



Introduction of Ethnozoology-a review

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SUMMARY

Interaction between human being civilizations and the animals in their environment is known as ethnozoology. It includes the classification and vernacular names of fauna, folklore awareness, and utilize of whole fauna. The importance of this information to our knowledge of the functions performed by fauna in human being civilization is the focus of ethnozoological research. Ethnozoology is a branch of ethnology that studies how people across the globe have seen and interacted with faunal assets from the beginning of time. Using animals and their products such as meat, fats, milk, venom, feather, egg and honey, hooves, antler, horn, scale, bone, tusk, testis, saliva, quill, liver, bile, brain, carapaces, hair, musk gland, skin, blood, teeth, beak and urine to cure people with different health issues has a long history and is still popular in many areas of the globe, even as modern science advances. Traditional medicines made from animal products are utilized, and an approximately 8.7% of the essential compounds used in contemporary therapy systems are derived from various fauna. Animal-derived essential chemicals account of the important compounds utilized in protective medicines, according to estimates. Insects are important components of contemporary society because of their anti-rheumatic, diuretic, antibacterial, analgesic, and immunological capabilities. Because contemporary drug development has been severely hampered in recent years owing to the loss of cultural and socioeconomic features of local populations throughout the world, recording of indigenous people's traditional knowledge is essential.

Keywords: Ethnozoology, Zootherapy, Folklore, Cure

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INTRODUCTION

From the dawn of recorded history, fauna have played a wide range of tasks in person existence, and humans have interacted with others in a variety of ways. "The study of the biological sciences as practiced by the different peoples examined by ethnology," according to a 19th-century definition (Clement *et al.*, 1998). Nature and culture interact in reciprocal ways, and ethnobiological studies contribute significantly to our understanding of how they do so. It includes the classification and naming of animals, cultural knowledge, and the use of wild and domestic animals. Ethnozoology is the study of human-animal interaction. Ethnozoology is a subfield of biology concerned with human-animal interactions and the knowledge humans have accumulated about

the Earth's fauna. The importance of this information to our knowing of the functions performed by animals in human civilization is the focus of ethnozoological research. Ethnozoology is a branch of ethnology that studies how people across the globe have seen and interacted with faunal assets from the beginning of time (Alves and Souto, 2015).

Ethnomedicine is the totality of the skills, practices and information based on indigenous ideas and experiences of various cultures, whether or not explainable, utilized in the preservation of health, prevention, diagnosis or improved health (Alves and Rosa, 2005; Altaf, 2016; Altaf *et al.*, 2017; Umair *et al.*, 2017a; Altaf *et al.*, 2018; Farooq *et al.*, 2019; Umair *et al.*, 2019; Altaf *et al.*, 2020; Altaf and Umair, 2020). Traditional medical practices differ significantly from nation to country and area to region (Khan *et al.*, 2017; Muhammad *et al.*, 2017c; Umair *et al.*, 2017b; Bashir *et al.*, 2018; Umair and Yaqoob, 2018; Altaf and Umair, 2020; Ijaz *et al.*, 2020; Khan *et al.*, 2020; Abbasi, 2021; Ijaz and Iftikhar, 2021), since they are affected by variables such as regional biodiversity, lifestyle (Betlu, 2013), culture (del Valle *et al.*, 2015; Altaf *et al.*, 2017; Muhammad *et al.*, 2017a), magic (Alves *et al.*, 2009; Benítez, 2011; Alves *et al.*, 2012), food (Rauf *et al.*, 2017), history, and individual characteristics (Betlu, 2013).

Ethnomedicine is the study of indigenous peoples' traditional medicine, especially for human health care, such as illness cures. Since ancient times, biodiversity has been utilized for healing in many civilizations (Vijayakumar *et al.*, 2015a; Vijayakumar *et al.*, 2015b). Many traditional healers, especially in rural areas, use ethnomedicine to cure diseases in most cultures (Cheikhoussef *et al.*, 2011; Farooq *et al.*, 2019).

Using animals and their products such as meat (Haidar and Bashir, 2021), fats (Ijaz and Faiz, 2021), milk (Altaf *et al.*, 2018; Aslam and Faiz, 2020), venom (Dixit *et al.*, 2010; Altaf and Faiz, 2021), feather (Adil and Tariq, 2020), egg (Tariq, 2020) and honey (Altaf and Umair, 2020), hooves (Vats and Thomas, 2015), antlers (Solís and Casas, 2019), horn (Yeshi *et al.*, 2017), scales (Altaf *et al.*, 2017; Altaf *et al.*, 2018), bones (Vallejo and González, 2014; Ijaz and Iftikhar, 2021), tusks (Shoukat *et al.*, 2020), testis (Bagde and Jain, 2015), saliva (Chellappandian *et al.*, 2014; Vijayakumar *et al.*, 2015a), quill (Sharma, 2002), liver (Haq *et al.*, 2020), bile (Vallejo and González, 2014), brain (Betlloch Mas *et al.*, 2014; Yeshi *et al.*, 2017), carapaces (Altaf *et al.*, 2018; Altaf *et al.*, 2020), hair (Haileselasie, 2012), musk gland (Mootoosamy and Mahomoodally, 2014), skin (Vallejo and González, 2014), blood (Vallejo and González, 2014), teeth (Dey *et al.*, 2017), beak (Alves and Rosa, 2013) and urine (Kim and Song, 2013) to cure people with different health issues has a long history and is still popular in many areas of the globe, even as modern science advances (Jugli *et al.*, 2020). In recent years, the use of zootherapy has been regarded as the most dependable main alternative to many other recognized therapeutic methods throughout the globe. Indigenous peoples' traditional knowledge has been essential in finding living creatures with medicinal properties, which are useful for addressing human health issues (Kendie *et al.*, 2018). According to ethnozoologist (Borah and Prasad, 2017), several indigenous tribes in India have lately started to choose traditional animal-based remedies over other health-care systems. The

treatment of human illnesses using prescriptions derived from animals is known as zootherapy (Costa-Neto, 2005).

Traditional study of herptiles known as; ethno-herpetology (Noor and Haider, 2020; Saleem *et al.*, 2021), fishes i.e. ethno-ichthyology (Muhammad *et al.*, 2017a; Muhammad *et al.*, 2017b; Muhammad *et al.*, 2018; Altaf *et al.*, 2020; Altaf *et al.*, 2021), Insects i.e. Ethno-entomology, mammals i.e. Ethno-mammalogy (Altaf, 2018; Afsheen *et al.*, 2020; Abbasi, 2021), birds i.e. Ethno-ornithology (Altaf *et al.*, 2017), and spider i.e. ethno-arachnology (Ulicsni *et al.*, 2016) are investigated. Cross-cultural ethnozoological studies are critical for understanding populations of human and utilization of fauna (Alves and Rosa, 2005).

Traditional medicines made from animal products are utilized, and an approximately “8.7%” of the essential compounds utilized in contemporary systems of healthcare are derived from various animal species. Traditional medicines made from animal products are utilized, and an approximately “8.7%” of the essential compounds utilized in contemporary healthcare systems are derived from various taxa of fauna (Alves and Souto, 2015). Zootherapy has gained popularity as a viable alternative for many other well-known treatments used throughout the globe. Zootherapy makes extensive use of animals or derived products of animal from all taxonomic groupings, including reptiles, arthropods, insects, mammals and birds (Mahawar and Jaroli, 2006, 2008; Altaf *et al.*, 2018).

Animals as therapeutic agents have undoubtedly made a major contribution to the treatment and prevention of health problems all over the world. Animal-derived essential chemicals account for approximately “8.7%” of the important compounds utilized in protective medicines, according to estimates. Insects are important components of contemporary society because of their anti-rheumatic, diuretic, antibacterial, analgesic, and immunological capabilities. Because contemporary drug development has been severely hampered in recent years owing to the loss of cultural and socioeconomic features of local populations throughout the world, recording of indigenous people's traditional knowledge is essential (Alves and Rosa, 2005).

Both rural and urban regions have recorded significant medical usage of animal parts and products (Oliveira *et al.*, 2010). Faun and derived products from various sections of their bodies have long been included into the medicinal remedies inventory utilized in numerous cultures. Zootherapy is becoming a popular alternative to many other well-known treatments used throughout the globe in contemporary cultures. However, this treatment option may put extra strain on endangered animal populations; therefore, research focused on the usage of animals' body parts as folk remedies are needed to address this conservation problem (Hernandez *et al.*, 2015). The use of animals and plants for therapeutic reasons has been handed down through the generations as traditional knowledge. Modern zootherapy has been discovered. Animal-derived medications are mostly produced from the body parts of animals, their metabolic products, or products such as an angiotensin-converting enzyme (ACE) inhibitor derived from snake venom (Haq *et al.*, 2020).

Traditional or folk medicine has traditionally relied on animal derived items, which is still the case today. Poverty and restricted access to modern treatment, especially in rural regions, are the primary reasons for their reliance on traditional medicine. The knowledge, skill, and practises that are used to preserve health as well

as to diagnose, cure, improve, or prevent mental and physical diseases, and are founded on experiences, beliefs, and ideas that are indigenous to various cultures. Ethnomedicine is source of curing, and also has significant element religious along with cultural traditions (Chaudhury *et al.*, 2016).

In fact, ethnozoological medicine focuses on the natives' perceptions of illness (Alves *et al.*, 2018); their own methods; disease classification criteria (Alves, 2012); cures and causes (Kim *et al.*, 2018); types of healers and therapists who seek to alleviate illness, as well as their social roles and skills (Hajdari *et al.*, 2018; Solís and Casas, 2019); preventive measures; the relationship between religion and medicine; cultural aspects of medicine, and so on (Alves *et al.*, 2012; del Valle *et al.*, 2015; Altaf *et al.*, 2017; Haider *et al.*, 2017; Hakeem *et al.*, 2017; Rauf *et al.*, 2017; Bashir *et al.*, 2018; Iftkhar *et al.*, 2018; Manzoor *et al.*, 2018). Traditional health behaviors not only predominate over contemporary ones, but they also often confuse their adoption. People are, for the most part, reliant on nature (Bhattarai *et al.*, 2006; Ajagun *et al.*, 2007; Bezerra *et al.*, 2013; Hajdari *et al.*, 2018; Kim *et al.*, 2018).

In traditional health treatment, a variety of species are used. Ethno-medicinal applications of animal species, on the other hand, are less documented. Furthermore, we believe that growing population and industrialization are threatening ethnozoological knowledge of local people living in settled regions, which should be recorded before it is depleted.

REFERENCES

- Abbasi, Z. 2021. Diversity and folklore medicinal uses of mammalian species of Harighal, Azad Jammu and Kashmir, Pakistan. *Journal of Wildlife and Ecology*. 5: 60-65.
- Adil, S., S. Tariq. 2020. Study of traditional and modern applications of feathers-a review. *Journal of Wildlife and Ecology*. 4: 141-150.
- Afsheen, S., S. Adil, S. Ijaz, H. Aslam, R. Kanwal. 2020. A brief study of mammals-A review *Journal of Wildlife and Ecology*. 4: 51-70.
- Ajagun, E.J., C.E. Anyaku, M.P. Afolayan. 2007. A survey of the Traditional Medical and Non-medical Uses of Animals Species and Parts of the Indigenous people of Ogbomoso, Oyo State. *Int J Herbal Med*. 5: 26-32.
- 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. 2018. Study of human-mammals conflict and interaction-A review *Journal of Wildlife and Ecology*. 2: 20-24.
- Altaf, M., A.M. Abbasi, M. Umair, M.S. Amjad, K. Irshad, A.M. Khan. 2020. The use of fish and herptiles in traditional folk therapies in three districts of Chenab riverine area in Punjab, Pakistan. *J Ethnobiol Ethnomed*. 16: 1-21.
- Altaf, M., A.M. Abbasi, M. Umair, M.S. Amjad, N. Muhammad, K.J. Iqbal, A.M. Khan. 2021. The usage of freshwater fishes in cultural and folklore therapies among the people along river Jhelum, Punjab, Pakistan. *Journal of Wildlife and Ecology*. 5: 79-99.
- Altaf, M., M. Faiz. 2021. Snake venom-a review. *Journal of Wildlife and Ecology*. 5: 146-158.
- Altaf, M., A. Javid, M. Umair, K.J. Iqbal, Z. Rasheed, A.M. Abbasi. 2017. 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. 2020. Diversity, distribution and medicinal importance of Honeybees in the World-A review. *Journal of Wildlife and Ecology*. 4: 130-141.
- Altaf, M., M. Umair, A.R. Abbasi, N. Muhammad, A.M. Abbasi. 2018. Ethnomedicinal applications of animal species by the local communities of Punjab, Pakistan. *Journal of ethnobiology and ethnomedicine*. 14: 55.
- Alves, R., G. Santana, W. Almeida, N.L. Neto, W. Vieira. 2009. Reptiles used for medicinal and magic religious purposes in Brazil. *Applied Herpetology*. 6: 257-274.
- Alves, R., W.M.S. Souto. 2015. Ethnozoology: A Brief Introduction. *Ethnobiology and Conservation*. 4.
- 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., I.L. Rosa. 2005. Why study the use of animal products in traditional medicines? *Journal of ethnobiology and ethnomedicine*. 1: 1-5.
- Alves, R.R., I.L. Rosa, N.A.L. Neto, R. Voeks. 2012. Animals for the gods: magical and religious faunal use and trade in Brazil. *Human Ecology*. 40: 751-780.
- Alves, R.R.N., I.L. Rosa. 2013. Animals in traditional folk medicine. Implications for conservation.
- Alves, R.R.N., J.S. Silva, L. da Silva Chaves, U.P. Albuquerque. 2018. Ethnozoology and animal conservation *Ethnozoology*. p 481-496. Elsevier.
- Aslam, H., M. Faiz. 2020. Ethnopharmacological and modern applications of milk of various mammalian species-a review. *Journal of Wildlife and Ecology*. 4: 211-226.
- Bagde, N., S. Jain. 2015. Study of traditional man-animal relationship in Chhindwara district of Madhya Pradesh, India. *J Global Biosci*. 4: 1456-1463.
- Bashir, S.M., Z. Rashid, B. Mumtaz, M. Altaf, K. Rauf, R. Haider, B. Safeer, S.I. Farooq, L. Safdar, I. Manzoor, S. Yasrub, A. Iftikhar. 2018. Assessment of behavioral ecology, folklore and medicinal uses of Barn Swallow (*Hirundo rustica*) in district Bagh-Pakistan. *Journal of Wildlife and Ecology*. 2: 13-21.
- Benítez, G. 2011. Animals used for medicinal and magico-religious purposes in western Granada Province, Andalusia (Spain). *Journal of ethnopharmacology*. 137: 1113-1123.
- Betlloch Mas, I., E. Chiner, J. Chiner Betlloch, F.X. Llorca, L. Martín Pascual. 2014. The use of animals in medicine of Latin tradition: study of the *Tresor de Beutat*, a medieval treatise devoted to female cosmetics
- 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.F.P. de Araujo, Â.G.C. Alves, R.R.N. Alves. 2013. Birds and people in semiarid northeastern Brazil: symbolic and medicinal relationships. *Journal of ethnobiology and ethnomedicine*. 9: 3.
- Bhattarai, S., R.P. Chaudhary, R.S. Taylor. 2006. Ethnomedicinal plants used by the people of Manang district, central Nepal. *Journal of ethnobiology and ethnomedicine*. 2: 41.
- Borah, M.P., 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 and ethnomedicine*. 13: 39.
- Chaudhury, S., C.H. Rahaman, H. Singh. 2016. Some ethnozoological uses of Birhor tribe of West Bengal, India. *J Traditional and Folk Practices*. 2: 03-04.

- Cheikhoussef, A., M. Shapi, K. Matengu, H.M. Ashekele. 2011. Ethnobotanical study of indigenous knowledge on medicinal plant use by traditional healers in Oshikoto region, Namibia. *Journal of ethnobiology and ethnomedicine*. 7: 1-11.
- Chellappandian, M., P. Pandikumar, S. Mutheeswaran, M.G. Paulraj, S. Prabakaran, V. Duraipandiyar, S. Ignacimuthu, N. Al-Dhabi. 2014. Documentation and quantitative analysis of local ethnozoological knowledge among traditional healers of Theni district, Tamil Nadu, India. *Journal of ethnopharmacology*. 154: 116-130.
- Clement, K., C. Vaisse, N. Lahlou, S. Cabrol, V. Pelloux, D. Cassuto, M. Gourmelen, C. Dina, J. Chambaz, J.-M. Lacorte. 1998. A mutation in the human leptin receptor gene causes obesity and pituitary dysfunction. *Nature*. 392: 398-401.
- Costa-Neto, E.M. 2005. Entomotherapy, or the medicinal use of insects. *Journal of Ethnobiology*. 25: 93-114.
- del Valle, Y.G., E.J. Naranjo, J. Caballero, C. Martorell, F. Ruan-Soto, P.L. Enríquez. 2015. Cultural significance of wild mammals in mayan and mestizo communities of the Lacandon Rainforest, Chiapas, Mexico. *Journal of ethnobiology and ethnomedicine*. 11: 36.
- Dey, A., P. Gorai, A. Mukherjee, R. Dhan, B.K. Modak. 2017. Ethnobiological treatments of neurological conditions in the Chota Nagpur Plateau, India. *Journal of ethnopharmacology*. 198: 33-44.
- Dixit, A., K. Kadavul, S. Rajalakshmi, M. Shekhawat. 2010. Ethno-medico-biological studies of South India. *Indian Journal of Traditional Knowledge*. 9: 116-118.
- Farooq, A., M.S. Amjad, K. Ahmad, M. Altaf, M. Umair, A.M. Abb. 2019. Ethnomedicinal knowledge of the rural communities of Dhirkot, Azad Jammu and Kashmir, Pakistan. *Ethnobiology and Ethnomedicine*. 15: 1-45.
- Haidar, R., S.M. Bashir. 2021. Chemical composition, traditional and modern uses of meat of animals-a review. *Journal of Wildlife and Ecology*. 5: 47-55.
- Haider, R., M. Altaf, Z. Rasheed, K. Rauf, B. Mumtaz, M. Altaf, M. Shabir, F. Hakeem, A. Iftikhar. 2017. Assessment of behavioral study, human activities impacts and interaction with white cheeked bulbul (*Pycnonotus leucotis*) in district Bagh, Azad Jammu and Kashmir, Pakistan. *Wildlife and Ecology*. 1: 17-24.
- Haileselasie, T.H. 2012. Traditional zootherapeutic studies in Degu'a Tembien, Northern Ethiopia. *Current Research Journal of Biological Sciences*. 4: 563-569.
- Hajdari, A., A. Pieroni, M. Jhaveri, B. Mustafa, C. Quave. 2018. Ethnomedical remedies among Slavic speaking people in South Kosovo. *Ethnobiology and Conservation*. 7.
- Hakeem, F., M. Altaf, S. Manzoor, K. Rauf, B. Mumtaz, M. Bashir, R. Haider, S.I. Farooq, L. Safdar, 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.
- Haq, S.M., E.S. Calixto, U. Yaqoob, R. Ahmed, A.H. Mahmoud, R.W. Bussmann, O.B. Mohammed, K. Ahmad, A.M. Abbasi. 2020. Traditional Usage of Wild Fauna among the Local Inhabitants of Ladakh, Trans-Himalayan Region. *Animals*. 10: 2317.
- Hernandez, J., C.M. Campos, C.E. Borghi. 2015. Medicinal use of wild fauna by mestizo communities living near San Guillermo Biosphere Reserve (San Juan, Argentina). *Journal of ethnobiology and ethnomedicine*. 11: 1-10.
- Iftikhar, A., M. Umair, A.R. Abbasi, S. Ashraf, S.M. Bashir, S. Afsheen, H. Aslam, S. Ijaz, S. Adil. 2018. Status and cultural uses of Indian Pangolin (*Manis crassicaudata*) in selected sites of Pakistan. *Journal of Wildlife and Ecology*. 2: 23-30.

- Ijaz, S., S. Adil, H. Aslam, R. Kanwal, S. Afsheen. 2020. Human interaction, conflict, threats and role of mammals-A review. *Journal of Ethnomedicine and Ethnoecology*. 1: 1-11.
- Ijaz, S., M. Faiz. 2021. Chemical composition, folk and modern uses of fats and oil-a review. *Journal of Wildlife and Ecology*. 5: 104-110.
- Ijaz, S., A. Iftikhar. 2021. Chemical composition, ethnomedicinal and industrial uses of bones-a review *Journal of Wildlife and Ecology*. 5: 56-59.
- Jugli, S., J. Chakravorty, V.B. Meyer-Rochow. 2020. Zootherapeutic uses of animals and their parts: an important element of the traditional knowledge of the Tangsa and Wancho of eastern Arunachal Pradesh, North-East India. *Environment, development and sustainability*. 22: 4699-4734.
- Kendie, F.A., S.A. Mekuriaw, M.A. Dagneu. 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: 1-12.
- Khan, A., S. Mehmood, R.A. Khan. 2017. Ethnobotanical study of some wild herb medicinal Xerophytes of district Bannu, Khyber Pakhtunkhwa, Pakistan. *Journal of Wildlife and Ecology*. 1: 37-51.
- Khan, M.S.H., S. Ullah, M.H. Hamed, M. Altaf. 2020. A study of illegal wildlife trade and seizures in Pakistan. *Journal of Wildlife and Ecology*. 4: 193-210.
- Kim, G., H. Kim, M.-J. Song. 2018. Ethnopharmacological implications of quantitative and network analysis for traditional knowledge regarding the medicinal use of animals by indigenous people in Wolchulsan National Park, Korea. *Journal of ethnopharmacology*. 213: 1-11.
- Kim, H., M.-J. Song. 2013. Ethnozoological study of medicinal animals on Jeju Island, Korea. *Journal of ethnopharmacology*. 146: 75-82.
- Mahawar, M.M., D. Jaroli. 2006. Animals and their products utilized as medicines by the inhabitants surrounding the Ranthambhore National Park, India. *Journal of ethnobiology and ethnomedicine*. 2: 46.
- Mahawar, M.M., D. Jaroli. 2008. Traditional zootherapeutic studies in India: a review. *Journal of ethnobiology and ethnomedicine*. 4: 17.
- Manzoor, I., M. Altaf, B. Safeer, S. Yasrub. 2018. Study of diversity, distribution and cultural uses of house mouse (*Mus musculus*) in district Bagh, Azad Jammu and Kashmir-Pakistan. *Journal of Wildlife and Ecology*. 2: 22-29.
- Mootoosamy, A., 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.
- Muhammad, N., A.M. Khan, K.J. Iqbal, M.S. Haider, S. Ashraf, Z.S. Ansari, S.A. Chattha, A.R. Abbasi, M. Yaqoob. 2017a. Assessment of distribution and ethnocultural uses of the Baringo tilapia (*Oreochromis niloticus*) in Punjab, Pakistan. *Journal of Wildlife and Ecology*. 1: 7-13.
- Muhammad, N., A.M. Khan, M. Umair, A. Qazi, A. M. Yaqoob, S. Ashraf, Q. Khan, M. Farooq. 2017b. Assessment of distribution and ethnocultural uses of the Sol (*Channa marulius*) in Punjab, Pakistan. *Journal of Wildlife and Ecology*. 1: 35-41.
- Muhammad, N., M. Umair, A.M. Khan, A.R. Abbasi, Q. Khan, A. Khan, M.Z. Awan. 2017c. Assessment of the diversity and ethno-medicinal uses of the carps in Punjab, Pakistan. *Journal of Wildlife and Ecology*. 1: 52-60.
- Muhammad, N., M. Umair, A.M. Khan, M. Yaqoob, M.S. Haider, Q. Khan, A.R. Abbasi. 2018. Assessment of cultural uses of Mrigal carp (*Cirrhinus mrigala*) in Gujranwala division, Pakistan. *Journal of Wildlife and Ecology*. 2: 1-9.

- Noor, U., R. Haider. 2020. Assessment of herpetofauna diversity and human-herpetofauna-interaction in district Sudhnoti, Azad Jammu and Kashmir, Pakistan. *Journal of Wildlife and Ecology*. 4: 156-163.
- Oliveira, E.S., D.F. Torres, S.E. Brooks, R.R. Alves. 2010. The medicinal animal markets in the metropolitan region of Natal City, Northeastern Brazil. *Journal of ethnopharmacology*. 130: 54-60.
- Rauf, K., M. Altaf, B. Mumtaz, M. Altaf, R. Haider, B. Safeer, S.I. Farooq, L. Safdar, M. Manzoor, S. Yasrub, S.M. Bashir, A. Iftikhar. 2017. Assessment of behavior, distribution, ecology and interaction study of Cinnamon Tree Sparrow (*Passer rutilans*) in district Bagh-Pakistan. *Journal of Wildlife and Ecology*. 1: 43-49.
- Saleem, R., M. Altaf, M. Umair, M.S. Amjad, A.M. Abbasi. 2021. Ethnopharmacological applications of the amphibians and reptiles among the people in the vicinity of Margalla Hill National Park, Islamabad, Pakistan. *Journal of Wildlife and Ecology*. 5: 13-25.
- Sharma, S.K. 2002. A study on ethnozoology of Southern Rajasthan. *Ethnobotany*.
- Shoukat, A., M.F. Khan, G.M. Shah, S. Tabassam, M. Sajid, H. Siddique, K.D. Badshah, I. Ullah. 2020. Indigenous knowledge of zootherapeutic use among the people of Hazara division Khyber-Pakhtunkhwa, Pakistan.
- Solís, L., A. Casas. 2019. Cuicatec ethnozoology: traditional knowledge, use, and management of fauna by people of San Lorenzo Pápalo, Oaxaca, Mexico. *Journal of ethnobiology and ethnomedicine*. 15: 1-16.
- Tariq, S. 2020. Chemical composition and traditional uses of eggs of different avian species-A review. *Journal of Wildlife and Ecology*. 4: 45-50.
- Ulicsni, V., I. Svanberg, Z. Molnár. 2016. Folk knowledge of invertebrates in Central Europe-folk taxonomy, nomenclature, medicinal and other uses, folklore, and nature conservation. *Journal of ethnobiology and ethnomedicine*. 12: 47.
- Umair, M., M. Altaf, A.M. Abbasi. 2017a. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. *PloS one*. 12: e0177912.
- Umair, M., M. Altaf, R.W. Bussmann, A.M. Abbasi. 2019. Ethnomedicinal uses of the local flora in Chenab riverine area, Punjab province Pakistan. *Journal of ethnobiology and ethnomedicine*. 15: 7.
- Umair, M., Z. Rashid, N. Muhammad, A. Khan. 2017b. Study of diversity and ethnomedicinal plants of head Khanki, Pakistan. *Journal of Wildlife and Ecology*. 1: 25-36.
- Umair, M., M. Yaqoob. 2018. Traditional medicinal uses of honey in the district Gujranwala, Punjab, Pakistan. *Journal of Wildlife and Ecology*. 2: 11-19.
- Vallejo, J.R., J.A. González. 2014. Fish-based remedies in Spanish ethnomedicine: a review from a historical perspective. *Journal of ethnobiology and ethnomedicine*. 10: 1-31.
- Vats, R., 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, 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, R. Damodaran. 2015b. Ethnozoological study of animals used by traditional healers in Silent Valley of Kerala, India. *Journal of ethnopharmacology*. 162: 296-305.

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