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DOCUMENTATION OF ETHNOVETERINARY PRACTICES IN DISTRICT JHANG, PAKISTAN

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ABSTRACT

The study was conducted to document the plants used in the traditional veterinary practices in Jhang district of Pakistan. Rapid and participatory rural appraisal techniques were used for collection of information i.e. the interviews and focused group discussions were carried with 253 traditional veterinary healers for a period of one year. From the study area, 46 plant species representing 31 families were documented for the treatment of different infectious and non-infectious ailments. The most frequently reported (≥ 22% respondents) plants included: *Trachyspermum ammi* (L.) Sprague, *Capsicum annuum* Linn, *Vernonia anthelmintica* L., *Foeniculum vulgare* Mill, and *Allium cepa* Linn. Of 46 plants, 33 were indigenous. Materials other than plants are also used as adjunctive therapy for different ailments. A wide variation in the dose, vehicle, part of plant, mode of preparation and administration/application was observed. The efficacy claims and indications for different plants were quite conflicting. The traditional veterinary healers in the study area used diverse plant species in the veterinary practices with varying claims about their efficacies. Controlled studies for the validation of the plant usage are underway in the Department of Parasitology, University of Agriculture, Faisalabad, Pakistan.

Key words: Ethno-veterinary; Phytotherapy; Medicinal plants; Documentation; Jhang; Pakistan.

INTRODUCTION

Ethnoveterinary medicine (EVM) is the conventional system of curing animal diseases which based on traditional skills, methods, practices, knowledge and beliefs (Mathias-Mundy and McCorkle, 1989). This indigenous knowledge is passed on orally from one generation to the next and differs greatly from region to region and even within regions (McCorkle *et al*., 1996; Ole-Miaron, 1997). There is a need to document EVM in different areas as this knowledge is becoming extinct due to prompt changes in socio-economical values, environmental conditions and technology.

Pakistan is having a rich source of medicinal plants due to its diverse agro-geoclimatic conditions. Most of these plants are being used by local healers for therapeutic purposes (Iqbal *et al*., 2004, 2006; Hussain *et al*., 2008; Sindhu *et al*., 2012; Goraya *et al*., 2013; Panda and Dhal, 2014) without specific knowledge of their active ingredients. At present, traditional knowledge on medicinal plants is diminishing due to loss of octogenarians or the old age men who were the most experienced curators of EVM knowledge and die without documenting their knowledge of medicinal plants (Cox, 2000).

Over the past decade, an initiative has been taken to document the endangered EVM practices in different areas of Pakistan as it is disappearing because of multiple factors e.g. rapid socio-economic environmental and technological changes. Compiled reports of inventories of EVM from Pakistan include those of Dilshad *et al*. (2008, 2010), Kakar *et al*. (2013), Goraya *et al*. (2013) and Hamad *et al*. (2013, 2014). Traditional veterinary cures have also been documented in other countries like: Tanzania (Sheila *et al*., 2007), India (Savithramma *et al*., 2007; Panda and Dhal, 2014), Brazil (Albuquerque *et al*., 2007), Indonesia (Katrin *et al*., 2008), Botswana (Moreki 2012) and Africa (Kubkomawa *et al*., 2013).

Hundreds of plants have been tested for their antiparasitic activity in Ethno Veterinary Research Centre, Department of Parasitology, University of Agriculture, Faisalabad (UAF), Pakistan. This paper reports some of the ethnobotanicals used in the treatment and prevention of the livestock diseases by the herdsmen in district Jhang, Punjab, Pakistan.

MATERIALS AND METHODS

Study Area: District Jhang, takes its name from its headquarter city Jhang which means a clump or a grove of trees, lies between 30º-37º to 31º-59º north latitudes and 71º-37º to 73º-13º east longitudes. The total area of the district is 8,809 km^2. It has three tehsils: Jhang, Shorkot and Chiniot. The district is bounded on the north by Sargodha and Hafizabad districts, on the west by Layyah, Bhakhar and Khushab districts, on the east by Faisalabad and T.T. Singh districts and on the south west by Muzaffargarh district (Fig 1).

The study area falls under the category of subtropical region with temperature ranging from 8°C-50°C, 32-80% relative humidity and 150-350 mm rainfall annually. The study area consist of three different planes i.e. in the extreme west sandbanks of Thal, centrally located river valley and on the extreme east old Sandal Bar is located (Anonymous, 2000).

Rapid Rural Appraisal: Rapid Rural Appraisal is an assembly of cost effective ways used by group of professionals which aims to learn about particular topic, area or situation by getting relevant data from people of area under consideration for planning projects (Waters-Bayer and Bayer, 1994). To this end, an exploration survey was conducted with local Veterinary Officers and Veterinary Assistants to identify the local healers in the different areas of Jhang. The surveillance was done with the team consisted of a veterinary doctor who worked as translator, a community representative and skilled field assistants selected from local community. This primary survey was conducted with Rapid Rural Appraisal (RRA). Livestock farmers having less than 30 animals either small or large ruminants or a combination of these species were omitted in the next phase of surveillance.

Respondents: The population of interest was individuals knowledgeable on EVM which are locally called as "*Sianas"*. All the interviewees in the population were consisted of male individuals with age of 50-90 years which claimed to have information about history of traditional remedies. A questionnaire was used to identify a required sample of significant ethno-veterinary respondents. The significant respondents were selected on the basis of their extensive vocabulary about social and cultural system as compared to other members of the community and knowledge about particular issue or technology. A total of 253 key respondents were interviewed by using local language i.e., Punjabi.

Participatory Rural Appraisal: Participatory Rural Appraisal (PRA) is more extensive than RRA as it involves more rural people to identify their problems, pursuing for their solutions and evaluating results. Every person was asked to show the species of medicinal plants in the field which were popular for use in the animals. The described plants were collected and air dried, thus becoming part of a herbarium. Medicinal plants used by the traditional veterinary healers (TVHs) were identified by the experts in Department of Botany, UAF, Pakistan. The voucher specimens were preserved at the Ethno Veterinary Research and Development Centre, Department of Parasitology, UAF, Pakistan. During survey, the constraints of livestock farmers about prevailing diseases/ ailments were also collected in order to quantify their frequency in the study population.

RESULTS AND DISCUSSION

Local livestock farmers were mostly self-made ethnobotanist due to their extensive knowledge about environment of their ecosystem and they could name each and every plant found on their land or they used to keep their animals healthy. Their knowledge and skills about EVM allowed them to use herbal remedies for the treatment of different livestock diseases thus, allowing them to develop a reliable conventional bioprospecting system which requires no scientific analysis but knowledge of local community to develop a new herbal preparation.

The action of crude botanicals have shown their pharmacological effect which depends upon various factors including: place, season of the year, time of collection of plants and their storage and in addition, Ibrahim (1996) said that, these crude botanicals biotransformed more rapidly *in vivo* as compared to commercial drugs.

In district Jhang, mostly used mixture of two or more plants as reported earlier (Sindhu *et al.*, 2012). Keeping in view the therapeutic actions of plants, Etkin (2002) reported that complex reactions were found between constituents of single plant with mixture of multiple plants while other characteristics that were under considerations include: (a) whether some plants which were mixed together increase the availability of bioactive compounds, (b) if preparations diminish toxicity while retaining their therapeutic actions. The medicine was extracted by soaking or boiling as reported earlier (Patil and Shettigar, 2010). The active ingredients of most of the ethnobotanicals were not yet explored.

The centerally located river valley is rich in livestock as there is availability of water, lavish pastures and facilitating geographical location. Herbs of harmal (*peganum harmala* L.) and bathoo (*Amaranthus caudatus* L.) were found everywhere and the trees of jand (*prosopis spicigera* L), Karir (*Capparis aphylla* Roth), Beri (*Ziziphus jujuba* L. Lam., non P. Mill.), Van (*Salvadora abeoides* Decne.), Kikar (*Acacia Nilotica* L. Wild.ex Delile), Shisham (*Dalbergia sissoo* Roxb.Ex Dc.), Aak (*Calotropis procera* Ait.f.) and Bohar (*Ficus benghalensis* L.) were also found where there is no cultivation.

In the conditions where social culture and traditional medicinal knowledge exists, a random sample technique does not acceptable. It is inappropriate to have consensual reports. Etkin (2002) of normative shared common behavior, which was then inappropriately extrapolated to general community. Keeping in view the definition of "Veterinary Anthropology" the data collection methods were used to increase the amount of data that could be collected over a 5-months period, as well as to maintain the data as a public, collaborative and participatory activity (Mathias-Mundy and McCorckle 1989; Lans, 1996). Aim of both RRA and PRA is the faster collection of better quality data, and speedier analysis, than given by conventional questionnaires (Baldwin and Cervinskas, 1993; Waters-Bayer and Bayer, 1994). Such type of data collection approaches have successfully been used in earlier reports from different parts of the world (Lans *et al*., 2000; Tabuti *et al*., 2003; Adedeji *et al*., 2013; Kulkarni *et al*., 2014; Panda and Dhal, 2014) as well as Pakistan (Iqbal *et al*., 2004; 2006; Hussain *et al*., 2008; Sindhu *et al*. 2012; Goraya *et al*., 2013).

For effective research and collection of data, collaboration with selected significant respondents was the basic strategy (Etkin, 2002). Individual healers and herbalists also had specialist knowledge (McCorckle *et al*., 1996; Etkin, 2002). The traditional tribal culture prevailing in the study area does not prohibit women to limit themselves to their houses. Therefore, both male and female members of the family were often involved in animal husbandry practices. However, each group has specific folk knowledge and also has occupational specialization; for example, farmers know much about ruminant EVM practices.

Plant Species used for Treating Different Diseases: A total of 46 species of plants representing 33 families were recorded (Table 1). These plants were used for the treatment of different diseases of animals. The most number of plant species (n = 4/46) belonged to family Solanaceae and Umbelliferae, followed by Brassicaceae and Zingiberaceae (n = 3/46).

The 21 species: *Trachyspermum (T.) ammi* (L.) Sprague., *Tamarindus indica* L., *Capsicum (C.) frutescens* L., *Vernonia (V.) anthelmintica* (L.) Wild., *Amomum (A.) subulatum* Roxb., *Cannabis sativa Linn.*, *Citrus medica* L., *Linum usitatissimum* L., *Acacia nilotica* (Linn.) Delile, Fl. Aegypt., *Azadirachta indica* A. Juss., *Cucurbita maxima* Duchesne, *Foeniculum (F.) vulgare* P. Mill., *Morus alba* L., *Piper nigrum* L., *Calotropis procera* (Ait.) Ait. f., *Allium cepa* Linn., *Punica granatum* L., *Solanum melongena* L., *Withania coagulans* Dunal, *Ziziphus jujuba* (L.) Lam., non P. Mill. were used to treat more than one ailments. Mathias-Mundy and McCorkle (1989) reported that similar kinds of plants were used commonly to treat both human and animal diseases. However, some of the plants mentioned here also have other uses in community for example, *T. ammi* (L.) Sprague, *C. frutescens* L., *V. anthelmintica* (L.) Wild and *A. subulatum* Roxb have their use in human medicine as well as human food. Mostly, efforts were made to improve the conservation of plant species that have multiple uses which may motivate the people to conserve those species of plants due to their multiple uses (Aguilar and Condit, 2001; Etkin, 2002).

The most frequently employed plant parts were leaves (n=14) (32%) followed in order by seeds (n=12) (27%) and fruits (n=7) (16%). Other parts like: aerial parts, oil, gum, latex and flowers were also used as traditional medicines.

Diseases and Conditions: The reported plants were used against following 26 diseases and conditions: agalactia, anestrus, anorexia, chronic diarrhoea, colic, constipation, enhancing milk production, expulsion of placenta, fever, foot rot, heat stroke, indigestion, traumatic inflammation, non-specific jaundice, mastitis, panting, pneumonia, uterine prolapse, red water, rheumatism, toxaemia, tympany, worm infestation and external wounds.

The most common problem of ruminants as constrained by farmers was worm infestation in district Jhang. There are multiple reasons for the increased rate of worm infection which include grazing of animals on infected pastures, use of dried feed, immune status of the animals particularly those with less than 6 months of age, deworming status of the animals and education of the farmers (Odoi *et al*., 2007). Of total 46 plants, 18 were reported to be used against various parasitic diseases.

Different forms of preparations of these plants were: drench ball, topical extracts, topical pastes and decoctions. A number of concoctions (mixture of more than one plant) were used in district Jhang for the treatment of worm infection. The frequently used combinations were *Brassica (B.) campestris* L. ssp. *napus* Duthie Fuller + *Salvia plebia* R. Br., *B. campestris* L. ssp. *napus* Duthie Fuller + *Morus alba* L., *T. ammi* (L.) Sprague + *Ferula assa-foetida* Linn., *T. ammi* (L.) Sprague + *Mentha arvensis* L. and *Allium cepa* Linn. + *F. vulgare* P. Mill.

There were some materials other than plant origin which were used in various preparations. These includes: Sodium bicarbonate, Sodium Chloride, Ammonium Chloride, black salt and molasses. Farmers also employed such kind of non-plant materials alone e.g. Sodium bicarbonate, Sodium Chloride, Ammonium Chloride, black salt, molasses and other methods including: branding of animals, hot water massage and making cuts on the skin of animals were also used to treat them. Preventive use of such chemicals as well as standardized drugs have been reported elsewhere e.g. Mathias-Mundy and McCorkle, (1989) have reported the use of talc, iron rust and sulphur in Thailand,

Table 1. An inventory of important ethnoveterinary plants among livestock farmers in district Jhang, Punjab.

Sr.No.	Plant species	Family	Vernacular name	Part used	Disease/Condition	Methods of preparation and administration
1	*Linum usitatissimum* L.	Linaceae	Alsi	Seeds	Agalactia, Rheumatism	Mix 60-100 g in molasses and give PO*
2	*Amomum subulatum* Roxb.	Zingiberaceae	Bari Ilaichi	Seeds	Agalactia, Anorexia, Worm infestation	Mix 50 g powdered seeds with 50 g of each sodium chloride, ammonium chloride and 250 g molasses, PO or drench ball
3	*Citrus limon* (L.) Burm.f.	Rutaceae	Nimbo	Fruit	Agalactia, Non-specific Jaundice, Mastitis,	Mix 200-300 g in molasses and give PO
4	*Cuminum cyminum* L.	Umbelliferae	Safed zera	Seeds	Agalactia, Heat stroke, Non-specific Jaundice, Panting, Red Water	Give 60 g seed powder PO
5	*Lepidium sativum* Linn.	Brassicaceae	Halu	Seeds	Agalactia, Haemorrhagic Septicemia	Give 250 g with 100 ml *Brassica* oil and 250 g of molasses and give PO
6	*Brassica campestris L.*	Brassicaceae	Sersoon	Oil	Agalactia, Haemorrhagic Septicemia	Give 250 g with 100 ml *Brassica* oil and 250 g of molasses and give PO
7	*Tamarindus indica* L.	Leguminosae	Imli	Fruit	Agalactia, Heat stroke, Non-specific Jaundice, Mastitis, Panting, Prolapse	Mix 200-300 g in jaggery and give PO
8	*Vernonia anthelmintica* (L.) Willd.	Asteraceae	Kali Zeeri	Seeds	Allergy, Mastitis, Traumatic Inflammation, Toxaemia, Prolapse,	Mix 60-100 g in molasses and give PO
9	*Capsicum annuum* Linn.	Solanaceae	Sabaz mirch	Fruit	Allergy, Anestrus, Indigestion, Toxaemia	Give 250 g PO
10	*Piper nigrum* L.	Piperaceae	Kali Mirch	Pepper corns	Allergy, Indigestion,	Give 50-100 g in physic drench ball
11	*Trachyspermum ammi (L.) Sprague.*	Umbelliferae	Ajjwain porji	Seeds	Anestrus, Worm infestation, Fever, Colic, Constipation, Tympany,	Mix 50-100 g powdered seeds with molasses and give PO
12	*Solanum melongena* L.	Solanaceae	Bengan	Fruit	Anestrus, Constipation	Give 500 g half cooked PO
13	*Punica granatum* L.	Punicaceae	Anar	Fruit Peel	Worm infestation, Anorexia	Give 250-300 g as decoction
14	*Zingiber officinale* Roscoe	Zingiberaceae	Adrak	Root	Anorexia	Give 50-150 g root powder in 250 g molasses physic drench ball
15	*Nicotiana tabacum* L.	Solanaceae	Tambaco	Leaves	Worm infestation, Chronic Diarrhea	Give 2 liters of tobacco smoked water PO
16	*Eugenia jambolana* Lam.	Myrtaceae	Jamon	Leaves	Chronic Diarrhea	Give 5 kg leaves as feed stuff
17	*Acacia nilotica (Linn.) Delile, Fl.Aegypt.*	Mimosaceae	Desi Kikar	Leaves	Chronic Diarrhea, Worm infestation	Give 100 g fresh leaves in butter fat PO
				Bark	Foot and Mouth Disease, Foot rot	Boil 500 g bark with 50 g Sodium chloride and use the water extract for hoof wound dressing
18	*Ferula assa-foetida*	Umbelliferae	Heang	Seeds	Colic	Give PO mixture of jaggery having 25-50 g seeds or

Sr.No.	Plant species	Family	Vernacular name	Part used	Disease/Condition	Methods of preparation and administration
	Linn.			Latex	Worm infestation	latex of Heang
				Latex	Tympany	Give a mixture of 100 g of *Trachyspermum ammi* L., 60 g Sodium bicarbonate,30 g NaCl and 125 g molasses PO
19	*Fumaria indica* (Hausskn.)	Fumariaceae	Papara	Leaves	Constipation	Give 5 kg leaves PO
20	*Aloe vera* (L.) Burm. F	Asphodelaceae	Kanwar gandal	Leaves	Foot and Mouth Disease, Toxaemia	Give mixture of jaggery having 100-150 g powdered leaves PO
21	*Foeniculum vulgare* Mill.	Umbelliferae	Sounf	Seeds	Indigestion	Mix 50 g NaCl, 250 g molasses and 100 g of powdered seed and give PO or physic drench ball
22	*Cannabis sativa Linn.*	Cannabaceae	Bhang	Leaves	Prolapse, Panting	Give mixture of jaggery having 100-250 g powdered leaves PO
23	*Morus alba* L.	Moraceae	Toot	Leaves	Haemorrhagic Septicemia	Boil 500 g leaves with 250 g *Curcuma longa* in 250 ml *Brassica* oil and make the paste and apply tropically on throat
				Fruit	Heat stroke	Boil 500 g fruit in 1L water with 250 g sugar and give PO
					Pneumonia	Boil 1kg fruit in 2 L water with 1 kg sugar and give 500 ml daily PO
24	*Curcuma longa* Linn.	Zingiberaceae	Haldi	Rhizome	Haemorrhagic Septicemia	Boil 500 g leaves with 250 g *Curcuma longa* in 250 ml *Brassica* oil and make the paste and apply tropically on throat
25	*Ficus religiosa* Linn.	Moraceae	Pepal	Leaves	Haemorrhagic Septicemia	Make paste by boiling 2-3 kg leaves with 250 ml *Brassica* oil in 1L water and apply topically
26	*Commiphora wightii (Arn.) bhandari*	Burseraceae	Googal	Leaves	Indigestion	Give 100 g leaves PO
27	*Allium sativum* Linn.	Liliaceae	Thoam	Bulbs	Lochia	Give 250-500 g half cooked in 500 g sugar PO
28	*Withania coagulans* Dunal	Solanaceae	Paneer	Aerial parts	Worm infestation	Mix 50-200 g in jaggery or physic drench ball PO
29	*Papaver somniferum* L.	Papaveraceae	Post	Seeds	Worm infestation	Give 200 g seeds with 200 gm molases PO
				Latex	Prolapse	Give 20 g with molasses PO
30	*Dalbergia sissoo* Roxb. Ex DC.	Fabaceae	Tali	Leaves	Prolapse	Boil 2 kg leaves in 2 L of water and give 500 ml daily PO for 3 days.
31	*Cucurbita maxima* Duch. ex Lam.	Cucurbitaceae	Kadu	Seeds	Prolapse, Worm infestation	Give physic drench ball having 50-150 g powdered seed
32	*Ziziphus jujuba* Mill.	Rhamnaceae	Beer	Leaves	Prolapse	Boil l kg in 1L water and give PO
					External Wounds	Boil l kg in water and dress the wounds
33	*Raphanus sativus Linn.*	Brassicaceae	Moli	Root	Prolapse	Fresh 5-10 kg
34	*Calotropis procera* (Ait.) R.Br.	Asclepiadaceae	Aak	Flowers	Toxaemia, Worm infestation	Mixture of 50-200 g of Aak and jaggery give PO
35	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Leaves	Toxaemia, Worm infestation	Mix 500 g leaves in molasses and give PO
					External Wounds	Boil 500 g leaves with 50 g sodium chloride and use the water extract for wound dressing
36	*Citrullus colocynthis*	Cucurbitaceae	Kor tunbah	Fruit	Tympany	Mix dry powder of Kor tunbah about 100-250 g in

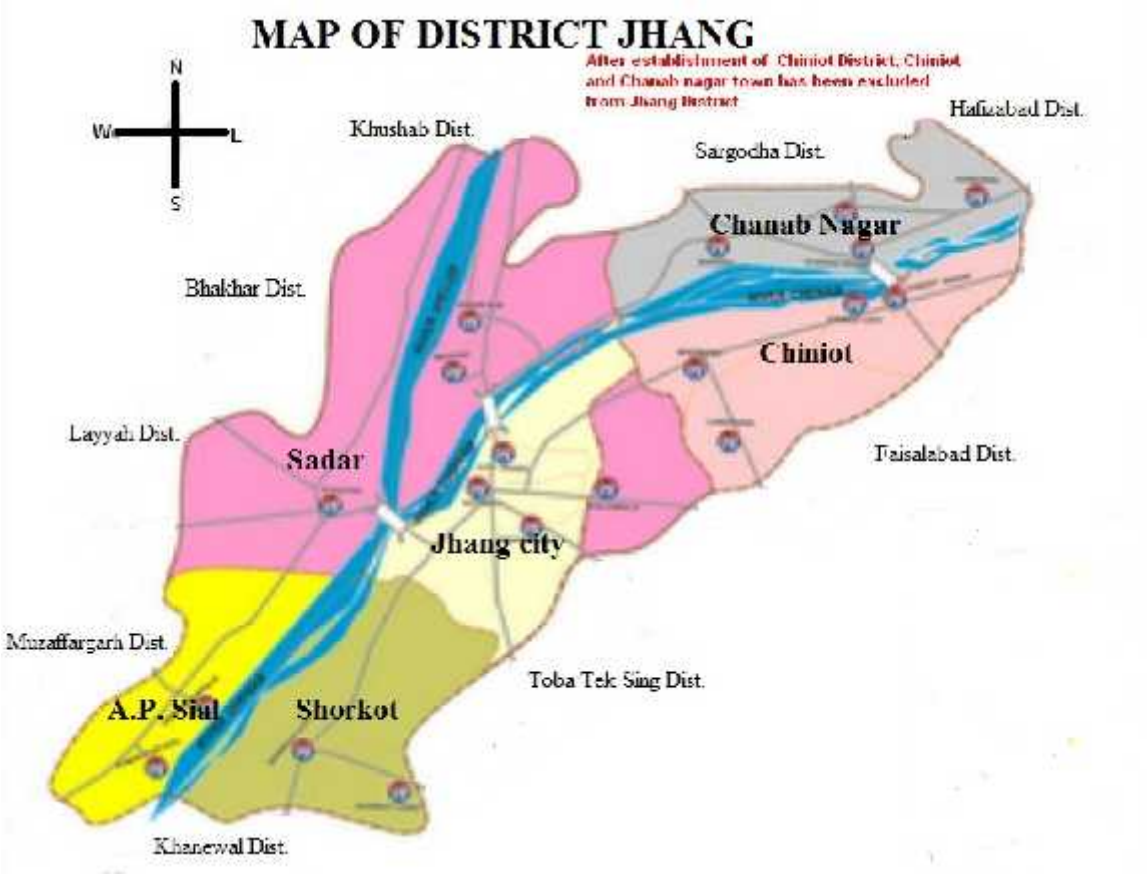
Sr.No.	Plant species	Family	Vernacular name	Part used	Disease/Condition	Methods of preparation and administration
	(L.) Schrad.					jaggery and give through physic drench ball
37	Mentha arvensis L.	Labiatae	Poodina	Leaves	Anorexia, Colic	Give a mixture of 250 g *Allium cepa* L.,100 g *Mentha arvensis* L. with 50 g NaCl, and 50 g Sodium bicarbonate as physic drench ball
38	Allium cepa Linn.	Liliaceae	Piaz	Bulb	Anorexia, Indigestion	Give a mixture of 250 g *Allium cepa* L.,100 g *Mentha arvensis* L. with 50 g NaCl, and 50 g Sodium bicarbonate as physic drench ball
39	*Mallotus philippensis* (Lam.) Muell. Arg.	Euphorbiaceae	Kamala	Fruits	Worm infestation	Give mixture of 50-100 g Kamala in jaggery PO
40	*Arundo donax* Linn.	Poaceae	Nara	Leaves		Give fresh leaves of Nara about 100-250 g PO
41	*Embelia ribes* Burm. F.	Mysinaceae	Babrung	Seeds		Give 100-150 g powdered seeds mixed in jaggery PO
42	*Psidium guajava* L.	Myrtaceae	Amrood	Seeds		Give 50-150 g powdered seeds in physic drench ball
43	*Areca catechu* L.	Palmae	Supari	Seeds		Give powdered seeds 50-100 g mixed in jaggery or physic drench ball
44	*Butea frondosa* Roxb.	Papilionaceae,	kamar kas	Gum		Give powdered leaves 100-250 g mixed in jaggery PO
45	*Chenopodium album* (L.)	Chenopodiacea e	Bathu	Leaves		Give green leaves of Bathu about 5 kg PO
46	*Vitex negundo* L.	Verbenaceae	Smalu	Seeds		Give powdered seeds 100-250 g mixed in jaggery PO

***Per Os (through oral route) = PO**

Heffernan *et al*., (1996) reported use of motor oil in Kenya and soap by livestock farmers in Nigeria (Alawa *et al*., 2003).

As names of the diseases in the study area were based on their symptoms; whereas, under Western Veterinary Science, diseases were named according to etiological information. Therefore, herdsmen were unable to describe the exact disease conditions (McCorkle, 1986; Mathias-Mundy and McCorkle, 1989; Delehanty, 1992).

Cattle, buffalo and horses were more prone to wounds, abrasions and swellings due to their employment on the field. Skin wounds were very common during the summer months caused by mosquitoes and horse-flies. Treatments were prepared to apply on the animal's hide for this purpose. Dysentery was quite widespread among large and small animals which might be attributable to unbalanced nutrition, hygienic norms or bacteria.



(www.pakimag.com)

Fig. 1. Physical map of district Jhang showing its tehsils and neighboring cities

Conclusions and recommendation: This study probably provided the first document on the inventory of medicinal plants used in EVPs against different infectious and non-infectious ailments in district Jhang. The treatments and practices that are reported in this study however, need to be verified in order to point out those which are more beneficial and practically advantageous for livestock development. Therefore, parameters like comparative efficacy, quality, effective and lethal dose concentrations and standardization of doses of crude plant-based preparations should be focused. Scientific validation of the plants would be of interest for the farming and scientific communities as well as pharmaceutical industry. Better understanding of EVM on scientific ground can open new horizons for possible drug targets and molecules in order to cure livestock parasitism in specific and other diseases in general.

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