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한국 속리산 국립공원 지역집단에서 이용되는 약용동물의 구전 전통지식에 대한 민족동물학적 연구

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Ethnozoological Study of Medicinal Animals for Orally Transmitted Knowledge Utilized in the Local Communities of Songnisan National Park, Korea

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ABSTRACT

Objectives : This study aims to record and conserve oral traditional knowledge of medicinal animals from the indigenous people living in the local communities of Songnisan National Park, Korea.

Methods : Data was collected by participatory observations and in-depth interviews with semi-structured questionnaires. Quantitative comparative analyses were accomplished through data received from the following three methods: informant consensus factor (ICF), fidelity level (FL), and network analysis.

Results : The investigation reveals that the indigenous people have used 49 species of medicinal animals distributed within 45 genera, belonging to 39 families with 336 different usages. According to the distribution of recorded families, the most representative families were Scolpendridae and Phasianidae, which were utilized 36 times each (10.71 % each). The category with the highest degree of consensus from informants was disorders related to the nervous system (0.97). 16 species were classified with a fidelity level of 100 %. The network analysis revealed that a lack of vigor was related to 23 species, including *Agkistrodon blomhoffii*, *Gallus domesticus*, and *Canis familiaris*, among the total 49 species investigated.

Conclusions : This documentation can help preserve the traditional knowledge and local health traditions of Korea that are disappearing due to rapid industrialization, urbanization, and death of the elderly with traditional knowledge. Additionally, the animals investigated in this study can be developed into medicinal food and drug for treating specific health conditions through further research.

Key words : Traditional knowledge, Informant Consensus Factor, Fidelity Level, Network analysis, Songnisan National Park

Ⅰ. Introduction

The study of medicinal compounds derived from animals in traditional medicine is pivotal since it has been estimated that over 80 % of the global population possesses a health system based on traditional medicine, using primarily plants and animals[1].

Traditionally, the use of animal products for the treatment of human or animal diseases has been utilized all over the world. Research studies in this area have been conducted in China (1,500 species)[2], North America (584 species)[3,4], India[5-7], Brazil[8], and Indonesia[9].

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The national park in Korea is particularly worth preserving due to their outstanding natural ecology and rich biodiversity as regions of protection designated officially by the Ministry of environment[10]. For these reasons, Songnisan was designated as a national park on March 24, 1970 and orally transmitted traditional knowledge, using both animals and plants have been passed down from generation to generation[11].

Traditional knowledge of using medicinal animals in Korea was rarely performed except for the research conducted in Wolchulsan National Park and Jeju Island by Kim[12,13].

The flora of Songnisan National Park was conducted by Kim et al. (1990)[14], Oh and Choi (2009)[15] however, its fauna and traditional knowledge have rarely been considered. The traditional knowledge is not inherited from generation to generation due to rapid industrialization and urbanization, so there is a risk that it will disappear if not documented.

This study aims to record and analyze the traditional knowledge of medicinal animals utilized by residents living in the local communities of Songnisan National Park in Korea.

Ⅱ. Materials and Methods

1. Study area

The study area is located in the center of South Korea, including two provinces (Chungcheongbuk-do, Gyeongsangbuk-do), two cities (Sangju-si, Mungyeong-si), and two counties (Boeun Gun, Goesan Gun) in its administrative district[10]. The area measures 284.4 ㎢ and lies between 127° 47′ 20″ E to 127° 58′ 00″ E longitude and 36° 28′ 05″ N to 36° 46′ 30″ N latitude (Fig. 1).

Songnisan is 1,058 m above sea level, while the annual average temperature is 11.5℃, with an annual precipitation of approximately 1,088.7 mm[16].

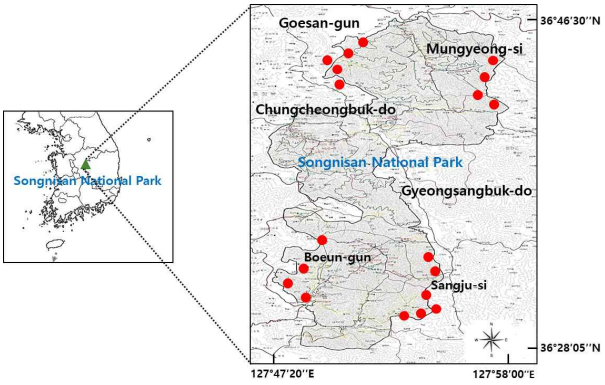

Fig. 1. Investigation sites in Songnisan National Park, Korea.

2. Investigative Method

Data was collected using participant observations and in-depth interviews, as the informants also become investigators themselves through attending informal meetings, open and group discussions, and overt observations with semi-structured questionnaires[17,18].

The content of the semi-structured questionnaires was composed of diverse ethnozoological information, including local names, animal parts used, ailments, methods of preparation, manufacturing and administration, dosage, and the usable duration regarding each curable formula[18-20].

Animal specimens were collected during a proper collecting period and were organized utilizing the normal specimen manufacturing method[21]. The voucher specimens were deposited for preservation in the herbarium of Jeonju University.

The precise identification and scientific names of animals were confirmed by the National Knowledge and Information System for Biological Species of Korea[22], Catalogue of Life, and 2019 Annual Checklist[23].

3. Quantitative Analysis

1) Informant Consensus Factor (ICF)

The ICF was used to identify the ethnozoological importance of the collected animal species and to analyze the agreement degree of the informants' knowledge about each category of ailments[24,25]. The range of the value is from 0 to 1, with a larger value determining the higher degree of agreement.

The ICF was calculated using the following formula: $ICF = (n_{ur} - n_t) / (n_{ur} - 1)$, where n_{ur} is the number of times an ailment was mentioned in each category, and n_t is the number of animal species used in the research.

2) Fidelity Level (FL)

The FL was employed to determine the most important animal species used for treating certain diseases by the local elderly people living in the study area[12,13]. The range of the value is from 1% to 100%, and the percentage correlates to the use of the same animal for certain medical treatments.

The FL value is determined using the following formula: $FL\ (\%) = N_p \times 100/N$, where Np is the number of informants that mentioned the specific animal species used to treat certain ailments and N is the total number of the informants who utilized the animals as medicine for treating any given ailment.

3) Network Analysis

The network analysis was applied to analyze the relationship between ailments and animals[13,26]. The network map of ailments–animals was constructed using the following parameters:

(1) The matrix of the ailments–animals was constructed from the number of informants who mentioned specific animals to treat certain ailments.

(2) The matrix map was analyzed and drawn by the software NetMiner (Ver. 4.3, Cyram Inc., Seoul, Korea).

Ⅲ. Results and Discussion

1. Demographic Characteristics of Informants

Field interviews were conducted from May 2014 to August 2014. All 97 key informants (23 men and 74 women) were randomly selected from 19 sites, which included community halls, senior welfare centers, and traditional markets (Fig.1).

The average age of the informants was 78 years, and they ranged from age 58–92, with residents living more than 40 years in the study areas. People in their seventies and eighties constituted 91.7 % of the total. The residents in these communities have hardly been affected by modern culture and education as 36 of them never received any formal education (Table 1).

Table 1. Demographic characteristics.

Demographic characteristics	Number (%)
Gender	
Male	23 (30.36%)
Female	74 (69.64%)
Age	
50–59	1 (1.0%)
60–69	5 (5.1%)
70–79	52 (53.6%)
80–89	37 (38.1%)
90–99	2 (2.0%)
Educational attainment	
Never attended school	36 (37.1%)
Never completed elementary school	24 (24.7%)
Completed elementary school	30 (30.9%)
Never completed middle school	1 (1.0%)
Completed middle school	3 (3.0%)
Never completed high school	1 (1.0%)
Completed high school	2 (2.0%)

2. Ethnozoological Knowledge of medicinal animals

The traditional knowledge recorded from the Songnisan National Park communities included 336 ethnomedicinal practices classified within 39 families, 45 genera, and 49 species (Table 2).

Table 2. Animal species used for medicinal purposes in the local communities of Songnisan National Park.

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
Acrididae	*Oxya japonica japonica*	Byeomettugi	Whole part	Fried	Oral	Lack of vigor	100.00
Anatinae	*Anas platyrhynchos*	Cheongdungori	Whole part	Infusion	Oral	Paralysis	100.00
				Raw	Oral	Paralysis	100.00
	Anas platyrhynchos domesticus	Ori	Egg	Infusion	Oral	Lumbago	9.09
					Oral	Paralysis	33.33
			Whole part	Infusion	Oral	Lack of vigor	54.55
					Oral	Paralysis	33.33
				Raw	Oral	Paralysis	33.33
			Blood	Raw	Oral	Paralysis	33.33
					Oral	Detoxification	3.03
Anguillidae	*Anguilla japonica*	Baemjangeo	Whole part	Infusion	Oral	Lung diseases	25.00
				Simmer	Oral	Lack of vigor	75.00
				Decoction	Oral	Lack of vigor	75.00
Apidae	*Apis cerana Fabricius*	Jaeraekkulbeol	Honey	Raw	Topical	Bee sting	29.27
					Topical	Stomatitis	34.15

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
					Topical	Bee sting	29.27
				Warm up in a double boiler	Oral	Cough	7.32
				Boiling	Oral	Common cold	9.76
				Poultice	Topical	Stomatitis	34.15
				Dissolution	Oral	Stomatitis	34.15
			Pupa	Roasting	Oral	Sexual decline	9.76
			Hive	Raw	Oral	Common cold	9.76
				Boiling	Oral	Common cold	9.76
				Infusion	Oral	Convulsions	4.88
					Oral	Measles	2.44
				Poultice	Topical	Postpartum myofascial pain syndrome	2.44
Bombycidae	*Bombyx mori*	Nuenabang	Cocoons	Raw	Topical	Burn	5.88
			Pupa	Powder	Oral	Cancer	17.65
				Raw	Oral	Paralysis	11.76
				Roasting	Oral	Paralysis	11.76
			Whole part	Powder	Oral	Glycosuria	41.18
				Powder, dissolution	Oral	Glycosuria	41.18
					Oral	Cardiovascular disease	23.53
Bovidae	*Bos taurus*	So	Dung	Raw	Topical	Burn	33.33
				Fumigation	Topical	Hemorrhoids	11.11
			Blood	Raw	Oral	Lung diseases	44.44
			Urine	Raw	Topical	Lacquer poisoning	11.11
	Capra hircus	Yeomso	Whole part	Infusion	Oral	Lack of vigor	56.25
				Simmer	Oral	Lack of vigor	56.25
				Roasting	Oral	Lack of vigor	56.25
				Extraction	Oral	Lack of vigor	56.25
					Oral	Panic disorder	12.50
				Infusion	Oral	Panic disorder	12.50
					Oral	Woman diseases	31.25
				Simmer	Oral	Woman diseases	31.25
	Capra aegagrus hircus	Heungnyeomso	Whole part	Simmer	Oral	Sexual decline	100.00
Buforidae	*Bufo bufo gargarizans*	Dukkeobi	Oil	Oil	Topical	Boils	100.00
Cambaridae	*Cambaroides similis*	Gajae	Whole part	Maceration	Oral	Measles	97.22
					Oral	Convulsions	2.78
				Infusion	Oral	Measles	97.22
Canidae	*Canis familiaris*	Gae	Whole part	Infusion	Oral	Tuberculosis	3.70
					Oral	Lack of vigor	66.67
					Oral	Sexual decline	3.70
			Fur	Burn	Topical	Dog bite	25.93
Cervidae	*Capreolus capreolus*	Noru	Whole part	Infusion	Oral	Lack of vigor	88.24
					Oral	Sexual decline	11.76
				Raw	Oral	Lack of vigor	88.24
				Roasting	Oral	Lack of vigor	88.24

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
	Cervus nippon	Saseum	Horn	Raw	Oral	Lack of vigor	50.00
				Simmer	Oral	Lack of vigor	50.00
Cetoniidae	*Protaetia brevitarsis seulensis*	Huinjeombagikkonmuji	Whole part	Infusion	Oral	Gastric cancer	12.50
				Powder	Oral	Cancer	62.50
					Oral	Glycosuria	6.25
					Oral	Gastric cancer	12.50
				Roasting	Oral	Cancer	62.50
					Oral	Indigestion	12.50
					Oral	Paralysis	6.25
Channidae	*Channa argus*	Gamulchi	Whole part	Simmer	Oral	Lack of vigor	50.00
					Oral	Postpartum care	50.00
Cobitidae	*Misgurnus mizolepis*	Mikkuraji	Whole part	Boiling	Oral	Lack of vigor	100.00
Colubridae	*Dinodon rufozonatus*	Neunggureongi	Whole part	Brewing	Oral	Lumbago	12.50
					Oral	Lack of vigor	62.50
				Infusion	Oral	Lack of vigor	62.50
				Simmer	Oral	Lung diseases	25.00
					Oral	Lack of vigor	62.50
	Elaphe schrenckii	Gureongi	Whole part	Infusion	Oral	Lack of vigor	17.86
					Oral	Panacea	28.57
				Roasting	Oral	Panacea	28.57
					Oral	Myalgia	42.86
				Simmer	Oral	Myalgia	42.86
					Oral	Lung diseases	10.71
					Oral	Lack of vigor	17.86
	Natrix tigrina lateralis	Yuhyeolmogi	Whole part	Simmer	Oral	Myalgia	50.00
				Roasting	Oral	Myalgia	50.00
				Infusion	Oral	Lack of vigor	8.33
					Oral	Lumbago	8.33
					Oral	Panacea	16.67
				Roasting	Oral	Sexual decline	16.67
			Egg	Roasting	Oral	Sexual decline	16.67
Cyprinidae	*Carassius carassius*	Bungeo	Whole part	Simmer	Oral	Lack of vigor	100.00
	Cyprinus carpio	Ingeo	Whole part	Simmer	Oral	Postpartum care	50.00
					Oral	Lack of vigor	50.00
Diaspididae	*Pseudaulacaspis pentagona*	Ppongnamukkakjibeolle	Whole part	Juice	Oral	Indigestion	100.00
Gadidae	*Theragra chalcogramma*	Myeongtae	Whole part	Soup	Oral	Hangover	28.57
					Oral	Postpartum care	28.57
			Head	Infusion	Oral	Typhoid fever	42.86
Hirudinidae	*Hirudo nipponia*	Geomeori	Whole part	Raw	Topical	Pus	75.00
					Topical	Boils	25.00
Hominidae	*Homo sapiens*	Saram	Urine	Raw	Topical	Chapped skin	13.04
			Stool	Dissolution	Oral	Bone diseases	30.43
					Oral	Extravasated blood	21.74

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
					Oral	Bruising	4.35
			Umbilical cord	Raw	Oral	Lung diseases	8.70
				Maceration	Topical	Atopic dermatitis	4.35
				Powder	Oral	Epilepsy	17.39
Leporidae	*Lepus brachyurus*	Santokki	Dung	Infusion	Oral	Measles	21.05
				Powder, dissolution	Oral	Measles	21.05
			Whole part	Infusion	Oral	Lack of vigor	68.42
					Oral	Liver cirrhosis	10.53
				Simmer	Oral	Lack of vigor	68.42
				Roasting	Oral	Lack of vigor	68.42
	Lepus sinensis coreanus	Mettokki	Dung	Infusion	Oral	Measles	100.00
Lumbricidae	*Lumbricus terrestris*	Jireongi	Whole part	Infusion	Oral	Sexual decline	66.67
					Oral	Malnutrition	33.33
Mantidae	*Tenodera angustipennis Saussure*	Samagwi	Whole part	Raw	Topical	Skin diseases	80.00
				Powder	Topical	Tonsillitis	20.00
Muridae	*Rattus norvegicus*	Jwi	Whole part	Brewing	Oral	Paralysis	76.92
				Infusion	Oral	Paralysis	76.92
			Rat	Brewing	Oral	Facial nerve paralysis	23.08
Mustelidae	*Meles meles*	Osori	Oil	Oil	Topical	Burn	73.91
					Oral	Burn	73.91
					Oral	Gastroenteric disorder	8.70
					Topical	Burn	73.91
			Gall bladder	Raw	Oral	Convulsions	8.70
				Dissolution	Oral	Lack of vigor	8.70
			Whole part	Oil	Topical	Burn	73.91
Ophichthidae	*Ophisurus macrorhynchus*	Mulbaem	Whole part	Infusion	Oral	Panacea	100.00
Phasianidae	*Gallus domesticus*	Dak	Foot	Infusion	Oral	Arthritis	13.41
					Oral	Lumbago	8.54
					Oral	Arthritis	13.41
					Oral	Arthrodynia	2.44
				Simmer	Oral	Arthritis	13.41
			Egg	Infusion	Oral	Diarrhea	2.44
				Maceration	Oral	Convulsions	1.22
				Raw	Topical	Centipede bite	1.22
					Topical	Bruising	9.76
					Topical	Lacquer poisoning	12.20
					Topical	Extravasated blood	3.66
			Whole part	Infusion	Oral	Lacquer poisoning	12.20
					Oral	Lack of vigor	30.49
					Oral	Pleuritis	3.66
					Oral	Abdominal cold hypersensitivity	7.32
					Oral	Lumbago	8.54
					Oral	Heat Stroke	3.66

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
				Raw	Topical	Lacquer poisoning	12.20
	Phasianus colchicus	Kkwong	Whole part	Infusion	Oral	Lack of vigor	54.55
					Oral	Sexual decline	18.18
				Roasting	Oral	Paralysis	9.09
				Simmer	Oral	Lack of vigor	54.55
					Oral	Tonic	18.18
Pleuroceridae	*Semisulcospira libertina*	Daseulgi	Whole part	Powder	Oral	Gastroenteric disorder	87.50
					Oral	Liver diseases	12.50
Ploceidae	*Passer montanus*	Chamsae	Whole part	Roast	Oral	Lack of vigor	100.00
Ranidae	*Rana nigromaculta*	Chamgaeguri	Leg	Simmer	Oral	Asthenia	15.79
			Ootheca	Raw	Topical	Burn	7.89
			Whole part	Fried	Oral	Lack of vigor	34.21
				Infusion	Oral	Sexual decline	10.53
					Oral	Scrotum eczema	2.63
					Oral	Lung diseases	15.79
				Pot stew	Oral	Lack of vigor	34.21
				Raw	Topical	Snakebite	2.63
				Roasting	Oral	Lack of vigor	34.21
					Oral	Malnutrition	10.53
				Simmer	Oral	Malnutrition	10.53
Sarcophagidae	*Musca domestica*	Jippari	Whole part	Roasting	Oral	Malnutrition	100.00
Scolpendridae	*Scolopendra subspinipes mutilans*	Jine	Whole part	Brewing	Oral	Lumbago	24.77
					Oral	Chronic myofascial pain	55.96
				Decoction	Oral	Osteoporosis	1.83
				Infusion	Oral	Lumbago	24.77
					Oral	Pleuritis	2.75
					Oral	Chronic myofascial pain	55.96
				Maceration, dissolution	Oral	Glycosuria	3.67
					Oral	Cardiovascular disease	3.67
				Powder	Oral	Chronic myofascial pain	55.96
					Oral	Lumbago	24.77
				Powder, dissolution	Oral	Chronic myofascial pain	55.96
					Oral	Lumbago	24.77
					Oral	Sinews and joint pain	7.34
				Simmer	Oral	Chronic myofascial pain	55.96
Sepiidae	*Sepia esculenta*	Chamgabojingeo	Bone	Powder	Topical	Abrasions	100.00
Sergestidae	*Acetes japonicus*	Jeotsaeu	Whole part	Wrap	Topical	Whitlow	100.00
Siluridae	*Silurus asotus*	Megi	Whole part	Simmer	Oral	Lack of vigor	100.00
Suidae	*Sus scrofa*	Metdwaeji	Whole part	Infusion	Oral	Sexual decline	100.00
	Sus scrofa domesticus	Dwaeji	Skin	Raw	Topical	Snakebite	21.13

Family	Scientific name	Korean name	Used part	Preparation	Application	Ailments	FL
			Foot	Infusion	Oral	Oligogalactia	39.44
				Simmer	Oral	Oligogalactia	39.44
				Infusion	Oral	Convulsions	9.86
					Oral	Lumbago	7.04
					Oral	Postpartum edema	8.45
			Fat	Infusion	Oral	Lung diseases	5.63
				Raw	Topical	Snakebite	21.13
				Roasting	Oral	Lung diseases	5.63
			Heart	Warm up in a double boiler	Oral	Convulsions	9.86
				Infusion	Oral	Convulsions	9.86
			Mouth	Dried	Topical	Salivation	5.63
			Whole part	Infusion	Oral	Lack of vigor	2.82
Talpidae	*Talpa micrura coreana*	Dudeoji	Whole part	Infusion	Oral	Salivation	26.09
					Oral	Lack of vigor	43.48
					Oral	Liver cirrhosis	17.39
				Roasting	Oral	Salivation	26.09
					Oral	Lack of vigor	43.48
					Oral	Paralysis	4.35
				Simmer	Oral	Malnutrition	8.70
Trionychidae	*Tryonyx sinensis*	Jara	Whole part	Infusion	Oral	Paralysis	50.00
			Body	Steam	Oral	Tonic	50.00
Vespidae	*Vespula Vulgaris*	Ttangbeol	Hive	Infusion	Oral	Asthma	23.08
			Whole part	Infusion	Oral	Headache	38.46
				Roasting	Oral	Malnutrition	38.46
Viperidae	*Agkistrodon blomhoffii*	Salmusa	Whole part	Brewing	Oral	Lack of vigor	43.59
				Decoction	Oral	Lack of vigor	43.59
				Infusion	Oral	Lung diseases	26.92
					Oral	Lack of vigor	43.59
					Oral	Sexual decline	5.13
					Oral	Panacea	5.13
					Oral	Tuberculosis	2.56
				Roasting	Oral	Myalgia	15.38
					Oral	Lack of vigor	43.59
					Oral	Lung diseases	26.92
					Oral	Sexual decline	5.13
				Simmer	Oral	Myalgia	15.38
					Oral	Lack of vigor	43.59
					Oral	Lung diseases	26.92

According to the recorded families, the most representative families were Scolpendridae and Phasianidae, which were utilized 36 times each (10.71 %, each), followed by Viperidae at 26 times (7.74 %) (Fig. 2).

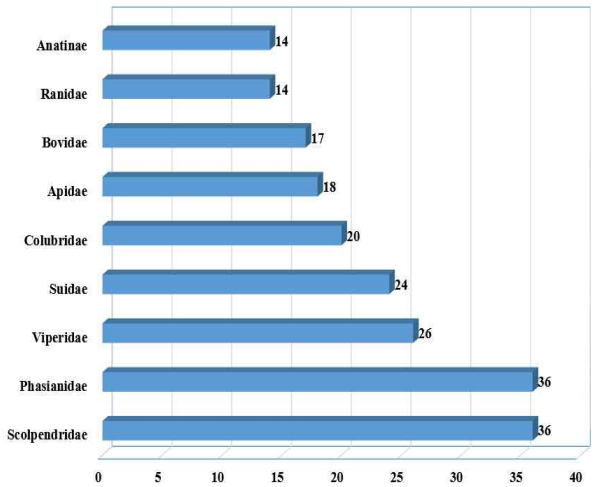

Fig. 2. Number of animal species by most representative family used for medicinal purpose.

Regarding the animal species mentioned most often, *Scolopendra subspinipes mutilans* was mentioned 36 times (10.7 %) followed by *Gallus domesticus* with 31 recordings (9.23 %) and *Agkistrodon blomhoffii* with 26 recordings (7.74 %).

The most utilized animal for ailments was *Gallus domesticus*, which was used for 13 different ailments: extravasated blood, lacquer poisoning, arthritis, centipede bites, convulsions, diarrhea, lack of vigor, pleuritis, bruising, lumbago, abdominal cold hypersensitivity, heat stroke, and arthrodynia. The following species will be able to develop into functional medicine in the near future.

Our analysis reveals that a total of 26 animal parts were selected as medicinal ingredients, with the top three parts being the whole animal (235 recordings, 69.94 %), the foot (18 recordings, 5.36 %), and honey (11 recordings, 3.27 %) (Fig. 3).

The results have revealed 23 modes of preparation for the medicinal animals, with the most common methods being infusion (35.11 %), powder (11.52 %), and raw (10.96 %) (Table 2).

The data reveals that the residents living in Songnisan National Park used medicinal animals as they could be easily obtained. Through further studies, the medicinal animals can easily be developed into suitable ingredients for pharma-foods in accordance with their availability.

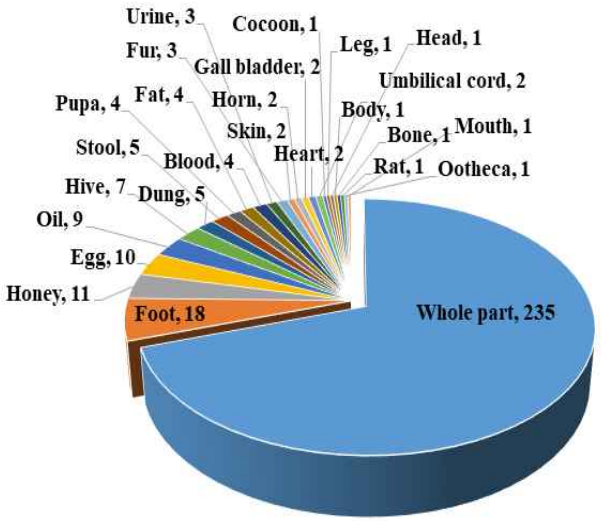

Fig. 3. Animal parts used for their medicinal properties (Number of use-report).

In the context of Korean culture and tradition, our results reported overall 32 species of animals that have been mentioned in KIOM, Dongui Bogam[27]. Among them, 10 species were in agreement at the level of generic names with species mentioned in Dongui Bogam. The scientific names of 7 species, namely, *Anguilla joponica*, *Bombyx mori*, *Misgurnus mizolepis*, *Cyprinus carpio*, *Phasianus colchicus*, *Silurus asotus*, and *Sus scrofa* were exactly in agreement. The other 15 species were in agreement with common names (Korean names). Only a single case of indication, which is using infused heart of *Sus scrofa domesticus* for convulsions, identically matched with Dongui Bogam. These results were due to the fact that Dongui Bogam had not been organized following the present nomenclature system.

3. Quantitative Analysis

1) Informant Consensus Factor (ICF)

The values of ICF ranged from 0.67 to 0.97 (Table 3). The categories with the highest degree of consensus from the informants was nervous system disorders (0.97) and pain (0.95). Two other disorders which ranked considerably high were muscular-skeletal disorders (0.91) and birth-related disorders (0.91). The lowest degree of consensus was for genitourinary system disorders (0.67) (Table 3). The data exposes the fact that the residents who mainly do farm work in these communities tend to treat more nervous system disorders and pain ailments using medicinal animals than any other health condition.

Table 3. Category of ailments and their informant consensus factor (ICF) according to Heinrich et al. (1998).

Symptom and ailment categories	Taxons	Use citations	ICF
Nervous system disorders	3	68	0.97
Pain	7	121	0.95
Muscular−skeletal disorders	5	45	0.91
Birth−related disorders	5	45	0.91
Circulatory system disorders	33	291	0.89
Respiratory system disorders	14	103	0.87
Poisonings	7	43	0.86
Inflammation	7	40	0.85
Cuts and wounds	3	14	0.85
Skin diseases and disorders	6	32	0.84
Diabetes	3	12	0.82
Other conditions	17	85	0.81
Liver complaints	3	9	0.75
Gastrointestinal disorders	6	19	0.72
Genitourinary system disorders	12	34	0.67

2) Fidelity Level (FL)

The FL is useful for identifying the key informants' most preferred species to use for treating certain ailments. The FL values in this study varied from 1.22 % to 100 % (Table 2).

Generally, an FL of 100 % for a species of animal indicates that all of the use−reports mentioned the same animal for a specific treatment.

This research classified 11 species of animals with fidelity levels of 100 %, even without considering animals that were mentioned only once for better accuracy. This information revealed that the informants had a tendency to rely on one specific animal species with one preparation method than using several preparatory methods[18].

Special attention was given to the important species (N, N*p*) of animals with an FL of 100 %:

Musca domestica (6, 6), *Anas platyrhynchos* (6, 6), *Sepia esculenta* (5, 5), *Passer montanus* (5, 5), *Oxya japonica japonica* (5, 5), *Ophisurus macrorhynchus* (4, 4), *Acetes japonicas* (3, 3), *Sus scrofa* (2, 2), *Silurus asotus* (2, 2), *Capra aegagrus hircus* (2, 2), and *Lepus sinensis coreanus* (2, 2).

These 11 species possess a much higher potential for being used in the development of functional medicine for specific ailments in the future.

3) Network Analysis

Analyzing the interrelationships among 66 ailments and 49 medicinal animals that were recorded in the study area revealed that *Canis familiaris* was used the most (Fig. 4).

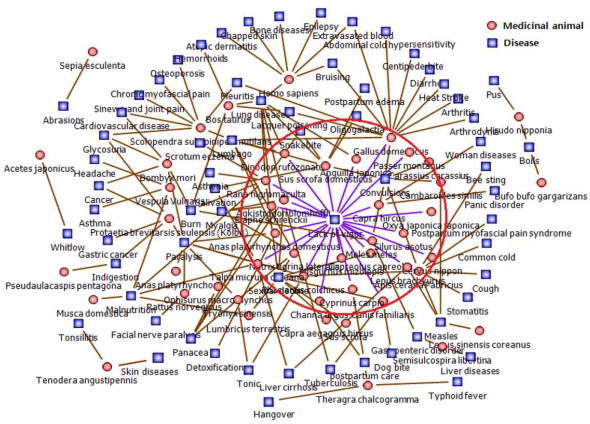

Fig. 4. The network map of ailments − medicinal animals in Songnisan National Park.

The highest associated category recorded is the lack of vigor within circulatory system disorders. Treatment for this medical concern is connected with the following three species: *Agkistrodon blomhoffi*, *Gallus domesticus*, and *Canis familiaris*, along with 23 species among the 49 total species (Fig. 5).

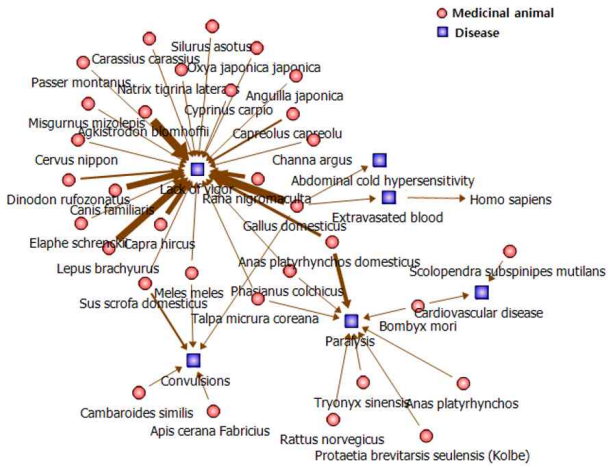

Fig. 5. The network map for circulatory system disorders.

In Figure 4, the thickness of the link relates to the number of animals being used in the treatment. The thickest link among circulatory system disorders is *Agkistrodon blomhoffi* (11 times), and *Gallus domesticus* (11 times), followed by *Lepus brachyurus* (9 times), *Canis familiaris* (8 times), and *Capra hircus* (7 times).

Ⅳ. Conclusion

This study is the first ethnozoological survey focusing on the oral traditional knowledge of medicinal amimals used by indigenous people in the communities of Songnisan National Park. The medicinal animal species reported in this study provide valuable information for Korean traditional medicine and demonstrates the importance of biodiversity within this region.

According to the ICF, the highest degree of the ailment categories for residents is related to nervous system disorders and pain. These results expose the fact that the Songnisan communities, who mainly tend to farm work, use the medicinal animals to treat work-related health concerns.

11 species with an FL of 100 % confirmed that residents tend to utilize a specific animal to treat a specific ailment. These animals and their utilized body parts will be able to develop into functional medicine with additional research.

Through the application of network analysis, we can interpret traditional knowledge to analyze the interrelationship between animals and ailments. In this study, 23 species of medicinal animals were utilized by informants for circulatory system disorders.

This documentation can help preserve the traditional knowledge and local health traditions of Korea that are disappearing due to rapid industrialization, urbanization, and death of the elderly with traditional knowledge. Additionally, the results of this study will provide basic data for further research and conservation.

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