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ETHNOVETERINARY SCRUTINIZATION OF HERBAL THERAPIES FOR THE TREATMENT OF LIVESTOCK OF TEHSIL ZAFARAWAL, DISTRICT NAROWAL, PUNJAB (PAKISTAN)

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Abstract

Introduction: *Traditional wisdom is essential to promoting coexistence between people and the natural world, is what keeps Pakistan's agriculture dependent on domesticated cattle. Ethnoveterinary medicine incorporates traditional knowledge of herbal therapy that is vital to maintaining the health of cattle in underdeveloped countries such as Pakistan. This study used qualitative analysis, quantitative indices, and Chi-square testing to investigate the utilization of common herbs as alternative medications for cattle in Tehsil Zafarwal, District Narowal.*

Objective: The study's goal was to record the ethnoveterinary knowledge of regional plant species, their phytochemical components, and how these plants are used to make remedies.

Methodology: *Information was gathered using questionnaires and interviews with hakims, herbal dealers, and indigenous people. Relevant information was supplied by 80 sources. The research included 30 plant species from 28 genera and 19 families, describing the phytochemical components that can be used to prepare remedies. The following quantitative indicators were used to analyze the data and noteworthy facts included in this work: Use Value (UV), Fidelity Level (FL), Relative Frequency Citation (RFC), Informant Consensus Factor (ICF), and Jaccard Index (JI). For data analysis, the Chi-square Test was employed.*

Results: *The results of the study reveal that herbs were the dominant plants which belong to 12 species which comprise 40% of the plants studied. The parts of the plant widely used for the study is leaves which were collected in the raw form fresh from the plants and then widely used to make medicines. Among the 19 families which are studied, Families: Cucurbitacce, Myrtaceae, Poaceae and Umbelliferae are the most dominant. The quantitive idices of the study include use value which is highest for Trigonella foenum graecum. The fidelity level was highest for Allium sativum and the highest consensus factor was 0.95 (postpartum disorders) and 0.94 (milk production). Relative frequency citation was also highest for Allium sativum and the Jaccard index ranged from 3.17 to 9.1.*

Conclusion: *The main conclusions of this study offer important insights into ethnoveterinary medicine and emphasize the significance of certain plant species in conventional veterinary care, which will aid in the development of phytomedicines.*

Key words: *Medicinal plants, Phytochemical constituents, Qualitative analysis, Quantitative analysis*

INTRODUCTION

In order to create a relationship between man and nature, traditional knowledge is essential. Pakistan is primarily an agricultural nation, and farmers rely heavily on domesticated livestock. In developing nations like Pakistan, the need for herbal traditional medicine has grown due to the need to sustain these livestock. Traditional wisdom, which is essential to promoting coexistence between people and the natural world, is what keeps Pakistan's agriculture dependent on domesticated cattle. Ethno veterinary medicine incorporates traditional knowledge of herbal therapy that is vital to maintaining the health of cattle in underdeveloped countries such as Asian Agriculture Countries (1). This study used qualitative analysis, quantitative indices, and Chi-square testing to investigate the utilization of common herbs as alternative medications for cattle in Tehsil Zafarwal, District Narowal. The knowledge, skill, methods, and

beliefs regarding animal health care that are held by community members are covered by ethno veterinary practices (1). Ethno veterinary medicines are less expensive and have fewer adverse effects than contemporary allopathic therapies. Perhaps as a result of the rural population's apparent reliance on plant-based medications for treating animals, the scientific community has been compelled to look for some potential solutions in this area (2).

Additionally, it covers social customs and the integration of cattle into farming systems practices (1). This information has been obtained through deliberate experimentation as well as trial and error (3). With an emphasis on the application of herbal remedies for the treatment of cattle, this study investigates the ethno veterinary practices in Tehsil Zafarawal, Punjab, Pakistan. Modern veterinarian treatments are widely available, yet because of their affordability, cultural acceptability, and accessibility, many rural communities continue to rely on these services. A long-standing custom of using natural resources for animal health is reflected in the great biodiversity of the area, which offers a variety of plants for herbal remedies (6-9). With the aforementioned information in mind, the current study was carried out to document the possible use of common plants as popular alternative medicines for livestock to treat different ailments in the Tehsil Zafarwal, District Narowal through qualitative analysis, quantitative indices and Chi-square test.

By bridging the gap between conventional wisdom and scientific validation, the findings may contribute to the wider application of herbal medicines in veterinary medicine. It also highlights how crucial it is to protect indigenous knowledge, which is in danger of disappearing as a result of industrialization and the declining passing down of ancient customs to future generations. Understanding and confirming ethno veterinary medicine promotes the conservation of wildlife and cultural heritage while facilitating the long-term rearing of livestock. The study will list particular plants and mixtures that are utilized in conventional therapies, assess their safety and efficacy, and consider whether they could have wider uses in veterinary care. It is hypothesized that these methods offer practical substitutes for traditional veterinarian care while also making a substantial positive impact on the health of livestock. Many studies highlighted that it is crucial to protect indigenous knowledge and encourage sustainable livestock production in order to promote biodiversity and the preservation of cultural heritage. With an emphasis on the advantages and restrictions of herbal remedies for the well-being and productivity of cattle, this study investigates ethno veterinary practices in Tehsil Zafarawal. It highlights how tradition and science may come together to create solutions that are accessible, sustainable, and culturally appropriate. The study's goal was to record the ethno veterinary knowledge of regional plant species, their phytochemical components, and how these plants are used to make remedies.

MATERIALS AND METHODS

DOCUMENTATION OF INDIGENOUS ETHNOBOTANICAL KNOWLEDGE

The study was conducted in Tehsil Zafarawal, District Narowal, Punjab, Pakistan, from August 2018 to March 2019. The research followed the established protocol for gathering ethnobotanical data as outlined by Alexiades and Sheldon (1996). Ethnobotanical surveys were conducted in 21 different localities within the tehsil, each chosen to ensure a comprehensive representation of the region's diverse flora and ethnobotanical practices Analysis of Herbal Remedies. The collected plant samples underwent phytochemical analysis to identify active compounds. This step aimed to validate the traditional claims of efficacy and understand the pharmacological basis of the treatments. This methodological framework facilitated a thorough and scientifically rigorous examination of ethnoveterinary practices in Tehsil Zafarawal, emphasizing the importance of preserving indigenous knowledge while validating its efficacy scientifically.

QUALITATIVE ANALYSIS

STUDY AREA & DATA COLLECTION

Zafarwal is one of the three Tehsils (sub-divisions) of Narowal District, located at 32°21'0N 74°54'0E with an altitude of 268 meters (882 feet). Being a part of small communities are among the least developed in terms of social and economic development. But they are quite knowledgeable about medicinal plants. To

become familiar with the research region and its vegetation, a reconnaissance survey of the area was conducted. On the basis of plant resources, the socioeconomic and ethnoveterinary profiles of the inhabitants of 10 villages were investigated. From the locals of these communities, information was gathered about the plants used to cure diseases in animals. The plants were collected, identified, dried, pressed and mounted on standard herbarium sheets. And these plants were submitted to MUST University Herbarium (MUH).

The little communities of Zafarwal, a Narowal District subdivision, have not seen much social or economic development. They do, however, know a lot about therapeutic herbs. In order to learn more about the area and its vegetation, a reconnaissance survey was carried out. Ten communities were examined for their socioeconomic and ethnoveterinary profiles, and data regarding plants used to treat animal illnesses was acquired. After being gathered and identified, the plants were dried, pressed, and mounted on conventional herbarium sheets. The three ethnic communities that were the subject of the study were Saraiki, Punjabi, and Pashtun, representing the linguistic and cultural variety of the region. The primary languages spoken in the study areas, Pashto, Saraiki, and Punjabi, were the languages used in 83 of the structured and semi-structured interviews that were performed as part of the surveys.

ETHNOVETERINARY DATA COMPILATION AND AUTHENTICATION

During visits, it has been seen that most of the interviewers were illiterate. However, just because there is less data available regarding some plants does not mean that they are less important for herbal medicines. It could be due to the less knowledge in youngsters. The botanical and local names of each plant, along with its family were manually confirmed with herbarium specimens, taxonomic literature (in both hard and soft form), manuals, and the Flora of Pakistan (www.eflora.com). This information was then cross-referenced with online data from the plant list website (www.theplantlist.org) or the Flora of Pakistan & literature.

Accurate data collection was made possible by the researchers' engagement with local people, which helped to foster trust and a knowledge of traditional practices. In order to gather plant samples for ethnoveterinary procedures, field trips were planned, and each collection location's GPS coordinates were noted. For accuracy, botanists verified the samples. The relevance of some plants for herbal treatments was not lessened by children's lack of knowledge, despite the fact that the majority of interviewees were illiterate. Manuals, taxonomic literature, herbarium specimens, and the Flora of Pakistan were used to carefully confirm the botanical and local names of every plant. Next, this data was cross-referenced with data from the internet.

EVALUATION OF SAFETY AND EFFICACY

The findings of the phytochemical study were contrasted with the farmers' opinions regarding the safety and effectiveness of the herbal remedies. The assessment of these approaches' possible incorporation into contemporary veterinary treatment was aided by this comparison.

REPORTING AND DATA SYNTHESIS

A thorough summary of Tehsil Zafarawal's ethnoveterinary practices was produced by synthesizing the data. The goal of the study was to identify herbal remedies that work well and offer suggestions for incorporating them into modern veterinary care without sacrificing traditional expertise.

GEOGRAPHICAL COORDINATES

Tehsil Zafarawal's central geographic coordinates are roughly 32.3446° N latitude and 74.8991° E longitude. These coordinates guaranteed the precision and repeatability of the research by offering a precise reference for the study region.

QUANTITATIVE ANALYSIS

FIDELITY LEVEL (FL)

Fidelity level means how much of inhabitants claim the use of a certain plant for treating some major diseases.

$$FL = \frac{NP \times 100}{N}$$

N is the total number of participants who use plants as medicines to treat any given sickness, and Np is the number of participants who declare using a specific species to treat a specific disease.

USE VALUE (UV) AND FREQUENCY OF CITATION (FC)

The relative position of reported plants was reflected by species in area and was determined by following formula:

$$UV = \frac{\Sigma U\iota}{N}$$

Where U denotes informants, who shared their information about the use and application of plants to cure specific disease, N shows the total number of respondents in the survey. If UV will 1 then it will consider higher while on the other hand if it will low, then the value will be 0. UV does not explain the data for single species of plants (4).

Formula for relative frequency citation is:

$$RFC = \frac{FC}{N}$$

Where, FC represents respondents who mentioned using a certain species, and N represents all respondents (5).

INFORMANT CONSENSUS FACTOR (ICF) AND JACCARD INDEX (JI)

Informant Consensus Factor was calculated by using following formula:

$$FIC = \frac{Nur - Nt}{Nur - 1}$$

Where, "Nur" denoted the total number of use reports for each disease cluster and "Nt" denoted the total number of species used for that cluster. This formula was used to determine whether the ethnomedicinal knowledge collected from traditional informants was homogeneous (6).

Jaccard Index (JI) calculated by relating earlier published study which has been carried out and accepted from allied, regional, and global level. JI was calculated by the percentage of plants species which was cited in addition with their medicinal usage with the help of following formula:

$$JI = 100 \times \frac{c}{a + b - c}$$

Where, a and b describe the total number of plants of the region a and b while c tells us about common plants (5).

CHI-SQUARE TEST

It is the knowledge of medicinal species that was dispersed among male and female participants between age categories (15-90) was relatively examined by using chi-square (7). To assess whether the knowledge of medicinal species is uniformly distributed or if there are notable differences in knowledge based on age and gender demographics

Its formula is:

$$X2 = (O\text{-}E)2/E$$

RESULTS

DEMOGRAPHIC PROFILE

In this study ethnoveterinary information of 30 local plants (n=30) was compiled from Tehsil Zafarwal. This calculation was made on the basis of the number of informants who gave the information about medicinal plants to treat illnesses in animals. A total of 80 informants were interviewed. Out of these, 52 were male and 28 were female from different age groups but majority was farmers and milkman. According to an analysis of result 70% of respondents were from above 45 years age. This survey permitted 30 plant species belonging to 28 genera and 19 families used to treat livestock of Tehsil Zafarwal. This study indicated that herbs were dominant in plant habit with 12 species (40%) followed by trees with 8 species (27%) and shrubs with 4 species (13%). While grasses and vines were least dominant with 3 species each (10% each). List of Ethnoveterinary medicinal plants used by the local people of Tehsil Zafarwal are shown in Table 1.

Table I. List of Ethnoveterinary medicinal plants used by the local people of Tehsil Zafarwal

Families	Sr. No.	Botanical Name	Local Name	Plant Habit	Plant Part Used	Dosage Form	Medical treatment (Phytochemical)
Alliaceae	01	*Allium sativum* L.	Lehsun	Herb	Seeds	Decoction	Food poisoning (Flavonoids) (8)
Asphodelaceae	02	*Aloe vera* L.	Qawar gandal	Shrub	Leaves, Roots	Powder	Mastitis & dislocation (Flavonoids) (9)
Asteraceae	03	*Artemisia absinthium* L.	Chaoo	Herb	Leaves	Raw	GIT infection , lambs (Sesquiterpene) (10)
	04	*Calendula officinalis* L.	Sat burgha	Herb	Leaves, Flowers	Paste	Wounds (Triterpenoids, flavonoids) (11)
Brassicaceae	05	*Brassica oleraceae* L.	Band gobhi	Herb	Brine	Raw	Rumination problem, cows (Phenols) (12)
Chenopodiaceae	06	*Beta vulgaris* L.	Chakndar	Herb	Roots	Added in fodder (Raw)	Less milk production in cows (Carotenoids, Phenols, Flavonoids) (13)
Cucurbitaceae	07	*Momordica charantia* L.	Karela	Vine	Leaves	Juice	Dewormer, Cough, Fever (Flavonoids, Alkaloids) (14)
	08	*Cucurbita pepo* L.	Kado	Vine	Fruit	Seeds	Dewormer, Fodder for pigs (Flavonoids, Alkaloids) (15)
	09	*Cucumis sativus* L.	Kheera	Vine	Fruit	Fermented	Rumination problem, cows (Alkaloids, Glycosides, Steroids, Saponins,) (16)
Cupressaceae	10	*Thuja orientalis* L.	Sarun	Shrub	Leaves	Extract	Ointment, sloughing of warts (Tannic acid, Umbelliferone, Flavonoids) (17)
Euphorbiaceae	11	*Riccinus communis* L.	Arind	Shrub	Seeds	Oil	Inducing labor (Methanol, Chloroform) (18)
Labiatae	12	*Origanum vulgare* L.	Oreganum	Herb	Leaves	Raw	Cough, Pneumonia (Flavonoids, Tannins, Phenolic glycosides) (19)
Meliaceae	13	*Azadirachta indica Adr. Juss.*	Neem	Tree	Leaves	Powder	Abdominal colic and abortion (Tannic acid, Flavonoids) (20)
Mimosaceae	14	*Leucaena leucocephala* L.	Jantri	Tree	Leaves, Pods	Raw	Purgative, Diarrhea (Prenols, Sterol, Flavonoids) (21)
	15	*Albizia lebbeck Benth.*	Sareen	Tree	Leaves	Raw	Weight gainer in cattles (Triterpenesaponin, glycoside) (22)
Moringaceae	16	*Moringa oleifera* L.	Sohanjna	Tree	Leaves	Extract	Piglet anemia and diarrhea (Alkaloids, Triterpenoids, Flavonoids, Tannins,) (23)
Myrataceae	17	*Psidium guajava Miller.*	Amrood	Tree	Leaves	Decoction	Diarrhea (Flavonoid, Carotenoid) (24)
	18	*Syzgium cumini* L.	Jaamun	Tree	Leaves	Raw	Loose stool (Anthocyanins, Glucoside, Ellagic acid,

							Isoquercetin) (25)
	19	*Eucalyptus globulus Labill.*	Sufaida	Tree	Leaves	Oil	Expectorant effect in horses (Alkaloids, Phenolic compounds, Steroids) (26)
Papilionaceae	20	*Trigonella Foenum-graecum* L.	Maithray	Herb	Seeds	Raw	Cold. (Alkaloids, Flavonoids, Steroids) (27)
Piperaceae	21	*Piper nigrum* L.	Kali mirch	Tree	Seeds	Raw	Weakness in chickens (Carbohydrates, Proteins, Calcium, magnesium) (28)
Poaceae	22	*Sacchrarum bengalensis Retz.*	Khar	Grass	Leaves	Raw	To treat mouth diseases. (Fatty acid, Alcohol, Hytosterols) (29)
	23	*Saccharum officinarum* L.	Ganna	Grass	Juice (Molasses)	Raw	Cold. (Fatty acid, Alcohol, Hytosterols, Higher terpenoids) (29)
	24	*Cynodon dactylon* L.	Khabal	Grass	Whole	Raw	Infertility (Flavonoids, Carotenoids, Alkaloids, Glycosides) (30)
Solanaceae	25	*Solanum tuberosum* L.	Aalo	Herb	Tuber	Boiled	Flavonoids, Phenolic acids, and Anthocyanins) (31)
	26	*Withania somnifera* L.	Aswaganda	Herb	Leaves	Decoction	Enteritis and arthritis (Alkaloid, Nitrogen compound, Sugar) (32)
Umbelliferae	27	*Anethum graveolens* L.	Dill	Herb	Arial part, Seeds	Decoction	Diarrhea, Rumination problem (Alkaloids, Flavonoids, Tannins) (33)
	28	*Cuminum cyminum* L.	Zeera	Herb	Leaves	Powder	Abdominal colic (phenolic compounds, aromatic volatile) (34)
	29	*Foeniculum vulgare Mill.*	Sonf	Herb	Seeds	Extract	Glaucoma (Triterpenes, Flavanoid glycosides) (35)
Verbenaceae	30	*Lantana camara* L.	Panjphuli	Shrub	Leaves	Decoction	Fever, cold, cough (Phytosterols, Phenolic compounds, Saponins) (36)

PLANT FAMILY INDEX

From the 19 families, the dominant families were cucurbitaceae, myrtaceae, poaceae and umbelliferae with 3 species each (10%) holding 1st rank followed by mimosaceae, solanaceae and asteraceae with 2 species each (7%) holding 2nd rank in family index. Remaining 12 families were represented one species only as shown in Fig. 1.

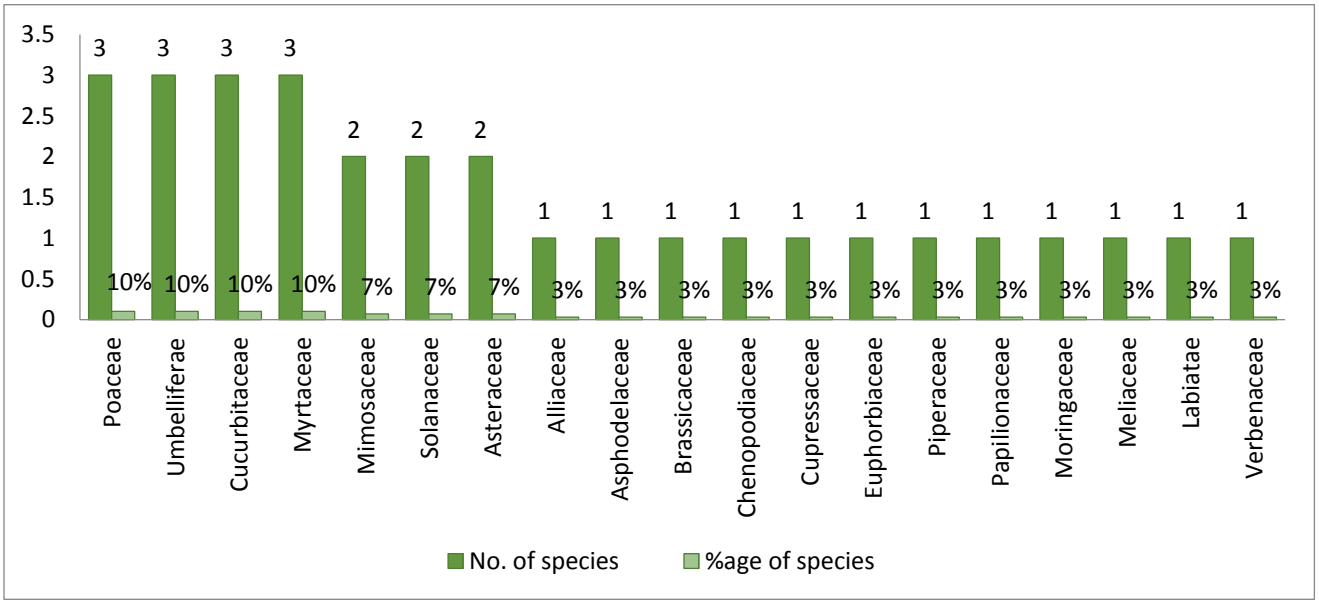

Fig. 1. Number of plants and percentage of plants belonging to different families

PLANT PART(S) USED, PREPARATION METHODS AND MODE OF ADMINISTRATION

In this study 30 plants were reported to prepare the remedies and many parts of the plants were used to prepare them. The most prevalently used plant part as shown in table 1 were leaves (55%) followed by seeds (20%), fruit (7%). And the least were root, flower, brine, whole, pod, tuber (3% each) (Fig 3). On the other hand, the dominant form of dosage was fresh/raw (44%) followed by decoction (17%), extract and powder (10% each), oil (7%), paste, juice boil and fermented (3 percent each).

QUANTITATIVE ANALYSIS

From the quantitative tools fidelity level was the one which has been calculated which declare the specific specie to treat specific disease. The highest fidelity level was for *Allium sativum* L. (87.5%) followed by *Trigonella foenum-graecum* L. (81.2%). Tools such as the usage value index (UVI) and relative frequency of citation (RFC) were used to investigate and assess the medicinal potential of plants as well as their potential for pharmacological research and medication development in the future. The highest use value was also for *Trigonella foenum-graecum* L. (0.85). The research area's medicinal plant species had Relative Frequeny Citation ranging from 0.07 to 0.9. The heighest relative frequency citation was found for *Allium sativum* L. (0.9) followed by Trigonella foenum-graecum L. (0.8) as shown in Table II.

Table II. Quantitative analysis of Ethnoveterinary medicinal plants

Sr. No	Botanical Name	Families	Family Ranking	FL	Use value		FC	RFC
					∑Ui	Uvi		
				(With 80 informants in the Analysis)				
01	*Momordica charantia* L.	Cucurbitaceae	1st	12.5%	13	0.16	10	0.13
02	*Cucurbita pepo* L.			7.5%	08	0.1	06	0.07
03	*Cucumis sativus* L.			21.2%	20	0.25	17	0.2
04	*Psidium guajava*	Myrataceae	1st	51.2%	50	0.62	41	0.5
05	*Syzgium cumini* L.			40%	37	0.46	32	0.4
06	*Eucalyptus globulus Labill.*			52%	20	0.25	13	0.16
07	*Sacchrarum bengalensis Retz.*	Poaceae	1st	6.2%	06	0.07	05	0.06
08	*Saccharum officinarum* L.			37.5%	34	0.43	30	0.37
09	*Cynodon dactylon*			30%	49	0.61	44	0.55
10	*Anethum graveolens* L.	Umbelliferae	1st	15%	18	0.23	12	0.15
11	*Cuminum cyminum* L.			21.5%	21	0.26	17	0.2
12	*Foeniculum vulgare Mill.*			27.5%	25	0.32	22	0.27
13	*Artemisia absinthium* L.	Asteraceae	2nd	31.2%	28	0.35	25	0.3
14	*Calendula officinalis* L.			43.7%	36	0.45	35	0.4
15	*Leucaena leucocephala* L.	Mimosaceae	2nd	68.7%	59	0.74	55	0.68
16	*Albizia lebbeck Benth.*			51.2%	49	0.62	41	0.5
17	*Solanum tuberosum* L.	Solanaceae	2nd	56%	20	0.25	14	0.18
18	*Withania somnifera* L.			38.7%	32	0.4	31	0.38
19	*Allium sativum* L.	Alliaceae	3rd	87.5%	72	0.9	70	0.9
20	*Aloe vera* L.	Asphodelaceae	3rd	56%	19	0.24	14	0.18
21	*Brassica oleraceae* L.	Brassicaceae	3rd	26.5%	24	0.3	21	0.26
22	*Beta vulgaris* L.	Chenopodiaceae	3rd	38.7%	34	0.43	31	0.38
23	*Thuja orientalis* L.	Cupressaceae	3rd	13.7%	17	0.21	11	0.14
24	*Riccinus communis* L.	Euphorbiaceae	3rd	10%	09	0.11	08	0.1
25	*Origanum vulgare* L.	Labiatae	3rd	11.2%	13	0.16	09	0.12
26	*Azadirachta indica Adr. Juss.*	Meliaceae	3rd	27.5%	26	0.33	22	0.28
27	*Moringa oleifera* L.	Moringaceae	3rd	46.5%	41	0.51	37	0.46
28	*Trigonella Foenum- graecum* L.	Papilionaceae	3rd	81.2%	68	0.85	65	0.8
29	*Piper nigrum* L.	Piperaceae	3rd	22.5%	19	0.24	18	0.23
30	*Lantana camara* L.	Verbenaceae	3rd	8.75%	11	0.14	07	0.08

By addressing research aims and issues, this study provides insightful information about ethnoveterinary practices in Tehsil Zafarawal, with a focus on traditional knowledge and herbal remedies for the treatment of animals.

CORRELATION BETWEEN USE VALUE AND RELATIVE FREQUENCY CITATION

Pearson's correlation was calculated to determine the relationship between use values and Relative Citation Frequency (RFC). The result shows that the variables UV and RFC are significantly correlated with a coefficient of determination R2 = 0.9836 as shown in Fig. 2.

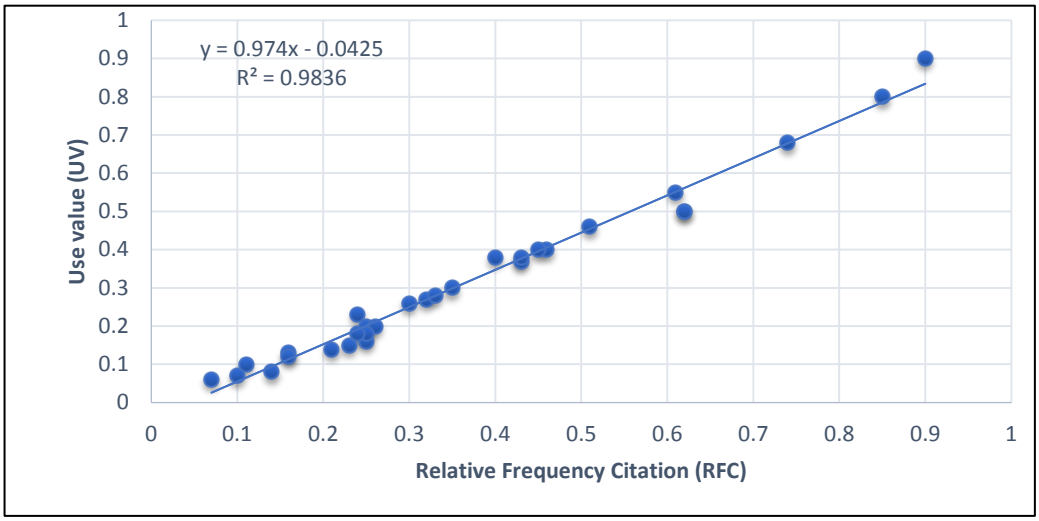

Fig. 2. Correlation graph between use value and Relative frequency citation

INFORMANT CONSENSUS FACTOR

All the ailments were categorized into nine disease categories which were known to the breeders and the informants of study area. The calculated Informant consensus factor (ICF) indicated that breeders have strong consensus regarding the ailments that led to losses in their animals. The highest ICF was 0.95 (Postpartum/Reproductive disorders) and 0.94 (Milk production) as shown in Table III.

Table III. Categories of Ailments and Informant consensus factor for Ethnoveterinary

Disease Categories	Ailments	N_t	N_{ur}	ICF
Digestives diseases	Diarrhea, food poisoning, gastrointestinal infection, dewormer, abdominal colic, purgative, loose stool,	11	62	0.80
Respiratory diseases	Cough, fever, cold, pneumonia	6	21	0.75
Rheumatic disorders	Joints dislocation, arthritis	3	17	0.87
Thought process disorder	Mastitis	3	13	0.83
Milk production	Milk production	3	36	0.94
Nutritious diseases	Weight gain, weakness, anemia	3	10	0.77
Skin diseases	Warts, wounds/ cuts	2	4	0.66
Postpartum/Reproductive disorders	Birth (labor induction, abortion)	2	22	0.95
Mouth and eye diseases	Mouth diseases, glaucoma	2	7	0.86

JACCARD INDEX (JI)

The value of Jaccard index is in between 3.17 to 9.1. The highest value of Jaccard index is from Girei, Adamawa State of Nigeria while the lowest value was observed in Cholistan Dresert, Pakistan. It clearly indicated that results of present study are different which is obviously independent (JI<50%) from previously studied areas (Table IV).

Table IV. Jaccard index obtained from previous studies

Sr. No	Previously studied area	References	a	b	c	Jaccard index (JI)
01	Seharti-Samre district, Ethiopia	Yirga et al., 2012	22	30	2	4
02	Girei, Adamawa State, Nigeria	Ayeni & Basiri, 2018	30	30	5	9.1
03	Tigray region, Northern Ethiopia	Gebrezgabiher, 2013	29	30	2	3.51
04	West Bengal, India	Saha et al., 2014	60	30	4	4.65

05	Cholistan Dresert, Pakistan	Khan, 2009	35	30	2	3.17

STATISTICAL ANALYSIS

CHI-SQUARE TEST

A statistical technique called the chi-square test is used to compare actual outcomes with predictions as shown in Table V and VI below. Since, calculated values of test statistics chi-square $X^2 = 7.808$ so, we agree to take the alternative hypothesis and accept that attributes are dependent in other words, the knowledge of ethnobotany is dependent in age groups.

The degree of freedom = (r-1) (c-1) (c for columns and r for rows)

The degree of freedom = (2-1) (5-1) = (1) (4) = 4

The table value of Chi-square for 4 degrees of freedom at 5% level of significance is 9.488.

Table value (9.488) > Calculated value (7.808)

Table V. Observed (O) values of informants

Age Group	Male (O)	Female (O)	Total
15-30	3	2	5
30-45	8	2	19
45-60	22	3	25
60-75	31	4	35
75-90	5	0	5
Total	69	11	80

Table VI. Chi-Square test for the test of the hypothesis

Sr. No	Expected values (E)	O-E	(O-E)2	X=(O-E)2/E
01	E1=5×69/80=4.32	2-4.32= (-1.31)	1.72	0.39
02	E2=10×69/80=8.63	8-8.63= (-0.63)	0.39	0.04
03	E3=25×69/80=21.56	22-21.56= (0.44)	0.19	0.008
04	E4=35×69/80=30.18	31-30.18= (0.82)	0.67	0.02
05	E5=5×69/80=4.32	5-4.32= (0.69)	0.47	0.11
06	E6=5×11/80=0.68	2-0.68= (1.32)	1.74	2.55
07	E7=10×11/80=1.37	2-1.37= (0.625)	0.39	0.28
08	E8=25×11/80=3.44	3-3.44= (0.41)	0.17	0.04
09	E9=35×11/80=4.82	4-4.82= (0.81)	0.65	4.15
10	E10=5×11/80=0.68	0-0.68= (-0.68)	0.46	0.22
Total	80		6.84	X=7.808

DISCUSSION

The study focuses on the use of herbal remedies for the treatment of cattle as it investigates ethnoveterinary practices in Tehsil Zafarawal. Older folks, primarily farmers and milkmen, make up the majority of knowledge bearers. A total of 30 plants species belonging to 19 families were recorded to be used by the people of Tehsil Zafarwal as ethnoveterinary medicine on phytoconstituents of plants recorded in the present study was extensively searched and reviewed in Table 1. High fidelity levels and utilization values were revealed by quantitative analysis for Trigonella foenum-graecum L. and Allium sativum L., along with a robust link between UVI and RFC The dominant families were cucurbitaceae, myrtaceae, poaceae and umbelliferae. And the reviewed phytochemicals indicated that most of the plants were enriched with alkaloids, flavonoids, tannins and saponins which were in agreement with the study of Usha et al., 2016 (3). One of the key plants, Trigonella foenum-graecum L., commonly known as fenugreek, has been extensively studied for its medicinal properties. Retrospective studies indicate its use in treating digestive problems, inflammation, and as a lactation stimulant in dairy cattle. The high-fidelity level (87.5%) and utilization value (0.85) recorded in the present study corroborate these traditional uses, suggesting a strong empirical basis for its efficacy (3). These ethnoveterinary medicinal plants have been reported by various researchers to treat various ailments. These phytoconstituents could be capable of treating a number of cattle illnesses. Traditional medicinal plant applications in healthcare practices offer hints for new fields of study for novel biological components and drug discovery (37). Allium sativum L., or garlic, another plant with a high fidelity level and RFC, has been used traditionally to treat infections, enhance milk production, and improve overall cattle health. Historical records and scientific studies confirm its antibacterial, antifungal, and

antiparasitic properties, which can be attributed to its rich phytochemical profile, including sulfur-containing compounds like allicin (34-36). The dominant families identified in the study, such as Cucurbitaceae, Myrtaceae, Poaceae, and Umbelliferae, have also been highlighted in past research for their extensive use in traditional medicine. Cucurbitaceae members, for instance, are known for their anti-inflammatory and antioxidant properties, which are beneficial in managing cattle health. The phytochemicals reviewed in these families, particularly alkaloids, flavonoids, tannins, and saponins, have shown significant pharmacological activities in various studies. In reviewing the phytochemical profiles, it is evident that these plants' traditional medicinal applications offer valuable insights for modern pharmacological research. The study of Usha et al. (2016) , along with other retrospective analyses, supports the therapeutic potential of these ethnoveterinary plants. The robust link between UVI and RFC further emphasizes the reliability of traditional knowledge in identifying effective medicinal plants (3, 14, 19). As suggested by numerous studies, including our own, these phytoconstituents could be capable of treating a variety of cattle illnesses, providing a natural and sustainable alternative to conventional veterinary medicines (11, 15, 33, 34).

Future research could focus on the pharmacological bioactivity of these plants, as well as the characterization and isolation of their active components, to develop new drugs and therapeutic agents.

This study highlights the application of pharmacological research in ethnoveterinary medicine to explore the possible medicinal uses of particular plants. It also suggests that these approaches, especially in rural areas, could promote sustainable cattle production by providing accessible, affordable treatment options. It is advised that future research use a more diverse sample, conduct comparison studies, and validate the safety and efficacy of herbal medicines due to two of the study's weaknesses: recollection bias and geographic focus.

CONCLUSION

This research is the first to be conducted in Tehsil Zafarwal of District Narowal (Pakistan) It does not provide any agreement with earlier research carried out in the region, but it does demonstrate that this region has a wide variety of medicinal anthelmintic herbs used to treat small ruminants. The results aid in the creation of practical and culturally appropriate veterinary treatments for sustainable livestock management Some of these plants need to undergo in vitro and in vivo experiments to determine whether or not they have anthelmintic qualities. This will give researchers a scientific database to use in their search for novel anthelmintic compounds and the improvement of conventional treatments.

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