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Cultural Significance and Medicinal Applications of Herpetofauna in Bagh, Azad Jammu and Kashmir, Pakistan

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SUMMARY

Human not only uses herptile species but also produces a negative impact on diversity and density. These points were kept in mind and developed the research; the main objectives of the study are; to know the interaction on the diversity and distribution of herptile species. Questionnaires and semi-structured interviews were applied to collect data from informants (n=100) of district Bagh. While interaction data were analyzed by Frequency of citation (FC) and Relative Frequency of citation (FC). The study showed that these species were hunted or killed for different purposes i.e. medicinal and trade. It is concluded that native people were the main cause of declining of herpetofauna species. Human destroy their habitats and kills for different purposes.

Keywords: Frequency of citation, Similarity index, Ethnomedicine, Herptile

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INTRODUCTION

In the world, 10,450 species of reptiles are reported (Uetz, 2016); while a total of 7,850 amphibian species are noted (AmphibiaWeb, 2018). A total of 195 species of reptiles are documented in Pakistan (Khan, 2006). Twenty-four (24) amphibian species are present in Pakistan by han (2010).

Pakistan is a stunning geographical beauty spanning 796,095 km^2 that is engulfed by the Palearctic, Oriental, and Ethiopian zoogeographical zones. The soothing caress of the Arabian Sea adorns its southwestern boundary, while the snow-clad Pamir in the mighty Himalayas adorns its northernmost tip. The convergence of the Hindukush, Himalaya, and Karakorum mountain ranges in the west, north, and northwest creates a spectacular spectacle, moulding the climate, geology, hydrology, and physiography into a natural symphony. This spectacular terrain has woven an intriguing tale, playing an important role in nourishing the numerous fauna and flora that cover Pakistan's regions, and has genuinely enchanted those who experience it (Khan, 2006).

In the enthralling area of Pakistan, there are roving snake attracter tribes known as "sanyasies", "gagras" and "Tapri-was" who engage in actions that endanger the reptilian species. Their actions have resulted in a decrease in the population of wild animals. These tribes have become a threat to the country's natural reptile population. Adding to the worry, these reptiles are in high demand in local marketplaces, as national physicians want them for research into numerous common ailments (Khan, 2006). The objectives of the study are to assess the human-herptile interaction in Bagh, Azad Jammu and Kashmir.

MATERIALS AND METHODS

STUDY AREA

The Bagh can be found in the lower Himalayas (Figure 1). The research site is located in a damp location with monsoon access. The variations in altitude cause a slew of disparities in rainfall and humidity in various sections of the region. Summer (average temperature 37°C) is mild, whereas winter (average temperature 4°C) is bitterly cold, with snowfall at higher elevations (DRU, 2007). Snowfall is also observed in lower places such as Mandri, Salian, Dhar, and Munhasa on occasion. The average rainfall was measured to be 150mm. The vegetation includes subtropical pine woods as well as Himalayan mixed temperate forests; and it is as; *Pinus spp.*, and *Cedrus spp.* (Bibi et al., 2013).

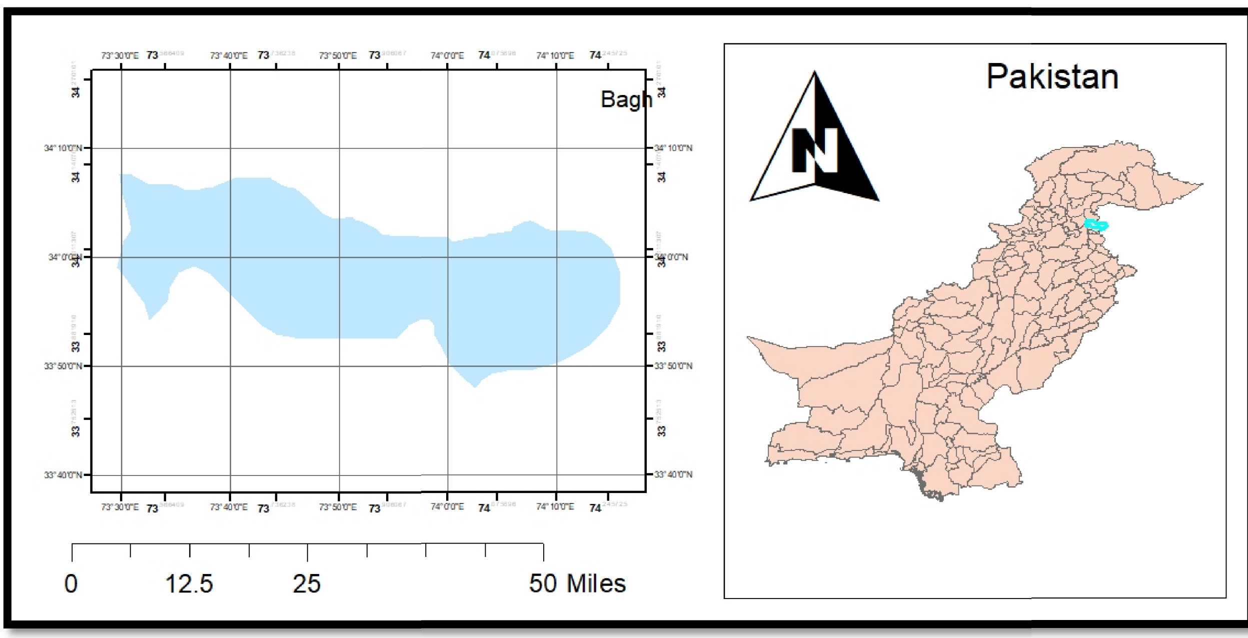

Figure 1: Map of the district Bagh.

ASSESSMENT OF HUMAN-HERPTILE INTERACTION

During the research noted that humans used these species for medicine and Hunting and export. Data were collected from 2016 to 2022 from various parts of Bagh.

STATISTICAL ANALYSIS

For the statistical analysis Frequency of citation (FC), and Relative Frequency of citation (FC), are also calculated as;

FREQUENCY OF CITATION (FC)

The number of informants who reported medicinal applications of each species is shown by FC.

RELATIVE FREQUENCY OF CITATION (RFC)

The FC is computed by dividing the number of respondents who recorded medical uses by the total number of respondents who confirmed uses for medicinal purposes.

RESULTS AND DISCUSSION

Respondents of the study area consist of females (n=26) and males (n=74), many of the respondents were educated i.e. PhD (n=3), Master (n=14), Graduate (n=18), Intermediate (n=21), Matric (n=22), Primary (n=12), while others were Illiterate (n=10). Data was collected from the people having different occupations i.e. teachers, housewives, laborers, farmers and shopkeepers from the study area (Figure 2). Respondents cast from the study area was as; Awan, Raja, Abbasi and Mughal. All the respondents were Muslims.

Figure 2: Profile of the respondents of the study area.

Table 1: Cultural uses of Herptile species in the study area.

Sr. No.	Scientific name Species Authority Common name	Code	Medicinal	Export	Hunting
1	*Eublepharis macularius* Blyth, 1854 Leopard gecko	FTG	√	√	√
2	*Laudakia agrorensis* Stoliczka, 1872 Agror agama	ML	√	X	√

	Varanus bengalensis				
	Daudin, 1802				
3	Bengal monitor	BM	√	X	√
	Hemidactylus brookii				
	Gray, 1845				
4	Brooke's house gecko	BHG	√	X	√
	Xenochrophis piscator piscator				
	Schneider, 1802				
5	Chekered keelback	CKB	√	X	√
	Bungarus caeruleus caeruleus				
	Schneider, 1801				
6	Common krait	CK	√	X	√
	Eryx johni				
	Russell, 1801				
7	Common sand boa	CSB	√	X	√
	Laudakia himayalayana				
	Steindachner, 1869				
8	Himalayan agma	HA	√	X	√
	Gloydius himalayanus				
	Giinther, 1864				
9	Himalayan pit viper	HPV	√	X	√
	Scincella himalayana				
	Gunther, 1864				
10	Himalayan skink	HS	√	X	√
	Bufo himalayanus				
	Gunther, 1864				
11	Himalayan toad	HT	√	X	√
	Calotes versicolor				
	Daudin, 1802				
12	Oriental Garden Lizard	OGL	√	X	√
	Spalerosophis diadema diadema				
	Schelegel, 1837				
13	Red spotted diadem snake	RSD	√	X	√
	Ptyas mucosus mucosus				
	Linnaeus, 1758				
14	Rope-snake	RS	√	√	√
	Daboia russelii russelii				
	Shaw and Nodder, 1797				
15	Russell's chain viper	RCV	√	X	√
	Amphiesma stolatum				
	Linnaeus, 1758				
16	Striped keelback	SK	√	X	√
	Hemidactylus flaviviridis				
	Ruppell, 1835				
17	Yellow belly/common house gecko	YBG	√	X	√

Note: X (absent) and √ (present)

The study noted that people of the area used two species for export i.e. *Eublepharis macularius* and *Ptyas mucosus mucosus*. People think that these species are very expensive and people capture for the sake of money. While all the species are hunted for medicine and export purposes (Table 1).

Out of total, 17 species of herpetofauna are used for different traditional medicines i.e. *Amphiesma stolatum, Bufo himalayanus, Bungarus caeruleus, Calotes versicolor, Daboia russelii, Eryx johni, Eublepharis macularius, Gloydius himalayanus, Hemidactylus spp., Laudakia spp., Ptyas mucosus mucosus, Scincella himalayana, Spalerosophis diadema, Varanus bengalensis* and *Xenochrophis piscator,* are used to treat various diseases i.e. joint pain, backbone pain, anti-venom, male potential and cancer (Table 2).

BODY PART(S) USED

Figure 3 reveals the usage of body parts from 17 herptile species in various recipes, show casing fat as the most commonly utilized part (in 15 recipes), followed by venom (in 2 recipes) and skin (in 1 recipe).

The inhabitant uses fat to treat joint pain, backbone pain, anti-venom, male potential and cancer (Figure 4). The presence of omega-3 fatty acids in fat opens the door to potential treatments for human diseases. This remarkable compound holds promise in countering aging effects, addressing atherosclerosis, and managing thrombotic and neurological disorders (Breteler, 2000; Kalmijn, 2000; Haag, 2003).

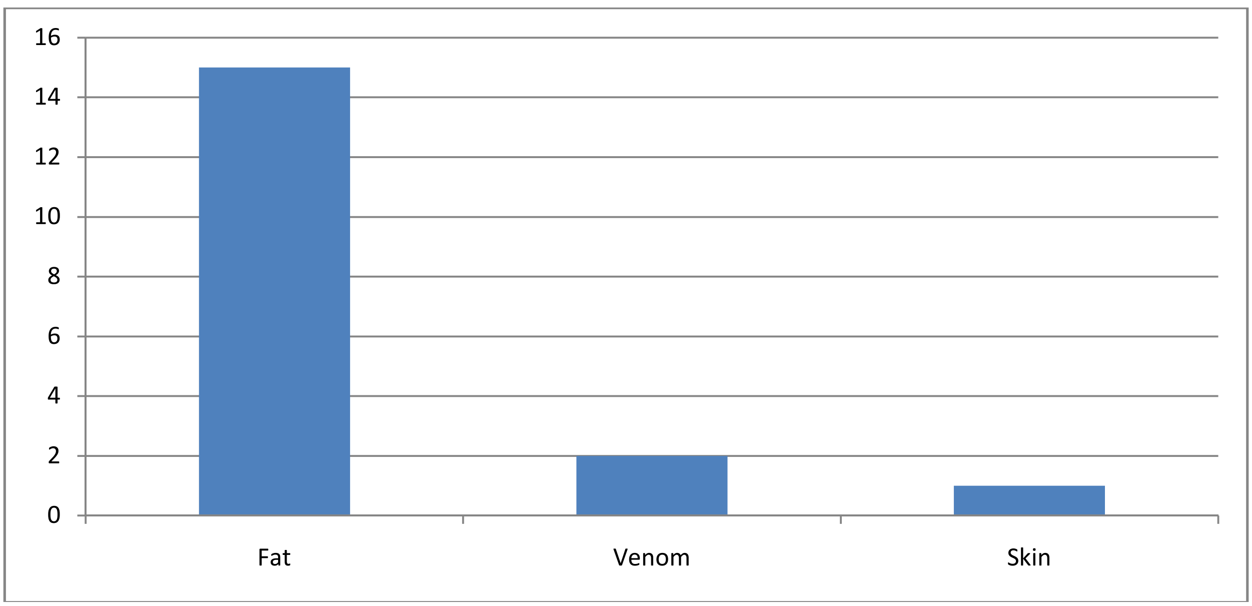

Figure 3: Body parts of herptile used in various recipes.

FREQUENCY OF CITATION (FC)

In Table 2, the herptile species commonly employed to treat various diseases were identified based on the maximum number of respondents. These species exhibited a high frequency of citations (FC) ranging from 2 to 34. *Eublepharis macularius*, in particular, stood out as the most commonly used species to address cancer pain across different study areas, with an impressive FC of 34. Additionally, the Brilliant *Amphiesma stolatum, Hemidactylus flaviviridis* and *Ptyas mucosus mucosus* were also prominently utilized species, each boasting FC values of 24, 22, and 19, respectively.

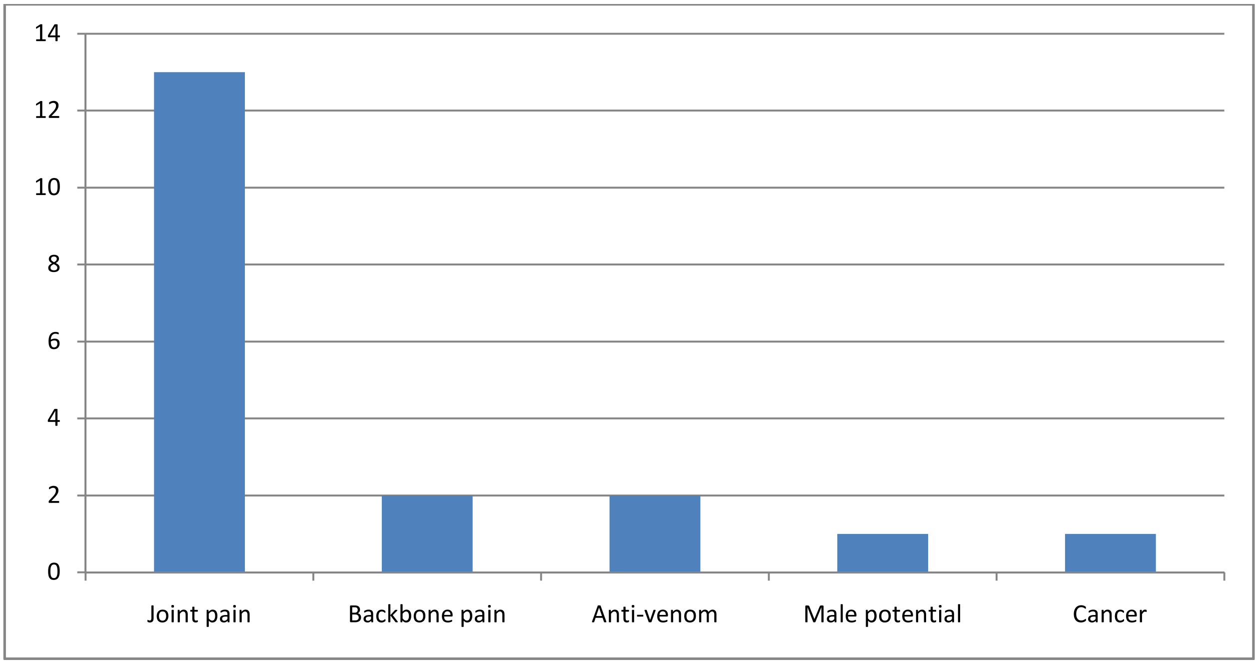

Figure 4: Number of herpetofauna species used to treat various diseases.

RELATIVE FREQUENCY OF CITATION (RFC)

In Table 2, the highest Relative Frequency of citation is noted for *Eublepharis macularius* (RFC=0.18), followed by *Amphiesma stolatum* (RFC=0.13), *Daboia russelii russelii* (RFC=0.12), *Hemidactylus flaviviridis* (RFC=0.11), *Ptyas mucosus mucosus* (RFC=0.10). Whole the lowest Frequency of citation is noted for *Laudakia himayalayana* (RFC=0.01).

Understanding human-herptile interaction and natural resource usage is crucial for the creation and integration of biodiversity conservation initiatives (Albuquerque and de Sousa, 2016). Documenting indigenous knowledge on animal-based treatments, on the other hand, is extremely important in the creation of policies for the sustainable use and restoration of natural resources (Borah and Prasad, 2017). Ethno-biological studies, in addition to integrating biological factors and providing information on traditional and medicinal values of fauna in any region, also cover economic, traditional, and cultural values of animal species in communities of people, and thus contribute significantly to animal conservation (Alves, 2012).

ZOONOTIC DISEASES

Wild animals and flora are extremely beneficial to indigenous peoples in terms of cultural (Muhammad et al., 2018), medicinal (Khan et al., 2017; Muhammad et al., 2017; Umair et al., 2017; Bashir et al., 2018; Altaf and Umair, 2020), and esthetic aspects (Altaf et al., 2018). Human-wildlife encounters can convey diseases to humans (Lowry and Smith, 2007; Kazwala, 2016; Altaf, 2020). People who come into contact with animals may be exposed to zoonotic infections (Chomel et al., 2007; Chethan et al., 2013). Zoonotic pathogens can be transmitted from animal to human as well as human to human by sexual contact, contact, vector, aerosol, infected droplet, and oral transmission (Belay et al., 2004; Kruse et al., 2004). Many zoonotic diseases, such as salmonellosis, sparganosis, nausea, vomiting, and diarrhea, are transmitted from frogs to humans (CFSPH, 2013; EHS, 2016). Similarly to reptiles, many zoonotic diseases such as mycobacteriosis, pentastomiasis, and gastroenteritis have been observed in humans (CFSPH, 2013; Okoye et al., 2015; Tappe et al., 2016). This study discovered that direct herptile usage has an impact not only on amphibian and reptile diversity, but also on human health due to the recorded spread of several zoonotic diseases.

CONCLUSION

Cultural uses of various herptile species were documented, primarily to maintain the diversity of amphibian and reptile species and their traditional usage among the local people in the District Bagh, Pakistan. Because of their close relationship with amphibian and reptile species, the local people in the research area have access to important traditional information, according to our findings. These findings could aid in the conservation of herptile species. However, the biggest risks to the area's herptile diversity are hunting, trading, and cultural use. These grave perils will eventually annihilate them. As a result, with the participation of concerned authorities, academia, and conservation managers, immediate conservation actions for the protection and sustainable utilization of medicinal herptiles should be implemented.

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Authors' contributions: Altaf has designed this project, collected data and written this article; while Altaf and Khichi have critically analyzed this article and approved as final.

Table 2: The medicinal uses and statistical analysis of the herpetofauna in Bagh, AJK

Sr.	**Scientific name**	**Part Use**	**Mode of use**	**Medicinal uses**	FC	RFC
1	*Eublepharis macularius*	Fat	Topical	Cancer	34	0.18
2	*Laudakia agrorensis*	Fat	Topical	Joint pain	4	0.02
3	*Varanus bengalensis*	Fat	Topical	Joint pain	5	0.03
4	*Hemidactylus brookii*	Fat	Topical	Joint pain	4	0.02
5	*Xenochrophis piscator piscator*	Fat	Topical	Joint pain	3	0.02
6	*Bungarus caeruleus caeruleus*	Fat	Topical	Joint pain	3	0.02
7	*Eryx johni*	Fat	Topical	Male potential	8	0.04
8	*Laudakia himayalayana*	Fat	Topical	Joint pain	2	0.01
9	*Gloydius himalayanus*	Venom	Topical	Anti-venom	5	0.03
10	*Scincella himalayana*	Fat	Topical	Joint pain	3	0.02
11	*Bufo himalayanus*	Fat	Topical	Joint pain	5	0.03
12	*Calotes versicolor*	Fat	Topical	Joint pain	11	0.06
13	*Spalerosophis diadema diadema*	Fat	Topical	Joint pain	12	0.06
14	*Ptyas mucosus mucosus*	Fat, skin	Topical	Joint pain, eye	19	0.10

15	*Daboia russelii russelii*	Venom	Topical	Anti-venom	22	0.12
16	*Amphiesma stolatum*	Fat	Topical	Backbone pain and joint pain	24	0.13
17	*Hemidactylus flaviviridis*	Fat	Topical	Backbone pain and joint pain	21	0.11