



Full Length Article

Inventory of Ethno-veterinary Practices used for the Control of Parasitic Infections in District Jhang, Pakistan

ZIA UD DIN SINDHU, SHAFIQ ULLAH, RAO ZAHID ABBAS, ZAFAR IQBAL¹ AND MANSOOR HAMEED[†]

Department of Parasitology, University of Agriculture, Faisalabad-38040, Pakistan

[†]Department of Botany, University of Agriculture, Faisalabad, Pakistan

¹Corresponding author's e-mail: zafaruaf1@gmail.com

ABSTRACT

This study aimed at documentation of ethno-veterinary practices (EVPs) to treat parasitic ailments in animals in District Jhang, Punjab, Pakistan. An initial appraisal was conducted to identify the traditional veterinary healers (n=200) among the local farmers. Interviews, group discussions and field visits were organized to collect the information over a period of six months. A total of 96 EVPs were documented, out of which 66 were based on medicinal plants and 30 on other organic and inorganic matters. A total of 35 plants representing 23 families were documented for the treatment of different parasitic diseases. The top 10 most frequently used plants were: *Eruca vesicaria* (n=69), *Azadirachta indica* (n=47), *Citrullus colocynthis* (n=32), *Brassica rapa* (n=25), *Ocimum basilicum* (n=22), *Ferula asafetida* (n=15), *Nicotiana tabacum* (n=13), *Allium cepa* (n=8), *Withania coagulans* (n=8) and *Aloe vera* (n=6). There was diversity in the use of plants in their dosage, mode of preparation, part used and indications. The most frequently reported prescriptions were for the treatment of mange (n=111) followed by helminthiasis (n=63), tick infestation (n=57) and fly infestation (n=39). On an overall basis, farmers expressed their satisfaction for the documented EVPs. Findings of the study indicated richness of the indigenous knowledge and its effective use in treating parasitic diseases prevalent in the area by the local farming communities. Value addition by standardization of doses of plants and their validation using scientific procedures would be of interest to the farmers, scientific community and pharmaceutical industry. © 2012 Friends Science Publishers

Key Words: Ethno-veterinary; Medicinal plants; Folk medicine; Documentation; Livestock

INTRODUCTION

Livestock sector, major subsector of agriculture, is contributing 11% to total export of Pakistan. This important sector is not only providing animal food to the nation but also contributing in the poverty alleviation by providing draught power and employment to rural population of the country (Anonymous, 2011). Approximately, 53 million people living in rural areas derive their livelihood from livestock through different ways. At present, annual growth rate of milk and meat production is very slow i.e., 3.0 and 2.7%, respectively (Pakistan Economic Survey, 2011), which is mainly attributed to high incidence of diseases, poor prophylaxis and high cost of modern veterinary medicine. In countries like Pakistan, where majority of the farmers own 5-6 animals per family (Anonymous, 2011), it is hard to provide veterinary facility at door step and to economically treat the animals with modern drugs. Even if the veterinarian is available, poor farmers cannot afford to pay for the modern drugs (Sindhu *et al.*, 2010). Under these circumstances, promotion of ethno-veterinary medicine (EVM) could be helpful in improving the livestock productivity in rural areas of Pakistan and improving the

economic condition of small holders. Therefore, on farm in hand information available for the treatment in form of EVM is considered as the only viable alternative.

EVM is a system based on folk beliefs and traditional knowledge as well as skills/methods and practices used for the maintenance of animal health and treatment of diseases (Mathius-Mundy & McCorkle, 1989). This knowledge and skills of ethno-veterinary practices (EVPs) is learnt through experience and transmitted orally from generation to generation (McCorkle *et al.*, 1996). Now a day, due to industrial development, this traditional knowledge has been vanished in some parts of the developed world (Tabuti *et al.*, 2003). On the other hand, EVM is still playing an important role in sustainable livestock farming in different areas of globe (Lin *et al.*, 2003). Use of medicinal plants is an important part of EVM. In Indo-Pakistan subcontinent, the tradition of using plants for treatment and curing of ailments is very old. This old traditional system of health care using plants for treatment and curing was documented in the form of Rigveda and Ayurveda (Somvanshi, 2006). Even in this modern world, plant materials are being used as the major source of health care by 80% of the world's population (Farnsworth *et al.*, 1985). To date, a very little

literature is available in Pakistan on EVM in the form of few research articles (Farooq *et al.*, 2008; Dilshad *et al.*, 2008; 2010; Sindhu *et al.*, 2010), in contrast to other countries where field manuals have been published for treatment of animals using EVM (Anonymous, 1996). In the light of above, this study was carried out to document the EVM used for control of parasitic infections in District Jhang of Pakistan.

MATERIALS AND METHODS

Study area: District Jhang lies between 30°-37° to 31°-59° north latitudes and 71°-37° to 73°-13° east longitudes of Punjab, Pakistan with an area of 8.809 square kilometers. The annual rainfall is about 288.8 mm and this area has extremes of climate with mean maximum and minimum temperature of 45 and 28°C in summer and 27 and 6°C in winter, respectively. Jhang region is blessed with agricultural land including major crops like sugarcane, wheat and rice. The livestock population of the study area has been estimated as 872819 cattle, 1175170 buffaloes, 385050 sheep, 1006992 goats, 8289 camels, 15123 horses, 1310 mules and 1425237 poultry (Livestock Population Census, 2006). These animals are mainly used for milk, meat and draught purpose. Major source of income is agriculture for the people who have a rich history of traditional livestock farming.

Documentation of EVM: For identification of traditional veterinary healers (TVHs), a small scale survey was performed using rapid rural appraisal (RRA) technique. During this phase of survey, 600 local farmers were contacted and a list of 200 TVHs was prepared, who are practicing EVM in the study area. Information was collected about the prevailing parasitic diseases in the area and the EVPs for their treatment by conducting interviews and focused group discussions by the survey team comprising of a veterinarian and a representative of local community. The interviews were conducted in local language “Punjabi”. Different plants being used in EVPs were also collected by organizing field visits with the help of TVHs. Species of the medicinal plants used by the TVHs were identified by a botanist Dr. Mansoor Hameed, Associate Professor at Department of Botany, University of Agriculture, Faisalabad (Pakistan; UAF). The plant specimens were submitted to Ethnoveterinary Research and Development Laboratory, Department of Parasitology, UAF after assigning the voucher numbers to the plant species.

RESULTS AND DISCUSSION

The average age of TVH was 50-60 years. They gained EVM knowledge from their parents, relatives and from the local community. Knowledge of EVM is stored in memories of TVHs and they transfer this knowledge to their next generations by word of mouth (Wanzala *et al.*, 2005). These people usually have a long history EVM in the family

and have a good knowledge of their environment as well (Nfi *et al.*, 2001). Most of the TVHs reported that their new generation is not taking interest in the EVM and this knowledge may vanish if not documented properly.

During the survey, respondents reported seven parasitic diseases/conditions of cattle, buffalo, sheep, goat, horse, donkey and dog, which are being treated by EVM. Among these diseases, mange was recorded as highest (n=110/200; 55%) followed by helminthiasis (n=64/200; 32%), ticks infestation (n= 60/200; 30%), fly infestation (n=40/200; 20%), lice infestation (n=28/200; 14%), myiasis (n=24/200; 12%) and fleas (n=18/200; 9%). For the treatment of these diseases/conditions, a total of 99 EVPs were recorded, 66 based on medicinal plants and 30 based on other organic and inorganic materials. Twenty seven out of the 96 documented remedies were for the treatment of mange, 28 for helminthiasis and 21 for tick infestation. Different EVPs recorded for the treatment of parasitic diseases/conditions in district Jhang has been presented in Table I.

Thirty five plants belonging to 23 families were reported to be used in the study area. Most frequently used plant was *Eruca vesicaria* (69 times), which is being used for the treatment of mange, ticks, lice, flies and helminthiasis. *Azadirachta indica* was recorded as 2nd most frequently used plant (47 times) for the treatment of mange, ticks, lice and flies. Other plants in order of their frequency of use were *Citrullus colocynthis* (32 times), *Brassica rapa* (25 times), *Ocimum basilicum* (22 times), *Ferula foetida* (15 times), *Nicotiana tabacum* (13 times), *Allium cepa* (08 times), *Withania coagulans* (08 times) and *Aloe vera* (06 times). Inventory of these plants along with local names and indications has been presented in Table II.

North-East area of Punjab in Pakistan is blessed with a valuable and good repository of medicinal plants. Various properties of plants have long been known for their effect and documented since 4500 B.C. (Somvanshi, 2006). Similar type of documentation has also been done in other parts of the world (Lans *et al.*, 2000; Uncini Manganelli *et al.*, 2001; Alawa *et al.*, 2002; Guarrera, 2005). Plants like *B. rapa*, *C. colocynthis*, *Capsicum annum*, *Foneiculum vulgarap*, *E. vesicaria*, *C. frutescens*, *Piper nigrum*, *Ruta graveolens*, *Solanum surratens*, *Amomum subulatum*, *A. vera*, *Lawsonia inermis*, *Butea monosperema*, *Syzygium cumini* and *Acacia nilotica*, have also been previously reported by Jabbar *et al.* (2006), Farooq *et al.* (2008), Hussain *et al.* (2008), Dilshad *et al.* (2008, 2010) and Sindhu *et al.* (2010) in other parts of Pakistan for their anti-parasitic and anti-microbial activity. New plant species documented in this study for parasitic diseases are *C. frutescens*, *Curcuma picta*, *Jasminum humile*, *Lepidium sativum*, *Nerium oleander*, *O. basilicum*, *Peganum harmala*, *R. graveolens*, *Sorghum bicolor*, *S. aromaticum*, *Trigonella foenumgraecum* and *Vitis vinifera*. A number of plants have also been reported previously for possessing different biological activities in animals like; anthelmintic, growth

Table I: List of plant based ethno-veterinary practices used for the treatment of different parasitic diseases as reported by the traditional veterinary healers (n=200) in district Jhang, Pakistan

S. No.	Botanical Name	Parts Used	Animal	Dosages/Administration	No. of Respondents
Mange					
1	<i>Azadirachta indica</i>	Leaf	Buffalo	Boil 250 g leaves in 1L water and apply topically for 4-5 days.	3
2	i. <i>A. indica</i>	i. Leaf	Buffalo	Paste is prepared by grinding 250 g of plant "ii" in decoction prepared by 250 g of plant "i". Paste is topically applied for 1 week.	3
	ii. <i>Citrullus colocynthis</i>	ii. Fruit			
3	<i>Eruca vesicaria</i>	Oil	Buffalo	Topical application for 4-5 days.	26
4	<i>E. vesicaria</i>	Oil	Buffalo	Mix 500 ml oil in 1L Lasi ¹ . Administer PO for 4-5 days.	2
5	<i>Trachyspermum ammi</i>	Seed	Buffalo	Mix 50 g of each in 50 g Russ ² and 250 g molasses, administer PO for 2-3 days.	1
	<i>Piper nigrum</i>	Seed			
	<i>Curcuma picta</i>	Bulb			
	<i>Saussurea costus</i>	Rhizome			
	<i>A. indica</i>	leaf			
6	<i>C. colocynthis</i>	Fruit	Buffalo	Cook two fruits in hot sand, mix with 200 g molasses and give PO for 2-3 days.	2
7	<i>Aloe vera</i>	Leaf	Buffalo	Mix 200 g leave with 50 g salt, administer PO early in the morning for 3 days.	3
8	<i>E. vesicaria</i>	Oil	Buffalo	Mix 250 ml oil in 500 g yoghurt, administer PO for 2-3 days.	10
9	<i>E. vesicaria</i>	Oil	Cattle	Administer 250 g oil PO for 4 days.	4
10	<i>Peganum harmala</i>	Seed	Buffalo	Boil 100 g seed in 500 ml water and administer PO, repeat after one day.	1
11	<i>C. colocynthis</i>	Fruit	Buffalo	Mix 1 fruit + 50 g leaves with 100 g black salt ³ , administer PO for 3 days.	2
	<i>Withania coagulans</i>	Leaf			
12	<i>A. indica</i>	Leaf	Buffalo	Mix and grind 250 g leaves of both plants with 1 fruit, administer PO for 3 days.	6
	<i>W. coagulans</i>	Leaf			
	<i>C. colocynthis</i>	Fruit			
13	<i>Nicotiana tabacum</i>	Leaf	Cattle	Boil 50 g leave in 500 ml water and mix with 200 ml oil, apply topically for one week.	3
	<i>E. vesicaria</i>	Oil			
14	<i>E. vesicaria</i>	Oil	Cattle	Mix 500 ml oil with 250 g Russ and 500 g desi ghee, make a bolus and administer PO for 2-3 days.	2
	<i>A. indica</i>	Leaf			
15	<i>E. vesicaria</i>	Oil	Cattle	Grind 250 g bulb in 250 ml oil and administer PO for 4-5 days.	1
	<i>A. cepa</i>	Bulb			
16	<i>A. indica</i>	Leaf	Cattle	Mix 250 g leaves and 100 g seed, give PO for 4-5 days.	1
	<i>T. ammi</i>	Seed			
17	<i>E. vesicaria</i>	Oil	Cattle	Administer 250 ml oil PO for 4 days.	4
18	<i>Capsicum frutescens</i>	Fruit	Cattle	Mix 100 g each in 200 g molasses and administer PO in 4 equal doses for 4 days.	5
	<i>Allium cepa</i>	Bulb			
	<i>A. indica</i>	Leaf			
19	<i>A. indica</i>	Leaf	Sheep	Boil 250 g leaves in 500 ml oil and topically apply for 1 week.	3
	<i>Brassica rapa</i>	Oil			
20	<i>E. vesicaria</i>	Oil	Goat	Topical application for 10 days.	3
Ticks infestation					
21	<i>B. rapa</i>	Oil	Buffalo	Topical application for one week.	9
22	<i>Melia azedarach</i>	Fruit	Buffalo	Mix 250 g fruit with 500 ml oil to make a paste, topical application for 2-3 days.	2
	<i>B. rapa</i>	Oil			
23	<i>C. colocynthis</i>	Fruit	Buffalo	Cut the fruit and applied topically.	2
24	<i>E. vesicaria</i>	Oil	Buffalo	Mix 100 g oil with 100 ml kerosene oil and 20 g naswar ⁴ , applied topically for 3 days.	1
25	<i>E. vesicaria</i>	Oil	Buffalo	Mix 250 ml oil with 250 g seed, administer PO for 3-4 days.	1
	<i>L. sativum</i>	Seed			
26	<i>A. indica</i>	Leave	Buffalo	Boil 250 g leaves in 500 ml oil and apply topically for 1 week.	4
	<i>B. rapa</i>	Oil			
27	<i>Capparis decidua</i>	Root	Cattle	Boil 250 g roots in 1 L water, apply topically for 4-5 days.	1
28	<i>Trigonella foenumgraecum</i>	Seed	Cattle	Administer 50 g seeds PO for 2-3 days.	1
29	<i>A. indica</i>	Leaf	Cattle	Boil 250 g leaves in 500 ml oil, apply topically for 3 days.	2
	<i>E. vesicaria</i>	Oil			
30	<i>N. tabacum</i>	Leaf	Sheep	Boil 100 g leaves in 500 ml water, apply topically for 2-3 days.	2
31	<i>E. vesicaria</i>	Oil	Goat	Topical application.	6
Lice infestation					
32	<i>N. tabacum</i>	Leaf	Buffalo	Boil equal quantity (250 g) of leave and fruit in 1 L water, apply topically for 2-3 days.	4
	<i>C. colocynthis</i>	Fruit			
33	<i>L. sativum</i>	Seed	Cattle	Mix 50 g seed of each plant with 250 g molasses, administer PO for 2-3 days.	1
	<i>E. vesicaria</i>				
34	<i>B. rapa</i>	Oil	Buffalo	Boil the oil and apply topically.	2
35	<i>A. indica</i>	Leaf	Sheep	Boil 200 g leaves and 2 fruits in 1 L water, topically apply for 4 days.	4
	<i>C. colocynthis</i>	Fruit			
36	<i>A. indica</i>	Leaf	Goat	Boil 200 g leaves in 1 L water, topically apply for 3 days.	2

Table I: Continued

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S. No.	Botanical Name	Parts Used	Animal	Dosages/Administration	No. of Respondents
Fly infestation					
37	<i>A. indica</i>	Leaf	Buffalo	Boil 100 g leaves and 2 fruits in 250 ml oil. Make a paste and apply on neck and udder region to repel flies	4
	<i>C. colocynthis</i>	Fruit			
	<i>B. rapa</i>	Oil			
38	<i>E. vesicaria</i>	Oil	Cattle	Topical application on neck and udder region to repel the flying insects	3
Helminthiasis					
39	<i>Convolvulus arvensis</i>	Whole plant	Buffalo	Boil 500 g in 2 L water and reduce to 500ml, administer PO on alternative day.	1
40	<i>C. colocynthis</i>	Fruit	Buffalo	Mix 1 fruit of with 250 g molasses, administer PO.	2
41	<i>N. tabacum</i>	Leaf	Goat	Mix 15 g leaves with 100g molasses, administer PO.	4
42	<i>Mallotus philippensis</i>	Leaf	Sheep	Mix 15 g with 100 g yogurt and administer PO.	2
43	<i>Ferula assafoetida</i>	Resin	Sheep	Mix 30 g with 50 g molasses and administer PO.	6
44	<i>F. assafoetida</i>	Resin	Buffalo	Boil 50 g resin and 250 g leaves in 1 L water, reduce the volume to 500 ml and administer PO.	2
	<i>A. indica</i>	Leaf			
45	<i>C. decidua</i>	Stem	Cattle	Boil 50 g stem in 500 ml water and administer PO.	1
46	<i>A. vera</i>	Stem	Buffalo	Mix 500 g stem with 50 g table salt and administer PO.	3
47	<i>C. decidua</i>	Stem	Buffalo	Mix 250 g stem with 100 g molasses and administer PO.	2
48	<i>F. assafoetida</i>	Resin	Buffalo	Mix 125 g resin + 50 g table salt + 6 L lasi, pour in a clay pot and bury in cattle dung for 7 days. Administer 250 ml PO daily for 10 days.	2
49	<i>B. rapa</i>	Oil	Cattle	Mix 250 ml oil with 250 g yogurt and administer PO.	1
50	<i>Ocimum basilicum</i>	Leaf	Cattle	Grind 250 g leaves in 100 ml water, administer PO for 2 days.	11
51	<i>Nerium oleander</i>	Leaf	Goat	Mix 50 g leaves with 125 g molasses, administer PO.	1
52	<i>F. assafoetida</i>	Resin	Horse,	Mix 50 g resin and 250 g leaves with 250 g molasses, administer PO.	3
	<i>A. indica</i>	Leaf	donkey		
53	<i>Jasminum humile</i>	Flower	Buffalo	Mix 100 g flowers of both plants with 100 g molasses, administer PO.	1
	<i>N. oleander</i>	Flower			
54	<i>Prunus persica</i>	Leaf	Goat	Mix 50 g leaves with 20 g salt, administer PO.	1
55	<i>C. colocynthis</i>	Fruit	Buffalo	Mix 1 fruit + 50 g seed + 50 g chili with 25 g table salt and 25 g black salt, administer PO.	1
	<i>Baccharoides anthelmintica</i>	Seed			
	<i>C. annuum</i>	Fruit			
56	<i>Vitis vinifera</i>	Vinegar	Cattle	Mix 250 ml vinegar + 50 g copper sulfate + 4 L lasi. Keep the mixture for 7 days and then administer PO. Dose for large animal is 100 ml and 25-30ml for small animal.	1
57	<i>Ruta graveolens</i>	Seed	Cattle	Mix 100 g seed with 100 g molasses, administer PO.	1
58	<i>Calotropis procera</i>	Flower	Buffalo	Cook 100 g flowers in hot sand and mix with 100 g molasses, administer PO.	1
59	<i>Coriandrum sativum</i>	Seed	Goat	Grind 50 g seed with 50 g common salt, administer PO.	1
60	<i>F. assafoetida</i>	Resin	Horse,	Mix 50 g of each plant, administer PO.	2
	<i>A. cepa</i>	Bulb	donkey		
	<i>A. sativum</i>	Bulb			
	<i>O. basilicum</i>	Leaf			
61	<i>Sorghum bicolor</i>	Seed	Cattle	Administer 500 g seed PO.	1
62	<i>C. annuum</i>	Fruit	Buffalo	Administer 500 g fruit PO for 2-3 days.	1
63	<i>O. basilicum</i>	Leaf	Buffalo	Mix 100 g leaves of each plant with 50 g molasses, administer PO.	4
	<i>J. humile</i>	Leaf			
64	<i>F. vulgare</i>	Seed	Buffalo	Mix 50 g seed, 1 fruit and 250 g leaves with 50 g molasses, administer PO.	2
	<i>C. colocynthis</i>	Fruit			
	<i>A. indica</i>	Leaf			
Myiasis					
65	<i>O. basilicum</i>	Leaf	Buffalo	Topical application of water extract.	3
66	<i>O. basilicum</i>	Leaf	Cattle	Mix the water extract of both plants with 100 ml petrol, wash the wound.	2
	<i>Syzygium aromaticum</i>	Seed			

¹Milk whey² A product prepared by mixing boiled leaves of *Azadirachta indica* with molasses³ A pungent smelling purplish or pinkish-gray rock salt used in Pakistan⁴Naswar is local preparation of *Nicotiana tabacum*

promoter and immune-modulatory effects (Alawa *et al.*, 2010; Awaad *et al.*, 2010; Badar *et al.*, 2011; Iqbal *et al.*, 2012). Some of the plants documented in this survey have already been scientifically validated for their anthelmintic activity. These plants include *A. indica* (Iqbal *et al.*, 2012), *Baccharoides (Vernonia) anthelmintica* (Iqbal *et al.*, 2006) and *A. nilotica* (Badar *et al.*, 2011). Activity of these medicinal plants used for the treatment of various parasitic diseases, based on empirical evidence, may be attributed to

their chemical contents like phenolics, terpenoids, polyphenols and alkaloids and polypeptide, which have long run biological effects (Cowan, 1999). In this study, parts of the plants mostly documented were leaf, oil, fruit, seed, resin, bulb, stem, flower, Rhizome, Root and whole plant.

Thirty EVPs, which do not include the use of medicinal plants, were also documented to be used for the treatment of different parasitic diseases (Table III). These indigenous recipes include the use of dairy products, and

Table II: Plants used for treatment of parasitic infections in ethno-veterinary medicine system of District Jhang, Punjab Pakistan

Botanical name of plant	Common name of plant (Urdu, English)	Botanical family	Diseases treated	No. of respondents
<i>Allium cepa</i> L.	Piyaz, ONION	Amaryllidaceae	Mange, helminthiasis	8
<i>A. sativum</i> L.	Thoam, GARLIC	Amaryllidaceae	Helminthiasis	2
<i>Aloe vera</i> (L.) Burm.f.	Kanwar gandal, BARBADOS ALOE.	Amaryllidaceae	Mange, helminthiasis	6
<i>Azadirachta indica</i> A. Juss.	Neem, NEEM	Meliaceae	Mange, tick infestation, lice infestation, fly infestation, helminthiasis	47
<i>Brassica rapa</i> L. subsp. <i>oleifera</i> (DC.) Metzg.	Sarson, FIELD MUSTARD	Brassicaceae	Mange, tick infestation, lice infestation, fly infestation, helminthiasis	25
<i>Calotropis procera</i> (Aiton) W.T.Aiton	Aak, SODOM APPLE	Apocynaceae	Helminthiasis	1
<i>Capparis decidua</i> (Forssk.) Edgew.	Karae, CAPPER	Capparaceae	Ticks infestation, helminthiasis	4
<i>Capsicum annum</i> L.	Surkh mirch, CHILI PEPPER	Solanaceae	Helminthiasis	2
<i>C. frutescens</i> L.	Sabz mirch, HOT PEPPER	Solanaceae	Mange	5
<i>Citrullus colocynthis</i> (L.) Schrad.	Korr tumma, BITTER CUCUMBER	Cucurbitaceae	Mange, tick infestation, lice infestation, fly infestation, helminthiasis	32
<i>Convolvulus arvensis</i> L.	Wun wehri, FIELD BINDWEED	Convolvulaceae	Helminthiasis	1
<i>Coriandrum sativum</i> L.	Dhanya, CORIANDER	Apiaceae	Helminthiasis	1
<i>Curcuma picta</i> Roxb. ex Skornick.	Kachoor, ZEDOARY	Zingiberaceae	Mange	1
<i>Eruca vesicaria</i> (L.) Cav. subsp. <i>sativa</i> (Mill.) Thell.	Taramira, SWEET ROCKET	Cruciferae	Mange, tick infestation, lice infestation, fly infestation.	69
<i>Ferula foetida</i> (Bunge) Regel	Heing, ASAFETIDA	Apiaceae	Helminthiasis	15
<i>Foeniculum vulgare</i> Mill.	Sounf, FENNEL	Apiaceae	Helminthiasis	2
<i>Jasminum humile</i> L.	Chumba, ITALIAN JASMINE	Oleaceae	Helminthiasis	5
<i>Lepidium sativum</i> L.	Halya, GARDEN CRESS	Brassicaceae	Tick infestation, lice infestation	2
<i>Mallotus philippensis</i> (Lam.) Müll. Arg.	Kamala, KAMALA TREE	Euphorbiaceae	Helminthiasis	2
<i>Melia azedarach</i> L.	Bakain, CHINABERRY	Meliaceae	Tick infestation	2
<i>Nerium oleander</i> L.	Kanair, OLEANDER	Apocynaceae	Helminthiasis	2
<i>Nicotiana tabacum</i> L.	Tambakoo, TOBACCO.	Solanaceae	Mange, tick infestation, lice infestation, helminthiasis	13
<i>Ocimum basilicum</i> L.	Pubri, BASIL	Lamiaceae	Helminthiasis	22
<i>Peganum harmala</i> L.	Hermal, WILD RUE	Nitrariaceae	Mange	1
<i>Piper nigrum</i> L.	Kali mirch, BLACK PEPPER	Piperaceae	Mange	1
<i>Prunus persica</i> (L.) Batsch	Aarro, PEACH	Rosaceae	Helminthiasis	1
<i>Ruta graveolens</i> L.	Soay, RUE	Rutaceae	Helminthiasis	1
<i>Saussurea costus</i> (Falc.) Lipsch.	Kuth, KUT Root	Asteraceae	Mange	1
<i>Sorghum bicolor</i> (L.) Moench	Jawar, SORGHUM	Poaceae	Helminthiasis	1
<i>Syzygium aromaticum</i> (L.) Merr. & L. M. Perry	Loong, BELL FRUIT	Myrtaceae	Myiasis	2
<i>Trachyspermum ammi</i> (L.) Sprague ex Turill	(L.) Ajjwain, BISHOP'S-WEED	Apiaceae	Mange	2
<i>Trigonella foenumgraecum</i> L.	Matheray, FENUGREEK SEEDS	Papilionaceae	Tick infestation	1
<i>Baccharoides anthelmintica</i> (L.) Moench	Kali zeeri, CONYZA ANTHELMINTICA Roxb	Asteraceae	Helminthiasis	1
<i>Vitis vinifera</i> L.	Angoor, EUROPEAN GRAPE	Vitaceae	Helminthiasis	1
<i>Withania coagulans</i> (Stocks) Dunal	Paneer, TOOTH BRUSH TREE.	Solanaceae	Mange	8

other organic and inorganic matter. In EVP, duration of treatment for a particular disease is highly variable and clinical recovery is approximately 100% as reported by some respondents. Therefore, the possibility of complete removal of causative organism for a specific disease might not be attained at the end of treatment. This is in contrast with the western veterinary medicinal practice; in which treatment is continued well until the signs of a disease disappear (Jabbar *et al.*, 2006).

CONCLUSION

This study provided an inventory of medicinal plants used in EVPs against different parasitic diseases. Findings of the study indicated richness of the indigenous knowledge

and its effective use in treating parasitic diseases prevalent in the area by the local farming communities. Value addition by standardization of doses of plants and their validation using scientific procedures would be of interest to the farmers, scientific community and pharmaceutical industry.

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Table III: List of ethno-veterinary practices, which do not include medicinal plants, for the treatment of different parasitic diseases reported by the traditional veterinary healers (n=200) in District Jhang, Pakistan

S. No.	Remedies	Animal	Dosages/administration	No. of Respondents
Mange				
1	Sulfur	Cattle	Topical application for 4-5 days.	7
2	Buffalo dung	Buffalo	Topical application for 1 week.	1
3	Old Persian well water	Cattle	Give a bath for 3-4 days.	1
4	Kerosene oil	Cattle	Topical application for 4-5 days.	5
5	Used engine oil	Sheep, goat	Topical application for 4-5 days.	12
Tick infestation				
6	Diesel oil	Cattle	Mix 100 ml oil and 5 tablets for topical application.	2
7	Naphthalene bolus Kerosene oil Naswar (a product of tobacco)	Buffalo	Mix 100 ml oil and 20 g of naswar, apply topically.	3
8	Canal water	Horse, donkey	Keep the animal in canal for 1 h, ticks will leave the animal.	2
9	Lasi (milk whey)	Cattle	Wash the animal for 2-3 days.	1
10	Hand picking	Buffalo	Remove the ticks with the help of hand and burn in fire.	5
11	Diesel oil Petrol	Cattle	Mix equal quantities of both and apply topically.	6
12	Kerosene oil	Sheep, goat	Spray the animal.	3
13	Used engine oil	Buffalo	Topical application.	2
14	Stone (any stone)	Cattle	Grooming with stone to remove ticks.	2
Fly infestation				
15	Diesel oil	Horse, donkey	Spray on the fly at morning and evening.	7
16	Kerosene oil	Buffalo	Spray the kerosene oil on the fly.	6
17	Used engine oil	Cattle, sheep, goat	Sufficient quantity of oil is applied topically.	7
18	Diesel oil Kerosene oil	Buffaloes	Mix equal quantities of both and spray the animal.	9
19	Camel bone	Buffalo	Burn 100 g of camel bone in fire and after grinding mix with 100 g molasses, administer PO for 4 Days.	3
Lice infestation				
20	Diesel oil	Buffalo	Topical application.	6
21	Kerosene oil	Cattle	Topical application.	4
22	Sump oil	Buffalo	Topical application.	4
Helminthiasis				
23	Copper sulfate	Buffalo	Mix 2 g copper sulfate with 200 g molasses, administer PO and repeat on alternative day.	3
24	Naphthalene balls	Buffalo	Mix 2 naphthalene balls in 500 g molasses, administer PO.	2
Fleas				
25	Used engine oil	Buffalo	Topical application.	8
26	Kerosene oil	Cattle	Topical application.	5
27	Naswar	Buffalo	Kashmiri naswar applied topically on the affected area of animal.	4
Myiasis				
28	Naphthalene balls	Buffalo, cattle	Mix 2 naphthalene balls in 50 g oil, pour on the wound.	11
29	Petrol	Sheep, goat, dog, cat	Pour on the wound.	4
30	Naphthalene balls	Sheep, goat	Mix 2 naphthalene balls in 50 g oil pour on the wound.	3

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