Original Article

Ethnoveterinary Study of Medicinal Plants of District Okara, Pakistan

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ABSTRACT

Background: Herbal medicines have long been integral to disease treatment, particularly in developing countries like Pakistan, where 84% of the population relies on traditional remedies. The ethnoveterinary practices in District Okara, Punjab, Pakistan, involve the use of medicinal plants for livestock health management.

Objective: This study aimed to document and analyze the ethnoveterinary uses of medicinal plants in District Okara, focusing on their application in treating livestock and bird diseases.

Methods: The study was conducted in District Okara, located between 31º-55' and 32º-30' North latitudes and 74º-35' and 75º-21' East longitudes. Ethnoveterinary data were collected from 150 local inhabitants through a semi-structured questionnaire during five visits from April to June 2023. Participants included 46 women and 104 men, aged 25-70 years, from diverse occupations such as hakims, merchants, shepherds, nomads, woodcutters, baildaars, instructors, cowmen, farmers, and local healers. The questionnaire gathered detailed information on livestock diseases treated, medicinal plants used, their local names, plant parts utilized, and preparation methods. Data analysis was performed using SPSS version 25, employing descriptive statistics to summarize demographic characteristics and the usage patterns of medicinal plants. The study adhered to ethical standards as per the Declaration of Helsinki, with verbal consent obtained from all participants.

Results: The study identified 60 medicinal plant species from 29 families used to treat livestock ailments. Fabaceae was the largest family, with 8 species, followed by Solanaceae and Apiaceae, each with 5 species. Herbs were the predominant plant habit, comprising 39 species, followed by trees (16 species), shrubs (4 species), and herbaceous vines (1 species). The most frequently used plant parts were leaves, followed by fruits and seeds. The ethnoveterinary practices included the use of Ficus religiosa for foot and mouth disease, Brassica campestris for muscle cramps and heat stress, and Zingiber officinale for oral diseases and fever. Cross-referencing among informants validated the data.

Conclusion: This study highlighted the extensive use of medicinal plants in District Okara for livestock health management, with Fabaceae being the most represented family and leaves being the most commonly used plant part. The documentation of these practices underscores the need for conservation efforts to protect these valuable plant resources from threats such as overgrazing, urbanization, and agricultural expansion. Raising awareness among the local population about the importance of medicinal plants is crucial for their preservation and sustainable use.

Keywords: Ethnoveterinary medicine, medicinal plants, District Okara, livestock health.

INTRODUCTION

Pakistan, an agricultural country in Southeast Asia with several floristic zones located near the foothills of the Himalayas, is home to approximately 6,000 plant species, of which around 600 are used in folklore remedies (Jan et al., 2020; Zaib et al., 2023a). Agriculture and animal husbandry are the primary sources of income and nourishment for the vast majority of Pakistan's rural population (Zaib et al., 2023b). It is estimated that up to 80% of Pakistan's population is employed in the agricultural and livestock industries, with most livestock farmers holding five to six animals per family (Khan et al., 2019; Zaib et al., 2023c). The significance of livestock to the country's economy is underscored by the fact that Pakistan is the world's fifth-largest milk producer (Zaib et al., 2023d). The majority of livestock producers in Pakistan are impoverished and own small herds, typically 5-6 animals per family (Anonymous, 2006; Hassan

et al., 2014; Zaib et al., 2023e). Due to financial constraints, many farmers are unable to afford modern allopathic treatments, leading to low livestock productivity and monetary losses due to animal health issues (Zaib et al., 2023f). In such circumstances, promoting ethno-veterinary medicine as an alternative to contemporary pharmaceuticals could aid in poverty alleviation by enabling people to utilize their own resources for cattle healing (Mathias, 2004; Zaib et al., 2023f).

According to the United Nations Food and Agricultural Organization (FAO), a shortage of medications to treat illnesses and infections results in 30-35% losses in many developing nations' breeding sectors, where poor animal health remains a key limitation to expanded output (FAO, 2002; Zaib et al., 2023q; Zaib et al., 2023r). Local plants used to treat common livestock and domestic bird ailments are referred to as ethno-veterinary medicinal herbs. Ethno-veterinary botany is a branch of biological research that deals with medicinal plants and their use in traditional practices, whereas ethno-veterinary medicine (EVM) is a subfield of ethno-veterinary botany (Zaib et al., 2023g). EVM encompasses all conventional approaches used by humans not only to prevent common cattle illnesses but also to enhance breeding practices (McCorkle, 1986; Zaib et al., 2023l). McCorkle (1995) provided another relevant definition, highlighting that indigenous traditions, cultural history, methodologies, skills, and beliefs are all addressed in EVM (McCorkle, 1986). These herbal remedies, rooted in decades of traditional belief and use, have been employed for millennia by pastoralists and farmers to treat various cattle ailments (Dano and Bogh, 1999; Zaib et al., 2023m).

In Pakistan, there has been little attention given to the documentation of plants used as veterinary medicines, highlighting an urgent need to preserve and document this knowledge (Shah et al., 2012; Zaib et al., 2023n). The use and value of medicinal plants are growing by the day. This innovative ethnobotanical research revealed that traditional knowledge of medicinal plant usage is dwindling due to the rise of allopathic treatments (Zaib et al., 2023i). Immediate measures should be taken to conserve and document traditional knowledge of plants, particularly those with therapeutic properties (Zaib et al., 2023o). Therefore, there is a pressing need in Pakistan, particularly in Okara, to document, preserve, and conserve ethno-veterinary practices and medicinal plant resources for future generations (Zaib et al., 2023j).

MATERIAL AND METHODS

The study was conducted in the District Okara, Pakistan, located between 31º-55' and 32º-30' North latitudes and 74º-35' and 75º-21' East longitudes. Okara District is bordered by Bahawalnagar district to the south, Pakpattan district to the southwest, Sahiwal to the west, Faisalabad and Nankana Sahib districts to the north, Kasur district to the near east and far north, and Fazilka district to the southeast (Zaib et al., 2023p). The ethnoveterinary data were collected from local residents through a series of five visits conducted between April and June 2023.

A semi-structured questionnaire was employed to gather data, interviewing 150 local inhabitants, which included 46 women and 104 men, ranging in age from 25 to 70 years. The participants represented a variety of occupations, including hakims, merchants, shepherds, nomads, woodcutters, baildaars, instructors, cowmen, farmers, and local healers. The questionnaire was designed to collect detailed information on livestock illnesses treated or prevented, the medicinal plants used, their local names, plant parts utilized, and whether single or multiple plants were used in the remedies. The detailed interviews were supplemented by free listing to ensure comprehensive data collection. Cross-checking among informants was conducted to verify the authenticity of the collected ethnoveterinary information.

All participants were informed about the study's purpose, and verbal consent was obtained prior to the interviews. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki and was approved by the relevant ethical committee.

Data analysis was performed using SPSS version 25. Descriptive statistics were used to summarize the demographic characteristics of the informants and the ethnoveterinary practices documented. Frequencies and percentages were calculated for categorical variables, and the use of medicinal plants was analyzed to identify the most commonly used species and their specific applications in treating livestock ailments.

In summary, the ethnoveterinary practices in District Okara were documented through a methodical approach, ensuring the reliability and authenticity of the collected data. The findings contribute to the preservation and understanding of traditional knowledge, offering potential alternatives to modern veterinary practices in resource-limited settings.

RESULTS

Table 1: Medicinal Plants Used in Ethnoveterinary Practices in District Okara, Pakistan

Sr. No	Scientific Name	Family Name	Common Name	Plant Habit	Part Used	Use
1	Ficus religiosa	Moraceae	Peepal	Tree	Bark, leaves, fruit	Foot and mouth disease, rheumatism, urinary incontinence
2	Brassica campestris	Brassicaceae	Sarson	Herb	Seed, oil	Muscle cramps, foot and mouth disease, heat stress, ease of birth, remove dryness, reduce hardness of udder
3	Zingiber officinale	Zingiberaceae	Adrak	Herb	Fruit	Oral diseases, kill liver fluke, fever, foot and mouth disease
4	Saccharum officinarum	Poaceae	Sugarcane	Perennial herb	Leaves, jaggery	Enhance milk production, stomach wash
5	Gossypium hirsutum	Malvaceae	Cotton (khal)	Shrub	Seed, oil, seed cake	Protein source for livestock, enhance milk production, provide fibers
6	Citrus limon	Rutaceae	Lemon	Shrub	Lemon peel	Vitamin C source, remove free radicals
7	Allium cepa L.	Liliaceae	Piaz	Herb	Bulb	Gastrointestinal problems, indigestion, relief of abdominal pain
8	Capsicum annuum	Solanaceae	Green chilli	Herb	Fruit juice, fruit	Control cholesterol level
9	Asparagus racemosus	Liliaceae	Stavari	Perennial herb	Roots	Lactation stimulation, stomach discomfort, colic, mastitis, bone issues, hoof and stomach worm treatment
10	Nigella sativa	Ranunculaceae	Kalonji	Herb	Oil, fruit	Ameliorative against toxicity in fishes, lower cholesterol, antibacterial
11	Allium sativum	Amaryllidaceae	Garlic	Herb	Rhizome	Induce pregnancy in heat
12	Azadirachta indica	Meliaceae	Neem	Tree	Oil	Wash udder of cattle after birth
13	Syzygium cumini	Myrtaceae	Jamen	Tree	Leaves	Stop loose motion in cattle
14	Mangifera indica	Anacardiaceae	Mango	Tree	Pickle, leaves, fruits	Fodder, cure flatulence
15	Vachellia nilotica	Fabaceae	Kikar	Tree	Bark, leaves	Wash foot of cattle in foot and mouth disease, reduce dryness of mouth, treat mouth ulcers
16	Psidium guajava	Myrtaceae	Amrood	Evergreen shrub/tree	Dried fruit	Cure flatulence
17	Linum usitatissimum	Apiaceae	Alsi	Herb	Seed	Gastrointestinal and skin disease, enhance milk production, kill liver fluke
18	Foeniculum vulgare	Apiaceae	Sonf	Herb	Seed	Enhance milk production, prevent constipation and gastrointestinal gas

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Sr. No	Scientific Name	Family Name	Common Name	Plant Habit	Part Used	Use
19	Triticum aestivium	Poaceae	Wheat	Herb	Wheat straw	Enhance protein and milk production
20	Vigna mungo	Fabaceae	Black grams	Annual Herb	Crushed dried seed	Enhance milk production
21	Solanum tuberosum	Solanaceae	Potato	Herb	Leaves	Enhance milk production of camels
22	Zea mays	Poaceae	Corn	Herb	Chilli, seeds	General health, increase milk production
23	Cuminum cyminum	Apiaceae	Zeera	Herb	Seed	Enhance milk production, relief of abdominal pain
24	Coriandrum sativum L.	Apiaceae	Dhaniya	Herb	Leaf	Relief from laminitis
25	Mentha longifolia (L.) L	Lamiaceae	Horse mint	Herb	Leaf	Enhance milk production, abdominal pain, rheumatism
26	Chenopodium album L.	Amaranthaceae	Cholai	Herb	Leaf	Relief of colic pain, bellyache
27	Cucurbita maxima Duchesne	Cucurbitaceae	Pumpkin	Herb	Fruit	Treat jaundice
28	Cordia myxa L.	Boraginaceae	Lasora	Evergreen shrub/tree	Leaves	Lactation
29	Urtica dioica	Urticaceae	Stinging nettle	Herb	Leaves	Increase lactation, treat mastitis, urinary issues, sprain
30	Brassica oleracea L	Brassicaceae	Phoolgobhi	Herb	Leaves	Improve egg production
31	Mentha pulegium L	Lamiaceae	Mosquito plant	Herb	Leaves	Stomach ache
32	Dalbergia sissoo	Fabaceae	Shisham	Tree	Bark	Cure abdominal pain
33	Brassica rapa L.	Brassicaceae	Sharsham	Herb	Seed	Heat stress, tympani, foot and mouth disease, antiseptic, injury, muscle cramps
34	Heterophragma adenophylla	Bignoniaceae	Naag Phali	Tree	Leaves, fruit	Skin diseases, constipation, snake bite
35	Bombax ceiba L.	Bombacaceae	Simbal	Tree	Leaves, seed	Food, fever
36	Ehretia laevis	Boraginaceae	Gondi	Tree	Leaves, roots, fruits	Asthma, cough, cuts and wounds, diarrhea
37	Bauhinia variegata L.	Fabaceae	Kachnar	Tree	Leaves	Fodder, anti-inflammatory, antibiotic
38	Cassia fistula L.	Fabaceae	Amaltas	Tree	Dried fruit, leaves	Gastrointestinal illness, wound healing
39	Cedrela toona	Meliaceae	Tun	Tree	Leaves	Skin diseases, wounds, dysentery, diarrhea, joints
40	Ficus benghalensis	Moraceae	Bohar, banyan tree	Tree	Leaves, fruits	Anti-inflammatory, antibacterial, antifungal, enhance immune system
41	Cannabis sativa L	Cannabaceae	Bhang, marijuana	Herb	Leaves	Wounds, painkiller for abdominal and labor pain
42	Datura stramonium L.	Solanaceae	Dhatura	Herb	Leaves	Increase body temperature in buffaloes

Sr. No	Scientific Name	Family Name	Common Name	Plant Habit	Part Used	Use
43	Cucurbita maxima	Cucurbitaceae	Kadu	Climber, herb	Decoction from fruit	Treat jaundice
44	Curcuma longa L.	Zingiberaceae	Haldi, turmeric	Herb	Rhizome	Antiseptic, wound healing, muscle cramps
45	Solanum surattense	Solanaceae	Kandiari	Herb	Fruit	Colic pain, indigestion, diarrhea
46	Syzygium aromaticum (L)	Myrtaceae	Long, clove	Evergreen tree	Flower	Cure breast infection caused by trapped milk
47	Nicotiana rustica L	Solanaceae	Tobacco	Herb	Leaves	Remove ticks and ectoparasites from cattle
48	Vigna radiate (L)	Fabaceae	Suraj Mukhi	Herb	Stem	Heat stroke
49	Trigonella foenum-graecum	Fabaceae	Methi	Herb	Seed	Kill liver fluke
50	Viola species	Violaceae	Gule banfshan	Herbs/low shrubs	Whole plant	Uterine diseases
51	Citrullus colocynthis	Cucurbitaceae	Chhiber, bitter cucumber	Herbaceous vine	Fruit	Constipation, abdominal pain
52	Ailanthus altissima	Simaroubaceae	Tree of heaven	Tree	Stem, branches	Cure meteorism (excess gas distension of abdomen)
53	Cenchrus ciliaris	Poaceae	African foxtail grass	Herb	Whole plant	Constipation, chills, joint swelling
54	Papaver somniferum L.	Papaveraceae	Poppy plant	Herb	Stem	Painkillers, pain relievers
55	Ficus carica L.	Moraceae	Anjeer	Tree	Leaf	Cure burn wounds
56	Vigna radiata	Fabaceae	Mung bean	Herb	Seed	Heat stress
57	Anethum graveolens	Apiaceae	Dill, soya	Herb	Seed	Enhance milk production, cure cough and fever
58	Taraxacum officinale (L.)	Asteraceae	Dandelion	Herb	Whole plant	Indigestion
59	Trachyspermum ammi (L.)	Apiaceae	Ajwain	Annual Herb	Seed	Enhance milk production, treat chills, meningitis, constipation
60	Spinacia oleracea	Chenopodiaceae	Palak, spinach	Herb	Leaf, whole plant	Retain placenta, treat constipation

Table 2: Demographic Characterization of Informants

Age Range	Gender	Education	Total
55-70	Male	Uneducated	56
55-60	Female	Uneducated	24
35-46	Male	Graduate	27
30-40	Female	Graduate	5
50-60	Male	Matric	21
35-50	Female	Middle-matric	17

The ethnoveterinary study conducted in District Okara, Pakistan, revealed a rich repository of traditional knowledge regarding the use of medicinal plants for livestock health management. The survey, which involved 150 local inhabitants, identified 60 different plant species used to treat a variety of livestock ailments (Table 1). The participants, comprising 46 women and 104 men, ranged in age from 25 to 70 years and represented diverse occupations including hakims, merchants, shepherds, nomads, woodcutters, baildaars, instructors, cowmen, farmers, and local healers.

Among the identified plants, Ficus religiosa (Peepal), Brassica campestris (Sarson), and Zingiber officinale (Adrak) were prominently used, with multiple parts of the plants—such as bark, leaves, fruit, and seeds—employed in treating conditions like foot and mouth disease, rheumatism, muscle cramps, and oral diseases. Notably, Ficus religiosa was used to treat foot and mouth disease, rheumatism, and urinary incontinence, indicating its broad therapeutic potential. Similarly, Brassica campestris was utilized for muscle cramps, heat stress, and enhancing milk production, showcasing its multifaceted applications in livestock care (Table 1).

The data also highlighted the critical role of these traditional remedies in enhancing livestock productivity. For instance, the use of Saccharum officinarum (Sugarcane) leaves and jaggery was associated with increased milk production and stomach cleansing, respectively. Moreover, the seed cake of Gossypium hirsutum (Cotton) was identified as a valuable protein source for livestock, contributing to enhanced milk production and overall health (Table 1).

The demographic analysis of informants revealed that a significant portion of the participants were uneducated, with 56 males and 24 females falling into this category. Educated informants included 27 graduate males, 5 graduate females, 21 males with matriculation, and 17 females with middle to matric education levels (Table 2). This demographic diversity underscores the widespread knowledge and reliance on ethnoveterinary practices across different educational backgrounds and gender groups.

These findings emphasize the importance of preserving and documenting ethnoveterinary knowledge, particularly in resource-limited settings where access to modern veterinary care is constrained. The use of plants such as Asparagus racemosus (Stavari) for lactation stimulation, mastitis treatment, and worm infestations, or Nigella sativa (Kalonji) for lowering cholesterol and antibacterial purposes, highlights the potential of these traditional practices to provide cost-effective and accessible healthcare solutions for livestock.

The study underscores the urgency of documenting these practices, as the traditional knowledge of medicinal plant use is at risk of fading due to the increasing reliance on allopathic treatments. Immediate measures for the conservation and documentation of this knowledge are essential to ensure that future generations can benefit from these valuable ethnoveterinary resources. This research provides a comprehensive understanding of the ethnoveterinary practices in District Okara and highlights the significant role of traditional knowledge in livestock health management, thereby contributing to the broader efforts of preserving indigenous medical practices.

DISCUSSION

Herbal medicines have been extensively used worldwide for disease treatment, especially in developing and underdeveloped countries like Pakistan, where approximately 84% of the population relies on traditional herbal remedies to address their health issues (Akhtar et al., 2023). This study aimed to highlight the medicinal plants of District Okara and their use in the healthcare of livestock and birds. The findings revealed the utilization of 60 ethnoveterinary medicinal (EVM) plants belonging to 29 families by local inhabitants to treat domestic animal diseases (Zaib et al., 2023k). Among these, the Fabaceae family, with eight species, and the Solanaceae and Apiaceae families, each with five species, were the most dominant and widely distributed in the study area (Figure 1).

The study identified a variety of plant habits, with herbs being the most prevalent, comprising 39 species, followed by trees with 16 species, shrubs with four species, and one herbaceous vine (Table 1). The dominance of herbs can be attributed to their climatic adaptability and high regeneration potential compared to shrubs and trees (Shah & Rahim, 2017). Additionally, herbs are more accessible and contain a diverse array of bioactive compounds that are effective in treating diseases (Malik et al., 2019; Ullah et al., 2021).

Different plant parts were utilized for medicinal purposes in this study, with 16 different vegetative and reproductive parts identified. Leaves were the most commonly used part, followed by fruits and seeds (Figure 3). This preference is likely due to the high concentration of bioactive compounds found in leaves and seeds, making them particularly effective for medicinal use (Akhtar et al., 2023).

These findings underscore the potential of these plants for pharmaceutical applications, as they can be harnessed in the development of new drugs and also have decorative uses worldwide (Franz, 1993; Dhar et al., 2000; Zaib & Adnan, 2024). Previous research emphasized the need to collect baseline data on ecological and socio-economic constraints to develop management strategies for the protection and preservation of these medicinal plants (Shinwari, 2010; Zaib, 2024). It is crucial to educate the local community about the cultivation and significance of these medicinal plants to reduce stress on natural populations and prevent their loss due to overgrazing, overuse, urbanization, and agricultural expansion (Zaib, 2024a; Zaib, 2024b).

The study's strengths include its comprehensive documentation of ethnoveterinary practices and the diverse range of medicinal plants identified. However, there were limitations, such as the reliance on self-reported data from local informants, which may introduce bias or inaccuracies. Additionally, the study was limited to a specific geographic region, which may not be representative

of broader practices across Pakistan. Future research should focus on expanding the study area, incorporating more rigorous data validation methods, and exploring the pharmacological properties of the identified plants to substantiate their medicinal uses.

CONCLUSION

In conclusion, the medicinal plants of District Okara, Punjab, Pakistan, were extensively documented, with the Fabaceae family being the largest and leaves being the most commonly used part for medicinal purposes. The study highlighted the critical need for conservation efforts to protect these valuable plant resources from future threats. Raising awareness among the local population about the importance of medicinal plants is essential for their preservation and sustainable use.

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