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Practice of traditional herbal medicine in animal husbandry of rural India

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Abstract

Traditional knowledge of herbal medicines has a rich heritage in Indian culture which stands as a unique wisdom to common society, scientists and planners that are involved in development projects. In India, farmer practices much indigenous technical knowledge in different field of livestock management to improve digestibility, milk production and wound treatment. Various extracts from plants are prepared as herbal medicine, have been used since decades for disease management such as general debilitation, indigestion and lack of appetite which are yet be further analyzed scientifically in livestock sector. 41% leaves and 21 % seeds followed by 10% fruits from plant parts are used for the treatment of veterinary ailments. Today, practices of many traditional herbal medicines are disappearing only because of the intrusion of foreign technologies or development of new concepts towards modern veterinary drugs. Traditional knowledge is always acceptable in rural communities as it incur low expense preparation, local availability and easy administration which are sustainable to social and cultural habitats. Therefore, the collection of knowledge is of great significance to sustain the productivity, protecting the ecosystem and help to develop alternatives to ecologically damaging the animal husbandry practices.

1. Introduction

India is a country of rich heritage practices of indigenous health control and treatment systems that have been used for animals since long generations. Indigenous technical knowledge (ITK), referred to as traditional knowledge/wisdom. It is evolved by members of the farm community and passed on from, generation to generation, or developed on the basis of recent experiment by farmers. ITK is unique to a given culture and society, but it has value also for the scientists and planners that are involved in development projects.

The knowledge of indigenous practices drains from one down to the next generation by as comprehensive approach for livestock management approach for poor farmers. At present, the ITKs and its systems are at great risk due to rapid environmental change and pacing of social, economic, political and cultural changes on a global scale. The word 'indigenous' depicts "native born, which means natural origin or produce in a country or in any specified area" and the word 'knowledge' means "assured belief, practical skill, that which is known, learning and enlightenment" (Reijntjes *et al.*, 1992).

In India, the ITK's are basically more popularize among the local people including farmers, rural artisans, landless labours, rural women, animal husbandry practitioners, *etc.*, which earn their livelihood through their own capacity of having little systematic knowledge as well as knowing the mechanism of how indigenous practices work for various ailments of animal husbandry. The indigenous technical knowledge system also helps the practitioners to cope with problematic situations through surviving in tremendous odds. Today, such practices are diminishing rapidly with the deceased farmer, bearing scientific and traditional knowledge because such people who serve the community are afraid to tell others about the usefulness of the herbal drugs looking to their gradual exploitation. Hence, it is necessary to identify the perceived effectiveness of such indigenous practices for their further scientific validation in various national and international research organizations (Singh and Chauhan, 2010). It is extremely difficult to acquire indigenous knowledge which is regarded as secrete or confidential. Moreover, since indigenous knowledge is not documented but stored in peoples' minds, it bears a high risk of losing it. Maundu (1995) stated that indigenous knowledge is diminishing at an alarming rate with the ageing of those in the indigenous population with strong links to the past. Majority of Indians depend on agricultural system which further can enhance the quality of their life with the practice of rich Indian tradition of ITK (Berkes and Folke, 1994).

Innovation is the first attempt to carry out an invention in practice. Fagerberg (2006) said that the knowledge which inherently possess by the indigenous communities is used for purposes of ranging from natural resource management, agriculture, medicine to other socioeconomic developments, and thus it instigates the process of innovation. The innovative minds of local farmers disseminate the traditional knowledge for a society which facilitates them to further communicate and decision-making in that geographical area for

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efficacy of the herbal medicines (Shubeena *et al*., 2018). The rural people possess much traditional and deeper knowledge of their surroundings and adopt them based on needs to solve local problems in managing agricultural and related activities (Nabukenya *et al*., 2014). It has been observed that the traditional knowledge of herbs among villagers help them to diagnose the particular disorder and disease in agricultural crops, vegetables, as well as in livestock and its management are practiced usually through their own capabilities as proved and disseminated by their ancestors (Ranjanna *et al*., 2013). This technique is based on the assumption criteria, reliable evidences, economic viability, farming community consent, traditional sound knowledge, and positive result of farmers after being used once. Villagers in hilly areas are more thoughtful to adopt and practice ITK's as they are distant away from developments (Santosh and Chhetry, 2012). They easily follow the traditional knowledge that they have learnt from their older generations (Singh and Tyagi, 2014).

2. Plants used in different field of livestock management

2.1 Herbs to increase digestibility and milk production

Glyricidia (*G. maculata*) and roasted soaked tamarind seeds is considered to increase lactation in cows (Ponnusamy *et al*., 2009). Also, to improve lactation in animals, 4 kg each of soaked cottonseed, bengal gram and horse gram are soaked, ground can be fed. It has also been reported the seeds of subabul (*Leucaena leucocephala*) which also fed to animals to improve the milk secretion. Bottle gourd (*Lagenaria siceraria*) with fenugreek (*Trigonella foenum-graceum*), coconut, black gram (*Vigna mungo*) and palm jiggery mixed with water is given for 3 days to improve the milk yield. Dried flowers of *Madhuca latifolia* (Illupsi) are given to improve the working efficiency of the bullock. *Prospisjulifera* fruits with jiggery and rice flour are given to improve digestibility. Asafoetida (*Ferula asafetida*) ground with gur is given to animals as ball to improve digestibility. Pepper, jaggery and betel leaf (*Piper betle*) powder is given to animals to increase digestibility.

In Kashmir, grinded mazamund (*Iris kashmiriana*) and jiggery are used in bolus form and given to animals to increase the milk productivity and also to overcome general debility body condition (Shubeena *et al*., 2018). Among many plants, soyabean, cowpea and wheat are considered to be commonly used by farmers for milk production purpose and to enhance the body condition after parturition.

2.2 Herbs to enhance general health management

There is a common belief in farmers of Bihar that buring of tortoise shell near animal shed protects animals from foot and mouth disease (Mishra *et al*., 2011). Farmers believe that cows with triangular shape, small legs, broad hind part, narrow fore part, and soft and shiny skin are considered as high milk producing cow (Chander *et al*., 2011).

For general debilitation, indigestion and lack of appetite, extracts of omum (*Trachyspermum ammi*), black cumin (*Nigella sativa*), pepper (*Piper nigrum*), gingelly (*Sesamum indicum*) and cardamom (*Elettaria cardamomum*) are given to cure digestibility problems. To activate the enzymatic activity and to induce the appetite, usually betel leaf and pepper ground are mixed with coconut oil fed to animals. Also, *Agave sisalna* is peeled and kept in the roof during night and given to animals in the morning. Thorn apple (*Datura stramonium*) seeds (3 gm), areca nut (20 gm) and white clay (500 gm) mixed with rice gruel is given twice a day to treat diarrhea (Ponnusamy *et al*., 2009). It has also been found that the neem (Margosa tree, *Azadirachta indica*) leaves and bark of daka and bark of *Daniaa* are mixed and sap is extracted from the mixture and then 100 ml of it is drenched everyday to increase digestibility for 3-4 days (De *et al*., 2004). Drenching about 1 kg fruit pulp extract of *Aegle marmelos* and mango seed kernal for 2-3 days are also found helpful to treat diarrhea (Balakrishnan *et al*., 2009).

To prevent intestinal worms, powder of subabul seeds mixed with water is given to goats. Leaves, flowers and bark of neem along with 100 gm of cucumber (*Cucumis sativus*) seeds are given for 3 days. It has been found that to treat milk fever leaves of indigo (*Indigo feratinctoria*) made as tablets are given to animals. Similarly, to reduce cold and cough, it is believed that equal amount of holy basil (*Tulsi* leaves, *Ocimum sanctum*) and basak leaves (*Adhatoda vasica*) boiled with water can be fed to the animals especially in winter season. Then extracted juice is mixed with 1-teaspoon honey and fed to the animal (De *et al*., 2004).

To cure the wounds, juice of sacred basil mixed with camphor is applied on the wounds. Leaf juice of thumbai (*Leucus lavandulae-folia*) is applied on the wounds (Ponnysamy *et al*., 2009). haldi (Turmeric, *Curcuma domestica*) has lots of antimicrobial and herbal property which is grounded in powder form and can be applied topically in wound to prevent entry of microorganisms and also prevent the formation of maggots. Extract of ganda (African marigold, *Targetes erecta*) leaves is applied topically. Jiyeti plant (*Sesbania sesban*) is known for its traditional medicinal property and can be used by burning for making the ash of jiyeti is mixed with coconut oil and applied topically to reduce the inflammatory reaction. Often, the inflammatory condition get worsen up, if the wound infested with worms and turned out be maggoted wound. In this condition, the seeds of ata (Custard apple, *Annona squamosa*) can be useful in powdered form for topical application for the treatment of worm-infested wound (De *et al*., 2004).

Farmers commonly use paste made from famously known healing tree of bael (*Aegle marmelos)* leaves use for 4-5 days to reduce shoulder pain of working ox as the plant has anti-inflammatory property (Mishra *et al*., 2011). For poisonous bites, juice of sacred basil and *Acalypha indica* is poured in the nostrils. Paste of *Aristolochia gigas* (pelican flower) mixed with equal quantity of butter is given to the animal (Ponnysamy *et al*., 2009). The paste made from the roots of bonson tree mixed with 21 pieces, golmorich (Black pepper, *Piper nigrum*) fed to animals for treating all the dog bites injury. Jaggery, garlic and ginger paste is given to the animals and is found beneficial to prevent bloat (De *et al*. 2004). Tympany can be treated by drenching linseed oil along with a mixture of ginger, turmeric and asafetida by keeping the animal's mouth open via tying a piece of wood into it (Balakrishnan *et al*.,2009). Applying turmeric on udder is found as herbal treatment of mastitis.

The common farmers of Bihar used to chant mantra to prevent animals from Khurha (FMD) by applying red ink drop on tender bamboo leaves especially on Saturday and believed mantra is "*Aage*

Arjun Pichhe Bhim, Khurha Mare Champaseen! *Chhoote Laar Na Phate Khari Duhai Shrikrishna Chandra k"*. Howevere, a mixed dose of 200 g of ginger (*Zingiber officinale*), turmeric (*Curcuma longa*) and garlic (*Allium sativum*) each in month of May, keeps foot and mouth disease away (Mishra *et al.*, 2011). Allowing animals to walk in hot sand and applying sand to wounds externally; applying linseed oil and turmeric externally; applying kerosene, if the wounds are infested with maggots (Balakrishnan *et al.*, 2009).

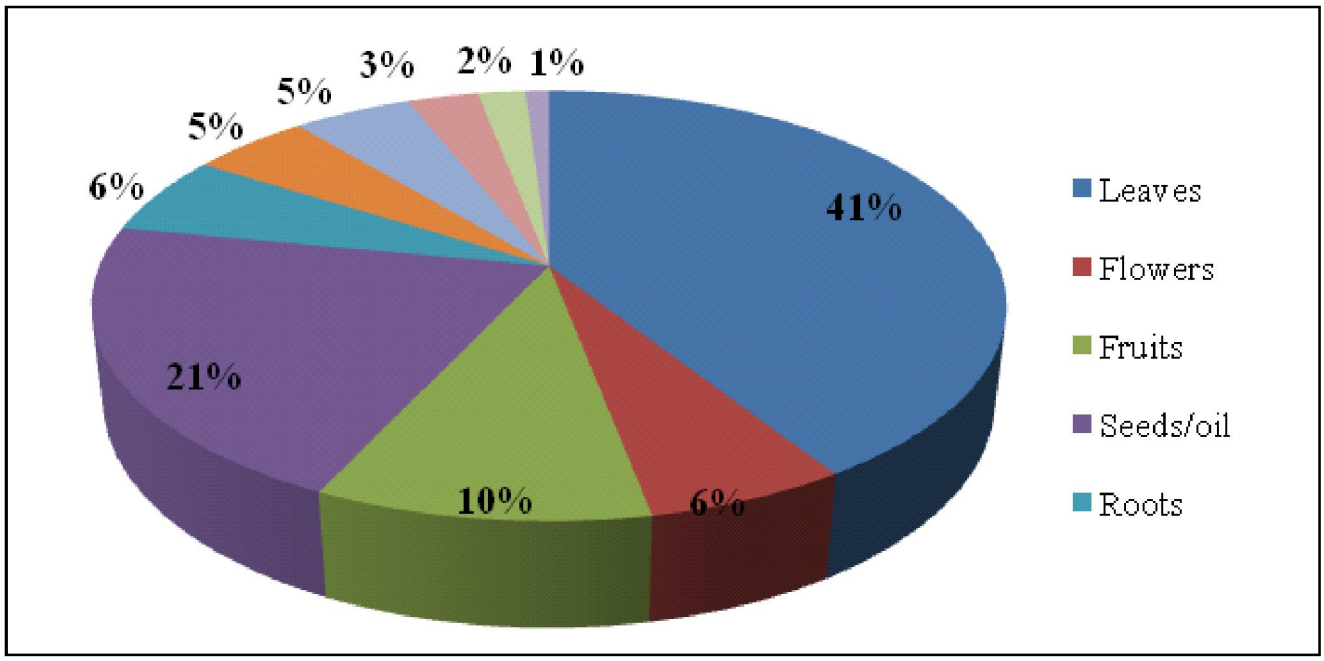
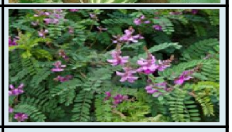


Figure 1: Percentage of plant parts used for the treatment of veterinary ailments.
(Sehgal, A.B. and Sood, S.K., 2013)

Table 1: List of the plants, usage and their active ingredients

Sr. No.	Common name	Scientific name	Active ingredients	Usage	References	Pictures
1.	Ajwain	*Trachyspermum ammi*	Thymol and carvacrol	Antiseptic, antitussive and expectorant properties	Trease and Evans, 2002	
2.	Black cumin	*Nigella sativa*	Thymoquinone (TQ)	Production of cytokine interferon-gamma against infection	Salem *et al.*, 2011	
3.	Pepper	*Piper nigrum*	Piperine	Natural bioenhancer potentiate the therapeutic effect	Corinna *et* al., 2012	
4.	Sesame (Gingelly)	*Sesamum indicum*	Lignan, phenolic acid, flavonoids, saponin and alkaloids	Potential source of micro-nutrients	Hassan and Umar, 2004	
5.	Cardamom	*Elettaria cardamomum*	1,8-cineole	Potent expectorant and antiseptic	Sengupta and Bhattacharjee, 2009	

6.	Sisal hemp	*Agave sisalna*	Sterols, steroidal sapogenins and steroidal alkaloids	Antheminitic and immun-omodulatory activity	Tewari *et al.*, 2014	
7.	Thorn apple seeds	Datura *stramonium*	Hyoscyamine and scopolamine	Antiasthmatic, anticholinergic and antimicrobial activity	Li *et al.*, 2012	
8.	Areca nut	*Areca catechu*	Arecoline, arecaidine, guvacine, and guvacoline	Antibacterial, antiviral and antitumor and anthelmintic action	Xiao *et al.*, 2019	
9.	Neem	*Azadirachta indica*	Azadirachtin	Antioxidant and anticancerous activity	Alzohairy, 2016	
10	Stone apple	*Aegle marmelos*	Aeglemarmelosine	Antidiarrheal and antidysentery property	Laphookhieo *et al.*, 2011	
11.	Cucumber	*Cucumis sativus*	α-linolenic acid, Caffeic acid, Citrulline and Cucurbitin B	Antioxidant and analgesic effect	Shah *et al.*, 2013	
12.	Indigo	*Indigofera tinctoria*	Galactomannan	Antihyper-glycemic and antibacterial activity	Motamarri *et al.*, 2012	
13.	Tulsi	*Ocimum sanctum*	Oleanolic acid, Ursolic acid and Rosmarinic acid	Inflammation and wound healing	Panchal and Parvez, 2019	
14.	Basaka	*Adhatoda vasica*	Pyrroloquinazoline alkaloids	Expectorant, abortifacient, antimicrobial, antitussive and anticancer	Soni *et al.*, 2008	
15.	Thumbai	*Leucus lavandulaefolia*	Acacetin, chrysoeriol, linifoliside, triterpenoids and steroids	Laxative, anthelmintic, antijaundice property	Begum *et al.*,2015	
16.	Turmeric	*Curcuma domestica*	Nonvolatile cur-cuminoids and the volatile oil	Anti-inflamma-tory, anticancerous, hypocholes-terolemic, anti-proliferative, and many other properties	Dosoky and Setzer, 2018	
17.	African marigold	*Tagetes erecta*	Syringic acid, quercetin and 6-hydroxykaemp-ferol	Central nervous system stimul-ant, antioxidant, antidepressant, and antipyretic in nature	Vedam *et al.*, 2019	

18.	Egyptian pea	*Sesbania sesban*	Anthocyanin	Antimicrobial, molluscicide, anti-inflammatory, CNS-stimulant and nephroprotective properties	Walekhwa *et al.*, 2020	
19.	Custard apple	*Annona squamosa*	Squamocin	Cytotoxic, antimicrobial, antioxidant, antitumor and insecticidal properties	Mondal *et al.*, 2018	
20.	Indian copperleaf	*Acalypha indica*	Ellagic acid, gallic acid and kauren-18-oic-acid	Antibacterial, anticancer, antidiabetic, antioxidant,	Chekuri *et al.*, 2020	
21.	Pelican flower	*Aristolochia gigas*	Aristolochic acids	Insecticidal and repellent activities	Kuo *et al.*, 2012	
22.	Garlic	*Allium sativum*	Ajoenes, thiosulfinates and vinyldithiins	Antibacterial, antifungal, antiprotozoal, antiviral, antioxidant and anti-inflammatory properties	Batiha *et al.*, 2020	
23.	Ginger	*Zingiber officinale*	Gingerols, shogaols, and paradols.	Antioxidant and anti-inflammatory activity	Mao *et al.*, 2019	
24.	Eucalyptus	*Glyricidia maculate*	Monoterpenes and sesquiterpenes	Antimicrobial and antioxidant property	Almas *et al.*, 2021	
25.	Subabul	*Leucaena leucocephala*	Caffeic acid, Isorhamnetin and Chrysoeriol	Antioxidant and cytotoxic activity	Hassan *et al.*, 2013	
26.	Fenugreek	*Trigonella foenum-graceum*	Alkaloids, carbohydrates, steroidal saponins, amino acids and minerals	Elevates pro-inflammatory cytokines and a potent anticancer activity	Syed *et al.*, 2020	
27.	Asafoetida	*Ferula asafetida*	Ferulic acid and asaresinotannols	Antispasmodic, analgesic, diuretic and vermifugal action	Mahendra and Bisht, 2012	
28.	Mazamund	*Iris kashmiriana*	Flavonoid, phenol and gallic acid	Potent antibacterial properties	Shubeena *et al.*, 2018	
29.	Illupsi	*Madhuca latifolia*	Quercetin, taxifoline and t glucosides	Skin diseases, rheumatism and headaches	Khana *et al.*, 2011	
30.	Bottle gourd	*Lagenaria siceraria*	Triterpene bryonolic acid	Antiallergic properties	Shah *et al.*, 2010	

3. Ethnoveterinary preparations

The folk health practices largely remain undocumented and are passed on from one generation to the other by word. The efforts are aim to encourage the use of ethnoveterinary knowledge throughout the world, so as to document more traditional knowledge and information in the field reports and scientific publications. The most common forms of ethnoveterinary preparations are powders, poultice, ointment, decoction, infusion, coldware extract, tincture and fumigation (Sri Balaji and Chakravarthi, 2010).

4. Problems/disadvantages

Each technology or concept has limitations, and ITK is no exception, *e.g.*, the scope for improvements based on ITK are limited to what can be done with local techniques, materials and genetic resources. Many new developmental techniques including information related to genes, techniques, materials, *etc*. may, be unknown and cannot be possible sometimes to explore with the informal system.

The informal system does not have required upgraded perspective and information to anticipate the valid opportunities and constraints that arise from the changing environments. Also, the indigenous and traditional materials which include herbs and methods of using it vary from one region to another, as the traditional use of indigenous knowledge is unique to a particular culture (Rao *et al*., 1995).

5. Advantages

The poor farmers perceive the traditional knowledge as more favourably accepted among all the rural communities due to its cost effectiveness, local availability in village flora and fauna, easy in preparation and administration, compatible to social and cultural habitats which make its overall sustainability. The available ITK are based on the trials performed by their ancestors since generations and found effective in rural settings where veterinary facilities are not available in emergency case (Singh, and Chauhan, 2010). Indigenous knowledge is often the most suitable, economic and economically friendly and has no adverse effect (Rahman, 2012).

These Indigenous Practices may be recommended and disseminated among the farmers where MVD (Modern Veterinary Drug) is not easily accessible. Further, the practices can also be blended with MVD through laboratory research, tests and scientific rationality (De *et al*., 2004).

6. Risk assessment of traditional knowledge

Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environment, fast pacing economic, political cultural changes on a global scale and practices vanish and diminishing as they become inappropriate and inefficient for new challenges due to which they adapt too slowly.

However, many practices have been disappeared only because of the intrusion and use of foreign and modern technologies with the upgraded development concepts which promise the gains and solutions of many problems within the short period of time without being capable of sustaining them. This over estimation of modern practices does not last long because of the side effects that triggered by the increased use of chemicals in various areas of life. This lead to a reconsideration of traditional systems of treatments, and thus a increased demand of natural products in form of drugs, foods, cosmetics, *etc*., has been noticed in recent years. These skills are transmitted to younger girls and, in some cases, boys, through socialization and apprenticeship (Mukherjee, 2002; Bodeker *et al*., 2005; Bandaranayake, 2006).

6.1 Risk management

The importance of documenting ancient/indigenous/traditional knowledge has recently gained a momentum allover the world including India. In India, several non-government organizations:

(a) BAIF, Pune;

(b) JagaranVikas Kendra, Udaipur;

(c) ANTHRA, Pune;

(d) SALIHOTRA, M.P.;

(e) Appropriate Technology of India, Ahemdabad;

(f) Women's Organization for Rural Development (WORD), Ahemdabad and

(g) Grassroots Innovation Augmentation Network (GIAN), Gujarat is reported to be involved in documentation and validation of indigenous technical knowledge system.

7. Conclusion

Today, practices of many traditional herbal medicines are disappearing only because of the introduction of many modern technologies and development of new concepts towards modern veterinary drugs, which leads to diminishing the usage of traditional knowledge among farmers community. The advantages of these wisdoms which passed from generation to generation has helped the farmers in many different ways such as cost effectiveness, ready availability in flora and fauna, easy administration mode, *etc*. Therefore, this collection of knowledge is of great significance to sustain the productivity, protecting the ecosystem and help to develop alternatives to ecologically damaging the animal husbandry practices which will lead to sustainability in the long run. If, ITKs were used in farming systems along with frontier technologies developed by the agricultural scientists, it would be more practical and not only the farmers would adopt quickly but also increase the beneficiary, practicability and acceptability of technology for betterment of mankind. Government and non-government organizations must work in relation to preservation of indigenous species of plants and development of herbal medicines.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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