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Study of Avian-human Interaction: Uses of Avian Species in Ethnopharmacological Practices in Haveli, Azad Jammu and Kashmir, Pakistan

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SUMMARY

Haveli, Azad Jammu and Kashmir, Pakistan, has a diversified geographical environment that supports a wide number of medicinal and edible bird species. Bird species have been utilized for a variety of diseases and cultural practices since antiquity, although ethnopharmacological and cultural usage of bird species in this region have rarely been reported. This research article provides an introductory ethnomedicinal and cultural valuation of avian species in Haveli, Azad Jammu and Kashmir, Pakistan. Additionally, it presents a comprehensive compilation and listing of previously available data on these species, which is being done for the first time. Data from 120 native respondents were collected using interviews and questionnaires. In total, 132 avian species were used in folklore utilization, of which 34 species are utilized to treat various diseases. 100% FL was examined for two avian species, the white-rumped vulture and the great tit, and utilized to treat stomach diseases, kidney difficulties, heart attacks, sexual problems, and skin issues. Out of the total, four bird species, namely black francolin, common pigeon, oriental turtle dove, and spotted dove, were determined to be more favored by responders and have the greatest RPL score. Recent research has revealed vital ethnoornithological information regarding native people and their interactions with bird species, which may aid in the sustainable use of avian variety in the studied area. Furthermore, in vitro and/or in vivo evaluation of biological activity in avian species with the highest FL% may be important for the development of new medications.

Keywords: Avian species; Ethno-ornithology; Chord diagram; Rank order priority

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INTRODUCTION

Ethno-ornithology is a study that explores the association between people's information and their cultural usage of avian species. It is important to accurately document avian species and local knowledge in ethno-ornithological research, ensuring that this information is accessible to all. In many human ethnic communities, birds are an important source of protein, and they are also utilized in ethnomedicine and nanomedicine (Altaf et al., 2017b; Altaf et al., 2018b). In Pakistan, various bird species, including herbivores, frugivores, granivores, and omnivores, are considered

edible. They are commonly used in recipes to gastrointestinal problems, respiratory disorders, skin infection and treat body weakness (Del Hoyo et al., 1992).

Pakistan has a rich and diverse bird population, consisting of almost 668 known species (Grimmett, 1998; Mirza and Wasiq, 2007). These birds have long been associated with human societies and are valued for various purposes, such as entertainment, commercial use, pets, magic, medicine, and food (Altaf et al., 2017b; Hakeem et al., 2017). Additionally, birds hold symbolic and medicinal significance for humans (Alves et al., 2012a). They are commonly utilized in ethnomedicine not only in Pakistan but also in other countries (Alves and Alves, 2011; Bezerra et al., 2013). The use of avian species for ethno-medicine, and modern medicine is widespread. Though, more research is needed to understand the cultural, and ethnomedicinal aspects of avian species' use to ensure the conservation of bio-resources. Consequently, efforts have been made to document avian populations that are utilized for social, ethno-cultural, and ethno-medicinal purposes (Alonso-Castro et al., 2011; Alves et al., 2012b; Arshad et al., 2014a).

Ethnozoological research is essential for understanding the sustainability of biocultural systems. Avian species play a significant role in various aspects of culture. These cultural practices can foster beliefs and behaviors that support the conservation of these species (Alves, 2012; Alves et al., 2018). This study specifically focuses on documenting the medicinal uses of avian species by both rural and urban populations in Haveli, Azad Jammu and Kashmir, Pakistan. It is part of a broader research project that aims to document how animals are utilized by local communities throughout Pakistan.

MATERIALS AND METHODS

STUDY AREA

Haveli is 162 kilometers from Muzaffarabad, the capital city of Azad Kashmir. It is located 250 kilometers from Pakistan's capital, Islamabad. The entire district of Haveli is mountainous, descending from northeast to southwest. The location is located in the lower Himalayas zone. The district's principal range is Pir Panjal. The mountains are mostly covered in conifers (Figures 1 and 2).

ETHNOORNITHOLOGY DOCUMENTATION

The data was collected from March 2018 to February 2020 from various ethnic societies in the study areas. We collected information on avian species' ethno-medicinal applications using semi-structured interviews and discussions, as described previously. We received prior informed consent (PIC) from all local respondents after informing them on the study's aims. We used questionnaires and semi-structured interviews with 120 people, including teachers, farmers, hunters, herders, and traditional health practitioners. We chose these informants based on their traditional knowledge of avian species' medicinal and cultural value. The surveys included a variety of topics, including the informants' private data, local names of species of birds, the cultural significance of avian species, and ethnopharmacological applications of avian species. We used the books of birds for the identification of avian species in the Pakistan (Roberts, 1991, 1992). We initially identified animal

species in the study area based on folk knowledge and later confirmed them with the help of photographs.

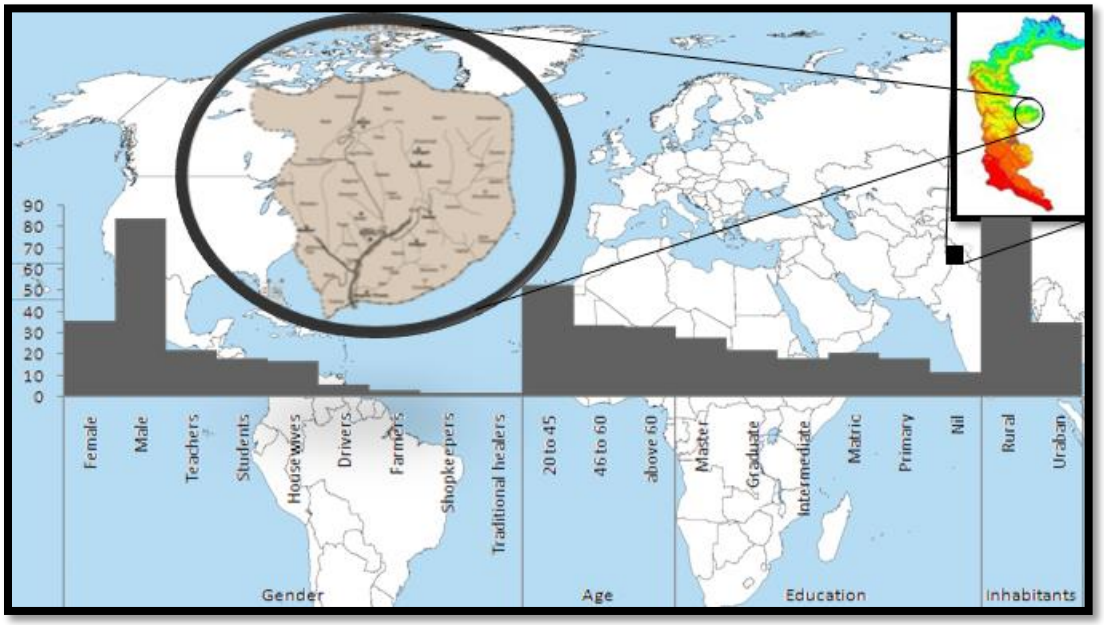

Figure 1: Map of Study area.

ETHICAL APPROVAL

Before the ethnopharmacological data gathering field survey, the "Women University of Azad Jammu and Kashmir, Bagh" in Pakistan approved the proposed avian project.

QUANTITATIVE ANALYSIS

The avian data was observed using various statistical tools:

Frequency of Citation (FC)

The FC shows the number of native participants that mentioned each avian species' ethnomedicinal usage (Friedman et al., 1986; Altaf et al., 2017b).

Fidelity level (FL%)

The fidelity level refers to the percentage of informants who report using a specific type of ethno-medicinal use of various bird species in a particular region. The FL index was analyzed using the equation provided below (Friedman et al., 1986; Alexiades and Sheldon, 1996).

$$FL\% = \frac{N_p}{N} \times 100 \quad \text{(a)}$$

Where "Np" is the informers' number for demanding sorts of ethno-medicinal use of fauna, and "N" is the overall number of informers who noted the fauna for use. A high "FL" index demonstrated the importance and frequency with which the region's informants used fauna for ethnocultural purposes.

Figure 2: Landscape of study area.

Relative Popularity Level (RPL)

The RPL refers to the proportion of ethnoornithological usage of a specific avian species for medicinal purposes, compared to the total number of informants reporting its use. However, avian species with similar "FL" values may have varying numbers of informants, which could affect their perceived effectiveness in treating illnesses. To address this, a scale was created, dividing the documented animals into "popular" and "unpopular" groups. The "RPL" is awarded a number ranging from zero to one, with 1.0 representing complete popularity for serious ailments and zero indicating not having any medical use. While all animals are considered significant for treating major illnesses, the "popularity index" begins at one and gradually declines to zero when the relative popularity of the animal species deviates from the popular category. Popular animals' "RPL" values are naturally closer to 1.0. For animals in the "unpopular group," the "RPL" number is less than one. Each animal's "RPL" value can be determined and computed depending on its location on the grid (Friedman et al., 1986; Ali-Shtayeh et al., 2000).

Rank Order Priority (ROP)

The animal's "ROP" is used to rank them appropriately, with "FL" values and "RPL" values used as correction features. The "ROP" is calculated by multiplying "FL" with "RPL". The value of "ROP" was analyzed using the equation provided (Friedman et al., 1986; Ali-Shtayeh et al., 2000).

$$\mathrm{ROP} = \mathrm{RPL} \times \mathrm{FL} \quad \text{(b)}$$

Similarity Index (SI)

SI is noted by the formula given below;

$$\mathrm{SI} = \frac{S_a}{T_a} (0 < \mathrm{SI} < 1) \quad \text{(c)}$$

Note:

S_a = The noted sickness found in both the previous and recent study

T_a = The total number of noted sicknesses in this study

STATISTICAL ANALYSIS

To explore the patterns of avian species' ethno-cultural and ethno-medicinal uses, we conducted a principal component analysis (PCA) using ethno-data variables. The chord diagrams, which illustrate the contribution of various animal parts and modes of use, were created chord with the help of R software version 3.6.1 (Hammer et al., 2001; Gu et al., 2014).

RESULTS

RESPONDENTS DATA

In total, 120 informants were chosen from 18 to 80 years of age to know cultural (Table 1) and ethnopharmacological (Table 2) information. Though, the maximum number of informants (n = 41) was between the ages of 18 and 40 years old. Out of total 108 informants were literate, viz., primary (n = 18), matric (n = 21), intermediate (n = 18), graduate (n = 22) and master (n = 28). About 71 percent of the informants were belonged to rural areas. The older informants have significant folklore awareness as compared to the younger ones. Nominated informants belong to dissimilar professions such as teachers, students, housewives, drivers, farmers, shopkeepers and traditional healers (Figure 1).

USES OF AVIAN SPECIES

Figures 3 and 4 demonstrate notable disparities in the utilization of avian species for cultural, and ethnomedicinal purposes. Component 1 and Component 2 accounted for 83.44% of the variance in MED (Medicinal use), SPST (Superstitious), EXP (Export), FD (Food), PU (Product Use), MGC (Magic), and FC (Frequency of Citation). Different avian body parts are used to cure different diseases (Figures 5 and 6).

QUANTITATIVE ASSESSMENT OF MEDICINAL BIRDS SPECIES

Frequency of citation (FC)

In Table 2, the highest value of "*FC*" is noted in Common Pigeon as 29, followed by Streaked Laughingthrush (27), Oriental Turtle Dove (24), and Himalayan Monal (22).

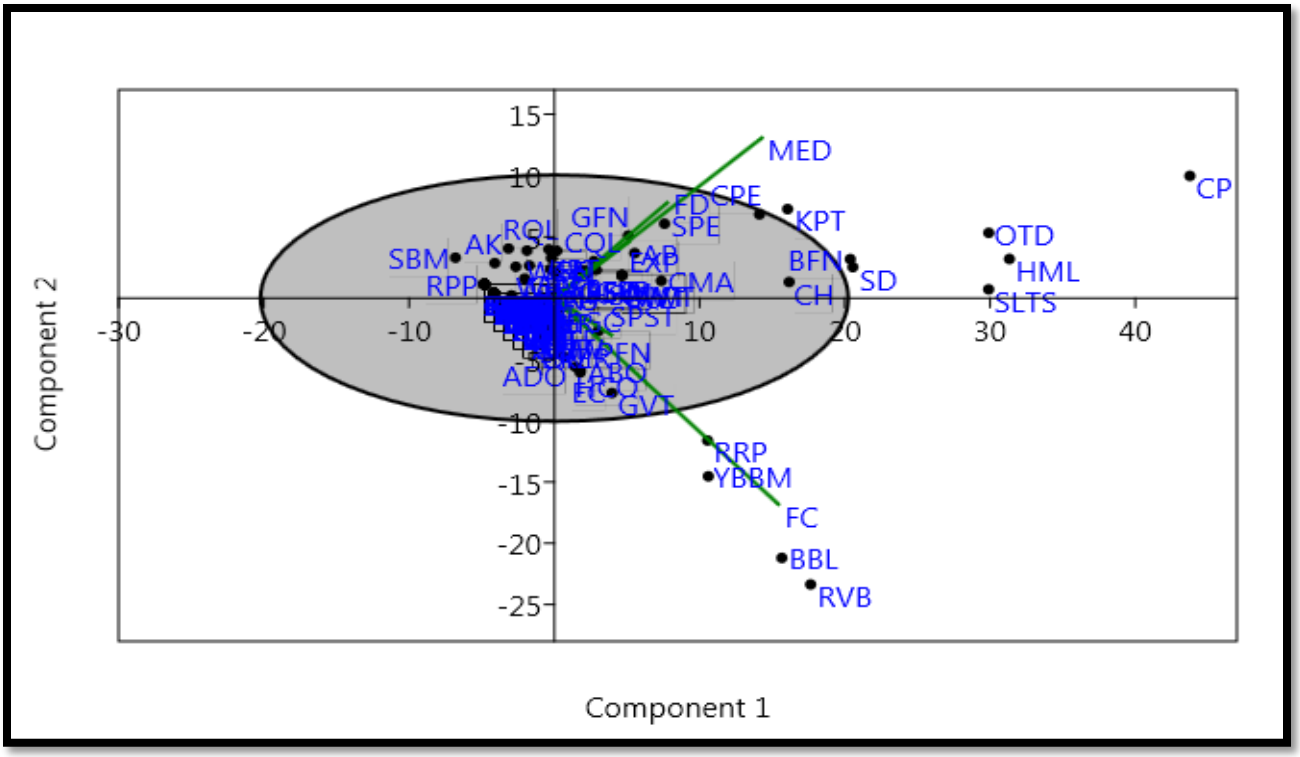

Figure 3: Principal component analysis of folklore data, (in Table 1 codes are present).

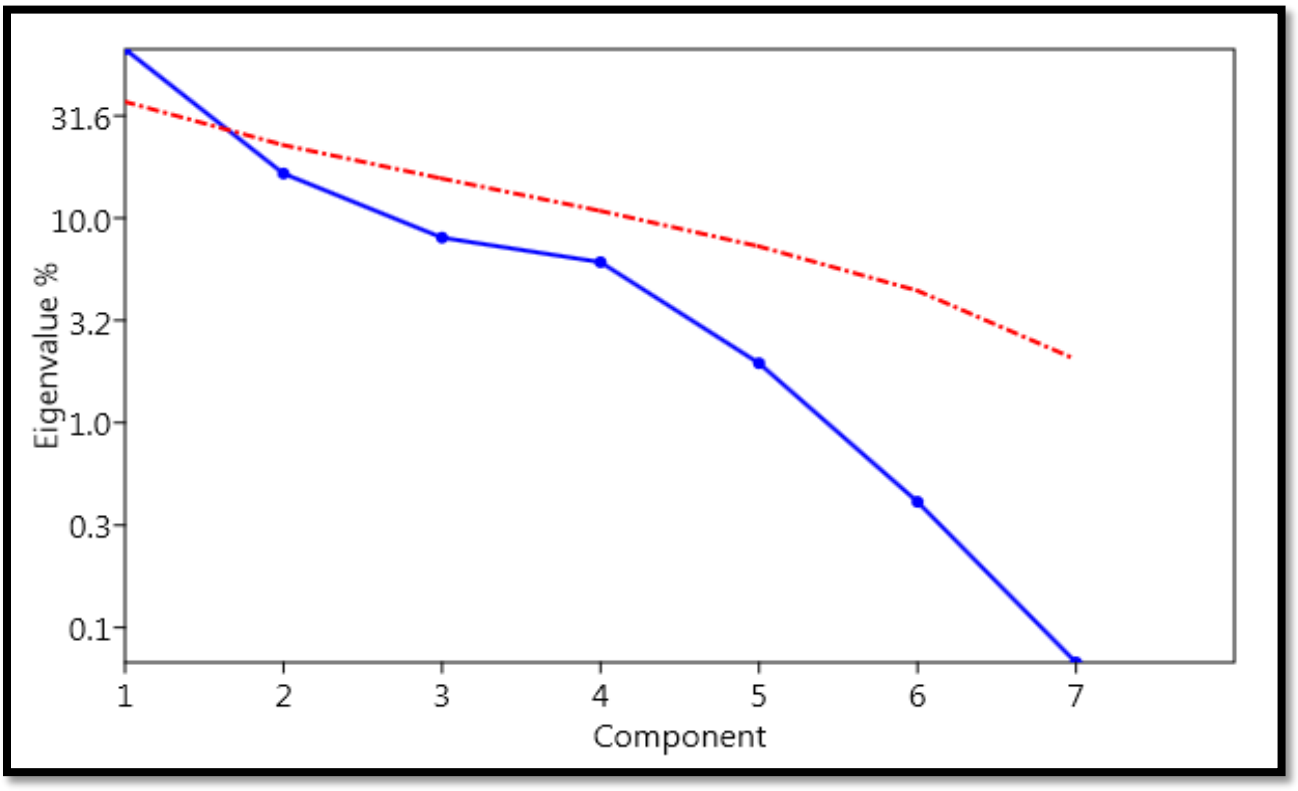

Figure 4: PCA versus Eigenvalue.

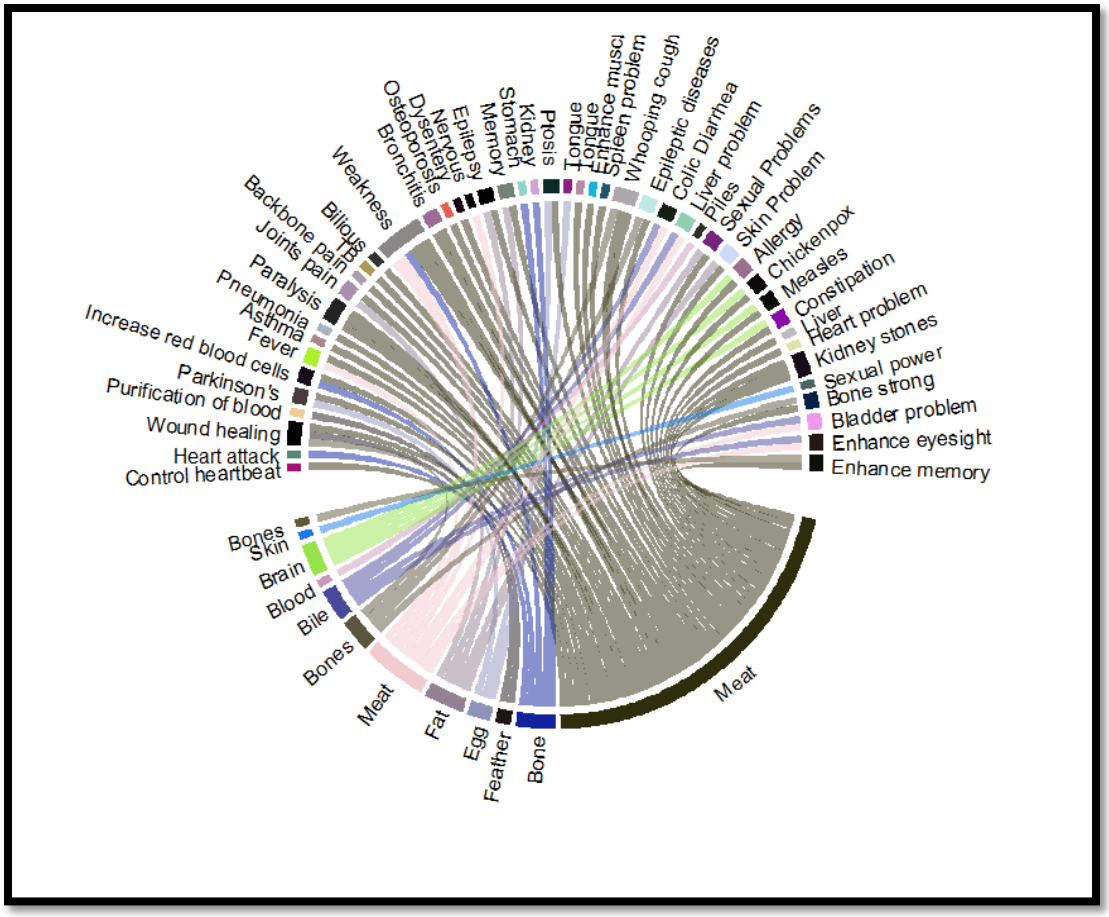

Figure 5: Relationship between body parts and diseases are used in study area.

Relative popularity level (RPL)

During the study, during the study documented 34 species that are utilized in folklore medicine usages. Out of total, 4 avian species i.e. Black Francolin, Common Pigeon, Oriental Turtle Dove and Spotted Dove were present more popular by informants and present the highest Relative popularity level i.e. RPL=1. The lowest RPL is noted as in two species i.e. rain quail and Asian koel (RPL=0.11) in study area.

Fidelity level (FL%)

During the study, it was documented that the *FL* of avian species during research varied from 10.53% to 100 percent. *FL (*100 percent*)* was noted for only two avian species, i.e., White-rumped Vulture, and Great Tit. Out of a total of 8 species of bird showed Fidelity level value equal and greater than 50%, i.e., Common Quail (66.67), Rain Quail (50.00), Chukar Partridge (50.00), Black Francolin (10.53), Golden Eagle (57.14), Common Pigeon (62.07), Asian Koel (50.00) and Barn Swallow (14.29) (Table 2).

Rank order priority (ROP)

The ROP is usage to conclude the suitable location of avian species with dissimilar *FL* values and the RPL Value. Total, 7 avian species have *above 30 ROP*. These

species are Chukar partridge (31.58), Himalayan Monal (36.36), kalij pheasant (31.58), common pigeon (62.07), oriental turtle dove (37.50), spotted dove (47.37) and common hoopoe (52.63) as shown in Table 2.

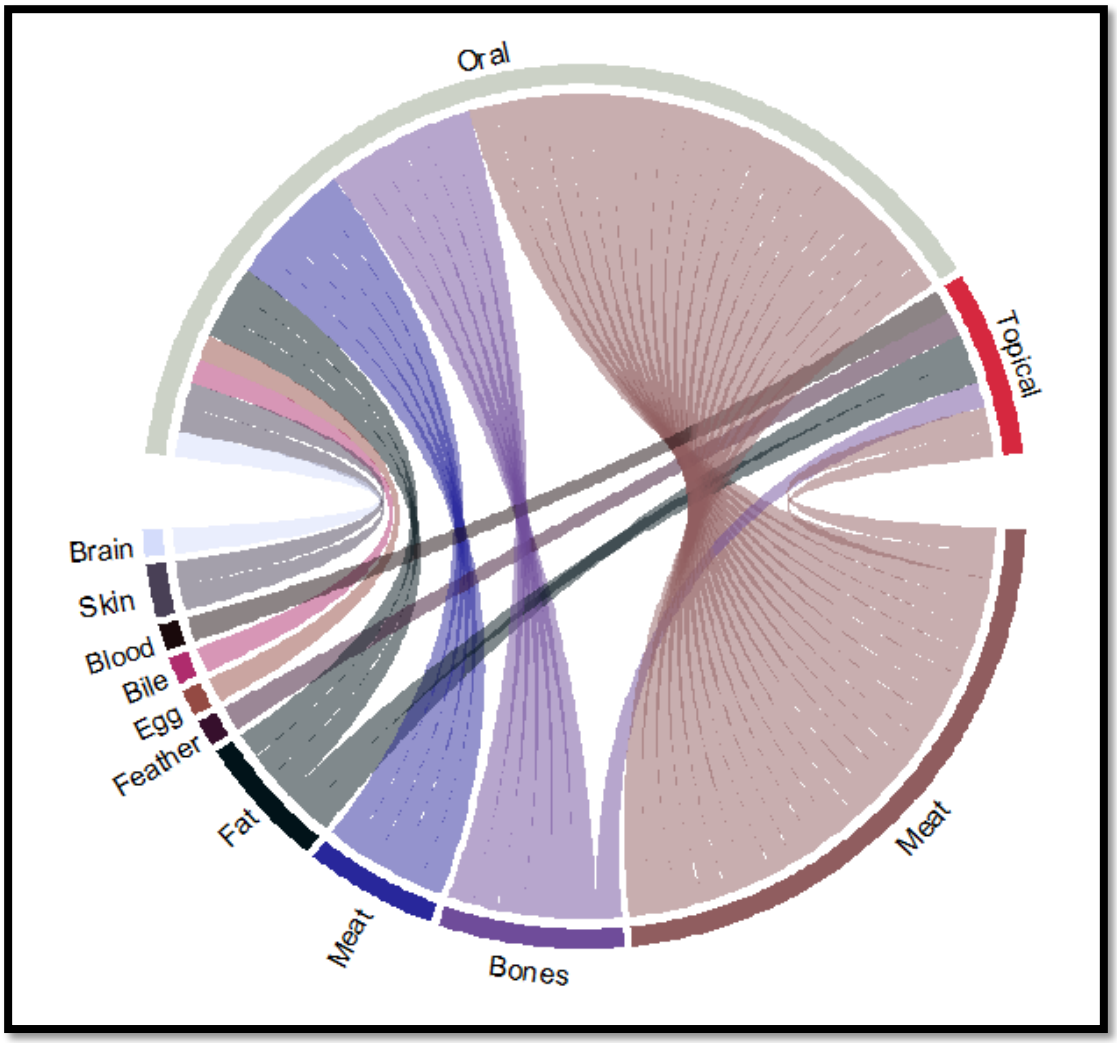

Figure 6: Products of avian species used in mode of application during present survey.

DISCUSSION

ETHNIC AND DEMOGRAPHIC DATA

Socio-demographic data about participants, such as gender, age, educational level, occupation, and ethnicity, is especially useful in ethnobiological research. This information is critical for assessing and understanding answers (Easthope, 1995). According to Nolan and Turner (2011), older participants, particularly those aged 50 and up, have a much higher level of conventional knowledge than younger ones. Community elders often have the most in-depth knowledge of diverse species. Individuals in this age group are involved in family obligations such as finances,

health, and education, but they are unable to pass on their expertise to the next generation. As a result, knowledge about the use of therapeutic avian species is slowly fading. Similar research in Pakistan and other countries have found that older individuals have greater traditional knowledge than younger ones (Kayode and Omotoyinbo, 2009; Umair et al., 2017; Amjad et al., 2020; Wanjohi et al., 2020). Educated folks in the research area were found to be less knowledgeable of the use of medicinal avian species than illiterate individuals due to their increased exposure to modernization. Similar results were reported in studies done in southern KPK (Mussarat et al., 2021) and central Punjab (Altaf et al., 2017b).

FOLKLORE APPLICATIONS

During the research noted that 34 species (like snow partridge, Western tragopan, rain quail, common quail, Chukar partridge, black francolin, grey francolin Himalayan monal, kalij pheasant, cattle egret, little egret, white-rumped vulture, golden eagle, common pigeon, hill pigeon, oriental turtle dove, spotted dove, Alexander parakeet, Asian koel, Oriental Scopus owl, common hoopoe, house crow, great tit, Asian house martin, barn swallow, streaked laughingthrush, common myna, house sparrow, russet sparrow, grey wagtail, white wagtail, citrine wagtail) have medicinal uses. It is also noted that 132 species are used in product uses. Their feathers are used in making ornamental things. During the study it was noted that 28 species having superstitious in the study area as;

i. Common quail is regarded as the messenger of those who have died.
ii. Peregrine falcon is considered as the symbol of strength and victory.
iii. Griffon vulture is the sign of shadow, secretes dream and unconscious death.
iv. Himalayan Monal is a symbol of beauty
v. Some people believe that Cattle egret egg must not be stolen if anyone does it, he will be exposed in few days by committing crime.
vi. Little egret is the sign of bad omen.
vii. Shikra presence is the symbol of power, victory and strength.
viii. Golden eagles are symbol as good sign when flying above the house.
ix. If common and hill pigeon poops on you many would call that bad luck.
x. Presence of spotted dove and oriental turtle dove are a symbol of peace.
xi. If someone eats remaining fruit of Alexander parakeet and Rose-ringed Parakeet, it is the symbol of intelligence.
xii. Himalayan cuckoo is considered as the saddest bird, its black color is the sign of sadness.
xiii. Some people thinks' that when Asian koel is singing, it Praise Allah.
xiv. If spotted owlet, Oriental Scopus Owl and Asian Barred Owlet speaks at night it shows that trouble may come in that village.
xv. Common hoopoe is the symbol of goodness.
xvi. The presence of this Ashy drongo is the sign of sorrow.
xvii. The voice of Yellow-billed blue magpie as alarm for threat.
xviii. The voices of house crow are considered as alarming for guest arrival.
xix. Presence of streaked laughingthrush is considered as alarm that snow is coming.
xx. People believed that if you see pair of common myna it's said that you would have a constant companion who would be always there with you.

xxi. House sparrow and russet sparrow are the symbol of rebirth and mother goodness.

It is noted that 19 species of birds are used as a food i.e. snow partridge, western tragopan, common quail, rain quail, Chukar partridge, black francolin, grey francolin, cheer pheasant, koklas pheasant, Himalayan pheasant, kalij pheasant, cattle egret, little egret, common pigeon, hill pigeon, oriental turtle dove, spotted dove, common hoopoe, streaked laughingthrush in the local area. During the research noted that four birds i.e. blood of oriental Scopus owl, Asian barred owlet, spotted owlet and bones of house crow are used in black magic in the local area.

These are the species which are used in the local area for export. Snow Partridge is hunted by people and export to other areas for food. Similarly western tragopan, common quail, rain quail, Chukar partridge, black francolin, grey francolin, cheer pheasant, all these birds are export to other areas for food. Some birds like Cattle Egret are Himalayan monal are captured by people and export to other areas for making artificial scenery products. Peregrine Falcon, golden eagle and shikra are export to other areas for entertaining purpose. Spotted owlet is poached and export for magical tricks. Parakeets (i.e. Rose-ringed Parakeet and Alexander Parakeet) poached and export to other areas for entertainment purpose. During the research it was recorded that almost all species of the birds has product uses. Their feathers are used in decoration and for used in making sport products.

ETHNOPHARMACOLOGICAL USES

These avian species i.e. snow partridge, Western tragopan, Himalayan monal, Chukar partridge, koklas pheasant, grey francolin, kalij pheasant, white-rumped vulture, golden eagle, hill pigeon, mountain scopus owl, house crow, Asian house martin, great tit and grey wagtail have documented first time to treat fever, asthma, pneumonia, wound healing, stomach problems, bronchitis, joints pain, weakness, fever, nervous problem, stomach disordered, kidney problems, heart attack, healing and purification of blood, whooping cough, epileptic disease, spleen problem, piles, sexual problems, skin problem, sexual potency and kidney stones.

During study noted that common pigeon is used against for Parkinson's disease, ptosis, paralysis and weakness; while its previous record showed that this species is used for bronchitis, puberty, menorrhagia, epilepsy, anemia, paralysis, abscess and infertility (Benarjee et al., 2010; Jaroli et al., 2010a; Alonso-Castro et al., 2011; Chakravorty et al., 2011; Jacobo-Salcedoa et al., 2011; Bagde and Jain, 2013; Arshad et al., 2014a; Mootoosamy and Mahomoodally, 2014; Paudyal and Singh, 2014; Vijayakumar et al., 2015a; Vijayakumar et al., 2015b; Altaf et al., 2017a). Common quail is used against bilious, control heartbeat, TB, joint pain, back bone pain, paralysis; while previous results showed that this species used for the following diseases as anemia, body weakness, skin diseases, sexual power, fever and enhance memory (Lohani, 2011; Vijayakumar et al., 2015a; Vijayakumar et al., 2015b; Altaf et al., 2017a). Oriental turtle dove is used against tongue problems in child, paralysis, enhance protein, and enhance power; while its previous record showed it is used for the treatment of maturity and impotency (Aloufi and Eid, 2016; Altaf et al., 2017a). Spotted dove is also used against for enhance protein, power, and paralysis; while its previous record showed that this species is used for the treatment maturity and impotency (Aloufi and Eid, 2016; Altaf et al., 2017a). Common hoopoe is used

against colic diarrhea, liver and bladder disease, enhance memory and eyes problem while its previous record showed that this species is used for the cure of gall bladder stone, kidney problems (Betlu, 2013; Altaf et al., 2017a). House sparrow is used against ptosis, heart, liver diseases, protein, paralysis and sexual power while its previous record showed that this species is used for the cure of aphrodisiac, paralysis, impotency, allergy, constipation, weakness, fever, chickenpox, and delay dentition (Lohani, 2011; Betlu, 2013; Arshad et al., 2014a; Bagde and Jain, 2015; Vijayakumar et al., 2015b; Aloufi and Eid, 2016; Altaf et al., 2017a). Little egret is used against for enhance memory, epilepsy, blood diseases; while its previous record showed that this species is used to cure asthma, body strength, breathing trouble, immune enhancer (Vijayakumar et al., 2015a; Vijayakumar et al., 2015b) Bone of streaked laughingthrush is used for osteoporosis; while its previous record showed that this species is used to cure Paralysis, flue and fever (Hakeem et al., 2017).

During the survey recorded following species which having medicinal uses; are recorded first time and having zero similarity Index i.e. snow partridge, western tragopan, common quail, rain quail, Chukar partridge, grey francolin, koklas peasant, Himalayan monal, kalij pheasant, cattle egret, little egret, white-rumped vulture, golden eagle, common pigeon, hill pigeon, Oriental turtle dove, spotted dove, Alexander parakeet, Asian koel, Oriental Scopus owl, house crow, great tit, Asian house martin, barn swallow, streaked laughingthrush, common myna, house sparrow, russet sparrow, grey wagtail, white wagtail and citrine wagtail. Only 3 species i.e. house sparrow has similarity index as; 0.23 common hoopoe as; 0.2 and Black francolin as; 0.50.

The inhabitants of the study area use fat, skin, and meat for various purposes. These include treating skin diseases, joint pains, burning, body swelling, and even as a sex enhancer. It has been suggested that the omega-3 fatty acid found in fat may have anti-inflammatory properties, making it potentially useful for treating human ailments (Wilson, 2015). In addition to its potential benefits for inflammation, this compound has also been linked to neurological disorders, atherosclerosis, thrombotic conditions, and aging effects (Breteler, 2000; Kalmijn, 2000; Haag, 2003). The high lipid, mineral, protein, and vitamin content of milk may explain its potential health benefits. These include strengthening the body, reducing joint pain, and even increasing sexual potency (Hemme et al., 2010; Alabdulkarim, 2012; Sabahelkhier et al., 2012; Contarini and Povolo, 2013; Vats and Thomas, 2015).

STUDY OF FOLK THERAPY

The ethnopharmacological data was analyzed using PCA, which considered seven variables: MED (Medicinal use), SPST (Superstitious), EXP (Export), FD (Food), PU (Product Use), MGC (Magic), and FC (Frequency of Citation). Our results clearly indicate that local residents primarily use bird species for Folklore and ethnomedicine (Figure 6). Earlier studies have also shown that birds are utilized as a food source in various regions of earth, such as India (Jaroli et al., 2010b; Chinlampianga et al., 2013), Pakistan (Arshad et al., 2014b; Altaf et al., 2017b), Philippines (Ploeg and Weerd, 2010), and Brazil (Alves et al., 2013; Teixeira et al., 2014). However, statistical analysis plays a central role in cultural studies as it provides valuable information for ethnomedicine and nanomedicine research.

Avian species are commonly used to treat various human ailments in Haveli, Azad Jammu and Kashmir, Pakistan. This reflects the extensive knowledge and control that people in this area have over their healthcare system, as well as the continued importance of traditional pharmacological practices in their culture. The prevalence and distribution of these avian species in the study area likely contribute to their high usage. Additionally, the use of traditional medicine for treating different ailments is associated with high RFC, RPL, and FL (Kayani et al., 2014; Amjad et al., 2017; Farooq et al., 2019).

In this particular study, the mallard (*Anas platyrhynchos*) was found to be the most popular avian species in Haveli, Azad Jammu and Kashmir, Pakistan, with a high FL of 100%. This indicates that the by-products of this species are widely available and extensively used for cancer treatment (Table 2). Another study by Altaf et al. (2018b) reported that the wild duck (*Anas platyrhynchos*) is used by local communities in Punjab, Pakistan, for treating cancer.

Bile is an old remedy method that is “bitter” in taste and cold in character. It enters the meridian of the liver, gallbladder, and heart, relieving toxicity, clearing heat, stopping endogenous wind and clearing away hepatic problems (Chen et al., 2012; Feng and Jia, 2015). Modern pharmacological investigations have also recommended that “bear bile” has a variety of “pharmacological properties”, including “antiviral”, “antibacterial”, “anti-inflammation”, “hypolipidemic”, “anti-gallstones” and “hepatoprotection” (Fu and Fan, 2014; Zhao et al., 2015). Bile of different species i.e. Bear (*Ursus* sp.), Indian Flap-shelled Turtle (*Lissemys punctata*), Common warthog (*Phacochoerus africanus*), Porcupine (*Hystrix* spp.), Spotted hyna (*Crocuta crocuta*), Gazelle (*Gazella* spp.), Olive baboon (*Papio anubis*), Elephant (*Elephas maximus*) and Common fox (*Canis* spp.) used to treat Pulmonary problems, AIDS, Diabetes, Erythroblastosis, Kidney failure, Syphilis (Yeshi et al., 2017; Altaf et al., 2018b; Kendie et al., 2018; Haq et al., 2020).

The study analyzed the FL (100%) of two avian species, specifically the white-rumped vulture and great tit. It is worth noting that avian species with 100% FL are commonly used in the folklore healing system in Haveli (Srithi et al., 2009; Bibi et al., 2014). Among all bird species, four were found to be particularly popular among respondents: Black Francolin, common pigeon, Oriental turtle dove, and spotted Dove. These species also had the highest "RPL" value, which is 1.00. These avian taxa's appeal can be due to their widespread range, variety, and awareness within the studied population. This supports their usage in ethnopharmacological applications, as stated by various ethnobiologists (Friedman et al., 1986; Ali-Shtayeh et al., 2000). Avian species with high RPL and FL values highlight their significance, indicating the necessity for additional pharmacological testing to determine the potential for therapy and screen for unidentified bioactive compounds.

AVIAN CONSERVATION

To design and integrate effective biodiversity conservation plans, it is essential to have a deep understanding of human-avian interaction and the usage of resources (Albuquerque and de Sousa, 2016). One valuable approach for developing strategies to sustainably manage and conserve bio-resources is to document indigenous knowledge regarding animal-based medicines (Borah and Prasad, 2017).

Ethnoornithological research studies not only incorporate ecological variables and ancestral beliefs about the curative properties of species in an area, but also consider the economical, customary, and religious beliefs of species of animals in human societies, thereby contributing significantly to the preservation of animals (Alves, 2012). Threats to the diversity of birds go beyond their use in traditional therapies and cultural practices. Climate change and ecosystem interactions, such as food chains and food webs, also contribute significantly to the decline in bird populations and diversity (Alves, 2012; Alves et al., 2018). Considering how important it is to identify answers to the present decline in biodiversity crisis, especially among species of birds (Boivin et al., 2016), it is vital to implement broad policies that tackle the issue in every aspect. Ethnozoology develops as a multidisciplinary approach for resolving this problem (Dickman, 2010).

NOVELTY OF THE RESEARCH

This research provides the first list of all accessible data on ethno-cultural and ethno-medicinal avian species in Haveli, Azad Jammu and Kashmir, Pakistan, and provides the first records of avian species, their traditional uses, and ethno-pharmacological applications of avian species. Ethno-pharmacological and ethno-cultural data provide the baseline data for further evaluation and production of novel drugs. These data provide knowledge about "human-animal conflict" and "interaction" (Albuquerque and de Sousa, 2016). Traditional studies and research also cover the "economic," "religion," "cultural," and "social" characteristics of birds in human communities (Alves, 2012; Altaf, 2016). This work is an invaluable resource that provides information about folklore and the traditional uses of avian species for therapeutic purposes. The data collected is unique, as there are no previous records available for these species. In total, we discovered that 31 avian species have a "similarity index" of 0.00. However, there are only 3 species that have a similarity index greater than zero: the house sparrow with a similarity index of 0.23, the common hoopoe with a similarity index of 0.2, and the black francolin with a similarity index of 0.50. In the present study used to treat measles, constipation, allergy, chickenpox, liver, bladder problems, enhance eyesight, colic diarrhea, bronchitis and osteoporosis. While in reported use, this species was used to Bronchitis (Arshad et al., 2014a), Gall bladder stone, kidney problems (Betlu, 2013; Altaf et al., 2017a), Increase sexual desire, impotency, gas trouble, constipation, Chickenpox, aphrodisiac, weakness, delay dentition, allergy, paralysis, and fever (Lohani, 2011; Betlu, 2013; Arshad et al., 2014a; Bagde and Jain, 2015; Vijayakumar et al., 2015b; Aloufi and Eid, 2016; Altaf et al., 2017a)

CONCLUSION

In Haveli, Azad Jammu and Kashmir, Pakistan, the local inhabitants have relied on 34 different avian species for the healing of sicknesses. The data we have collected reveals that many of these medicinal avian species are commonly used by the local communities. Despite the presence of other healthcare options, the native people of Haveli, Azad Jammu and Kashmir, Pakistan still place their trust in traditional medicine, recognizing the significant value of these avian species in healing of sicknesses. The data also indicates that popular avian species, with high FC, FL, RPL,

and ROP values, are particularly preferred for specific ailments. These findings can be used to promote the sustainable usage of avian species within the folklore healing system. However, the diversity of avian species in the area faces major threats from hunting, trading, and cultural practices. If unchecked, these threats will inevitably lead to the extinction of these species. Therefore, urgent conservation measures must be implemented to protect and sustainably utilize these medicinal avian species. The involvement of concerned authorities, academia, and conservation managers is crucial in addressing this issue.

REFERENCES

Alabdulkarim, B. 2012. Effect of camel milk on blood glucose, cholesterol, triglyceride and liver enzymes activities in female Albino rats. World Applied Sciences Journal. 17: 1394-1397.

Albuquerque, U. P., and D. C. P. de Sousa. 2016. Ethnobiology and Biodiversity Conservation Introduction to ethnobiology. p 227-232. Springer.

Alexiades, M. N., and J. W. Sheldon. 1996. Selected guidelines for ethnobotanical research: A Field Manual. The New York Botanical Garden, Boranx, NY.

Ali-Shtayeh, M. S., Z. Yaniv, and J. Mahajna. 2000. Ethnobotanical survey in the Palestinian area: a classification of the healing potential of medicinal plants. Journal of Ethnopharmacology. 73: 221-232.

Ali, A., M. Altaf, M. S. H. Khan, A. M. Khan, S. Ashraf, and S. A. Chattha. 2017. Avifauna diversity along the coastline of Banbhore (Gharo creek), district Thatta, Sindh, Pakistan. Journal of Wildlife and Ecology. 1: 8-16.

Ali, A., M. S. H. Khan, and M. Altaf. 2018. Winter survey of birds at district of the Badin, Pakistan. Journal of Wildlife and Ecology. 2: 11-22.

Ali, A., M. S. H. Khan, and M. Altaf. 2020. Analysis of anthropogenic activities on avian diversity along the coastal landscape of Sindh, Pakistan Journal of Wildlife and Ecology. 4: 94-110.

Alonso-Castro, A. J., C. Carranza-Álvarez, J. J. Maldonado-Miranda, M. del Rosario Jacobo-Salcedo, D. A. Quezada-Rivera, H. Lorenzo-Márquez, L. A. Figueroa-Zúñiga, C. Fernández-Galicia, N. A. Ríos-Reyes, and M. Á. de León-Rubio. 2011. Zootherapeutic practices in Aquismón, San Luis Potosí, México. Journal of ethnopharmacology. 138: 233-237.

Aloufi, A., and E. Eid. 2016. Zootherapy: A study from the northwestern region of the kingdom of Saudi Arabia and hashemite kingdom of Jordan. Ind J Trad Knowledge. 15: 561-569.

Altaf, M. 2016. Assessment of Avian and Mammalian Diversity at Selected Sites along river Chenab., University of Veterinary and Animal Sciences, Lahore, Pakistan.

Altaf, M., A. Javid, A. M. Khan, M. Khan, M. Umair, and Z. Ali. 2018a. Anthropogenic impact on the distribution of the birds in the tropical thorn forest, Punjab, Pakistan. Journal of Asia-Pacific Biodiversity. 11: 229-236.

Altaf, M., A. Javid, A. M. Khan, M. Umair, Irfan, S. Ashraf, M. Idnan, M. S. Haider, and Z. Ali. 2015. Assessment of water fowl diversity of River Chenab, Pakistan. The Journal of Animal & Plant Sciences. 25: 382-388.

Altaf, M., A. Javid, M. Umair, K. J. Iqbal, Z. Rasheed, and A. M. Abbasi. 2017a. Ethnomedicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab-Pakistan. Journal of ethnobiology and ethnomedicine. 13: 1-24.

Altaf, M., A. Javid, M. Umair, K. J. Iqbal, Z. Rasheed, and A. M. Abbasi. 2017b. Ethnomedicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab-Pakistan. Journal of Ethnobiology and Ethnomedicine. 13: 41.

Altaf, M., M. Umair, A. R. Abbasi, N. Muhammad, and A. M. Abbasi. 2018b. Ethnomedicinal applications of animal species by the local communities of Punjab, Pakistan. Journal of ethnobiology and ethnomedicine. 14: 55.

Alves, R. R. 2012. Relationships between fauna and people and the role of ethnozoology in animal conservation. Ethnobiology and Conservation. 1: 1-69.

Alves, R. R., and H. N. Alves. 2011. The faunal drugstore: Animal-based remedies used in traditional medicines in Latin America. Journal of ethnobiology and ethnomedicine. 7: 9.

Alves, R. R., I. L. Rosa, N. A. L. Neto, and R. Voeks. 2012a. Animals for the gods: magical and religious faunal use and trade in Brazil. Human Ecology. 40: 751-780.

Alves, R. R. N., R. C. L. Leite, W. M. S. Souto, D. M. M. Bezerra, and A. Loures-Ribeiro. 2013. Ethno-ornithology and conservation of wild birds in the semi-arid Caatinga of northeastern Brazil. Journal of Ethnobiology and Ethnomedicine. 9: 14 - 14.

Alves, R. R. N., R. O. S. Neta, D. Trovão, J. Barbosa, A. T. Barros, and T. L. P. Dias. 2012b. Traditional uses of medicinal animals in the semi-arid region of northeastern Brazil. J Ethnobiol Ethnomed. 8: 4269-4268.

Alves, R. R. N., J. S. Silva, L. da Silva Chaves, and U. P. Albuquerque. 2018. Ethnozoology and animal conservation Ethnozoology. p 481-496. Elsevier.

Amjad, M. S., M. F. Qaseem, I. Ahmad, S. U. Khan, S. K. Chaudhari, N. Zahid Malik, H. Shaheen, and A. M. Khan. 2017. Correction: Descriptive study of plant resources in the context of the ethnomedicinal relevance of indigenous flora: A case study from Toli Peer National Park, Azad Jammu and Kashmir, Pakistan. PloS One. 12: e0180917.

Amjad, M. S., U. Zahoor, R. W. Bussmann, M. Altaf, S. M. H. Gardazi, and A. M. Abbasi. 2020. Ethnobotanical survey of the medicinal flora of Harighal, Azad Jammu & Kashmir, Pakistan. Journal of Ethnobiology and Ethnomedicine. 16: 1-28.

Arshad, M., M. Ahmad, E. Ahmed, A. Saboor, A. Abbas, and S. Sadiq. 2014a. An ethnobiological study in Kala Chitta hills of Pothwar region, Pakistan: multinomial logit specification. J Ethnobiol Ethnomed. 10: 13.

Arshad, M. N., M. Ahmad, E. Ahmed, A. Saboor, A. Abbas, and S. Sadiq. 2014b. An ethnobiological study in Kala Chitta hills of Pothwar region, Pakistan: multinomial logit specification. Journal of Ethnobiology and Ethnomedicine. 10: 13 - 13.

Ashraf, S., S. Kanwal, M. S. Haider, and M. Altaf. 2018. Diversity of birds in rural and urban habitats of district Sargodha, Pakistan. Journal of Wildlife and Ecology. 2: 26-36.

Ashraf, S., A. Riaz, and N. Muhammad. 2019. Assessments of avian diversity of Uchhali lake, Pakistan. Journal of Wildlife and Ecology. 3: 8-15.

Bagde, N., and S. Jain. 2013. An ethnozoological studies and medicinal values of vertebrate origin in the adjoining areas of Pench National Park of Chhindwara District of Madhya Pradesh, India. International Journal of life sciences. 1 278-283.

Bagde, N., and S. Jain. 2015. Study of Traditional Man-Animal Relationship in Chhindwara District of Madhya Pradesh, India. Journal of Global Biosciences. 4: 1456-1463.

Benarjee, G., K. Srikanth, G. Ramu, and K. Ramulua. 2010. Ethnozoological study in a tropical wildlife sanctuary of Eturunagaram in the Warangal district, Andhra Pradesh. Ind J Trad Knowledge. 9: 701-704.

Betlu, A. L. S. 2013. Indigenous knowledge of zootherapeutic use among the Biate tribe of Dima Hasao District, Assam, Northeastern India. Journal of ethnobiology and ethnomedicine. 9: 1-16.

Bezerra, D. M. M., H. Araújo, A. Alves, and R. R. N. Alves. 2013. Birds and people in semiarid northeastern Brazil: symbolic and medicinal relationships. Journal of ethnobiology and ethnomedicine. 9: 1-12.

Bibi, T., M. Ahmad, R. B. Tareen, N. M. Tareen, R. Jabeen, S.-U. Rehman, S. Sultana, M. Zafar, and G. Yaseen. 2014. Ethnobotany of medicinal plants in district Mastung of Balochistan province-Pakistan. Journal of ethnopharmacology. 157: 79-89.

Boivin, N. L., M. A. Ze De R, D. Q. Fuller, A. Crowther, G. Larson, J. M. Erlandson, T. De Nham, and M. Petraglia. 2016. Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species distributions. Proceedings of the National Academy of Sciences of the United States of America. 113: 6388.

Borah, M. P., and S. B. Prasad. 2017. Ethnozoological study of animals based medicine used by traditional healers and indigenous inhabitants in the adjoining areas of Gibbon Wildlife Sanctuary, Assam, India. Journal of Ethnobiology & Ethnomedicine. 13.

Breteler, M. M. 2000. Vascular risk factors for Alzheimer's disease:: An epidemiologic perspective. Neurobiology of aging. 21: 153-160.

Chakravorty, J., V. B. Meyer-Rochow, and S. Ghosh. 2011. Vertebrates used for medicinal purposes by members of the Nyishi and Galo tribes in Arunachal Pradesh (North-East India). Journal of ethnobiology and ethnomedicine. 7: 1.

Chen, Y., H. Xue, and C. Zhou. 2012. Research of rare animal medicine bear gall. Chinese Journal of New Drugs. 21: 952-968.

Chinlampianga, M., R. Singh, A. C. Shukla, and C. Soil. 2013. Ethnozoological Diversity of Northeast India: Empirical Learning with Traditional Knowledge Holders of Mizoram and Arunachal Pradesh

Contarini, G., and M. Povolo. 2013. Phospholipids in milk fat: composition, biological and technological significance, and analytical strategies. International journal of molecular sciences. 14: 2808-2831.

Del Hoyo, J., A. Elliott, and J. Sargatal. 1992. Handbook of the birds of the world. Lynx edicions Barcelona.

Dickman, A. J. 2010. Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. Animal Conservation. 13: 458-466.

Easthope, G. 1995. Ethnicity and Health. In: N. J. Macmillan, Lupton G (ed.) Sociology of health and illness: Australian readings. p 143-161, Sydney, Australia.

Farooq, A., M. S. Amjad, K. Ahmad, M. Altaf, M. Umair, and A. M. Abbasi. 2019. Ethnomedicinal knowledge of the rural communities of Dhirkot, Azad Jammu and Kashmir, Pakistan. Journal of ethnobiology and ethnomedicine. 15: 1-30.

Feng, Z., and J. Jia. 2015. Medicinal use and substitution of bear gallbladder. Journal of Anhui Agricultural Science. 43: 150-152.

Friedman, J., Z. Yaniv, A. Dafni, and D. Palewitch. 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. Journal of ethnopharmacology. 16: 275-287.

Fu, S., and J. Fan. 2014. Protective effects and mechanism of bear bile powder on H2O2-induced apoptosis in PC12 cells. China Journal of Traditional Chinese Medicine and Pharmacy. 29: 55-59.

Grimmett, R., Inskipp, C. & Inskip, T. 1998. Birds of the Indian subcontinent. Christopher Helm an imprint of A and C Black (Publisher) Ltd, 35 Bedford Row, London WCIR 4JH.

Gu, Z., L. Gu, R. Eils, M. Schlesner, and B. Brors. 2014. circlize implements and enhances circular visualization in R. Bioinformatics. 30: 2811-2812.

Haag, M. 2003. Essential fatty acids and the brain. The Canadian Journal of Psychiatry. 48: 195-203.

Hakeem, F., M. Altaf, S. Manzoor, K. Rauf, B. Mumtaz, M. Bashir, R. Haider, S. I. Farooq, L. Safdar, and M. Altaf. 2017. Assessment of behavioral study, human activities impacts and interaction with Streak laughingthrush (*Trochalopteron lineatum*) in district Bagh, Azad Jammu and Kashmir-Pakistan. Journal of Wildlife and Ecology. 1: 1-7.

Hammer, Ø., D. Harper, and P. Ryan. 2001. Paleontological statistics software: package for education and data analysis. Palaeontologia Electronica. 1: 9.

Haq, S. M., E. S. Calixto, U. Yaqoob, R. Ahmed, A. H. Mahmoud, R. W. Bussmann, O. B. Mohammed, K. Ahmad, and A. M. Abbasi. 2020. Traditional Usage of Wild Fauna among the Local Inhabitants of Ladakh, Trans-Himalayan Region. Animals. 10: 2317.

Hemme, T., J. Otte, R. Echeverri Perico, R. Paarlberg, I. Walker, H. Pino, D. Horton, J. Polanía Vorenberg, J. Toro Calderón, and C. López Balmaceda. 2010. Status and prospects for smallholder milk production. A global perspective. FAO, Roma (Italia).

Jacobo-Salcedoa, M. R., A. J. Alonso-Castro, and A. Zarate-Martinez. 2011. Folk medicinal use of fauna in Mapimi, Durango, México. Journal of ethnopharmacology. 133: 902–906.

Jadoon, A., S. Bibi, and A. Rehman. 2019. Birds' population in district Haripur, Khyber Pakhtunkhwa, Pakistan. Journal of Wildlife and Ecology. 3: 18-25.

Jaroli, D., M. M. Mahawar, and N. Vyas. 2010a. An ethnozoological study in the adjoining areas of Mount Abu wildlife sanctuary, India. Journal of ethnobiology and ethnomedicine. 6: 6.

Jaroli, D. P., M. M. Mahawar, and N. J. Vyas. 2010b. An ethnozoological study in the adjoining areas of Mount Abu wildlife sanctuary, India. Journal of ethnobiology and ethnomedicine. 6: 6 - 6.

Kalmijn, S. 2000. Fatty acid intake and the risk of dementia and cognitive decline: a review of clinical and epidemiological studies. Journal of Nutrition Health. Aging. 4: 202-207.

Kayani, S., M. Ahmad, M. Zafar, S. Sultana, M. P. Z. Khan, M. A. Ashraf, J. Hussain, and G. Yaseen. 2014. Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies–Abbottabad, Northern Pakistan. Journal of ethnopharmacology. 156: 47-60.

Kayode, J., and M. A. Omotoyinbo. 2009. Ethnobotanical utilization and conservation of chewing sticks plants species in Ekiti state, Nigeria. Research Journal of Botany. 4: 1-9.

Kendie, F. A., S. A. Mekuriaw, and M. A. Dagnew. 2018. Ethnozoological study of traditional medicinal appreciation of animals and their products among the indigenous people of Metema Woreda, North-Western Ethiopia. Journal of ethnobiology and ethnomedicine. 14: 37.

Lohani, U. 2011. Traditional uses of animals among jirels of Central Nepal. Ethno Med. 5: 115-124.

Mirza, Z. B., and H. Wasiq. 2007. A field guide to birds of Pakistan Bookland, Lahore.

Mootoosamy, A., and M. F. Mahomoodally. 2014. A quantitative ethnozoological assessment of traditionally used animal-based therapies in the tropical island of Mauritius. Journal of ethnopharmacology. 154: 847-857.

Mughal, S., M. Pervaz, S. M. Bashir, and S. S. Shamashad. 2020. Assessment of diversity and ethnopharmacological uses of birds in Chakar, Hattian Bala district, Azad Jammu and Kashmir -Pakistan. Journal of Wildlife and Ecology. 4: 35-44.

Mussarat, S., R. Ali, S. Ali, R. A. Mothana, R. Ullah, and M. Adnan. 2021. Medicinal animals and plants as alternative and complementary medicines in southern regions of Khyber Pakhtunkhwa, Pakistan. Frontiers in Pharmacology. 1764.

Nolan, J. M., and N. J. Turner. 2011. Ethnobotany: The study of people-plant relationships. Ethnobiology. 9: 135-141.

Paudyal, R., and N. B. Singh. 2014. Ethno-medicinal Uses of Animals and Plants among the Migratory Tangbetons of Pokhara, Nepal. Journal of Institute of Science and Technology,. 19: 145-149.

Ploeg, J. v. d., and M. v. Weerd. 2010. Agta bird names : an ethno-ornithological survey in the Northern Sierra Madre Natural Park, Philippines. Forktail. 26: 127-131.

Roberts, T. J. 1991. The Birds of Pakistan Oxford University Press, Karachi

Roberts, T. J. 1992. The Birds of Pakistan. Oxford University Press, Karachi.

Sabahelkhier, M., M. Faten, and F. Omer. 2012. Comparative Determination of Biochemical Constituents between Animals (Goat, Sheep, Cow and Camel) Milk with Human Milk. Research Journal of Recent Sciences. 1: 69-71.

Srithi, K., H. Balslev, P. Wangpakapattanawong, P. Srisanga, and C. Trisonthi. 2009. Medicinal plant knowledge and its erosion among the Mien (Yao) in northern Thailand. Journal of ethnopharmacology. 123: 335-342.

Teixeira, P. H. R., T. d. N. Thel, J. M. R. Ferreira, S. M. de Azevedo, W. R. T. Júnior, and R. M. Lyra-Neves. 2014. Local knowledge and exploitation of the avian fauna by a rural community in the semi-arid zone of northeastern Brazil. Journal of Ethnobiology and Ethnomedicine. 10.

Umair, M., M. Altaf, and A. M. Abbasi. 2017. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. PloS one. 12: e0177912.

Vats, R., and S. Thomas. 2015. A study on use of animals as traditional medicine by Sukuma Tribe of Busega District in North-western Tanzania. Journal of ethnobiology and ethnomedicine. 11: 1-11.

Vijayakumar, S., S. Prabhu, J. M. Yabesh, and R. Prakashraj. 2015a. A quantitative ethnozoological study of traditionally used animals in Pachamalai hills of Tamil Nadu, India. Journal of ethnopharmacology.

Vijayakumar, S., J. M. Yabesh, S. Prabhu, M. Ayyanar, and R. Damodaran. 2015b. Ethnozoological study of animals used by traditional healers in Silent Valley of Kerala, India. Journal of ethnopharmacology. 162: 296-305.

Wanjohi, B. K., V. Sudoi, E. W. Njenga, and W. K. Kipkore. 2020. An ethnobotanical study of traditional knowledge and uses of medicinal wild plants among the Marakwet Community in Kenya. Evidence-Based Complementary and Alternative Medicine. 2020.

Wilson, L. 2015. Fats and oils for optimum health. The Center for Development.

Yeshi, K., P. Morisco, and P. Wangchuk. 2017. Animal-derived natural products of Sowa Riga medicine: Their pharmacopoeial description, current utilization and zoological identification. Journal of ethnopharmacology. 207: 192-202.

Zhao, J.-y., W. Lin, Q.-c. Zhuang, X.-y. Zhong, J. Peng, and Z.-F. Hong. 2015. Bear bile powder inhibits angiogenesis in vivo and in vitro. Chinese journal of integrative medicine. 21: 369-375.

Table 1: Cultural uses of avian fauna of district Haveli, Azad Jammu and Kashmir.

Sr.	Common name	Scientific name (Species Authority)	Local name	Code	Dist.	Status	MED	SPST	FD	EXP	PU	MGC	FC
1	Snow Partridge	*Lerwa lerwa*	Barfani Titri	SPE	R	LC	8	0	8	7	3	0	8
2	Tibetan Snowcock	*Tetraogallus tebitanus*		TSK	R	LC	0	0	0	0	3	0	4
3	Westarn Tragopan	*Tragopan melanocephalis*	Rattgalla	WTN	R	LC	3	0	2	2	3	0	3
4	Common Quail	*Coturnix coturnix*	Btair	CQL	PV	LC	6	4	3	1	3	0	6
5	Rain Quail	*Coturnix japonica*	Haum	RQL	SV	LC	2	0	2	2	2	0	2
6	Chukar Partridge	*Alectoris chkar*	Chukor	CPE	R	LC	12	0	11	9	3	0	12
7	Black francolin	*Francolinus francolinus*	Kala Teetar	BFN	R	LC	19	0	7	3	3	0	19
8	Grey Francolin	*Francolinus pondicerianus*	Bhoora Teetar	GFN	R	LC	7	0	7	3	3	0	7
9	Cheer Pheasant	*Catreus wallichii*		CPT	R	VU	0	0	1	1	3	0	5
10	Koklas Peasant	*Pucrasia macrolopha*	Baiger	KPT	R	LC	4	0	4	0	3	0	4
11	Himalayan Monal	*Lophophorus impejanus*	Lainth	HML	R	LC	22	22	14	8	3	0	22
12	Kalij Pheasant	*Lophura leucophura*	Bankukar	KPT	R	LC	13	0	11	12	3	0	13
13	Cattle Egret	*Bubulcus ibis*	Raiyarro	CE	R	LC	4	3	3	0	3	0	4
14	Little Egret	*Egretta garzetta*	Hanj	SE	R	LC	4	2	2	4	3	0	4
15	Indian Pond heron	*Ardeola grayii*		IPH	R	LC	0	0	0	0	3	0	5
16	Common Kestrel	*Falco naumanni*		CKL	R	LC	0	0	0	0	3	0	7
17	Peregrine Falcon	*Falco peregrinus*		PFN	WV	LC	0	6	0	10	3	0	10
18	Black Kite	*Milvus migrans*		BKE	R	LC	0	0	0	0	3	0	9
19	Griffon Vulture	*Gyps fulvus*		GVT	R	LC	0	13	0	0	3	0	13
20	White-rumped Vulture	*Neophron percnopterus*	Gidh	WRV	R	C.R	3	2	0	0	3	0	3
21	Himalayan Vulture	*Gyps himalayensis*	Cheel	HVE	R	N.T	0	0	0	0	3	0	4
22	Shikra	*Accipiter badius*	Baaz	SKR	SV	LC	0	4	0	6	3	0	6
23	Eurasian Sparrow-hawk	*Accipiter nisus*	Baaz	ESHK	R	LC	0	0	0	0	3	0	3
24	Northern Goshawk	*Accipiter gentilis*	Baaz	NGH	WV	LC	0	0	0	0	3	0	4
25	Himalayan Buzzard	*Butastur refectus*	Baaz	HB	WV	LC	0	0	0	0	3	0	5
26	Long -legged Buzzard	*Henicopernis longicauda*	Baaz	LLB	WV	LC	0	0	0	0	3	0	4

27	Golden Eagle	*Aquila Chrysaetos*	Baz	GEE	R	LC	7	2	0	2	3	0	7
28	Northern Lapwing	*Vanellus vanellus*		NLG	WV	LC	0	0	0	0	3	0	4
29	Yellow-wattled Lapwing	*Vanellus indicus*		YWL	R	LC	0	0	0	0	3	0	7
30	Common Pigeon	*Columba livia*	Kabootar	CP	R	LC	29	6	22	24	3	0	29
31	Hill Pigeon	*Columba rupestris*	Jangli kalbootar	HPN	R	LC	1	3	3	0	3	0	4
32	Oriental Turtle Dove	*Streptopelia orientalis*	Kogath	OTD	SV	LC	24	1	18	0	3	0	24
33	Spotted Dove	*Spilopelia chinensis*	Kamerri	SD	SV	LC	19	3	8	0	3	0	19
34	Alexander Parakeet	*Psittacula eupatria*	Totta	AP	R	LC	8	1	0	9	3	0	8
35	Rose-ringed Parakeet	*Psittacula krameri*	Totta	RRP	R	LC	0	1	0	9	3	0	23
36	Eurasian Cuckoo	*Cuculus canorus*	Cuckoo	EC	SV	LC	0	0	0	0	3	0	13
37	Himalayan Cuckoo	*Cuculus saturates*	Kal cheat	HCO	SV	LC	0	2	0	0	3	0	12
38	Asian Koel	*Eudynamys scolopaceus*	Koel	AK	SV	LC	2	1	0	0	1	0	2
39	Oriental Scopus Owl	*Otus sunia*	Ullo	OSO	R	LC	6	3	0	2	3	4	6
40	Asian Barred Owlet	*Glaucidium cuculoides*		ABO	R	LC	0	4	0	0	3	3	12
41	Spotted Owlet	*Strix occidentalis*	Mortan	SO	R	LC	0	7	0	0	3	5	7
42	Alpine Swift	*Tachymarptis melba*		AS	SV	LC	0	0	0	0	3	0	6
43	Common Swift	*Apus apus*		CST	SV	LC	0	0	0	0	3	0	6
44	Little Swift	*Apus affinis*		LST	SV	LC	0	0	0	0	3	0	3
45	Common Hoopoe	*Upupa epops*	Mahiya	CH	SV	LC	17	2	3	0	3	0	17
46	Indian Roller	*Coracias benghalensis*		IR	SV	LC	0	0	0	0	3	0	4
47	White -throated Kingfisher	*Todiramphus godeffroyi*		WTKF	R	LC	0	0	0	0	3	0	5
48	Indian Grey Hornbill	*Ocyceros birostris*		IGHB	R	LC	0	0	0	0	3	0	4
49	Great Barbet	*Psilopogon virens*	Peon	GB	R	LC	0	0	0	0	3	0	7
50	Blue-throat Barbet	*Psilopogon asiaticus*		BTB	R	LC	0	0	0	0	3	0	6
51	Eurasian Wryneck	*Jynx torquilla*		EUW	SV	LC	0	0	0	0	3	0	4
52	Brown-fronted Woodpecker	*Dendrocopos hyperythrus*	Thokthuka	BFW	R	LC	0	0	0	0	3	0	5
53	Himalayan Woodpecker	*Dendrocopos himalayensis*		HW	R	LC	0	0	0	0	3	0	4
54	Scaly-bellied Woodpecker	*Picus squamatus*		SBWP	R	LC	0	0	0	0	3	0	3

55	Long-tailed Minivet	*Pericrocotus ethologus*		LTM	SV	LC	0	0	0	0	3	0	4
56	Common Woodshrike	*Tephrodornis pondicerianus*		CWS	R	LC	0	0	0	0	3	0	3
57	Bay-backed Shrike	*Lanius vittatus*		BBS	R	LC	0	0	0	0	3	0	3
58	Long tailed Shrike	*Lanius schach*		LTS	SV	LC	0	0	0	0	3	0	5
59	Ashy Drongo	*Dicrurus leucophaeus*		ADO	SV	LC	0	1	0	0	3	0	11
60	Indian Golgen Oriole	*Oriolus kundoo*		IGO	SV	LC	0	0	0	0	3	0	3
61	White-throated Fantail Flycatcher	*Rhipidura albicollis*		WTFF	R	LC	0	0	0	0	3	0	7
62	Asian Paradise-flycatcher	*Macropodus opercularis*	Dhoodchakh	APF	SV	LC	0	0	0	0	3	0	8
63	Eurasian Jay	*Garrulus glandarius*		EUJ	R	LC	0	0	0	0	3	0	4
64	Yellow- billed Blue Magpie	*Urocissa flavirostris*	Chanjyara	YBBM	R	LC	0	21	0	0	3	0	21
65	Rafous Treepie	*Dendrocitta vagabunda*		RTP	R	LC	0	0	0	0	3	0	3
66	Large-billed Crow	*Corvus macrorhynchos*	Kank	LBC	R	LC	0	0	0	0	3	0	4
67	House Crow	*Corvus splendens*	Kagh	HC	R	LC	5	3	0	0	3	3	5
68	Red -billed Chough	*Corcorax melanorhamphos*		RBC	R	LC	0	0	0	0	3	0	6
69	Alpine Chough	*Pyrrhocorax graculus*		AC	R	LC	0	0	0	0	3	0	6
70	Great Tit	*Parus major*		GTT	SV	LC	4	0	0	0	3	0	4
71	Black-throated Tit	*Aegithalos concinnus*		BTT	R	LC	0	0	0	0	3	0	5
72	Green-backed Tit	*Parus monticolus*		GBT	R	LC	0	0	0	0	3	0	4
73	Common House Martin	*Delichon urbicum*		CHM	SV	LC	0	0	0	0	3	0	3
74	Asian House Martin	*Delichon dasypus*		AHM	R	LC	7	0	0	0	3	0	7
75	Barn Swallow	*Hirundo rustica*		BSW	SV	LC	7	0	0	0	3	0	7
76	Oriental Skylark	*Alauda gulgula*		OSL	SV	LC	0	0	0	0	3	0	7
77	Himalayan Bulbul	*Pycnonotus leucogenys*	Bulbul	HB	R	LC	0	0	0	0	3	0	5
78	White-eared Bulbul	*Pycnonotus leucotis*	Bulbul	WEB	R	LC	0	0	0	0	3	0	8
79	Black Bulbul	*Hypsipetes leucocephalus*	Bulbul	BBL	R	LC	0	0	0	0	3	0	34
80	Red vented Bulbul	*Pycnonotus cafer*		RVB	R	LC	0	0	0	0	3	0	37
81	Striated Prinia	*Prinia crinigera*	Chirrri	SP	R	LC	0	0	0	0	3	0	3
82	Grey breasted Prinia	*Prinia hodgsonii*		GBP	R	LC	0	0	0	0	3	0	4

83	Brown-flanked Bush Warbler	*Horornis fortipes*		BFBW	SV	LC	0	0	0	0	3	0	3
84	Common Chiffchaff	*Phylloscopus collybita*		CCF	WV	LC	0	0	0	0	3	0	5
85	Tickell's Leaf Warbler	*Phylloscopus affinis*		TLW	SV	LC	0	0	0	0	3	0	3
86	Lemon-rumped Warbler	*Phylloscopus chloronotus*		LRW	SV	LC	0	0	0	0	3	0	4
87	Hume's Leaf Warbler	*Phylloscopus humei*		HLW	SV	LC	0	0	0	0	3	0	4
88	Greenish Warbler	*Phylloscopus trochiloides*		GIW	PV	LC	0	0	0	0	3	0	4
89	Large-billed Leaf Warbler	*Phylloscopus magnirostris*		LBLW	SV	LC	0	0	0	0	3	0	3
90	Variegated Laughingthrush	*Garrulax variegates*		VLT	R	LC	0	0	0	0	3	0	5
91	Streaked Laughingthrush	*Trochalopteron lineatum*	Sorri	SLTS	R	LC	27	2	6	0	3	0	27
92	Brown Dipper	*Cinclus pallasii*		BDR	R	LC	0	0	0	0	3	0	4
93	Oriental White-eye	*Zosterops palpebrosus*		OWE	R	LC	0	0	0	0	3	0	3
94	White-cheeeked Nuthatch	*Sitta leucopsis*		WCN	R	LC	0	0	0	0	3	0	4
95	Wallcreeper	*Tichodroma muraria*		WCR	WV	LC	0	0	0	0	3	0	5
96	Bar-tailed Treecreeper	*Certhua Himalayana*		BTTC	R	LC	0	0	0	0	3	0	3
97	Common Myna	*Acridotheres tristis*	Gotaari	CMA	R	LC	11	1	0	0	3	0	11
98	Blue Whistling Thrush	*Myophonus caeruleus*		BWT	SV	LC	0	0	0	0	3	0	5
99	Chestnut Thrush	*Turdus rubrocanus*		CNT	R	LC	0	0	0	0	3	0	5
100	Black-throated Thrush	*Turdus atrogularis*		BTT	WV	LC	0	0	0	0	3	0	6
101	White-capped Redstart	*Chaimarrornid leucocephalus*		WCR	R	LC	0	0	0	0	3	0	4
102	Blue-capped Redstart	*Phoenicurus coeruleocephala*		BCR		LC	0	0	0	0	3	0	5
103	Black Redstart	*Phoenicurus ochruros*		BRS	PV	LC	0	0	0	0	3	0	6
104	Himalayan blue-tail Robin	*Tarsiger rufilatus*		HBTR	R	LC	0	0	0	0	3	0	4
105	Little Forktail	*Enicurus scouleri*		LFT	R	LC	0	0	0	0	3	0	5
106	Spotted Forktail	*Enicurus maculatus*		SFT	R	LC	0	0	0	0	3	0	6
107	Common Stonechart	*Saxicola torquatus*		CSC	SV	LC	0	0	0	0	3	0	5
108	Pied Bushchat	*Saxicola caprata*		PBC	SV	LC	0	0	0	0	3	0	4
109	Grey Bushchat	*Saxicola ferreus*		GBC	R	LC	0	0	0	0	3	0	3

110	Blue Rock Thrush	*Monticola solitaries*		BRT	SV	LC	0	0	0	0	3	0	3
111	Chestnut-bellied Rock Thursh	*Monticola rufiventris*		CNBRT	PV	LC	0	0	0	0	3	0	3
112	Ultramarine Flycatcher	*Fecidula superciliaris*		UMFC	SV	LC	0	0	0	0	3	0	4
113	Verditer Flycatcher	*Eumyias thalassinus*		VFC	SV	LC	0	0	0	0	3	0	7
114	House Sparrow	*Passer domesticus*	Chirri	HSP	SV	LC	7	1	0	0	3	0	7
115	Russet Sparrow	*Passer cinnamomeus*	Chirri	RSP	R	LC	5	1	0	0	3	0	5
116	Scaly-breasted Munia	*Lonchura punctulata*		SBM	IR	LC	0	0	0	0	3	0	0
117	Alpine accentor	*Prunella collaris*		AAR	R	LC	0	0	0	0	3	0	3
118	Rufous-breasted Accentor	*Prunella Strophiata*		RBA	R	LC	0	0	0	0	3	0	3
119	Grey Wagtail	*Motacilla cinerea*		GWT	SV	LC	9	0	0	0	3	0	9
120	White Wagtail	*Motacilla alba*		WWT	SV	LC	9	0	0	0	5	0	9
121	Citrine Wagtail	*Motacilla citreola*		CWT	SV	LC	9	0	0	0	3	0	9
122	Rosy Pipit	*Anthus roseatus*		RPP	SV	LC	0	0	0	0	3	0	3
123	Tree Pipit	*Anthus trivialis*		TPP	PV	LC	0	0	0	0	3	0	4
124	Plain Mountain Finch	*Leucosticte nemoricola*		PMF	R	LC	0	0	0	0	3	0	4
125	European Goldfinch	*Carduelis carduelis*		EGF	SV	LC	0	0	0	0	3	0	4
126	Common Rosefinch	*Carpodacus erythrinus*		CRF	SV	LC	0	0	0	0	3	0	4
127	Rock Bunting	*Emberiza cia*		RBG	R	LC	0	0	0	0	3	0	7
128	Red Crossbill	*Loxia curvirostra*		RCB	R	LC	0	0	0	0	3	0	6
129	Blue throat	*Luscinia svecica*		BTT		LC	0	0	0	0	3	0	7
130	Grey-hodded Warbler	*Phylloscopus xanthoschistos*		GHW		LC	0	0	0	0	3	0	8
131	Tibetan Blackbird	*Turdus merula maximus*		TBB		LC	0	0	0	0	3	0	4
132	Oriental magpie Robin	*Copsychus saularis*		OMR		LC	0	0	0	0	3	0	9

Note: MED (Medicinal use), SPST (Superstitious), EXP (Export), FD (Food), PU (Product Use), MGC (Magic), FC (Frequency of Citation), R (resident), SV (spring visitor), WV (winter visitor), PV (passage visitor), LC (least concern), VU (Vulnerable), CR (Critically Endangered), NT (Near Threatened).

Table 2: Medicinal use of avian fauna of district Haveli, Azad Jammu Kashmir.

Sr.	Common name	PU	MA	Treatments	FC	IMA	FL	RPL	ROP	Reported Use	References	SI
1	Snow Partridge	Meat	Oral	Fever	8	3	37.50	0.42	15.79			0.00
2	Western Tragopan	Meat	Oral	Asthma and Pneumonia	3	1	33.33	0.16	5.26			0.00
3	Common Quail	Meat	Oral	Bilious, control heartbeat, TB, Joint pain, back bone pain and paralysis	6	4	66.67	0.32	21.05	Skin diseases, sexual power, fever, anemia, body weakness, enhance memory	(Lohani, 2011; Vijayakumar et al., 2015a; Vijayakumar et al., 2015b; Altaf et al., 2017a)	0.00
4	Rain Quail	Meat + Bones	Oral	Increase red blood cells	2	1	50.00	0.11	5.26			0.00
5	Chukar Partridge	Meat + Bones	Oral	Weakness	12	6	50.00	0.63	31.58			0.00
6	Black Francolin	Meat	Oral	Osteoporosis and bronchitis	19	2	10.53	1.00	10.53	Bronchitis	(Arshad et al., 2014a)	0.50
7	Grey Francolin	Meat	Oral	Weakness and dysentery	7	3	42.86	0.37	15.79			0.00
9	Koklas Peasant	Fat	Topical	Joints pain	4	1	25.00	0.21	5.26			0.00
10	Himalayan Monal	Meat	Oral	Weakness	22	8	36.36	1.00	36.36			0.00
11	Kalij Pheasant	Meat	Oral	Weakness, fever and nervous problem	13	6	46.15	0.68	31.58			0.00
12	Cattle Egret	Meat + Fat	Oral	Memory and Epilepsy	4	1	25.00	0.21	5.26			0.00
13	Little Egret	Meat + Fat	Oral	Memory and Epilepsy	4	1	25.00	0.21	5.26	Asthma, breathing trouble, immune enhancer and body strength	(Vijayakumar et al., 2015a; Vijayakumar et al., 2015b)	0.00
14	White-rumped Vulture	Bone	Oral	Stomach disorder, kidney problems and heart attack	3	3	100.00	0.16	15.79			0.00

15	Golden Eagle	Feather	Topical	Wound healing and purification of blood	7	4	57.14	0.37	21.05			0.00
16	Common Pigeon	Meat + Egg	Oral	Parkinson's disease, ptosis and tongue problem	29	18	62.07	1.00	62.07	Menorrhagia, puberty, paralysis, bronchitis, infertility, epilepsy, anemia, and abscess	(Benarjee et al., 2010; Jaroli et al., 2010a; Alonso-Castro et al., 2011; Chakravorty et al., 2011; Jacobo-Salcedoa et al., 2011; Bagde and Jain, 2013; Arshad et al., 2014a; Mootoosamy and Mahomoodally, 2014; Paudyal and Singh, 2014; Vijayakumar et al., 2015a; Vijayakumar et al., 2015b; Altaf et al., 2017a)	0.00
17	Hill Pigeon	Meat + Bones	Oral	Wound healing	4	1	25.00	0.21	5.26			0.00
18	Oriental Turtle Dove	Meat	Oral	Paralysis and enhance muscle power	24	9	37.50	1.00	37.50	Maturity, and impotency	(Aloufi and Eid, 2016; Altaf et al., 2017a)	0.00
19	Spotted Dove	Meat	Oral	Paralysis and enhance muscle power	19	9	47.37	1.00	47.37	Maturity, and impotency	(Aloufi and Eid, 2016; Altaf et al., 2017a)	0.00
20	Alexander Parakeet	Meat + Bones	Topical	enhance memory	8	2	25.00	0.42	10.53			0.00
21	Asian Koel	Meat	Oral	Spleen problem	2	1	50.00	0.11	5.26			0.00
22	Oriental Scopus Owl	Meat + Bones	Oral	Whooping cough and epileptic disease	6	2	33.33	0.32	10.53			0.00
23	Common Hoopoe	Meat + Bile	Oral	Colic Diarrhea, liver, bladder problems and enhance eyesight	17	10	58.82	0.89	52.63	Gall bladder stone, kidney problems	(Betlu, 2013; Altaf et al., 2017a)	0.20
24	House Crow	Blood	Topical	Piles	5	1	20.00	0.26	5.26			0.00

25	Great Tit	Meat + Fat	Oral + Topical	Sexual Problems and skin Problem	4	4	100.00	0.21	21.05			0.00
26	Asian House Martin	Skin	Oral	Enhance sexual power	7	1	14.29	0.37	5.26			0.00
27	Barn Swallow	Skin	Oral	Enhance sexual power	7	1	14.29	0.37	5.26			0.00
28	Streaked Laughingthrush	Meat + Bones	Oral	Bone strong	27	5	18.52	1.00	18.52	Paralysis, flue and fever	(Hakeem et al., 2017)	0.00
29	Common Myna	Meat	Oral	Whooping cough and weakness	11	4	36.36	0.58	21.05	Whooping cough, weakness	(Altaf et al., 2017a)	0.00
30	House Sparrow	Meat + Brain	Oral	Allergy, chickenpox, measles and constipation	7	2	28.57	0.37	10.53	Increase sexual desire, paralysis, constipation, impotency, aphrodisiac, allergy, delay dentition and fever	(Lohani, 2011; Betlu, 2013; Arshad et al., 2014a; Bagde and Jain, 2015; Vijayakumar et al., 2015b; Aloufi and Eid, 2016; Altaf et al., 2017a)	0.23
31	Russet Sparrow	Meat	Oral	Paralysis, heart and liver problem	5	2	40.00	0.26	10.53			0.00
32	Grey wagtail	Meat	Oral	Kidney stones	9	1	11.11	0.47	5.26			0.00
33	White wagtail	Meat	Oral	Kidney stones	9	1	11.11	0.47	5.26			0.00
34	Citrine wagtail	Meat	Oral	Kidney stones	9	1	11.11	0.47	5.26			0.00

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