Survey on Ethnoveterinary Practices around Junagadh, Gujarat, India

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This study was conducted between January to July 2015 in Junagadh and surrounding villages to document the use of medicinal plants for veterinary practices by people living in this area. A total 121 farmers, cowshed owners or livestock owners were contacted personally in the survey with a semi-structured questionnaire. Out of 121, 82 male informants of age 40 to 70 years have responded well and were included in this study. Sixty-seven medicinal plants from 40 different families have been reported to be effective in 13 different animal ailments. A total of 13 medicinal plants were cited 47 times for gastrointestinal problems, which were the highest. Leaves were used prominently (27.59 %) whereas, epicarp was the least used (0.86 %). Large number of medicinal plants reported were from the Fabaceae family (15.38 %). Junagadh area is important due to a large plant biodiversity.

Key words: Ethnopharmacology, veterinary practices, traditional knowledge, Saurashtra, folklore, Gujarat

Ethnoveterinary practices include the use of local medicinal plants to prevent, cure or treat various ailments in animals. It can be considered as traditional knowledge, which is used for the well-being of animals[1]. Ethnoveterinary practices are known in India since the ancient *Vedic* period. Cattle husbandry was well developed during the *Rigvedic* period (1500-1000 BC) and the cow. '*Kamdhenu*' was adored and considered as the best wealth of mankind. Atharvaveda provided interesting information about ailments and herbal medicinal cures for diseases of humans, cows and horses[2]. Medicinal plants like *Arjuna* (*Terminalia arjuna*), *Indrajava* (*Holarrhena antidysenterica*), *Kadamba* (*Anthocephalus cadamba*), Neem (*Azadirachta indica*), *Asana* (*Pterocarpum marsupium*) and *Ashoka* (*Saraca asoca*) were commonly employed by *Vedic* Aryans to cure ailments of animals and men[3]. The oldest ancient treatise on veterinary Ayurveda is *Asvayurvedasiddhanta* (complete Ayurveda of horse). The text entitled *Hastyayurveda* (the Ayurveda of elephant) ascribed to Dhanvantari, the father of Ayurveda[4].

Gujarat state in India is a rich source of flora. As per Gujarat Biodiversity Board, 2198 angiosperm species are found in Gujarat, which is 12.56 % of total species found in India. Junagadh is located near to the Sasan Gir forest, which is the only Lion sanctuary in Asia. The average rainfall in this region is about 400 to 1000 mm. The coldest and warmest months are December and April, May, respectively[5]. Ethnoveterinary knowledge existed in Junagadh region of Gujarat state, due to various communities like *Charan*, *Maldharies*, *Rabaris*, *Kunbies* and *Maher*. These communities are nurturing various animals like cows, buffalos, sheep and goats in this region since long[6].

Traditional knowledge is being forgotten these days due to the advent of latest technologies, hence some researchers are attempting to document this fragile knowledge as written reports[7]. Dependence of poor people on medicinal plant-based treatments may be due to unavailability of hospitals in the nearby area as well as allopathic drugs[8]. Due to easy availability and low cost of medicinal plants, the livestock owners of the remote areas use them as a first aid for their animals[9]. Documentation of traditional ethnoveterinary knowledge is a requirement due to increasing demand for herbal drugs in the veterinary field along with some known side-effects of allopathic products. Recognization of ethnoveterinary practices in this region and their documentation is necessary for creating new herbal-based treatments. Thus, the present study was carried out to gather traditional knowledge from the animal keepers of different age and education status. This documentation may help to create awareness of the importance of veterinary therapy with medicinal plants.

Three *tehsils* of Junagadh, Mendarda and Vanthali of Junagadh district were selected primarily for the study. Four villages from each *tehsil* were randomly selected for this study, which were Plaswa, Bandhala, Majewadi, Bilkha from Junagadh; Barvala, Rajeshar, Araniyala, Aalidhra from Mendarda; and Gadoi, Vadla, Navagam, Nagadiya from Vanthali.

Study participants were selected randomly from each village included in the study area. Selection criteria

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for the participants included, either he should maintain animals at their home or on the farm or they should be engaged in animal keeping activities since 5 y or more. Minimum 10 participants from each village were contacted randomly. All participants were contacted either at their farm or at home. There were no female participants in this study due to the patriarchal nature in these villages hence only male participants were included. Some cowshed owners were also contacted for this survey.

A semi-structured questionnaire was prepared in the local Gujarati language, which contained more than 8 questions that included personal details along with contact numbers (if any), occupation, ailments of animals and medicinal plants used in particular ailments, type of application of plants and part of the plant. The plant species cited by the informant were determined from, flora of Gujarat[10], and other traditional books written in the Gujarati language[11,12].

Plants consumed in the ethnoveterinary practice in the Junagadh and surrounding area were investigated in this study. Total 67 plant species from 40 different families were documented for different purposes in the area (Table 1). Face-to-face interviews were conducted with the participants with a semi-structured questionnaire, which contained basic questions related to the aim of this study. Number of participants were highest in Mendarda (34.15 %) *tehsil* followed by Junagadh (32.93 %) and Vanthali (32.93 %) as shown in fig. 1A. All 82 participants interviewed in various *tehsils* were males in the age range of 40 to 70 y or more (fig. 1B). Participants in the age range of 40 to 50 y demonstrated more ethnoveterinary knowledge as compared to other groups. This shows that the

TABLE 1: MEDICINAL PLANTS USED IN ETHNOVETERINARY PRACTICE IN JUNAGADH REGION OF GUJARAT, INDIA

Scientific name with family	Vernacular name	Medicinal use of different parts of plants
Abrus precatorius L. (Fabaceae)	*Chanothi*	Crushed seed given with jaggery in retention of the placenta
Achyranthes aspera L. (Amaranthaceae)	*Aghedo*	Juice of the seed in light warm water given in gastric disturbance
Adansonia digitata L. (Bombacaceae)	*Gorakh ambli*	A paste of fruits is applied locally to wound and orally for enteritis
Adhatoda vasica Nees. (Acanthaceae)	*Ardusi*	Leaves are used in mild to moderate cough
Aegle marmelos (L.) Corrêa. (Rutaceae)	*Billi*	Crushed fruits given orally for diarrhoea
Allium cepa L. (Liliaceae)	*Dungli*	Fresh bulbs given for retention of the placenta
Aloe barbadensis Mill. (Liliaceae)	*Kuvarpathu*	Fresh leaf gel for burns, itching and wounds
Anacyclus pyrethrum (L.) Lag. (Compositae)	*Akkal karo*	Crushed root decoction given up to 250 ml for retention of the placenta
Anethum sowa Roxb. ex Flem. (Umbelliferae)	*Suva*	Fresh cold decoction of seed given in stomach problems
Annona squamosa L. (Annonaceae)	*Sitaphali*	Fresh leaf paste with sugar applied locally for wound and maggots
Aristolochia bracteolata Lam. (Aristolochiaceae)	*Kidaamari*	Fresh paste applied for the treatment of maggots and parasites on the skin
Asparagus racemosus willd. (Asparagaceae)	*Satavari*	Root is used as a galactagogue in cow and buffalo
Azadirachta indica A. Juss. (Meliaceae)	*Kadvo Limdo*	Fresh cold decoction of leaf and stem bark is applied to itching and skin infections
Bauhinia variegata L. (Caesalpiniaceae)	*Kachnar*	Powdered bark applied externally for wounds
Bryophyllum pinnatum (Lam.) Oken (Crassulaceae)	*Paanfuti*	Leaf paste along with *Aegle marmelos* fruit pulp given for chronic stomach problems and mild urinary tract problems in cattle
Butea monosperma (Lam.) Taub. (Fabaceae)	*Khakharo*	Powder of bark applied to the wound for quick healing.
Calotropis procera (Aiton) Dryand. (Asclepiadaceae)	*Aakado*	Leaf paste or entire fresh leaf applied along with *Cassia auriculata* leaf paste for chronic joint inflammation
Carissa carandas L. (Apocynaceae)	*Karmada*	Juice of the fresh plant used for infected wounds that refuse to heal
Cassia fistula L. (Caesalpiniaceae)	*Garmalo*	Seeds given along with jaggery for stomach problems
Cassia tora L. (Calsalpiniaceae)	*Kuvadiyo*	Fresh paste of seed and root applied locally for ringworm and fungal infection
Centratherum anthelminticum (L.) Gamble (Asteraceae)	*Kalijiri*	Dried seed powder used for maggot wound

Citrus medica L. (Rutaceae)	*Bijoroo*	Fresh decoction of the plant given as a supplement to cattle
Clerodendrum phlomidis L. f. (Verbenaceae)	*Arni*	Fresh paste is applied to worm and other foot diseases
Coccinia grandis (L.) Voigt (Cucurbitaceae)	*Tindora*	Fruit is an antidiabetic
Cocos nucifera L. (Arecaceae)	*Naliyeri*	Cattle exposed to a fog of dry leaves for chronic cough
Cordia dichotoma G. Forst. (Boraginaceae)	*Gunda*	Powder of bark used externally for wound healing. Fresh juice given for intestinal worms
Curcuma amada Roxb. (Zingiberaceae)	*Amba haldar*	Powdered rhizome paste applied for foot joint inflammation, bone fractures. Thick syrupy solution in water given internally to oxen in hyperventilation
Curcuma longa L. (Zingiberaceae)	*Haldar*	Warm paste applied locally for inflammation, antiseptic
Cymbopogon citratus (DC.) Stapf. (Poaceae)	*Lemon Grass*	Given with fodder for anorexia in cattle
Datura metel L. (Solanaceae)	*Dhaturo*	Leaf paste applied in painful injuries of ankle bone
Derris indica (Lamk.) Bennet. (Fabaceae)	*Karanj*	5 to 10 g seed are crushed in water and apply for itching and pruritus
Eclipta alba (L.) Hassk. (Compositae)	*Bhangro*	Leaf paste is applied to wound along with other herbs
Elephantopus scaber L. (Compositae)	*Gojihva*	Commonly used for wound healing in cattle
Enicostemma littorale auct. Non-Bl (Gentianaceae)	*Mamejvo*	Stomach problems and treatment of intestinal worms
Euphorbia nivulia Buch.-Ham. Euphorbiaceae	*Dandaliyo thor*	Fog of dried stems for the treatment of cough. Fresh paste of stem applied locally for inflammation
Ferula foetida (Umbelliferae)	*Hing*	Given in flatulence
Ficus bengalensis L. (Moraceae)	*Vad*	Bark paste applied in fractures along with other herbs
Ficus racemosa L. Syn. *Ficus glomerata* Roxb. (Moraceae)	*Umbaro*	Fruits given with fodder for liquidy dung due to stomach problems. Bark paste externally used for wound healing and minor haemorrhages
Ficus religiosa L. (Moraceae)	*Pipalo*	Juice of leaf and bark given for vaginal prolapse
Glycyrrhiza glabra L. (Fabaceae)	*Jethi Madh*	Root powder given with water for the treatment of cough
Lepidium sativum L. (Curciferace)	*Sheliyo*	Seeds given as a supplement during pregnancy
Leptadenia reticulata (Retz.) Wight & Arn. (Asclepiadaceae)	*Dodi*	Fruit paste applied to various skin problems
Mangifera indica L. (Anacardiaceae)	*Ambo*	Ash of bark given for cough and respiratory problems
Moringa oleifera Lam. (Moringaceae)	*Saragvo*	To increase milk production in cow and buffalo
Murraya koenigii (L.) Spreng. (Rutaceae)	*Mitho limdo*	Leaf given with fodder during diarrhoea and related problems
Ocimum sanctum L. (Labiatae)	*Tulsi*	Used as antiseptic, antibacterial
Pandanus tectorius Soland.ex Parkinson (Pandanaceae)	*Kevado*	Fresh water decoction of leaf is used to all types of wounds
Peltophorum pterocarpum (DC) K. Heyne. (Caesalpiniaceae)	*Pilo gulmohar*	Bark decoction given in diarrhoea. Pods used externally for mild to moderate inflammation
Piper nigrum L. (Piperaceae)	*Kala mari*	Fruit given with fodder for indigestion
Prosopis juliflora (Sw.) DC. (Mimosaceae)	*Gando bawal*	Leaf and fruit paste applied locally for infections in cattle
Psoralea corylifolia L. (Fabaceae)	*Baauchi*	Seed paste applied to itching and other related skin problems
Pueraria tuberosa (Willd.) DC (Fabaceae)	*Fagiya ni ganth*	Chopped tubers given orally to increase milk production. Tuber decoction suggested for urinary problems
Punica granatum L. (Punicaceae)	*Dadam*	Fresh decoction of fruit epicarp is given orally for diarrhoea and bloat
Sapota achras Mill. (Sapotaceae)	*Chikoo*	Unripe fruits given in diarrhoea
Semecarpus anacardium L. (Anacardiaceae)	*Bhilama*	Fruits given to treat retention of the placenta
Solanum melongena L. (Solanaceae)	*Ringna*	Fruits given with fodder for retention of the placenta
Solanum xanthocarpum Schrad. & H. Wendl. (Solanaceae)	*Bhoi ringni*	Fruit is used in treatment of a cough and respiratory diseases
Syzygium cuminii Merr. (Myrtaceae)	*Kala Jambu*	Fruit and leaves are antidiabetic. Leaf paste applied as antibacterial on wound

Tagetes erecta L. (Compositae)	*Galgota*	Fresh paste of flower petals applied to the wound
Tamarindus indica L. (Caesalpiniaceae)	*Ambali*	Treatment of stomach pain due to ingestion of castor seed
Tecomella undulata (Sm.) Seem. (Bignoniaceae)	*Ragat rohido*	Dilute decoction to wash infected eyes. Bark paste applied along with other herbs for bone fracture. orally given to treat intestinal worms
Terminalia arjuna (Roxb. ex DC.) Wight & Arn. (Combretaceae)	*Arjun*	Bark juice is given to hyperventilated oxen in the field
Thespesia populnea (L.) Soland. ex Correa (Malvaceae)	*Paras piplo*	Bark paste applied for skin diseases and itchy skin
Trachyspermum ammi (L.) Sprague (Umbelliferae)	*Ajmo*	Leaf juice given in common stomach problems
Tridax procumbens (L.) L.	*Gha buri*	Fresh juice applied to wounds
Vitex negundo L. (Verbenaceae)	*Nagod*	Leaf paste applied externally for mild to moderate inflammation
Zingiber officinale Roscoe (Zingiberaceae)	*Aadu*	Crushed rhizomes along with jaggery given to cattle in bloat and indigestion

*All botanical names of medicinal plants verified on www.plantlist.org

knowledge of ethnoveterinary practice is in the hands of middle aged people, which might have been inherited. Participants who had education, from 5 to 9 standards were found to possess good ethnoveterinary knowledge in all three *tehsils*. The highest number of participants with education up to 10th standard and above were found in the Mendarda *tehsil* (fig. 1C). Even with a low level of primary or secondary school education, participants demonstrated good traditional knowledge, which suggested ethnoveterinary information is being inherited.

GIT problems, wound healing, skin-related disorders, respiratory problems and inflammatory conditions were listed more compared to other diseases. Out of the 67 medicinal plants, 22.03 and 13.56 % were used for treating bloating, diarrhoea and wound healing action, whereas about 10.17 % plants were used for skin problems, respiratory problems and inflammation-related problems (fig. 2A). Apart from these, for treating retention of the placenta, parasitic infections, bone fracture, milk let down problem, vaginal and urinary tract problems, a number of plants alone and/or in combinations were commonly used. Leaves (27.59 %) and fruits (18.97 %) were used predominantly, while epicarp, exudate and rhizomes were used sparingly (4.31 %; fig. 2B).

Some farmers have reported the use of fresh juice of *Tridax procumbent* in large ruminant injuries. This plant was reported to exhibit antiseptic and antihemorrhagic activity[13,14]. These activities of this plant might be due to the presence of steroids and triterpenes[15]. Another report from one of the farmers indicated use of fresh decoction of *Prosopis juliflora* leaves when an animal suffered from infectious diseases. Phytochemical

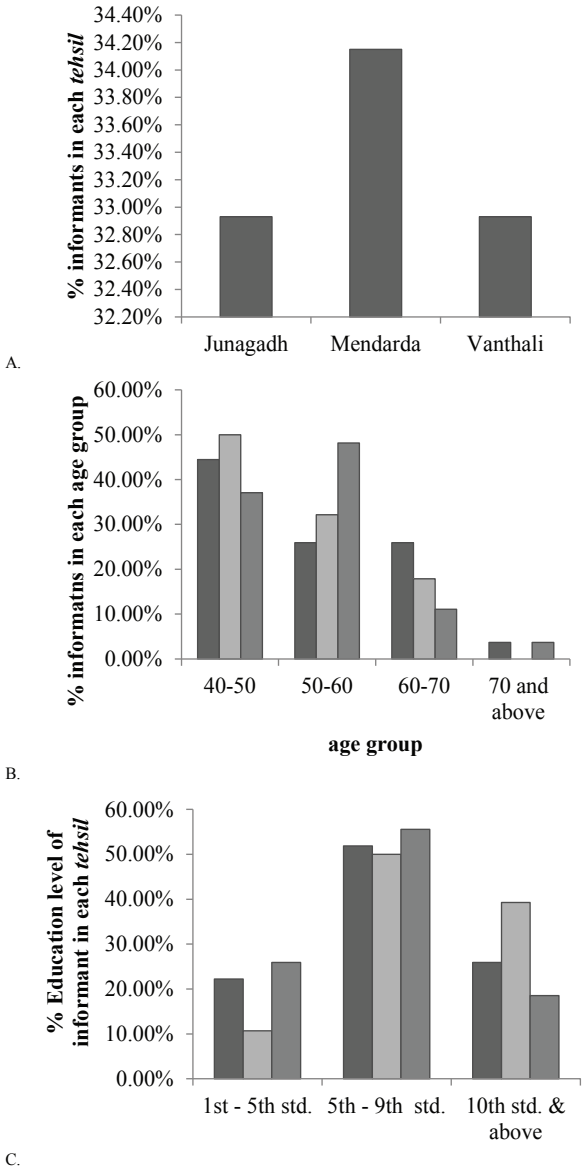

Fig. 1: Statistical details of the participants
(A) Percent participants in each district (B) percent distribution of participants age-wise (C) education level of participants in the study area. ■ Junagadh, ■ Mendarda, ■ Vanthali

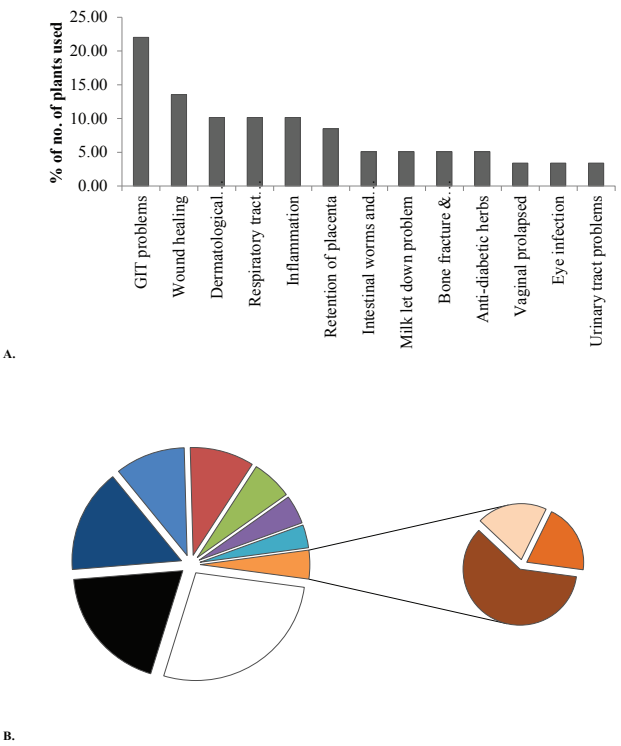

Fig. 2: Distribution of ailments and plant parts used as treatments

(A) Percent use of medicinal plants in various ailments and (B) percent use of vegetative parts of medicinal plants in the study area. □ Leaf, ■ fruit, ■ bark, ■ seed, ■ root, ■ stem, ■ whole plant, ■ flowers, ■ others (■ rhizomes, ■ epicarp, ■ exudate)

analysis of *P. juliflora* revealed the presence of four piperidine alkaloids with good antibacterial and antifungal activities[16-18].

One of the widely distributed plants from this region is *Achyranthes aspera*, which has been used by livestock owners and farmers for gastric disturbance (bloat) in animals. This plant is also monographed in Ayurvedic Pharmacopoeia of India. Various pharmacological actions like wound healing[19], spermicidal activity[20] and hepatoprotective activity[21] were reported. Veterinary use of this plant however was not reported.

Butea monosperma is one of the important medicinal plants found throughout India except in arid regions. Ayurvedic Pharmacopoeia of India described the use of stem bark of this plant in chronic diseases like abdominal tumour and other intestinal conditions. But it was surprising to note the use of the plant for instant wound healing purpose, in which stem bark powder was applied to the fresh injury of animals. Though the mechanism of action is still unknown the presence of palastrin, isobutein, and other flavonoids, as well, tannins might help in wound healing through antioxidant and astringent mechanisms[22].

Use of various parts of *Azadirachta indica* leaves, stem bark in itching and other skin-related diseases have been documented. Triterpenes like nimbin, azadirachtin, limonoid presnet in neem could be responsible for this therapeutic activity[23].

Ricinus communis is one of the important agricultural crops in this area. Participants reported that when animals swallow the seeds of *R. communis* accidentally, a very painful condition resulted. To treat this condition *Tamarindus indica* was given alone or mixed with palatable food has been reported. *T. indica* is traditionally used as a laxative. Presence of tartaric acid, malic acid, and citric acid, xylose, epicatechin, and phenolics have been reported in this plant[24].

Another interesting finding was the use of *Pueraria tuberosa* tuber as the galactagogue in milch animals. Tubers of this plant are being used in human[15] but the veterinary use of this plant has not been studied. Some participants cited this Ayurvedic treatment, which was generally practised for the human. Under that, use of *Solanum xanthocarpum* for respiratory diseases, *Terminalia arjuna* in hyperventilated oxen, *Psoralea corylifolia* for the skin and related ailments were also informed[25]. All the claims cited were by participants with primary to secondary level education. This shows that Ayurveda system of medicine constituted traditional knowledge that passed from generation to generation since long.

After the thorough survey by interviews with livestock keepers, farmers and traditional healers, it was realized that important ethnoveterinary knowledge is possessed by rural people. This valuable information needs to be validated with *in vitro* and *in vivo* studies. Proper utilisation of this information might help in developing alternate therapy of ailments.

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Conflicts of interest:

The authors declare that there is no conflict of interests in this paper.

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REFERENCES

1. Khattak NS, Nouroz F, Inayat Ur Rahman, Noreen S. Ethnoveterinary uses of medicinal plants of district Karak, Pakistan. J Ethnopharmacol 2015; 171:273-9.
2. Bhandari PR, Mukerji B. Role of indigenous drugs in veterinary medicine in India. Indian Vet J 1958;1:55.
3. History of Veterinary Medicine in India [cited 2016 Dec 01]. Available from: http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=151206.
4. Mazars G. Traditional veterinary medicine in India. Rev Sci Tech 1994;13(2):443-51.
5. gsbb.in/index.php [internet]. Gujarat (India). Gujarat Biodiversity Board 2016 [cited 2016 Dec 02]. Available from: http://www.gsbb.in/gujarat-biodiversity.php.
6. Jadeja BA, Odedra NK, Solanki KM, Baraiya NM. Indigenous animal healthcare practice in district Porbandar, Gujarat. Indian J Tradit Know 2006;5:253-8.
7. World Health Organization. International Union on Conservation of Nature, and World Wide Fund for Nature. Guidelines on the conservation of medicinal plants. Available from: http://apps.who.int/medicinedocs/documents/s7150e/s7150e.pdf.
8. Ritter AR, Ritter RA, Monteiro MV, Monteiro FO, RodriguesST, Soares ML, *et al*. Ethnoveterinary knowledge andpractices at Colares Island, Pará state, eastern Amazon, Brazil. J Ethnopharmacol 2012;144:346-52.
9. Piluzza G, Virdis S, Serralutzu F, Bullitta S. Uses of plants,animal and mineral substances in Mediterranean ethnoveterinary practices for the care of small ruminants. J Ethnopharmacol 2015;168:87-99.
10. Shah GL. Flora of Gujarat state, Vallabh Vidhyanagar: Sardar Patel University; 1978.
11. Pade SD, Vyas HB. Aryabhishak athva Hindustanno vaidraj. 19th ed. Bombay: Sastun Sahitya; 1996.
12. Indraji J. Kutchh Svasthanni Vanaspatio. Ahmedabad: Pravin Prakashan; 1998.
13. Pathak AK, Dixit VK. Insecticidal and insect repellent activity of essential oils of *T. procumbens* and *Cyathocline lyrata*. Fitoterapia 1988;58(3):211-4.
14. Saxena RC, Dixit OP, Sukumaran P. Laboratory assessment of indigenous plant extracts for anti-juvenile hormone activity in *Culex quinquefasciatus*. Indian J Med Res 1992;95:204-16.
15. Khare CP. Indian Medicinal Plants; an illustrated dictionary. Germany: Springer; 2006.
16. Dos Santos ET, Pereira ML, da Silva CF, Souza-Neta LC, Geris R, Martins D, *et al*. Antibacterial Activity of the Alkaloid-Enriched Extract from *Prosopis juliflora* Pods and its Influence on *in vitro* Ruminal Digestion. Int J Mol Sci 2012;14:8496-516.
17. Patel HB, Patel UD, Modi CM, Javia BB, Bhatt PR, Pandya KB. *In vitro* Antimicrobial Effect of *Adhatoda vasica*, *Annona squamosa*, *Aloe vera*, *Butea monosperma* and *Prosopis juliflora*. World J Pharm Res 2015;4:1168-77.
18. Ahmed VU, Sultana A, Qazi S. Alkaloids from the leaves of *Prosopis juliflora*. J Nat Prod 1989;52:497-501.
19. Edwin S, Jarald EE, Deba L, Jaina A, Kingera H, Dutta KR, *et al*. Wound Healing and Antioxidant Activity of *Achyranthes aspera*. Pharm Biol 2008;46:824-8.
20. Vasudeva N, Sharma SK. Post-coital antifertility activity of *Achyranthes aspera* Linn. root. J Ethnopharmacol 2006;107:179-81.
21. Bafna AR, Mishra SH. Effect of methanol extract of *Achyranthes aspera* Linn. on rifampicin-induced hepatotoxicity in rats. ARS Pharm 2004;45:343-51.
22. Jafri M, Mehta BK. Evaluation of chemical constituents of *Butea monosperma* (Bark). Int J Pharm Sci Res 2014;5:4548-51.
23. Kumar A, Pareek PK, Kadam VV, Shakyawar DB. Anti-moth activity of Neem (*Azadirachta indica* A, Juss.) on woollen fabric. Indian J Trad Knowl 2016;15:272-7.
24. Bhadoriya SS, Ganeshpurkar A, Narwaria J, Rai G, Jain AP. *Tamarindus indica*: Extent of explored potential. Pharmacogn Rev 2011;5:73-81.
25. Pharmacopoeia Commission for Indian Medicine and Homeopathy. 1st ed. Ghaziabad: Ayurvedic Pharmacopoeia of India; 2016.