



Review On The Pharmacological Concepts Of The Vranahara Drugs W.S.R To Madhava Dravyaguna

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Vrana is a term used to indicate wound, abscess, injury, ulcer etc. It involves three stages Vrana shopha, Vrana and Vrana vastu which are comparable to the three stages of the wound healing. This also involves the process of inflammation and repair of the damaged tissues of the body. The principles mentioned for the treatment are based on those three stages and the changes occurring during these three stages. In the present study drugs mentioned to be useful in the treatment of the Vrana in the Text Madhava dravyaguna (a 13th century book on the properties of the drugs available at that time) are analyzed to understand their properties and uses in the different stages of the vrana. It was finally concluded that the drug mentioned were having properties like anti-inflammatory, anti-oxidant, analgesic and anti-biotic and were useful in the treatment of the Vrana.

Key words: Vrana, Saptopakrama, Shodhana, Ropana, Madhava dravyaguna,

Introduction:

Vrana, according to Sushruta chikitsa sthana 1st chapter, is a discontinuity or break in the continuity of the body or bodily tissues¹. This creates a permanent change in the body in the form of scar even after healing². Vrana indicates Ulcer, Wound, Scar, Abscess, Tumour, Cancer, Boils, Cicatrix or Crack etc depending on the context. The word Vrana can better be correlated with the Ulcers or wounds, as the basic definition of the ulcer is “A circumscribed inflammatory and often suppurating lesion on the skin or an internal mucous surface resulting in necrosis of tissue” which is similar with the definition of the Vrana.

Vrana is of two types based on the aetiology. They are Nija and Agantuja causes. Nija causes includes the vitiation of the doshas leading to the formation of the vrana and can be compared with the infections, free radical injuries, endocrine causes etc. Agantuja causes include the external physical injuries, chemical injuries, radiation injuries etc like injuries, burns, surgical incisions etc¹.

Eight sites were mentioned for the vranas to appear (Ca.Ci.25/26). They are Twak (simple cuts on the skin to major diseases like squamous and basal cell carcinoma), Mamsa (deep injuries involving the muscular tissues, tumours involving the muscular tissues etc), Sira (Varicose ulcers, injuries to the blood vessels etc), Snayu (injuries involving the exposure of ligaments and tendons, sprains etc), Asthi (fractures and conditions like osteoporosis), Sandhi (joint injuries and deformities), Koshta (peptic ulcer diseases, ulcerative colitis etc) and Marma (Injuries to the organs like heart, lungs, brain genital organs etc), where the epithelial surfaces are present².

Depending on the site of involvement and the duration of the injury few complications like like Visarpa (Cellulitis), Pakshaghata (nerve damage leading to loss of organ function), Sirasthambha (thrombophlebitis), Moha (giddiness or unconsciousness), Unmada (seizures), Apatanaka, Jwara (fever because of infection), Trushna (thirst due to excessive blood loss) and Hanugraha (neck stiffness or tetany) are seen (Ca.Ci.25/29-31)³. These complications make the condition much worse and sometimes prove to be fatal to the patient.

The bodily processes help to restrict the wound or ulcer by the process called Inflammation. Because of the inflammations many changes occur in the body and produce the signs and symptoms. These processes facilitate wound healing process and involve three stages. They are ⁴

1. Inflammatory phase (Formation of *Vrana sophā*): The inflammatory phase commences as soon as tissue integrity is disrupted by injury; this begins the coagulation cascade to limit bleeding. The changes that take place in this phase are platelet aggregation, release of cytokines and histamines and the passage of neutrophils and monocytes (which become macrophages) to the site of injury. Consequently, an inflammatory exudate that contains red blood cells, neutrophils, macrophages, and plasma proteins, including coagulation cascade proteins and fibrin strands, fills the wound in a matter of hours. Macrophages not only scavenge but they also are central to the wound healing process because of their cytokine secretion. This shows the symptoms of palor, rubor, dolor, swelling and loss of function. This stage is the stage of *Vrana sophā*.
2. Proliferative phase (*Vrana*): The proliferative phase begins as the cells that migrate to the site of injury, such as fibroblasts, epithelial cells, and vascular endothelial cells, start to proliferate and the cellularity of the wound increases. Cellular proliferation continues with the formation of extra-cellular matrix proteins, including collagen and new capillaries (angiogenesis). This process is variable in length and may last several weeks.
3. Maturation phase (Formation of *Vrana Vastu*): In the maturation phase, the dominant feature is collagen formation. The dense bundle of fibers, characteristic of collagen, is the predominant constituent of the scar. The wound undergoes remodeling continuously to achieve a state similar to that prior to injury.

The net result of the above process will be one of the following:

- Complete resolution, with regeneration of the native cells.
- Healing by connective tissue replacement and scarring.
- Abscess formation.
- Progression to chronic inflammation and ulceration.

All the ulcers thus formed may not require surgical interventions and most of the ulcers require medical management to promote wound healing. The following is the medical line of the treatment for the ulcers or injuries:

- Removal of the extraneous sources of irritation (external causes or diseases causing the ulcerations).
- To facilitate venous return from the ulcerated part.
- To ensure healthy blood supply.
- Antiseptics, to clean contaminated wounds (*Shodhana* and *Ropana* dravyas)
- Disinfecting the ulcer with Antibiotics (*Raksha* karmas)
- Medicated dressings (*Bandhana* karmas)
- Analgesics or pain relievers (*Vedanasthapana* dravyas)
- Nutrition (*Pathya* and *Apathyas*)

The Ayurvedic pharmacological concepts of the management of the *vrana* include *Saptopakramas* (Seven procedures) (*Su.Su.* 17/17-18)⁵ called:

- *Vimlapana*
- *Avasecana*
- *Upanaha*
- *Paatana*
- *Shodhana*
- *Ropana*
- *Vaikrutapaharana*

Of which the first four are useful for the treatment of the *Vrana sophā*, *shodhana* and *ropana* play a major role in the treatment of the *Vrana* (ulcer). These seven procedures are again subdivided into 60 procedures

Shasti-upakramas (Su.Ci.1/7)⁶. Charaka mentions 36 procedure treatments for the management of vrana (Ca.Ci.25/39-43)⁷. Of the sixty procedures, some are for the pre-operative management (like apatarpana, alepana, pariseka, abhyanga, swedana, vimlapana, upanaha etc). Operative procedures include visravana, lekhana, eshana, aharana, vyadhana, sravana, sivana, sandhana, peedana, shonitasthapana, nirvapana etc. Post operative procedures are targeted at nutritive (use of sarpi, taila), disinfective (vrana dhupana, avacurna, rakshavidhana, krimighna) and corrective measures (Romasanjana, krishna karma, pandukarma, lomapaharana). Thus a great emphasis is laid on the pre-operative, operative and post-operative measures for the treatment of Vrana in the Ayurvedic classical texts like Bruhatrayi, Laghutrayi, Nighantus, Rasashastra granthas etc.

Madhava Dravyaguna is one of the rare classical Ayurvedic texts, of around 13th century A.D. written by Madhavakara. It is a compilation on the properties and actions of the drugs, available at the time of 13th century A.D. The text is divided into 29 chapters and followed the arrangement of the dravyas in different vargas based on the Sushruta and Vagbhata. The prominent actions and properties of the drugs were mentioned in detail in short stanzas⁸.

So an attempt is made to identify the Vranahara dravyas mentioned in Madhava Dravyaguna and to analyze their pharmacological concepts.

Materials and methods:

Madhava dravyaguna Text was thoroughly searched for the drugs having the effect on Vrana and are tabulated. The pharmacological concepts of the drugs like Rasa, Guna, Veerya, Vipaka and Karma, useful parts, chemical contents etc are recorded and tabulated. Finally the drugs were analyzed to understand the similarities and differences in their properties and actions.

Observations:

Table 1: The following is the list of drugs mentioned to be useful in Vrana cikitsa in Madhava Dravyaguna and their properties as described in Ayurvedic texts.

Name of the drug Botanical name Family	Properties (Rasapancak a)	Pharmacologic al actions (Karma) and references	Useful part	Chemical contents ⁹	Referenc e
Harītakī <i>Terminalia chebula</i> Retz. (Combretaceae)	five rasas (pañcarasa – astringent (kashaya), sweet (madhura), sour (amla), pungent (katu), bitter (tikta) - except salt (Lavaṇa rasa)), Sara, Ushna	Reduces oedema (śōtha), skin diseases (kuṣṭha) and heals ulcers and wounds ¹⁰ (vraṇa) ¹¹ .	Fruits	Tannins, anthraquinones and polyphenolic compounds.	M.D.G. 1/7-8

Nimba <i>Azadirachta indica</i> A. Juss (Meliaceae)	Tikta, Laghu, Śīta, Kaṭu	Pitta, kapha diseases, vomiting (chardi), ulcers (vraṇa) and skin diseases (kuṣṭha).	Bark	Tetranortriterpenoids, margocin, nimbidiol, nimbolicin, azadirinin.	M.D.G. 1/19
Madhuka <i>Glycyrrhiza glabra</i> L. (Fabaceae)	Sweet (madhura), heavy (guru), Snigdha, Śīta, Madhura	Reduces haemorrhagic diseases (raktapitta), cleans the infected wounds (vraṇa śōdhana) and promotes wound healing (vraṇa rōpaṇa).	Root	Glycyrrhizin, glycyrrhizic acid, glycyrrhetic acid, asparagine, sugars, resin and starch.	M.D.G. 1/84
Prapaunḍarīka <i>Nelumbo nucifera</i> Gaertn. (Nelumbonacea)	Cool (śīta)	Good for visual perception (cakṣuṣya) and is useful for wound healing (vraṇa rōpaṇa)	Rhizome	Starch and Reducing Sugars. Alkaloid (Nelumbine).	M.D.G. 1/85
Jyōtiṣmatī <i>Celastrus paniculatus</i> Willd. (Celastraceae)	Kaṭu, Tikta, Sara, Uṣṇa, Tīkṣṇa, Uṣṇa, Kaṭu	Increases memory (mēdhya) and very quickly reduces ulcers (vraṇa) and blisters (visphōṭa). analgesic activity ¹²	Seeds and oil	Alkaloids, Oil and Tannins.	M.D.G. 1/99
Bhūrjja <i>Betula utilis</i> D.Don. (Betulaceae)	Kaṭu, Kaṣāya, Laghu, Uṣṇa, Kaṭu	Reduces ulcers (vraṇa) ¹³ , kapha and asra	Stem bark	Betulin, lupeol and 3 β - aetoxy - 12 - oleanen - 28 - oic acid.	M.D.G. 1/114
Vandāka <i>Dendrophthoe falcata</i> (Linn. f.) Ettingsh. (Loranthaceae)	Kaṣāya, Tikta, Madhura, Laghu, Rūkṣa, Śīta, Kaṭu	Reduces kapha, vāta, rakta, rakṣa, ulcers ¹⁴ (vraṇa) and poisons (viṣa)	Leaf	Leaves contain flavonoids such as Quercetin, quercetrin; Tannins comprising of gallic and chebulinic acid.	M.D.G. 1/154
Sārāla <i>Pinus longifolia</i> Roxb.	Astringent (kaṣāya),	Helps in disinfecting the	Oil	Oleo-resin and Flavonoids.	M.D.G. 10/15

(Pinaceae)	bitter (tikta), pungent (kaṭu)	ulcers (vraṇa) and śōdhanam).			
Tinduka <i>Diospyros exsculpta</i> <i>Buch. - Ham.</i> (Ebenaceae)	Madhura, Kaṣāya, Tikta, Guru, Snigdha, Uṣṇa, Madhura	Reduces ulcers (vraṇa) and vāta.	Stem bark	Triterpenoids (Lupeol, Betulin, Betulinic acid, Oleanolic acid) and Sterol.	M.D.G. 21/5-6
Guñjā <i>Abrus precatorius</i> Linn. (Fabaceae)	Tikta, Kaṣāya, Rūkṣa, Laghu, Tikṣṇa, Uṣṇa, Kaṭu	Reduces skin diseases (kuṣṭha) and ulcers (vraṇa) ¹⁵ .	Whole plant	An albuminous substance (abrine and abralin).	M.D.G. 1/94
Halanī <i>Gloriosa superba</i> Linn. (Liliaceae)	Tikta, Kaṣāya, Kaṭu, Sara, Tikṣṇa, Uṣṇa, Kaṭu	Reduces skin diseases (kuṣṭha) and infected or putrefied wounds (dṭa vraṇa).	Root	Alkaloids and Resins.	M.D.G. 1/96
Karavīra <i>Nerium indicum</i> Mill. (Apocynaceae)	Kaṭu, Tikta, Kaṣāya, Tikṣṇa, Laghu, Rūkṣa, Uṣṇa, Kaṭu	Reduces skin diseases (kuṣṭha) and infected or putrefied wounds (dṭa vraṇa) ¹⁶ .	Drug powder	Cardiac glucoside (oleandrin)	M.D.G. 1/96
Niśā (Haridrā) <i>Curcuma longa</i> Linn. (Zingiberaceae)	Tikta, Kaṭu, Rūkṣa, Uṣṇa, Kaṭu	Reduces anemia (pāṇḍu), polyuria (mēha), lymph gland swellings (apaci), pitta, skin disorders (tvak ṣaḍḍō kapha, pitta, oedema (śōtha), itching (kaḍu) and infected wounds ¹⁷ (duṣṭavrāṇa).	Rhizome	Essential oil and a colouring matter (curcumin).	M.D.G. 1/104
Vamśa <i>Bambusa arundinacea</i>		Reduces ulcers (vraṇa),	Stems	Starch	M.D.G. 1/112

(Retz.) Willd. (Poaceae)		destroys rakta, acts as purgative (bhedana) and reduces oedema (śōtha) ¹⁸ .			
Madana (Madanaphala) <i>Xeromphis spinosa</i> (Thunb) Keay. (Rubiaceae)	Bitter (tikta), light (laghu), dry (rūkṣa), hot (uṣṇa)	Causes vomiting (vamana), acts as lēkhana (scrapes the fat), reduces skin diseases (kuṣṭha), kapha, bloating (ānāha), oedema (śōtha), distension of abdomen (gulma) and ulcers (vraṇa) ¹⁹ .	Stem bark decoction	Essential oil, saponin, tannin and resin.	M.D.G. 1/136
Jambū <i>Syzygium cumini</i> (L.) Skeels (Myrtaceae)	Dry (rūkṣa),	Acts as anti-diarrhoeal (saṅgrāhi) and reduces kapha, pitta, ulcers (vraṇa) ²⁰ and asra (rakta).	10-20 g of the drug for decoction . (Stem bark)	Glycoside (Jamboline), Tannin, Ellagic acid and Gallic acid.	M.D.G. 21/8-9
Kōśāmraja <i>Schleichera oleosa</i> (Lour.) Oken (Sapindaceae)	Fast spreading (sara),	Reduces worm infestations (kr̥mi) ²¹ , skin diseases (kuṣṭha) and ulcers (vraṇa).	Oil		M.D.G. 10/11
Tila <i>Sesamum indicum</i> L. (Poaceae)	Slightly astringent (kaṣāya), sweet (madhura), bitter (tikta), unctuous (snigdha), heavy (guru), hot (uṣṇa) and sweet	It is useful as external application for wounds and ulcers ²² (vraṇa lēpana), increases strength (bala) and is also useful in all types of the	Seeds powder and oil	Fixed Oil	M.D.G. 10/3-5; 17/6-7

	(madhura) in vipāka	fractured wounds.			
Sikthaka (Wax)		Best in reducing ulcers (vraṇa), vīsarpa, skin diseases (kuṣṭha), vāta, and rakta			M.D.G. 1/103
Sindūra <i>Red sulphide of Mercury</i>	Hot (uṣṇa)	Reduces skin diseases (kuṣṭha), anemia (pāṇḍu) and poisons (viṣa). It promotes the fracture healing process (bhagna sandhāna janana) and help for the cleaning and healing of the wounds (vraṇa śōdhana and rōpaṇa)	Bhasma	<i>Red sulphide of Mercury</i>	M.D.G. 1/167
Saurāṣṭri Alum $KAl(SO_4)_2 \cdot 12H_2O$	Astringent	Reduces kapha, pitta, diseases due to poisons (viṣa rōga) and help for the cleaning of the wounds (vraṇa śōdhana)	Powder	$KAl(SO_4)_2 \cdot 12H_2O$	M.D.G. 1/168
Madhu Honey	Sweet (madhura) with astringent (kaṣāya) as anurasa, cool (śīta), light (laghu), dry (rūkṣa),	Acts as appetizer (dīpana), scraping (lēkhana), strengthener (balya), purifies and heals ulcers (vraṇa śōdhana rōpaṇa), binding (sandhāna), It reduces worm infestations (krimi), thirst	Honey	Glucose, fructose, sucrose, water, minerals, amino acids and proteins.	M.D.G. 4/3-4

		(tr̥ṣṇa) and bewilderment (mōha)			
Purāṇa sarpi (Ghee more than one year old)		It also reduces all the three dōṣa (dōṣatraya), acts as purgative (bhēdi), and purifies ulcers and helps for wound healing (vraṇa śōdhana and rōpaṇa).	Ghee		M.D.G. 9/11-12
Māmsa rasa		Cause pleasing effect (prīṇanaḥ), acts as elixir (prāṇajanaḥ), reduces dyspnoea (śvāsa), cough (kāsa), emaciation (kṣaya), kapha, acts as appetizer (dīpana), cardio tonic (hr̥dya) and heals disinfected ulcers (śuddha vraṇa), vāta, pitta and fatigue (śrama). It is useful for people having fractures (bhagna), dislocations (viśliṣṭa sandhīnām), wasting (kr̥śa) and decreased semen (alparētasām).	The soups prepared with meat	Proteins, fats	M.D.G. 27/25-27

Sarpa pitta <i>Snake's gall bladder secretions</i>	Pungent (kaṭu), fast acting (tīkṣṇa), hot (uṣṇa)	Improves vision (cakṣuṣya), reduces convulsions (apasmāra), skin diseases (kuṣṭha), infected wounds (duṣṭavraṇa), insanity (unmāda) and worm infestations (kr̥mi).			M.D.G. 1/169
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Discussion and conclusion:

Vrana indicates wounds, ulcers and tissue injury. The process of the Vrana starts with inflammatory response of the body and the causative factors for such inflammatory process are varied. They may be a simple cut to complex open wounds because of injuries (abhigataja vranas) or may be because of some internal injurious agents like free radicals, chemical and physical agents, radiation etc. So the primary aim of the treatment of the Vrana will be to remove the causative factors and reduce the inflammation. Hence anti-oxidant, anti-inflammatory, analgesic and anti-biotic agents are required for the effective management of the Vrana. Analyzing the saptaupakramas as mentioned in the Ayurvedic classics, it has been observed that only shodhana and ropana processes are useful in the management of vrana and the last process i.e., vaikrutapaharana is the process for the treatment of the changes that appear after wound healing. The remaining four karma vimlapana, avasechana, upanaha and patana are the processes involved to reduce the vrana or make the vrana shopha to burst open to form a vrana. This involves the usage of the anti-inflammatory and anti-oxidant drugs. If the vrana burst opens, then pus and discharge will be seen. So for the cleaning of the vrana shodhana dravyas must be used. They must have astringent and styptic properties so that they can remove the pus and discharge and dry the surface of the Vrana. After the Vrana is formed rupture of the skin or mucosa occurs and exposes the deeper tissues of the body making them susceptible for infections. So the shodhana drugs must also contain disinfectant and anti-biotic properties so that they can prevent the growth of the microorganisms. Finally to promote the process of wound healing ropana drugs are used which facilitate the growth of the normal tissue and helps for the wound healing.

From the above observations on the drugs, it is observed that most of the drugs mentioned are having anti-inflammatory and wound healing properties. Especially Tikshna and ushna drugs like Langali, Karavira, Gunja, Sarpa pitta are used having the anti-inflammatory property and drugs like Bhurja, Vandaka etc are found to be useful for their anti-oxidant properties. They produce the paka in the Vrana shopha and thereby reduce the negative effects of the inflammation on the various organs of the body.

Kashaya rasa containing drugs like Haritaki, Jambu, Saurashtri etc are useful for the process of shodhana and ropana (wound healing). The decoction of most of the drugs is used for the cleaning and irrigation of the wound. Haridra, Jambu, Haritaki etc are used internally for their prameha hara property and can also be used externally in the form of decoction for the cleaning and disinfection of the wound.

Drugs like Jyotishmati are useful for their analgesic and anti-inflammatory properties. Wounds cause inflammatory signs like redness, pain, loss of function etc. So to reduce the pain analgesic drugs like Jyotishmati will be useful.

Drugs like Haridra, Koshamra etc are having the antibacterial action apart from the wound healing activity. They will be useful as disinfectants in the process of wound healing.

Ghee, Tila oil, and Siktaka (wax) are used as base for the preparation of the topical dosage forms. Mamsa rasa is mentioned to be used for avasecana karma. Sushruta mentioned to use oil and ghee based preparations to be useful for the shodhana and ropana of the vrana. These lipid based preparations have slower and prolonged absorption through the skin and bypasses the liver and can be conveniently applied to the local area of damage²³.

Conclusion:

From the above literary study it can be concluded that the drugs mentioned to be useful in the text Madhava Dravyaguna have a strong evidences that they are useful for the management of Vrana. This study provides the evidences for the use of the above drugs in various stages of the wound process and help for clinicians for the selection of the drugs.

Abbreviations used:

Ca.Ci :	Caraka Samhita, cikitsa sthana
Su.Ci :	Sushruta Samhita, Cikitsa sthana
M.D.G :	Madhava Dravyaguna
Su. Su :	Sushruta Samhita, Sutra sthana

References:

1. Atridev, Sushruta Samhita of Acarya Sushruta, Motilal Banrnsidas, Delhi, 1997, 381.
2. Atridev, Sushruta Samhita of Acarya Sushruta, Motilal Banrnsidas, Delhi, 1997, 89.
3. Brahmanand Tripathi, Caraka samhita of Acarya Agnivesha, Chaukhambha surabharati prakashan, Varanasi, 1987
4. Jorge I de la Torre, James A Chambers, Wound Healing, Chronic Wounds: [Print] - eMedicine Plastic Surgery,
5. <http://emedicine.medscape.com/article/1298452-print>, dt 5/13/2009.
6. Atridev, Sushruta Samhita of Acarya Sushruta, Motilal Banrnsidas, Delhi, 1997, 72.
7. Atridev, Sushruta Samhita of Acarya Sushruta, Motilal Banrnsidas, Delhi, 1997, 379.
8. Brahmanand Tripathi, Caraka samhita of Acarya Agnivesha, Chaukhambha surabharati prakashan, Varanasi, 1987
9. Sharma PV, Madhava Dravyaguna, Chaukhambha vidyabhavan, Varanasi, 1973, Introduction, 5-18.
10. Ayurvedic Pharmacopoeia Committee, Ayurvedic Pharmacopoeia of India e-book V1.1, IJHM (CCRAS), Hyderabad, 2008.
11. Li K, Diao Y, Zhang H, Wang S, Zhang Z, Yu B, Huang S, Yang H. Tannin extracts from immature fruits of Terminalia chebula Fructus Retz. promote cutaneous wound healing in rats. BMC Complement Altern Med. 2011 Oct 7;11:86.
12. Suguna L, Singh S, Sivakumar P, Sampath P, Chandrakasan G. Influence of Terminalia chebula on dermal wound healing in rats. Phytother Res. 2002, May;16(3):227-31
13. Fayyaz Ahmad, Rafeeq Alam Khan, Shahid Rasheed, Preliminary screening of methanolic extracts of Celastrus paniculatus and Tecomella undulata for analgesic and anti-inflammatory activities, Journal of Ethnopharmacology, 42(3), May 1994, 193–198.

14. M. V. Kumaraswamy and S. Satish, Free radical scavenging activity and lipoxygenase inhibition of *Woodfordia fruticosa* Kurz and *Betula utilis* Wall., African Journal of Biotechnology Vol. 7 (12), 17 June 2008, 2013–2016.
15. Pattanayak SP, Sunita P. Wound healing, anti-microbial and antioxidant potential of *Dendrophthoe falcata* (L.f) Ettingsh. J Ethnopharmacol. 2008 Nov 20;120(2):241-7.
16. Anam EM. Anti-inflammatory activity of compounds isolated from the aerial parts of *Abrus precatorius* (Fabaceae). Phytomedicine. 2001 Jan;8(1):24-7.
17. Patel, G., Nayak, S., Shrivastava, S.. Antiulcer activity of methanolic leaves extract of *Nerium Indicum* Mill.. International Journal of Biomedical Research, North America, 1, oct. 2010. Available at: <<http://www.ssjournals.com/index.php/ijbr/article/view/patel%20et%20al>>. Date accessed: 13 May. 2012.
18. Panchatcharam M, Miriyala S, Gayathri VS, Suguna L. Curcumin improves wound healing by modulating collagen and decreasing reactive oxygen species. Mol Cell Biochem. 2006 Oct;290(1-2):87-96.
19. Muniappan M, Sundararaj T. Antiinflammatory and antiulcer activities of *Bambusa arundinacea*. J Ethnopharmacol. 2003 Oct;88(2-3):161-7.
20. Dinesh kumar, Satish C. Mudgade, Zulfiqar Ali Bhat, Santosh S. Bhujbal and R. Rub, Anti allergic and anti-inflammatory effects of the fruits of *Randia dumetorum* Lamk, Oriental Pharmacy and Experimental Medicine, Volume 11, Number 3 (2011), 161-167.
21. Muruganandan S, Srinivasan K, Chandra S, Tandan SK, Lal J, Raviprakash V. Anti-inflammatory activity of *Syzygium cumini* bark. Fitoterapia. 2001 May;72(4):369-75.
22. P Ghosh, P Chakraborty, A Mandal, M G Rasul, Madhumita Chakraborty, and A Sahal, Triterpenoids from *Schleichera oleosa* of Darjeeling Foothills and Their Antimicrobial Activity, Indian J Pharm Sci. 2011 Mar-Apr; 73(2): 231–233.
23. Shenoy RR, Sudheendra AT, Nayak PG, Paul P, Kutty NG, Rao CM. Normal and delayed wound healing is improved by sesamol, an active constituent of *Sesamum indicum* (L.) in albino rats. J Ethnopharmacol.
24. Tripathi KD, Essentials of Medical Pharmacology, 6th Edition, Jaypee Brothers Medical Publishers Pvt. Ltd. Delhi, 2008,