

Full Length Research Paper

Oral traditional knowledge for the treatment of digestive system diseases investigated in North Jeolla Province, Korea

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This study aims to record and conserve oral traditional knowledge for the treatment of digestive system diseases in North Jeolla Province, Korea. Data was collected with semi-structured questionnaires through the participatory rural appraisal method (PRA). This study reveals that overall 29 digestive system diseases have been treated with a total of 74 species of medicinal plants belonging to 69 genera in 40 families. This study also reports 447 different modes of plant-based therapeutic application of medicinal material. The informant consensus factor (ICF) for the digestive, bloody stool, enteritis and gastritis are 1.00, the highest among 29 different digestive ailments. Twenty medicinal plants with 100% fidelity level (FL) were found in 8 digestive ailments. These results will help to prepare the way for advanced research such as new medicines and new therapies.

Key words: Oral traditional knowledge, digestive system diseases, informant consensus factor, fidelity level, Korea.

INTRODUCTION

The most important component of traditional medicine in the field of complementary and alternative medicine is based on traditional knowledge. The significance of genetic resources and traditional medical knowledge has increased with the announcement of the Nagoya Protocol in October, 2010 (Nagoya Protocol, 2010). In particular, the protocol includes a new set of regulations about how nations should fairly and equally share the benefits arising from utilization of genetic resources. This kind of momentum will fuel the fire for more investigation into traditional knowledge over research on genetic resources which have been studied for a long time (Houghton, 2007).

The traditional knowledge of genetic resources is divided into two parts: recorded knowledge and orally transmitted knowledge. Sharing of the benefits is not an issue in the case of recorded knowledge. However, orally transmitted knowledge that has not been recorded through investigation and research cannot be acknowledged, in which case it is not subject to

benefit-sharing. For the past twenty years, orally transmitted knowledge due to its economic value has been actively investigated in less-developed areas such as Asia (El-Ghazali et al., 2010; Rahmatullah et al., 2010; Sher et al., 2010; Ullah et al., 2010), Africa (Giday et al., 2009; Teklehaymanot, 2009; Yirga, 2010) and Latin America (Halberstein, 1997; Tene et al., 2007). The traditional culture and the natural ecosystem of these regions have been relatively well conserved. Since orally transmitted traditional knowledge is possessed by older generation, most of it can disappear drastically following their deaths (Kim et al., 2006; Kim and Song, 2008).

Since a rapid industrialization took place in the Republic of Korea during the latter half of the 20th century, much of its orally transmitted traditional knowledge has disappeared along with the breakdown of traditional culture and the natural ecosystem. Moreover, a strong influence of conventional medicine has led to the decline of orally transmitted knowledge about traditional treatment of diseases. In this respect, investigative research on orally transmitted treatment knowledge is desperately needed.

In the viewpoint of complementary and alternative medicine, research about digestive system diseases has been conducted on a weak level throughout the world

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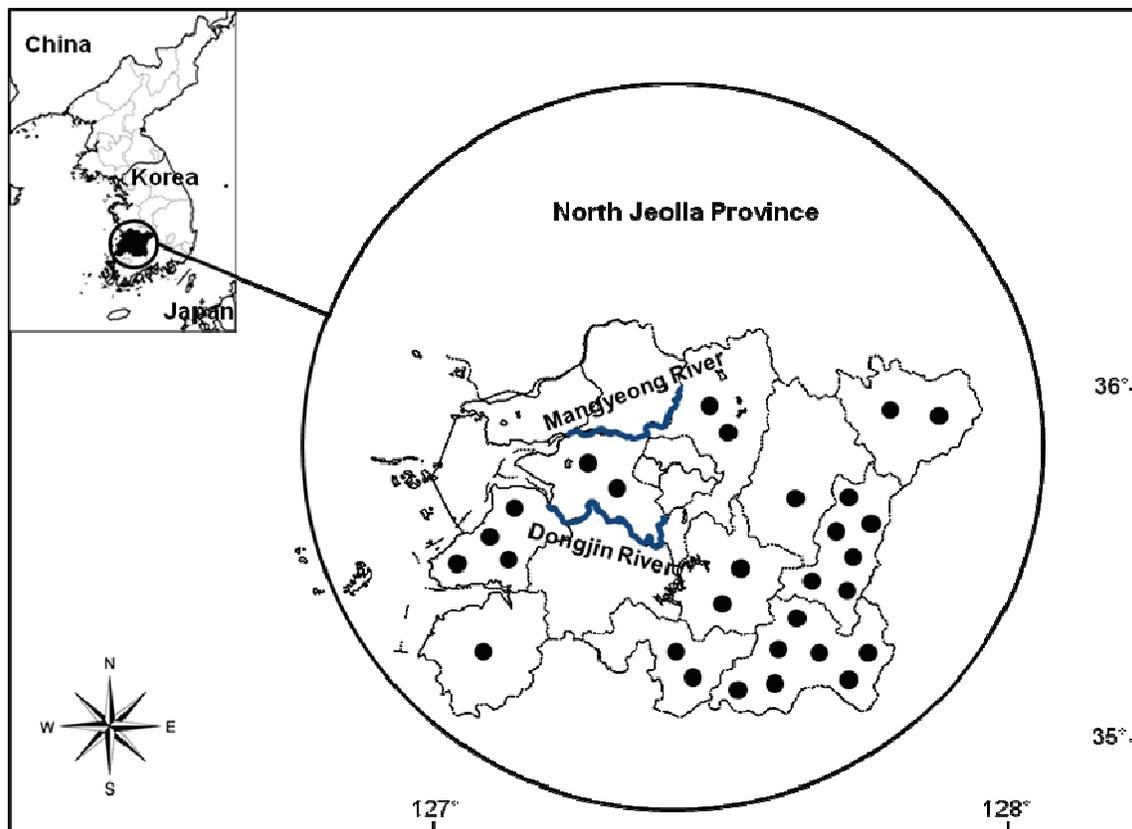


Figure 1. Twenty-nine study areas for investigation.

(Haas et al., 2000; Kav, 2009; Mullin and Clarke, 2010; Tillisch, 2006). In particular, there is no single research that investigates orally transmitted knowledge of traditional treatments.

The aim of this study is to record and analyze orally transmitted traditional knowledge about treatment of digestive system diseases for the first time in the world. As a result, new traditional therapies for digestive system diseases will be recorded. The recorded therapies will be available as new verified treatments through further studies such as clinical trials.

STUDY AND INVESTIGATION METHODOLOGY

The study area

The study area covers the middle portion of the central and southern region in North Jeolla Province which is the southwest part of the Korean Peninsula. The administrative district consists of sixteen cities and counties (Figure 1). This region is characterized by a harmonious farming culture of two distinct agrarian styles. The eastern part, approximately 1,000m above the sea level, is engaged mainly in dry-field farming while having developed a mountainous culture. In contrast, the western part, approximately 100m under the sea level, has conserved a plain land culture in the paddy-field area. The size of the land is 8,061.41km² (North Jeolla Provincial Government, 1989) and the total population in 2010 was 1,874,521

with a population density of 232.5/km² (North Jeolla Provincial Government, 2010).

Investigation method

Field investigation was conducted on 29 sites for 22 months beginning from July 10th, 2008 to May 20th, 2010 (Figure 1). We interviewed 71 key informants (29 men and 42 women) who have lived over 40 years around the investigation area. The average age of the informants was 72 (51 to 92 years old) and all of them have been hardly affected by modern culture and education.

Data was collected with semi-structured questionnaires through the participatory rural appraisal method (PRA) where the informants served as the investigators at the same time (Kim and Song, 2008). The contents of the semi-structured questionnaires included inquiries about ethnopharmacological information of diverse medicinal plants for treatment of digestive system diseases including local names, plant-parts used, ailments and methods of preparation, manufacturing and administration, dosages, and usable durations of the medicines (Kim et al., 2006; Martin, 1995; Poonam and Singh, 2009). The precise identification of plants as recorded by the informants was performed in accordance with Lee (1979) and Lee (2002). All the plant specimens were collected during either their flowering or fruiting seasons and organized using the normal specimen manufacturing method (Martin, 1995).

The voucher specimens were deposited for preservation in the herbarium at Jeonju University (JJU). Scientific names of plants were confirmed with the National Knowledge and Information System for Biological Species (NKISBS, 2010) of Korea.

Quantitative analysis

The informant consensus factor (ICF) was opted to analyze the degrees of agreement among the informants on the treatment of digestive system diseases (Trotter and Logan, 1986; Heinrich et al., 1998, 2009; Heinrich, 2000). It was calculated by the following formula: $ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$ (n_{ur} is the number of use-reports for each of the 14 ailments; n_t is the number of plant species used).

The fidelity level (FL) was employed to determine the most important plant species used in treatment of specific respiratory disease by the local herbal practitioners or literate elders living in the study area (Alexiades, 1996; Ugulu et al., 2009). It was calculated by the following formula: $FL(\%) = \frac{N_p \times 100}{N}$ (N_p is the number of informants to mention plant species for treating one particular respiratory disease; N is the total number of informants who used medicinal plants for any given ailments).

RESULTS AND DISCUSSION

Ethnomedicinal analysis

The 63 informants (24 men and 39 women) mentioned traditional knowledge for the treatment of digestive system diseases among the total 71 informants (29 men and 42 women) were arranged in the following age group; in the fifties (7), sixties (12), seventies (31), eighties (12), and nineties (1). The average age of the informants was 72 (51 to 92 years old) which is quiet high. The inhabitants who were under 50 years of age had nearly forgotten all about traditional treatments since they have received a western style education. So, no written records were produced.

Through this investigation, we were able to confirm once again the rapid loss of knowledge about traditional treatments. That is, mentions of 9 informants took 38.5% of the whole. However, the number of medicinal plant and ailment occupied 67.6% and 79.3%, respectively. This means that the distribution of the traditional treatment is very narrow.

Twenty nine ailments which were recorded in this study were treated with 447 different modes of plant-based therapeutic application (Table 1). The most common disease is indigestion which 43 informants mentioned 76 times, followed by gastroenteric disorders, liver diseases, abdominal pain, appetizer, detoxification, and diarrhea. These ailments compromise about 80% of the total number of ailments that were mentioned (Figure 2). Another 5 ailments including enteritis were mentioned twice, and 6 others including vomiting were mentioned once. This concentration of seven ailments implies a narrow distribution of traditional treatment.

Meanwhile, in the case of the gastroenteric disorders and liver diseases, the number of mentions is greater although the number of informants was between 22-23 people compared to 28-31 informants in the abdominal pain, appetizer, and detoxification group. This kind of result is due to the fact that the same species of medicinal plant is used differently according to the number of plant-parts used and their various therapeutic

applications. A total of 74 species belonging to 40 families in 69 genera (56 species, 15 varieties and 3 forms) were used as medicinal plants to treat ailments. Medicinal plants including 17 families and 22 species were applied to treat indigestion.

Subsequently, 18 species were used for gastroenteric disorders and liver diseases, 14 species for the abdominal pain, 12 species for detoxification and so on. One single species of a medicinal plant was used to treat a total of 13 ailments (Table 1). This result shows that the number of medicinal plants in usage is inclined towards two extreme sides depending on the ailment. Overall, a total of eleven plant-parts were used. Eight plant-parts were used to treat gastroenteric disorders, followed by indigestion, liver diseases and detoxification (6 kinds), abdominal pain, diarrhea and jaundice (5 kinds) (Figure 3). Using various plant-parts for the treatment of one ailment presents a necessity to conduct a comparative study about the medical efficiency of each plant-part. Medicinal plants were prepared in 20 different methods. Among these, juice, decoction, infusion and maceration occupied 78% of the total. An oral application accounted for 98% of all applications. Other methods of application include eight kinds of topical and one nasal (Table 1). All therapeutic applications used a single medicinal plant except for four combination therapies in which two or more compound medicinal materials are used (Table 1).

Analysis of consensus and fidelity

The ICF (Informants Consensus Factor) indicated that there was a level of agreement for the treatment of 29 digestive system diseases. The consensus on the traditional treatment for digestive, bloody stool, enteritis and gastritis showed high scores (Table 2). However, there was no agreement for the treatment of hepatitis, hookworm, cholelithiasis, gastric cancer, gastric ulcer, hematemesis, spleen diseases, stomachic and vomiting. This implies that the informants' reliability about traditional treatment is very low (Heinrich et al., 1998, 2009). The FL (Fidelity Level) is the index which ranks the priority of the plants mentioned by the informants to treat digestive system diseases. In this investigation, twenty medicinal plants with 100% fidelity level were found in 8 digestive ailments. More specifically, indigestion was treated with 7 species of medicinal plants with 100% FL followed by detoxification (4 species); gastroenteric disorder, liver diseases and abdominal pain (2 species); appetizer, parasitization and jaundice (1 species). These medicinal plants and therapeutic applications show a very high rate of reliability from the informants (Alexiades, 1996).

Important medicinal plants

Among three medicinal plants used for appetizer

Table 1. Information about the recorded medicinal plants.

Diseases	Scientific name	Korean name	Number of mentions	Informants	Used part	Preparation	Application	FL	
Indigestion	<i>Agrimonia pilosa</i> Ledeb.	Jipsinnamul	2	Male (1), female (1)	Whole part	Infusion	Oral	100.0	
	<i>Allium microdictyon</i> Prokh.	Sanmaneul	1	Male (1)	Root	Decoction	Oral	25.0	
	<i>Alnus japonica</i> (Thunb.) Steud.	Orinamu	1	Female (1)	Fruit	Decoction	Oral	100.0	
	<i>Aralia elata</i> (Miq.) Seem.	Dureupnamu	4	Female (2)	Root	Decoction, fermentation	Oral	100.0	
	<i>Artemisia capillaris</i> Thunb.	Sacheolissuk	2	Female (2)	Leaf	Juice	Oral	11.8	
	<i>Actyloides ovata</i> (Thunb.) DC.	Sapju	11	Male (4), female (7)	Root	Decoction, infusion	Oral	55.0	
	<i>Diospyros kaki</i> Thunb.	Gannamu	1	Female (1)	Fruit	Infusion	Oral	6.7	
	<i>Hordeum vulgare</i> var. <i>hexastichon</i> (L.) Asch.	Bori	2	Male (1), female (1)	Seed	Fermentation	Oral	33.3	
	<i>Leonurus japonicus</i> Houtt.	Ikmocho	4	Female (2)	Leaf, stem	Juice	Oral	9.3	
	<i>Perilla frutescens</i> var. <i>acuta</i> Kudo	Soyeop	1	Male (1)	Leaf	Decoction	Oral	100.0	
	¹ <i>Phytolacca esculenta</i> VanHoutte	Jarigong	4	Female (4)	Root	Fermentation	Oral	50.0	
	<i>Plantago asiatica</i> L.	Jilyeongi	10	Male (2), female (7)	Whole part	Decoction, juice, maceration	Oral	43.5	
	<i>Prunus mume</i> Siebold & Zucc. for. <i>mume</i>	Maesinamu	3	Male (3)	Fruit	Extraction, brewing	Oral	75.0	
	<i>Pueraria lobata</i> (Willd.) Ohwi	Chilk	2	Female (2)	Root	Juice	Oral	8.7	
	<i>Punica granatum</i> L.	Seokryunamu	2	Male (1), female (1)	Fruit	Juice	Oral	100.0	
	<i>Quercus acutissima</i> Carruth.	Sangsurinamu	2	Female (2)	Fruit	Powder	Oral	50.0	
	<i>Ricinus communis</i> L.	Pimaja	9	Male (2), female (7)	Seed, fruit	Oil	Oral	69.2	
	<i>Smilax china</i> L.	Cheongmiraedeonggul	2	Female (2)	Fruit	Decoction	Oral	100.0	
	<i>Solanum nigrum</i> L. var. <i>nigrum</i>	Kkamajung	6	Male (1), female (2)	Leaf, stem	Infusion	Oral	100.0	
	<i>Sophora flavescens</i> Solander ex Aiton	Gosam	1	Male (1)	Root	Maceration	Oral	33.3	
	¹ <i>Viscum album</i> var. <i>coloratum</i> (Kom.) Ohwi	Gyeousali	4	Female (4)	Whole part	Fermentation	Oral	100.0	
	<i>Zanthoxylum piperitum</i> (L.) DC.	Chopinamu	2	Male (1), female (1)	Seed	Oil	Oral	100.0	
	Gastroenteric disorder	² <i>Aconitum ciliare</i> DC.	Noijeogaraknamul	6	Male (1), female (2)	Leaf, stem	Infusion	Oral	100.0
		<i>Atractylodes ovata</i> (Thunb.) DC.	Sapju	4	Male (2), female (2)	Root	Powder, soup, decoction	Oral	20.0
		<i>Curcuma longa</i> L.	Ulgeum	1	Male (1)	Root	Soup	Oral	100.0
		<i>Euonymus alatus</i> (Thunb.) Siebold	Hwasalnamu	1	Male (1)	Stem	Decoction	Oral	100.0
		<i>Ixeridium dentatum</i> (Thunb. ex Mori) Tzvelev	Sseumbagwi	1	Male (1)	Whole part	Juice	Oral	33.3
		<i>Lactuca indica</i> L.	Wanggodeuppaegi	3	Male (1), female (3)	Whole part	Juice	Oral	100.0
		<i>Ligustrum obtusifolium</i> Siebold and Zucc.	Jwitongnamu	1	Male (1)	Fruit	Decoction	Oral	100.0
		<i>Oryza sativa</i> L. var. <i>sativa</i>	Byeo	1	Female (1)	Seed	Rice water	Oral	33.3
		<i>Phytolacca esculenta</i> VanHoutte	Jarigong	4	Female (2)	Root	Maceration, clear soup with dumplings	Oral	50.0
		<i>Pinus densiflora</i> Siebold and Zucc.	Sonamu	1	Female (1)	Leaf	Juice	Oral	100.0
		<i>Polygonatum odoratum</i> var. <i>pluriflorum</i> (Miq.) Ohwi	Dunggulire	2	Female (2)	Root	Soup	Oral	50.0

Table 1. Contd.

	Chilk	14	Male (2), female (10)	Root	Brewing, infusion, juice, maceration, soup	Oral	60.9
<i>Pueraria lobata</i> (Willd.) Ohwi							
<i>Quercus acutissima</i> Carruth.	Sangsurinamu	2	Female (2)	Fruit	Powder	Oral	50.0
<i>Rhus verniciflua</i> Stokes	Otnamu	10	Male (1), female (6)	Bark, resin, stem	Decoction, extraction, infusion	Oral	83.3
<i>Rosa davurica</i> Pall.	Saengyeolgwinamu	1	Male (1)	Fruit	Brewing	Oral	100.0
<i>Styrax japonicus</i> Siebold and Zucc.	Taejuknamu	2	Male (1), female (1)	Fruit	Infusion	Oral	40.0
<i>Trachelospermum asiaticum</i> (Siebold and Zucc.) Nakai var. <i>asiaticum</i>	Masakjul	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
<i>Ulmus davidiana</i> var. <i>japonica</i> (Rehder) Nakai	Neureupnamu	2	Female (2)	Bark	Simmer	Oral	50.0
<i>Acer tegmentosum</i> Maxim.	Sangyeoreupnamu	1	Male (1)	Stem	Decoction	Oral	100.0
<i>Adenocaulon himalaicum</i> Edgew.	Myeolgachi	1	Male (1)	Whole part	Juice	Oral	100.0
<i>Artemisia capillaris</i> Thunb.	Sacheolssuk	9	Male (4), female (5)	Leaf, whole part	Decoction, infusion, juice	Oral	52.9
<i>Artemisia princeps</i> Pamp.	Ssuk	2	Male (1)	Leaf, stem	Juice	Oral	3.7
<i>Dendropanax morbiferus</i> H.Lev.	Hwangchilnamu	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
<i>Duchesnea indica</i> (Andr.) Focke	Baemitalgi	1	Male (1)	Fruit	Brewing	Oral	33.3
<i>Equisetum hyemale</i> L.	Soksae	1	Male (1)	Stem	Decoction	Oral	100.0
<i>Eucommia ulmoides</i> Oliv.	Duchung	2	Female (2)	Stem	Decoction	Oral	100.0
<i>Glycine max</i> (L.) Merr.	Kong	2	Female (2)	Seed	Fermentation	Oral	66.7
<i>Hedera rhombea</i> (Miq.) Bean	Songak	1	Male (1)	Fruit	Decoction	Oral	100.0
<i>Hovenia dulcis</i> Thunb. ex Murray	Heotgaenamamu	6	Male (3), female (3)	Stem	Decoction, soup	Oral	100.0
<i>Ilexidium dentatum</i> (Thunb. ex Mori) Tzvelev	Sseumbagwi	2	Male (1), female (1)	Whole part	Juice	Oral	66.7
<i>Oenanthe javanica</i> (Blume) DC.	Minari	3	Male (2)	Leaf, stem, whole part	Juice	Oral	23.1
<i>Prunus padus</i> L. for. <i>padus</i>	Gwirungnamu	1	Male (1)	Stem	Boiling	Oral	100.0
<i>Sorbus commixta</i> Hedl.	Magamok	7	Male (2)	Fruit, leaf, stem	Brewing, decoction, soup	Oral	63.6
<i>Taraxacum platycarpum</i> Dahlst.	Mindeulre	6	Female (4)	Leaf, stem, whole part	Decoction	Oral	50.0
<i>Trachelospermum asiaticum</i> (Siebold and Zucc.) Nakai var. <i>asiaticum</i>	Masakjul	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
<i>Zingiber mioga</i> (Thunb.) Roscoe	Yangha	1	Male (1)	Root	Juice	Oral	100.0
<i>Allium tuberosum</i> Rotlier ex Spreng.	Buchu	3	Male (1), female (2)	Whole part	Porridge, juice	Oral	75.0
<i>Artemisia capillaris</i> Thunb.	Sacheolssuk	3	Female (3)	Leaf	Infusion	Oral	17.6
<i>Artemisia princeps</i> Pamp.	Ssuk	17	Male (2), female (9)	Leaf, stem, whole part	Juice	Oral	31.5
<i>Diospyros kaki</i> Thunb.	Gammamu	1	Female (1)	Fruit	Infusion	Oral	6.7
<i>Juglans mandshurica</i> Maxim. var. <i>mandshurica</i> for. <i>mandshurica</i>	Garaenamamu	2	Female (2)	Fruit	Raw	Oral	100.0

Table 1. Contd.

		Ikmocho	8	Female (5)	Leaf, stem, whole part	Juice, maceration	Oral	18.6
	<i>Leonurus japonicus</i> Houtt.							
	<i>Lithospermum erythrorhizon</i> Siebold and Zucc.	Jichi	1	Female (1)	whole part	Infusion	Oral	50.0
	<i>Panicum miliaceum</i> L.	Gijang	1	Male (1)	Seed	Boiling	Oral	25.0
	<i>Papaver somniferum</i> L.	Yanggwibi	3	Female (3)	Leaf	Decoction	Oral	100.0
	<i>Plantago asiatica</i> L.	Jilgyeongi	2	Female (2)	Whole part	Decoction	Oral	8.7
	<i>Prunus mume</i> Siebold and Zucc. for. <i>mume</i>	Maesilnamu	1	Female (1)	Fruit	Extraction	Oral	25.0
	<i>Rhus verniciflua</i> Stokes	Otnamu	2	Male (1), female (1)	Stem	Infusion	Oral	16.7
	<i>Sorbus commixta</i> Hedi.	Magamok	2	Female (2)	Stem	Decoction	Oral	18.2
	<i>Styrax japonicus</i> Siebold and Zucc.	Taejuknamu	3	Male (2), female (1)	Fruit	Raw	Oral	60.0
Appetizer	<i>Artemisia princeps</i> Pamp.	Ssuk	17	Male (4), female (13)	Leaf, whole part	Juice	Oral	31.5
	<i>Dendranthema zawadskii</i> var. <i>latifolium</i> (Maxim.) Kitam.	Gujeolcho	8	Female (4)	Leaf, stem	Decoction	Oral	100.0
	<i>Leonurus japonicus</i> Houtt.	Ikmocho	19	Male (4), female (7)	Leaf, sprout, stem, whole part	Juice, maceration	Oral	44.2
Detoxification	<i>Allium microdictyon</i> Prokh.	Sanmaneul	1	Male (1)	Root	Decoction	Oral	25.0
	<i>Allium scorodopasum</i> var. <i>viviparum</i> Regel	Maneul	2	Male (2)	Root	Raw	Oral	100.0
	<i>Dendropanax moribiferus</i> H.Lev.	Hwangchilnamu	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
	<i>Hordeum vulgare</i> var. <i>hexastichon</i> (L.) Asch.	Bori	4	Male (1), female (1)	Seed	Detoxification, maceration	Oral	66.7
	<i>Leonurus japonicus</i> Houtt.	Ikmocho	4	Male (2)	Leaf, stem	Juice	Oral	9.3
	<i>Oryza sativa</i> L. var. <i>sativa</i>	Byeo	2	Female (2)	Seed	Rice water	Oral	66.7
	<i>Pueraria lobata</i> (Willd.) Ohwi	Chilk	2	Male (1), female (1)	Root	Juice	Oral	8.7
	<i>Ribes fasciculatum</i> var. <i>chinense</i> Maxim.	Kkamagwibapnamu	3	Male (1)	Fruit, leaf, stem	Decoction	Oral	100.0
	<i>Sageretia theezans</i> (L.) Brongn.	Sangdongnamu	2	Male (1)	Leaf, stem	Decoction	Oral	100.0
	<i>Sedum sarmentosum</i> Bunge	Dolhamul	1	Male (1)	Whole part	Juice	Oral	100.0
	<i>Vigna radiata</i> (L.) Wilczek	Nokdu	19	Male (3), female (16)	Seed	Juice, maceration	Oral	100.0
	<i>Zizyphus jujuba</i> var. <i>inermis</i> (Bunge) Rehder	Daechunnamu	1	Male (1)	Fruit	Detoxification	Oral	100.0
Diarrhea	<i>Allium tuberosum</i> Rotlier ex Spreng.	Buchu	1	Male (1)	Whole part	Juice	Oral	52.0
	⁴¹ <i>Artemisia princeps</i> Pamp	Ssuk	14	Female (5)	Leaf, stem, whole part	Decoction, juice	Oral	25.9
	⁴¹ <i>Diospyros kaki</i> Thunb.	Gamnamu	10	Female (10)	Fruit	Decoction, infusion	Oral	66.7
	<i>Leonurus japonicus</i> Houtt.	Ikmocho	6	Male (3)	Leaf, stem	Juice	Oral	14.0
	<i>Panicum miliaceum</i> L.	Gijang	1	Male (1)	Seed	Boiling	Oral	25.0
	<i>Plantago asiatica</i> L.	Jilgyeongi	1	Male (1)	Seed	Decoction	Oral	4.3
	<i>Thalictrum aquilegifolium</i> var. <i>sibiricum</i> Regel and Tilling	Kkueonguidari	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
	<i>Viola mandshurica</i> W.Becker	Jebikkot	1	Male (1)	Whole part	Decoction	Oral	33.3

Table 1. Contd.

Jaundice	<i>Artemisia capillaris</i> Thunb. <i>Artemisia gmelini</i> Weber ex Stechm. <i>Cucumis melo</i> var. <i>makuwa</i> Makino <i>Fallopia japonica</i> (Houtt.) RonseDecr. <i>Oenanthe javanica</i> (Blume) DC. <i>Plantago asiatica</i> L. <i>Viola mandshurica</i> W.Becker	Sacheolissuk Deowijgi Chamoe Hojanggeun Minari Jilgyeongi Jebikkot	3 3 1 1 10 1 1	Male (1), female (2) Male (1) Male (1) Male (1) Male (1), female (4) Male (1) Male (1)	Whole part Whole part Fruit Root Leaf, stem Whole part Whole part	Infusion, juice Brewing, infusion, fermentation Powder Decoction Juice Decoction Decoction	Topical, oral Oral Nasal Oral Oral Oral Oral	17.6 100.0 100.0 100.0 76.9 4.3 33.3
Hangover	<i>Artemisia princeps</i> Pamp. <i>Diospyros kaki</i> Thunb. <i>Pueraria lobata</i> (Willd.) Ohwi	Ssuk Gannamu Chilk	4 3 5	Female (2) Female (3) Female (5)	Leaf, stem Leaf Root	Simmer Infusion Juice	Oral Oral Oral	7.4 20.0 21.7
Acute gastroenteritis	<i>Glycine max</i> (L.) Merr. <i>Plantago asiatica</i> L.	Kong Jilgyeongi	1 8	Female (1) Male (3), female (5)	Seed Whole part	Fermentation Juice, maceration	Oral Oral	33.3 34.8
Stomach problem	<i>Leonurus japonicus</i> Houtt. <i>Panicum miliaceum</i> L. <i>Taraxacum platycarpum</i> Dahlst.	Ikmocho Gijang Mindeulle	2 1 6	Male (1) Male (1) Female (3)	Leaf, stem Seed Leaf, stem	Juice Boiling Decoction	Oral Oral Oral	4.7 25.0 50.0
Parasitization	<i>Pulsatilla koreana</i> (Yabe ex Nakai) Nakai ex Mori <i>Sophora flavescens</i> Solander ex Aiton	Halmikkot Gosam	4 2	Female (2) Female (2)	Root Whole part	Decoction, grain syrup Decoction	Oral Oral	100.0 66.7
Constipation	<i>Lithospermum erythrorhizon</i> Siebold and Zucc. <i>Ricinus communis</i> L.	Jichi Pimaja	1 4	Male (1) Female (4)	Root Seed	Powder Oil	Oral Oral	50.0 30.8
Digestive	<i>Atractylodes ovata</i> (Thunb.) DC.	Sapju	4	Female (4)	Root	Brewing, decoction	Oral	20.0
Hemorrhoid	<i>Imperata cylindrica</i> var. <i>koenigii</i> (Retz.) Pilg. <i>Sanguisorba officinalis</i> L.	Tti Opul	1 3	Male (1) Female (1)	Flower Whole part	Decoction Maceration, paste, poultice	Oral Topical	100.0 50.0
Bloody stool	<i>Sanguisorba officinalis</i> L.	Opul	3	Female (1)	Whole part	Maceration, paste, poultice	Topical	50.0
Enteritis	<i>Thalictrum aquilegifolium</i> var. <i>sibiricum</i> Regel and Tiling	Kkueonguidari	2	Male (1)	Leaf, stem	Decoction	Oral	50.0
Gastritis	<i>Sorbus commixta</i> Hedi.	Magamok		Female (2)	Stem	Decoction	Oral	18.2
Hepatitis	<i>Plantago asiatica</i> L. <i>Viola mandshurica</i> W.Becker	Jilgyeongi Jebikkot	1 1	Male (1) Male (1)	Whole part Whole part	Decoction Decoction	Oral Oral	4.3 33.3
Hookworm	<i>Allium microdictyon</i> Prokh. <i>Ranunculus chinensis</i> Bunge	Sanmaneul Jeotgaraknamul	1 1	Male (1) Male (1)	Root Whole part	Decoction Decoction	Oral Oral	25.0 100.0

Table 1. Contd.

Intestinal disease	<i>Polygonatum odoratum</i> var. <i>pluriflorum</i> (Miq.) Ohwi	Dunggulre	2	Female (2)	Root	Soup	50.0
Stomatitis	<i>Duchesnea indica</i> (Andr.) Focke	Baemtaigi	2	Male (1)	Leaf, stem	Decoction	66.7
Cholelithiasis	<i>Glechoma grandis</i> (A.Gray) Kuptian.	Ginbyeongkotpul	1	Male (1)	Aerial part	Decoction	100.0
Gastric cancer	<i>Ulmus davidiana</i> var. <i>japonica</i> (Rehder) Nakai	Neureupnamu	1	Male (1)	Bark	Decoction	25.0
Gastric ulcer	<i>Ulmus davidiana</i> var. <i>japonica</i> (Rehder) Nakai	Neureupnamu	1	Male (1)	Bark	Decoction	25.0
Hematemesis	<i>Camellia japonica</i> L.	Dongbaeknamu	1	Male (1)	Fruit	Decoction	100.0
Spleen diseases	<i>Atractylodes ovata</i> (Thunb.) DC.	Sapju	1	Male (1)	Root	Decoction	5.0
Stomachic	<i>Allium microdictyon</i> Prokh.	Sanmaneu	1	Male (1)	Root	Decoction	25.0
Vomiting	<i>Panicum miliaceum</i> L.	Gjang	1	Male (1)	Seed	Boiling	25.0

^{1)~4)}: Plants of medicinal decoction.

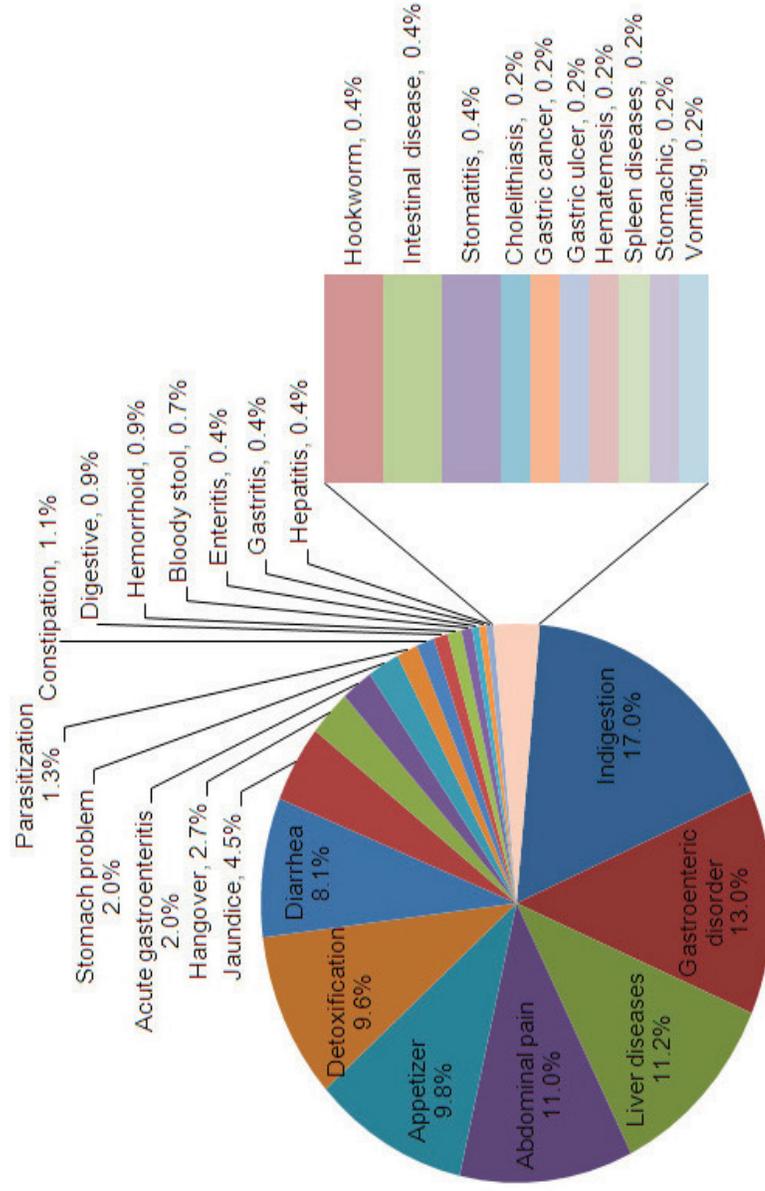


Figure 2. Number of mentions of medicinal plants used to treat digestive system diseases.

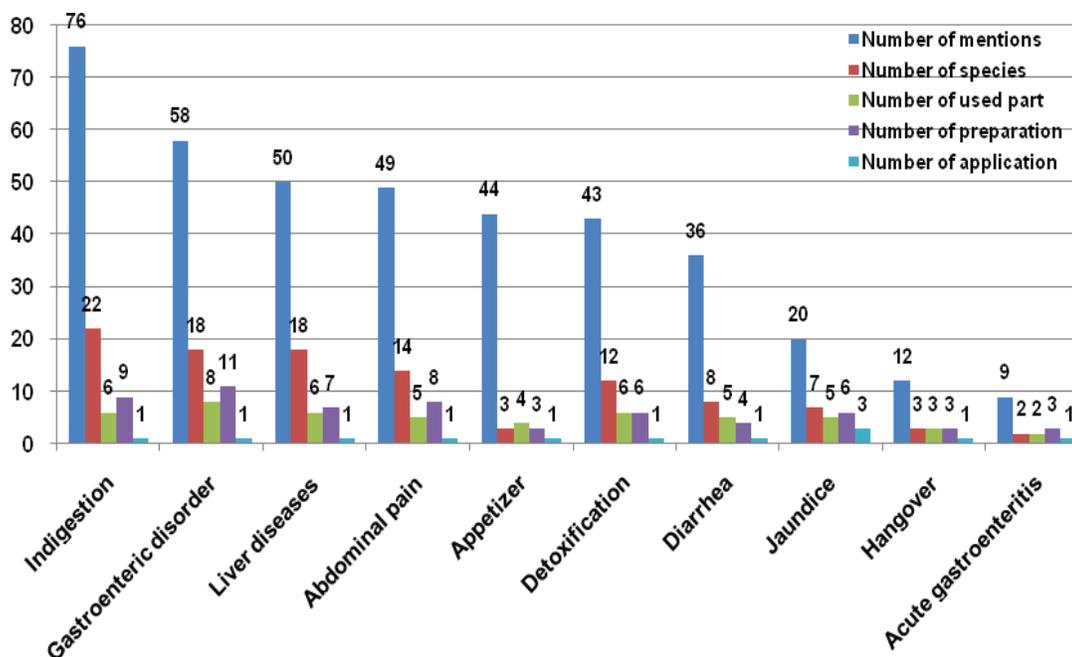


Figure 3. The number of mentions, species, used part, preparation, and application used to treat digestive system diseases.

Table 2. Category of digestive system diseases and their informant consensus factors (ICF).

Diseases	TAXONS	Use Citation	ICF
Digestive	1	4	1.00
Bloody stool	1	3	1.00
Enteritis	1	2	1.00
Gastritis	1	2	1.00
Intestinal disease	1	2	1.00
Stomatitis	1	2	1.00
Appetizer	3	44	0.95
Acute gastroenteritis	2	9	0.88
Hangover	3	12	0.82
Diarrhea	8	36	0.80
Parasitization	2	6	0.80
Constipation	2	5	0.75
Stomach problem	3	9	0.75
Detoxification	12	43	0.74
Abdominal pain	14	49	0.73
Indigestion	22	76	0.72
Gastroenteric disorder	18	58	0.70
Jaundice	7	20	0.68
Hemorrhoid	2	4	0.67
Liver diseases	18	50	0.65

(ICF 0.95), *Dendranthema zawadskii* var. *latilobum* (Maxim.) Kitam had 100% FL index. There is a high possibility that this species will be developed into a new medicine or a new therapy.

For a treatment of detoxification, *Vigna radiata* (L.) Wilcz showed a fidelity level of 100% among 19 informants. Furthermore, *Aconitum ciliare* DC. for treating gastroenteric disorder, *Solanum nigrum* L. var. *nigrum* for

indigestion and *Hovenia dulcis* Thunb. ex Murray for liver diseases showed a fidelity rate of 100% among 6 informants. These medicinal plants have the potential to become excellent medicinal material through clinical trials.

Medicinal plants that were used to treat ailments are as follows; *Leonurus japonica* Houtt. and *Plantago asiatica* L. (to treat 6 ailments), *Artemisia princeps* Pamp. (5 ailments), and *Allium microdictyon* Prokh., *Artemisia capillaris* Thunb., *Atractylodes ovata* (Thunb.) DC., *Diospyros miliceum* L., *Pueraria lobata* (Willd.) Ohwi, and etc. (4 ailments). These species which are used to treat various ailments need further studies to clarify and accurately assess their medical effects.

Conclusion

The significance of orally transmitted traditional knowledge will be emphasized more with the announcement of the Nagoya Protocol (2010). Particularly, knowledge about traditional treatments among other traditional knowledge is expected to increase in demand because of its economic value.

With a consideration to this trend, it is desirable to conduct a research to record oral knowledge about traditional treatment of specific diseases, to investigate by semi-constructed questionnaires using the PRA method. Three main results obtained from this research; ethnomedicinal analysis, analysis of ICF and FL, and analysis of important medicinal plants, prove the importance of this study.

A total of 447 traditional therapeutic applications for about 29 digestive system diseases were recorded in this investigation. This result implies that both quantity and quality of orally transmitted traditional knowledge in the study area are excellent. Therefore, further measures need to be taken in order to better preserve and develop this traditional knowledge.

The reliability of five medicinal plants including *D. zawadskii* var. *latilobum* (Maxim.) Kitam, *V. radiata* (L.) Wilcz, *A. ciliare* DC., *S. nigrum* L. var. *nigrum* and *H. dulcis* Thunb. ex Murray were high. These species can be developed as new medicines or new therapies through additional studies.

This research unveils the effectiveness of traditional treatments which have been passed down orally from one generation to the next. The authors of this paper hope to make a contribution towards fair and equal sharing of the benefits from utilizing genetic resources in accordance with the Nagoya Protocol.

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