika bhasma* with *Madhu pratisarana* in *Tundikeri* (Chronic Tonsillitis). The study was an Open Labelled Randomized Comparative study with a pre- and post-test design at the outpatient level of S.V.M. Ayurvedic Medical College & R.P.K Ayurvedic Hospital, Ilkal, Karnatak, India. In accordance to inclusion and exclusion criteria 30 patients were treated with *Tankana bhasma* (Purified borax powder) along with *Madhu* (honey) *pratisarana* and *Sphatika bhasma* (purified potash alum) along with *Madhu pratisarana* on alternative days for 13 days to Group A and Group B respectively. Each group comprised with 15 patients. After assessment of all data, the result conforms that both the drug *Tankana bhasma* with *Madhu pratisarana* and *Sphatika bhasma* with *Madhu pratisarana* on *Tundikeri* have significant result. However, in overall assessment, the efficacy of *Tankana bhasma pratisarana* is more significant than *Sphatika bhasma pratisarana* in the management of *Tundikeri*.

Keywords: *Tundikeri*, Tonsillitis, *Tankana*, Borax, *Sphatika*, Alum, *Madhu*, *Pratisarana*

Article Info: Received 10 Sep 2019; Review Completed 24 Oct 2019; Accepted 29 Oct 2019; Available online 15 Nov 2019



Cite this article as:

Sahoo I, More SS, Jadhav V, Dalai S, Sahoo M, Clinical Appraisal on Therapeutic Efficacy of *Tankana* and *Sphatika Bhasma* with *Madhu Pratisarana* in *Tundikeri*, Journal of Drug Delivery and Therapeutics. 2019; 9(6):130-134
<http://dx.doi.org/10.22270/jddt.v9i6.3707>

*Address for Correspondence:

Itishree Sahoo, M.S. Scholar, P.G. Deptt. of Shalakyta Tantra, SVM Ayurvedic Medical College, ILKAL, Karnatak, India

1. INTRODUCTION

'Tundikeri': The term of Ayurveda gives a general meaning of disease which occurs in oral cavity (*Mukhagata roga*) defined as swelling at root of *Hanu sandhi* (temporo-mandibular joint) that resembling (Fig.1) *Vana karpasa Phala* (cotton fruit).^[1,2] Ayurveda classified this disease under *Kanthagata* (disease of throat) and *Talugata roga* (disease of palate) also.^[3,4] *Tundikeri* of Ayurveda has been correlated with Tonsillitis of modern science.^[5-7] Tonsillitis is an infection of tonsils. The surface and deep bacterial flora of chronic inflamed tonsils consist of an abundance of probable pathogenic aerobic and anaerobic bacteria, primarily of streptococcal origin.^[8-12] From all visits to paediatrician, it is found that 7% children are affected with this disease.^[13] Ayurveda advocates that it is caused by the vitiation and imbalance of *doshas* i.e., *Vata*, *Pitta*, and *Kapha*. Mainly derangement of *Kapha* and *Rakta* (blood) is preceded by impaired digestive capacity (*Mandagni/Vishamagni*) and obstruction of channels (*Srotavarodha*) namely *Annava ha srotas* (gastrointestinal tract) and *Pranava ha srotas* (respiratory tract) which is manifested as difficulty in

swallowing, mouth breathing, choking spells at night, etc.^[14,15]

Ayurveda provides enough references regarding the treatment of *Tundikeri* based on *doshik* predominance, signs and symptoms. Among these one of the promising therapy is application of *Kshara* (alkali) in the form of *Pratisarana* (Application of different form of drugs inside the mouth with the help of a finger tip).^[16] This therapy has many advantages over conventional surgery and is aimed at pacifying inflammation and subsidence of symptoms. *Pratisarana kshara* is a prevalent treatment modality in Ayurveda which has been advocated in disorders like *Arbuda* and *Adhimamsa* besides that many other unhealthy or undesirable growths of body tissues.

Out of various minerals described in Ayurveda, *Tankana* (Borax/Sodium tetraborate decahydrate) and *Sphatika* (Alum/ Potash alum) are important minerals which are used for *Rasa Samskara* as well as therapeutic use in purified form. *Tankana* is also named as *Kshararaja* means it is corrosive in nature but not a strong corrosive.^[17] *Tankana*

bhasma (Purified *Tankan*/Sodium Borate) is known as a best bleaching agent & anti-septic which helps in the removal of media for growth of pathogens. *Sphatika* is also an alkaline Material. *Kshariya* in nature and possesses *kashaya*, *katu*, *amla* and *madhura rasa*.^[18] *Sphatika bhasma* (Purified Alum) is also a bleaching agent & anti-septic which sustains the growth of pathogens by eroding the layer formed by the infection. Considering these thoughts a comparative study was carried out to trace the efficacy of *Tankana* and *Sphatika kshara* (in form of *bhasma*) *Pratisarana* with *Madhu* (honey).

2. MATERIAL AND METHODS

Design

Open Labelled Randomized Comparative study

Participants: In accordance with the Inclusion criteria, patients associated with chronic tonsillitis (*Tundikeri*) i.e *Kathina sotha* (enlargement of tonsil), *Ragatwa* (hypermia), *Galoparodha* (dysphagia), *Mukha daurgandhya* (halitosis) were selected and registered in OPD-IPD of Department of *Shalaky Tantra*, S.V.M. Ayurvedic Medical College & R.P.K Ayurvedic Hospital, Ilkal between April 2018 to Jun 2018.

Exclusion criteria were Tonsillitis associated with complications such as peritonsillar abscess, tonsillar cyst, tonsillolith or any other systemic disorders and patients who had taken systemic steroids or antibiotics in past 4 weeks.

Study Drug

Tankana bhasma, *Sphatika bhasma* and *Madhu*

Preparation of *Tankan bhasma* and *Sphatika bhasma*:^[19-21] The raw material of both the drugs were taken in a clean and dry *Khalva yantra* separately and pounded well to prepare powder. This powder was taken in a *Sarava* (earthen pot) & heated in *Madhyamagni* (moderate heat) until all the water content is completely evaporated. Finally *Tankana* was obtained as a white coloured puffy light substance and *Sphatika* was obtained as an off-white coloured light substance. This white substance then made as fine powder like the character of *bhasma* by *khalva yantra*.

Intervention

Out of 36 patients, 30 patients were participated till end of the study design. A suitable sampling technique was adopted with 15 patients each in study Group A & Group B. Patients of Group A treated with *Tankana bhasma* along with *Madhu pratisarana* on alternative days for 13 days. Patients of Group B treated with *Sphatika bhasma* along with *Madhu pratisarana* on alternative days for 13 days (total 7 time application). From 14th day to 21st day patients were undertaken for follow-up without medicines in both the Groups.

Trial Method

Tankana bhasma with *Madhu* and *Sphatika bhasma* with *Madhu* were mixed in equal quantity respectively. *Pratisarana* was carried out i.e applied in dose which sufficiently covers the whole surface of tonsil. The duration of *Pratisarana* was 2 minutes per sitting i.e approximately 100 *Vakmatra* (time duration after Pronunciation of one alphabetic letter).^[22]

Assessment Criteria

Subjective parameters were assessed according to severity of sign and symptoms. Assessment was done on the basis of grading and scoring of clinical features on 1st day (before treatment), 14th day (after treatment) & 21st day (after

follow-up) on four point grade scale. *Kathina Shotha*- Tonsils in tonsillar fossa, Tonsils visible beyond the anterior pillar, Tonsils extended $\frac{3}{4}$ of way to midline, completely obstructing; Kissing Tonsils. *Ruk* (Pain) - No pain, Occasional, During food intake, Recurrent/Several times per day, throughout the day. *Raaga* (Redness of Tonsils) - Nil, Mild discoloration, Moderate discoloration, Severe discoloration, Severe discoloration with throat ulceration. *Galoparodha* (dysphasia) - No difficulty, Difficulty in taking solid food only, Difficulty in taking solid & liquid food, Difficulty in swallowing saliva itself. *Mukha daurgandhya* (Halitosis) - No Halitosis, Halitosis present only when opening the mouth completely, Halitosis present during yawning, Halitosis present even during talking. Objective criteria were assessed according to Pictorial presentation and Size of Tonsils (By applying 4% xylocaine to measure the tonsil by tonsillar forceps before and after treatment)

3. DATA ANALYSIS

The observations of characters were presented in tabulated form & statistically analyzed individually & inferences drawn. For each independent sample, unpaired t-test and Mann-Whitney U test (for between-subjects designs) and paired samples t-test and the Wilcoxon test (for within-subjects designs) were done.

4. OBSERVATION AND RESULT

Out of 36 registered patients, 30 patients were completed the study. In accordance to socio demographic profile, participants were approximately equal percentage of male and female in gender basis, 76.7% Hindu & 23.3% Muslim on religion basis. Socio economic status divulged that 30% lower classes, 20% Lower middle classes, 43% Middle classes and 5% higher classes. In dietic regimen equal % of vegetarian and mixed vegetarian participants were traced. *Prakriti* shows participants having majority in *Vata kapha prakriti* (73.3%) & others *Pitta prakriti* (26.7%)

Trail drug effected on the score of *Sotha*, *Ruk*, *Raagatwa*, *Galoparodha* and *Mukha daurgandhya* was 38.9%, 84.2%, 63%, 60% and 84% respectively improvement in Group A and 14.3%, 65.5%, 39.5%, 33.3% and 53.6% respectively improvement in Group B. Within both the groups (Wilcoxon signed ranks test) statistical significance ($p < 0.05$) on signs and symptoms of chronic tonsillitis was found. (Table1)

5. DISCUSSION

With the chief complain of sore throat, difficulty in swallowing, refuse to intake of food, pain in throat and fever etc patients are diagnosed as the disease *Tundikeri*. Investigation conforms the inflammation of the tonsils is caused by a microbial organism. The symptoms are usually mild and often related to the common cold. Acute tonsillitis often affects school-going children, but also affects adults. Haemolytic streptococcus is the most commonly infecting organism. Other causes of infections may be staphylococci, pneumococci or H.influenzae. These bacteria may primarily infect the tonsil or may be secondary to a viral infection.

The statistical analysis (Mann Whitney 'U' test) on subjective criteria showed that p-value on all parameters are less than 0.05 but mean rank for Group A in all clinical features is greater than Group B, which imply that there is significant difference between Group A and Group B.(Table 2)

Observations on objective criteria reveal that, the effect of drugs in both groups is significant as p value < 0.05. But In Group A, only 7.5% patient shows reduction in size of tonsils while in Group B is 3.4%. This observation was statistically analyzed by using paired t-test as data are quantitative &

sample size is less than 30. Inter group comparison by using Un-paired t-test, shows that $p < 0.05$ and mean difference for Group A is greater than Group B. Therefore the drug prescribed in Group A is more effective than drug prescribed in Group B.

Tankana is corrosive as well as *Mridu* (soft) in nature having the properties like *Katu rasa*, *Ushna virya*, *Ruksha* & *Tikshna guna*. *Kshara* has been used as *Prakriti vighatana* treatment for all types of *krimi chikitsa* as *krimi* cannot exist in *kshariya* state.^[23,24]

Tankana carries properties like *Kapha-visleshaka* and *Vatahara* due to *Katu rasa*, *Ushna virya* & *Tikshna guna*. *Katu rasa* & *Tikshna guna* helps the drug to penetrate the deeper parts of *Tundikeri* which removes the vitiated *Kapha dosha* and mucoid debris, so that symptoms like *Mukha daurgandhya* (halitosis) is reduced. Pain is reduced in *Tundikeri* due to pacification of *Vata dosha* due to *Srotabarodha* (blockage of channels). Because of Vitiated *kapha* under goes *Vishlesana* due to *Kshariya swabhava* of *Tankana*, this further helps to open the obstructed canals of the tonsil. *Katu rasa* along with *Ruksha*, *Tikshna guna* acts as *Lekhana* and *Marga vishodhana*, which helps in reduction of *Ragata* and *Sotha*.

The results of *in-Vitro* antimicrobial study of *Tankana* reveals that *Tankan* was effective against bacterial strains *E. coli*, *P. aeruginosa*, *S. aureus*, *S. pyogenes* and fungal strains *C. albicans*, *A. niger* and *A. Clavatus*.^[25] *Tankana churna* possesses anti inflammatory action also.^[26]

Sphatika or Potassium aluminium Sulphate (Alum) exhibited broad spectrum antibacterial potency against test bacteria but much more on the Gram negative than gram positive using *in-vitro* susceptibility tests but *in-vitro*-study demonstrates that alum can be used as a novel and emerging antimicrobial agent in food system to combat some spoilage bacteria and food borne pathogens.^[27]

Madhu is the chief drug in *Samana chikitsa* having the nature of *Yogavahi* (catalyst) also. The *Yogavahi* character of *Madhu* helps to increase the pharmacodynamic action of drugs without changing its original properties. It acts as antimicrobial & anti healing action due to its *Kashaya rasa*, *Rukshya guna* & character like *Visanwayat* (krimighna).^[28] The anti-microbial properties of honey is derived from the osmotic effect of high sugar content & low moisture content along with its acidic properties of gluconic acid. The healing properties of honey are due to the fact that it offers antibacterial activity, maintains a moist wound condition and its high viscosity helps to provide a protective barrier to prevent infection. Its immune modulator property is relevant to wound repair too. The antimicrobial action of honey is due to the enzymatic production of Hydrogen peroxide.^[29]

Madhu is applied locally with purified *Tankan* for various ailments of mouth including *Mukhapaka* where swelling, burning etc. are present.^[30] *Madhu* with purified *Sphatika* powder- 2-3 gunja (1 gunja = 125mg) is indicated in whooping cough.^[31] *Kashaya rasa* & *Rukshya guna* of *Madhu* helps to absorb *Kapha (soshana)* that leads to reduction of *Shotha*.^[32] So, *Madhu* may also helps for the reduction of the clinical feature *Shotha* in *Tundikeri*.

It is reported that honey reduced the activities of cyclooxygenase-1, cyclooxygenase-2, thus honey showing anti-inflammatory effect also.^[33] The local application of *Tankana bhasma* with *Madhu pratisarna* and *Sphatika bhasma* with *Madhu pratisarna* are *Vyadhihara* by nature. As the drug was directly applied at the site of disease, therefore the remedy was fast acting in reducing the signs and symptoms. No side effects were observed during the study period.

On overview of both the drugs (*Tankana* and *Sphatika*) the chemical formula of both the drugs are different but belongs to same family i.e. "Borax Family". Both have equal properties. But the chemical formula indicates they are different due to their water content. *Tankana* (Borax compound) contains 10 water molecules, on the other side *Sphatika* (Potash alum compound) contains 24 water molecules. Along with, there is a clear difference in *Rasa* & *Guna* between both drugs. *Tankana* has *Katu rasa* & *Tikshna guna*, where as *Sphatika* has *Kashaya*, *Katu*, *Amla-Madhura rasa* & *Guru-Snigdha guna*. Both drugs are *kshariya* in nature but the *kshariya* character is less in *Sphatika* due to presence of more water molecules which responsible for variation in *Guna* and *Rasa* than *Tankana*. So that *kshariya* property of *Tankana* has acts more effectively than *Sphatika*.

6. CONCLUSION

Tundikeri is a clinical condition which is very common in child as well as in growing age (adolescent) with no significant relation to sex, religion & geographical distribution. Its signs and symptoms correlates with Tonsillitis in contemporary medicines. Poor oral hygiene, improper food habit like more intake of *kaphaja ahara-vihara* & exposure to cold are the chief predisposing factors of the disease *Tundikeri*. Children as well as growing age adults with *Kapha-Vata* predominance *Shareerika prakriti* are more prone to develop tonsillitis. Both the drug *Tankana bhasma* with *Madhu pratisarana* and *Sphatika bhasma* with *Madhu pratisarana* on *Tundikeri* have significant results. However, there is significant effect of *Tankana bhasma Pratisarana* than *Sphatika bhasma Pratisarana* in *Tundikeri* as from the Ayurvedic perspective, it controls the imbalance of *doshas* and thus effectively reduces the signs and symptoms of chronic tonsillitis.

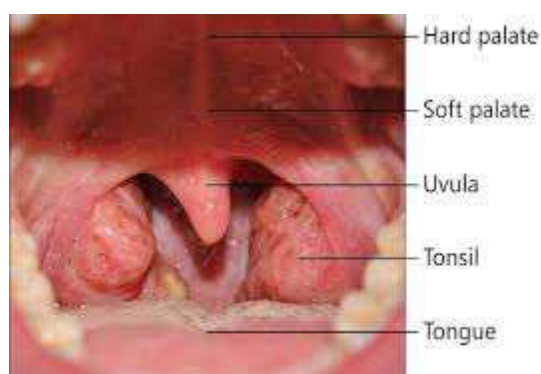


Fig.1:Tundikeri (Chronic Tonsilitis) that resembling Vana Karpasa Phala (cotton fruit).

Table 1: Effect of prescribed drugs on signs and symptoms of chronic tonsillitis (BT & AT) - test statistics within the groups (Wilcoxon signed ranks test).

Sign & Symptoms	Group	Wilcoxon Signed Rank W	P-Value	% Effect	Result
Shotha (Inflammation)	A	-3.742 ^a	0.000	38.9	Significant
	B	-2.000 ^a	0.046	14.3	Significant
Ruk (Pain)	A	-3.502 ^a	0.000	84.2	Significant
	B	-3.578 ^a	0.000	65.5	Significant
Raaga (Redness)	A	-3.453 ^a	0.001	63.0	Significant
	B	-3.873 ^a	0.000	39.5	Significant
Galoparodha (Dysphagia)	A	-3.464 ^a	0.001	60.0	Significant
	B	-2.449 ^a	0.014	33.3	Significant
Mukha daurgandhya (Halitosis)	A	-3.051 ^a	0.002	84.6	Significant
	B	-3.000 ^a	0.003	56.3	Significant

Table 2: Statistical analysis & comparison of all features (Subjective Criteria) in both groups

Sign & Symptoms	Group	N	Mean Rank	Sum Ranks	Mann Whitney U	P-Value
Shotha (Inflammation)	A	15	20.50	307.50	37.500	0.000
	B	15	10.50	157.50		
Ruk (Pain)	A	15	20.53	308.00	37.000	0.001
	B	15	10.47	157.00		
Raaga (Redness)	A	15	20.50	307.50	37.500	0.000
	B	15	10.50	157.50		
Galoparodha (Dysphagia)	A	15	18.50	277.50	67.500	0.028
	B	15	12.50	187.50		
Mukha daurgandhya (Halitosis)	A	15	16.30	244.50	100.500	0.562
	B	15	14.70	220.50		

Conflict of Interest: None

REFERENCES

- Ambikadatta Shastri, Sushruta Samhita of Sushruta with Ayurveda TatvaSandipika Hindi Commentary, Reprint edition, Chaukhambha Sanskrit Sansthan, Varanasi, Nidanasthana, 2010; 16/44: 387
- Vagbhatta. Astanga Hridayam, A commentary of Sarvanga Sundari of Arundatta and Ayurveda Rasayan of Hemadri, Edited by Anna Moreshwari Kunte, Krishna Ram Chandra Shastri Navre, Chaukhambha Sanskrit Series Office, Varanasi, 9th Edition, Uttara Sthana, 2002; 21/47, Page-849.
- Atrideva Gupta, Astanga Hridaya of Vagbhatta, "Vidyotini" Hindi Commentary, edited by Vaidya Yadunandana Upadhyaya, Reprint edition, Chaukhambha Sanskrit Bhawan, Varanasi, Uttar Tantra, 2009; 21/47: 712.
- Ambikadatta Shastri, Sushruta Samhita of Sushruta, TatvaSandipika Hindi Commentary, Reprint edition, Chaukhambha Sanskrit Sansthan, Varanasi, Nidanasthana, 2010; 16/42:387
- P.L. Dhingra, Deeksha Dhingra, Diseases of Ear, Nose and Throat, 6th Edition Chapter 51:258
- P. Hazarika, Text book of ENT and Head and neck surgery, Third Edition, Reprint Edition, 2014; 51:476
- A short textbook of E.N.T. disease by K.B. Bhargava, S.K. Bhargava, T. Shah 9th edition, Reprint 2011 Chapter 38 Page 247
- Surow J B, Handler SD, Telian SA, Fleisher GR, Baranak CC. Bacteriology of tonsil surface and core in children. Laryngoscope. 1989; 99:261-266.
- Gaffney RJ, Freeman DJ, Walsh MA, Cafferkey MT. Differences in tonsillar core bacteriology in adults and children: a postoperative study of 262 patients. Respir Med. 1991; 85:383-388.
- Mitchellmore IJ, Reilly PG, Hay AJ, Tabaqchali S. Tonsil surface and core cultures in recurrent tonsillitis: prevalence of anaerobes and beta-lactamase producing organisms. Eur J Clin Microbiol Infect Dis. 1994; 13:542-548.
- Brook I, Yokum P, Foote PA. Changes in the core tonsillar bacteriology of recurrent tonsillitis: 1977-93. Clin Infect Dis. 1995; 21:171-176.
- Sjernerquist-Desatnik A, Holst E. Tonsillar microbial flora: comparison of recurrent tonsillitis and normal tonsils. Acta Otolaryngol (Stockh). 1999; 119:102-106.
- Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson Textbook of Pediatrics, 18th ed. New Delhi: Elsevier; 2008.
- Acharya J T. Sushruta Samhita of Sushruta. 1st ed. Varanasi: Chaukhambha Surbharati Prakashan; 2003.
- Bhisagacharya HP. Astanga Hridaya. 1st ed, Krishnadas Academy, Varanasi; 2000.
- Sushruta, Sushruta Samhita edited with Ayurveda Tatva Sandipika Hindi Commentary by Ambika Dutta Shastri, Pranajivana Manekchand Mehta Part-1 Chaukhambha Sanskrit Sansthan, Varanasi, Chikitsa Sthan, 2006; 40/70:186.
- Shadananda Sharma. Rasatarangini edited by Kasinath Sastri. Motilal Banarasidas, Delhi, Ekadasdas Taranga: 2014; 13/72-74
- Vagbhatta, Rasaratna samuchaya, Vijnanabodhini Hindi commentary by Dattatreya Ananta Kulkarni, Meharchand Lachhmandas Publications, New Delhi, 1998; 3/64:52
- Shadananda Sharma. Rasatarangini edited by Kasinath Sastri, Motilal Banarasidas, Delhi, Trayodasa Taranga: 2014; 13/77:318
- Shadananda Sharma. Rasatarangini edited by Kasinath Sastri, Motilal Banarasidas, Delhi, Trayodasa Taranga: 2014; 13/78:318,319
- Upadhyaya Madhava, Ayurveda prakash, Hindi commentary by Shri Gulrajsharma Mishra, Pt. Shiva sharma; Chaukhambha Bharati academy, Varanasi, 2016; 2/1:322
- Charaka, Charaka Samhita, Vidyotini Hindi commentary, Kasinath Shastri, Gorakhnath Chaturvedi. Part 1, Chaukhambha Bharati Academy, Varanasi: Kalpa sthana, 1996; 12/43
- Shadananda Sharma. Rasatarangini edited by Kasinath Sastri, Motilal Banarasidas, Delhi, Trayodasa Taranga, 2014; 13/79-81:319
- Priyavrata Sharma. Priya Nighantu: Chaukhambha Surabharati Prakashan, Varanasi, Suvarnadi varga: 2004: 39

25. Adhvaryu TR, Patel KS, Kori VK, Rajgopala S Majusha R; *In vitro* antimicrobial activity of *Tankana*, European journal of Biomedical and pharmaceutical sciences:2015; 2(7):210-213
26. Bagepalli Srinivas, Ashok Kumar, Gopi Setty Saran, Anand Mouna, Chonduri Naveen Kumar, *In vitro* anti-inflammatory activity of *Tankana* churna, 2013; (40)1:
27. Lawrence O, Amadi, Nathaniel N, Ngerebara, Susceptibility profiles of Alum on Bacteria isolated from shellfish Bivalve oyster international Journal of Current microbiology and applied science, 2017; (6)1:941-947
28. Charaka, Charaka Samhita: Vaidya Manorama Hindi vyakhya by Vidyadhara Sukla, Ravidutta Tripathy, Part1, Chaukhamba Sanskrit Pratisthan; Varanasi, Sutra sthan, 1998. 27/245,246:419.
29. P.Saranraj, S.Sivasakthi, Glaucio Dire Feliciano, Pharmacology of Honey: A Review Advances in Biological Research, 2016; 10(4):271-289
30. Shadananda Sharma, Rasatarangini edited by Kasinath Sastri; Motilal Banarasidas, Delhi, Ekadasdas Taranga, 2014; 13/91:320
31. Jadavji Trikamji Acharya, Rasamritam, edited & English translated by Damodar joshi, G.Pravakar Rao, Chaukhambha Sanskrit bhawan, Varanasi; 1998:141
32. Charaka, Charaka Samhita, Vaidya Manorama Hindi vyakhya by Vidyadhara Sukla, Ravidutta Tripathy, Part1, Chaukhamba Sanskrit Pratisthan, Varanasi, Sutra sthan, 1998; 26/42-(6):379.
33. Natalia G Vallianou, Penny Gounar, Alexandros Skourtis, John Panagos, Christos Kazazis, Honey and its Anti-Inflammatory, Anti Bacterial and Anti Oxidant Properties, General Medicine: Open Access, 2014; (2)2:1-5

Journal of Drug Delivery & Therapeutics



JDDT