

Ethnopathogenicity, Ethnophysiology and Herbal Medicine

A Case Study of a Traditional Healer in Phitsanulok Province

แนวคิดเกี่ยวกับสาเหตุการเกิดโรคแบบพื้นบ้าน
แนวคิดเกี่ยวกับกายวิภาคและสรีระวิทยาพื้นบ้าน
และยาสมุนไพร: กรณีศึกษาหมอพื้นบ้านคนหนึ่ง
ในจังหวัดพิษณุโลก

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Abstract

For this research, a purposive qualitative ethnopathogenecity and ethnophysiology of a long experienced Thai traditional healer in Phisanulok province was carried out. The Ethnopathogenecity which explained the concepts of illness could be divided into two groups (1) The illness caused by the supernatural power and (2) from natural power. For the concept of Ethnophysiology illness caused by imbalance of 6 body systems which could not be separated from each other, and contain stomach, heart, gastrointestinal tract, blood, feet and blood vessels.

The recipes of herbal medicine commonly used were (1) tonic (2) drug for gastrointestinal tract (3) drug for diseases of the prostate gland (4) drug for the chronic illness of the testes (5) drug for chest discomfort (6) anti cough, antipyretic, anti sore throat (7) anti malarial drug (8) anti herpes zoster, herpes simplex (9) constipation and (10) immune stimulant. Medical ingredients which were used for these recipes could be divided into three groups i.e.- plants, animal and minerals. Herbs were found in 47 kinds from 34 species.

Herb which used for these recipes could be divided into 3 groups i.e.- plants, animal and minerals. The most common used were GRAMINEAE 6, ZINGIBERACEAE, PIPERACEAE and RUTACEAE 3, all the rest were 1-2 kinds in various species. Using animal was one species, and mineral were two kinds.

Keywords: ethnopathogenecity, ethnophysiology, herbal medicine, Phitsanulok

บทคัดย่อ

การศึกษาเชิงคุณภาพเกี่ยวกับสาเหตุการเกิดโรคและแนวคิดกายวิภาคและสรีรวิทยาพื้นบ้านครั้งนี้เก็บข้อมูลจากหมอพื้นบ้านท่านหนึ่งที่มีประสบการณ์และความเชี่ยวชาญในการรักษาโรคมาอย่างยาวนาน สำหรับแนวคิดเกี่ยวกับสาเหตุการเกิดโรคแบบพื้นบ้าน พบว่า ความเจ็บป่วยเกิดขึ้นใน 2 มิติใหญ่ๆ คือ (1) การเกิดโรคที่มีสาเหตุมาจากอำนาจเหนือธรรมชาติ และ (2) การเกิดโรคที่มีสาเหตุมาจากอำนาจตามธรรมชาติ สำหรับแนวคิดเกี่ยวกับกายวิภาคและสรีรวิทยาพื้นบ้าน พบว่า ความเจ็บป่วยเกิดขึ้นจากการขาดความสมดุลของระบบอวัยวะที่สำคัญ 6 ประการ คือ กระเพาะอาหาร หัวใจ ลำไส้ เลือด เหน็บ และเส้นเลือด ส่วนประกอบของร่างกายทั้ง 6 มีความเชื่อมโยงและสัมพันธ์กัน ไม่สามารถแยกออกจากกันได้

การรักษาด้วยยาสมุนไพรส่วนใหญ่นิยมจ่ายยาตำรับ ตำรับยาที่สั่งจ่ายบ่อย ประกอบด้วยยาในกลุ่ม (1) ยาบำรุง (ยาอายุวัฒนะ) (2) ยาโรคกระเพาะ (3) ยารักษาต่อมลูกหมาก (4) ยาแก้ช้ำลงอั้นตะ (5) ยารักษาโรคสันนิบาตกระตุกในอก (6) ยาแก้ไอ แก้ไข้และกวาดคอเด็ก (7) ยารักษาโรคไข้มลาเรีย (8) ยาแก้ปวด ไฟลามทุ่ง เริม (9) ยาแก้ท้องผูก (10) ยาสร้างภูมิต้านทาน

สมุนไพรในภาพรวมที่ใช้ในปรุงยารักษาโรคสามารถแบ่งออกได้ 3 กลุ่ม ประกอบด้วยพืชวงศ์ สัตว์วงศ์และธาตุวงศ์ สมุนไพรที่เป็นพืชวงศ์พบทั้งสิ้น 47 ชนิด จาก 34 วงศ์ สมุนไพรที่ใช้มากที่สุดจัดอยู่ในวงศ์ GRAMINEAE พบทั้งสิ้น 6 ชนิด, ZINGIBERACEAE, PIPERACEAE และ RUTACEAE พบทั้งสิ้นอย่างละ 3 ชนิด นอกนั้นเป็นวงศ์ปลีกย่อยต่างๆ อย่างละ 1-2 ชนิด สมุนไพรที่เป็นสัตว์วงศ์พบ 1 ชนิด และสมุนไพรที่เป็นธาตุวงศ์พบ 2 ชนิด

คำสำคัญ: แนวคิดเกี่ยวกับสาเหตุการเกิดโรคแบบพื้นบ้าน, แนวคิดเกี่ยวกับกายวิภาคและสรีรวิทยาพื้นบ้าน, ยาสมุนไพร, พิษณุโลก

Introduction

Traditional medicine has existed since ancient times in Thailand, played a significant role in the health care system, and was transformed and largely supplemented after the introduction of Western medicine (Sangvichien, 1978; Howe, Keiwbarnka & Khan, 2004; Charulxananan & Chentanez, 2007). However, traditional medicine was not absolutely obliterated from the Thai cultural context and is still being used and providing considerable care in rural communities, especially among ethnic minorities and elderly groups. Due to its holistic approach, traditional medicine has become popular again. The reasons have to do with the limitations, medical side effects, suffering from the intrusive, high technology of the Western medical system and the rising costs of health care (Riewpaiboon, Pansang, & Sooksriwong, 2005)

During the past two decades, several studies in the area of ethnomedicine, ethnobotany, and ethnopharmacology had been carried out in different population groups (Anderson, 1986; Chiramongkolgarn & Paisooksantivatana, 2002; Itharat et al, 2002; Upho, Trisonthi & Chayamarit, 2004; Simsek et al, 2004; Tovanaronte & Chukeatirote, 2005; Tongdonae & Paisooksantivatana, 2006). The goals were to explore local medical practices, to seek ways to conserve traditional medicine, to identify problems in the existing situation, and to provide indigenous information and recipes for pharmaceutical development. These studies were done by different scholars from a wide range of academic disciplines such as: medicine, public health, pharmacology, botany, agriculture, anthropology, and folklore studies. The research methodologies were designed in survey, quantitative, qualitative, or designed as a combination of research methods (Chuakul, Saralump & Boonpleng 2001; Chiramongkolgarn & Paisooksantivatana, 2002).

Numerous studies documented that traditional knowledge of medicinal compounds from materia medica is still one of the most important resources for the discovery of hitherto unknown biotic drug sources (Oldfield, 1989). The

exploration of traditional medicine has proved a valuable tool in developing the art of bioprospecting for pharmaceutical compounds (Gaston, 1996). In Thailand, for example, two species of “Hua-Khao-Yen” (*Smilax corbularia* and *Dioscorea membranacea*) have been proved and developed an increase of the quality of life of HIV/ AIDS patients (Tewtrakul, Itharat & Rattanasuwan, 2006). For this reason, herbal medicines involving traditional remedies and practices should be among the highest priorities for investigation and development.

The objective of this study was twofold. One was to understand the medical concepts in ethnopathogenicity and ethnophysiology of a traditional healer. The other was to study herbal medicine and recipes which normally are used and applied for treatments.

Research Methodology

This research was carried out in Phitsanulok province in the form of In-depth interviews with an experienced Thai traditional medicinal healer. The key informant was asked about his way of life, traditional medical theory, use of medicinal plants, places of collection, which parts were used, and the method of drug preparation. Herbal specimens were also collected, identified, and displayed in the library of the Department of Thai Traditional Medicine, Faculty of Medicine, Thammasat University. Moreover, the practical guidelines on the product quality standard, especially the knowledge of Good Agricultural Practice (GAP) and Good Harvesting Practice (GHP) were shared with the traditional healer in the way of knowledge exchange.

Results

1. Life history of the healer

The traditional medicinal healer was born on the 20th of June 1918 in Uthai Thani province. He used to be a novice, monk and left the priesthood at the age of 21 and married then. After his wife passed away in 1979, he moved and settled down in Phitsanulok province and stays till now with his son and daughter-in-law.

He received traditional medical knowledge from his ancestors and is able to read and write fluently in the ancient alphabet of Pali and Sanskrit. Traditional medical ethics play a significant part in his life. Making merit, offering food to the monks, praying, and observing religious precepts, are strongly practiced. Compassion to patients and not using his medical knowledge for wrong purposes are also very important in his daily life. Additionally, medical taboos such as: do not walk under a washing line or bridge; do not eat the food which has been donated to the ancestors; do not eat snakes or dogs; do not have sex with one's wife during her menstrual cycle, are strongly followed. Otherwise, the spirit and soul of his masters and his medical efficiency can deteriorate or dissolve.

Treatment can be performed in different ways: treatment at the healer's or patient's house, or through an encounter initiated by a third person. For the new patient, seven steps are regularly performed including: establishing a doctor-patient relationship, setting up the rice bowl (sacrifice), paying respect to the master, pledging to the master, diagnosis, treatment, and removing the rice bowl.

2. Traditional Medical Theory

2.1 *Ethnopathogenecity*

In the study of any medical system, the concept of disease causation

and a traditional pathology-oriented perspective should be emphasized for understanding local diagnosis and treatment. In-depth interviews indicate that there are two levels of causation for illnesses which can be caused by supernatural and natural powers.

(1) Illness or sickness caused by supernatural powers can be the result of negative feelings or as a punishment from ghost (*Phee*), black magic (*Khun Sai*), spirit (*Khwan*), ancestors (*Bunpaburut*), destiny (*Chook Cha Taa*), violation of a taboo (*Ka lum*), and physical location (*Feng Shui or Huang Jui*). In these situations, healing maybe be performed through praying, begging, or from treatment of a traditional healer.

(2) Illness caused by natural powers can be caused by the interaction between an individual and the physical environment, for instance, a change of climate or an infectious disease. Eating habits and types of food also play an important factor in health. Weakness can occur when breaking a food taboo or consuming unwholesome food. Physical activities and accidents were also included as natural causes of illness.

2.2 Ethophysiology

From an anatomical perspective, the human body has six significant organ systems including: stomach, heart, intestine, blood, feet and blood vessels. The details are shown below.

1) *Stomach*: In a traditional perspective, the stomach is the first main organ to receive good water, food, but also poisons through daily consumption. For the good condition of the stomach, it only should get food and water. A basic sign of an unhealthy stomach can be identified when there is too much gas inside.

2) *Intestine*: This organ connects with stomach and can be divided into two parts, duodenum and ileum. The duodenum plays a significant function for

food digestion, while the ileum functions by squeezing and dividing valuable and non valuable liquids out of the duodenum. The valuable liquid from the digestive process becomes bile (*Nam Dee*), whereas the non valuable liquid will be transmuted into urine and feces. Parts which are unable to be discharged from the body will be transformed into lymph or serum (*Num Lueng*). A healthy intestine should not have much gas inside. Too much farting means an intestinal problem.

3) *Blood*: Is the combination of water, bile, and lymph. Drinking water plays an important factor for blood quality. In the traditional healer's interpretation, insufficient water intake results in thick blood. Too much water can cause anemia. Thus, an appropriate amount of drinking water is important for good blood quality. Bile is a valuable liquid which controls the function of the lymph and the body's immune's system. If the lymph is not being discharged from the body it will have a negative effect on the body. Thus, the healer feels that to have good blood quality the body should have an equilibrium between water, bile, and low or no lymph.

4) *Feet*: The healer believes that the feet consist of 108 tendons. The most important tendon is the hamstring that directly connects with all blood vessels inside the body. The hamstring plays a significant role in motion control and is a blood circulation distributor. Feet can also be used as an indicator to show healthy and weak conditions. Healthy feet should have an appropriate temperature and not make any noise when walking or moving.

5) *Blood vessels*: there are also 108 blood vessels inside the body. The function of these vessels is to carry blood throughout the body. The original point of blood circulation starts from the center point of the feet and pumps up to the heart and brain, respectively. Good blood vessels control the efficiency of blood circulation. For instance, varicose veins indicate a blood vessel problem. Moreover, insomnia or frequent fainting also indicates a blood vessel problem.

6) *Heart*: This important organ receives blood from all body parts through the 108 blood vessels. Symptoms such as headaches, dizziness, fainting, or heart palpitations are basic signs of heart problems, which are related to the blood vessels, and the feet.

3. Herbal medicine for treatment

Medicinal herbs can be produced in four ways including: bolus (*Ya-Look-Klon*), boil (*Ya-Tom*), mandl's paint (*Ya-Kwad-Kor*), and poultice (*Ya-Pok*). In this research, the recipes for herbal medicines commonly used were tonics, drugs for gastrointestinal tract, drugs for diseases of the prostate gland, drugs for the chronic illness of the testes, drugs for chest discomfort, anti cough, antipyretic, anti sore throat, anti malarial drug, anti herpes zoster, herpes simplex, constipation and immune stimulants.

The herbs which were used for these recipes can be divided into three groups of origin from plants, animals and minerals. There were 47 kinds of herbs from 34 species. The most commonly used were GRAMINEAE, ZINGIBERACEAE, PIPERACEAE and RUTACEAE. Insect use was one species (honey bee), minerals were of two kinds (Aluminium alimini sulfate and Sodium Chloride). Ten recipes for herbal medicines are explained in table 1. The information of the 47 herbs (34 species) is explained and consists of the scientific name, family, preparation, and dosage.

Discussion

Even though Western medicine plays an important part in health care in Thailand, the use of natural plants for primary care still remains an important area of study. Ethnopathogenecity was found to be the same as those found by Chuakul and Queiroz where the illness can be caused by both natural and/or supernatural powers (Queiroz, 1984; Howe, Keiwkarnka & Khan, 2004), while the ethnophysiology and anatomical perspective of the traditional healer has not been reported or mentioned in any academic research (i.e. the human body has six organ systems). This traditional perspective may be one that only the healer and his ancestors have used for the diagnosis and treatment of illnesses.

The herbal medicines found in this study have been proved by the experiences of the healer and clients that they can cure basic symptoms (fever, constipation, coughing, herpes, etc.), chronic illness (GI, prostate gland, hernia, etc.), and infectious diseases (malaria). There are many examples of modern pharmaceutical preparations which have been derived from plants used by traditional practitioners (Arseculeratne, 2002). More scientific research by means of drug development is needed to prove the efficiency of herbal medicine.

Table 1 Medicinal plants commonly used by the key informant

Treatment	Scientific name	Family	Preparation
Tonic	<i>Derris scandens</i> (Roxb.) Benth. <i>Dipterocarpus alatus</i> Roxb. ex G.Don <i>Cyperus rotundus</i> Linn. <i>Citrus hystrix</i> DC. <i>Tinospora crispa</i> (L.) Miers ex Hook.f. & Thomson <i>Alpinia galanga</i> (L.) Willd. <i>Boesenbergia rotunda</i> (L.) Mansf. <i>Piper nigrum</i> Linn.	LEGUMINOSAE- PAPILONIOIDEAE DIPTEROCARPACEAE CYPERACEAE RUTACEAE MENISPERMACEAE ZINGIBERACEAE ZINGIBERACEAE PIPERACEAE	All herbal ingredients, in the same proportions, are dried and ground into a powder form. Six egg yolks are added and the mixture is left until it is absolutely dry. At the end of the process, honey or rice whisky is mixed as an aqueous adjuvant and the mixture is shaped into small balls. Taking one tablet a day, after dinner, is increasing the appetite and improves blood circulation. Moreover, it also can be used to cure muscle pain, as a laxative, and for hemorrhoids.
Gastrointestinal tract (GI)	<i>Musa sapientum</i> Linn. <i>Cyperus rotundus</i> Linn. <i>Tinospora crispa</i> (L.) Miers ex Hook.f. & Thomson	MUSACEAE CYPERACEAE MENISPERMACEAE	In the same proportions, herbs are thinly sliced, laid in the hot sun until it is completely dried out, and blended in a powder form. Honey is added and then shaped into small balls. Take one tablet per day, either before meals or before bed.

Treatment	Scientific name		Family	Preparation
Prostate grand and hernia	<i>Glinus oppositifolius</i> (L.) A.DC. <i>Smilax china</i> Linn.	MOLLUGINACEAE SMILACACEAE	Fresh herbs, in the same proportions, are boiled. Normal water or tap water can be used, but rainwater provides the highest herbal efficiency. Before drinking, the boiled herbs should be filtered. Drinking approximately one coffee cup, two times a day in the morning and evening can cure the prostate grand and hernia problem.	
Groin swelling	<i>Ananas comosus</i> (L.) Merr. Aluminium alimini sulfate	BROMELIACEAE (Al ₂ (SO ₄) ₂ 24H ₂ O)	Heat water in a pot until boiling. Sliced pineapple (with peel) is added and after waiting for a while it will be boiled again. Turn off the heat and wait until it is warm. Then, a tea spoon of grounded Aluminium alimini sulfate is added. Filtering before drinking, one coffee cup two times a day in the morning and evening is suitable for treating groin swelling. Moreover, this recipe also can restore sexual dysfunction and hernia problems.	

Treatment	Scientific name	Family	Preparation
Constipation	<i>Bridelia ovata</i> Decne.	EUPHORBACEAE	All ingredients are prepared in the pot with water and wait until it is boiling. Drink as tea approximately 1/2 coffee cup per day to recover from constipation.
	<i>Tamarindus indica</i> Linn.	CAESALPINICEAE	
	<i>Cassia fistula</i> Linn.	LEGUMINOSAE	
	<i>Bambusa bambos</i> (L.) Voss	CAESALPINIOIDEAE	
		GRAMINEAE	

Table 1 (continued) Medicinal plants commonly used by the key informant

Treatment	Scientific name	Family	Preparation
Chest discomfort and coughing	<i>Jasminum sambac</i> (L.) Aiton	OLEACEAE	All ingredients, in the same proportions, are prepared in a dried form. Blend together as a powder and bring into the sun for drying. Either honey or rice whisky are applied as an aqueous adjuvant and shaped into small balls. To cure the symptom of chest discomfort and coughing, the patient should take only one tablet after a meal per day.
	<i>Mimusops elengi</i> Linn.	SAPOTACEAE	
	<i>Mesua ferrea</i> Linn.	GUTTIFERAE	
	<i>Mammea siamensis</i> Kosterm.	GUTTIFERAE	
	<i>Nelumbo nucifera</i> Gaertn.	NELUMBONACEAE	
	<i>Draecena loureiri</i> Gagnep.	DRACAENACEAE	
	<i>Diospyros decandra</i> Lour.	EBENACEAE	
	<i>Eleusine indica</i> (L.) Gaertn.	GRAMINEAE	
	<i>Coriandrum sativum</i> Linn.	UMBELLIFERAE	
	<i>Tinospora crispa</i> (L.) Miers ex Hook.f. & Thomson	MENISPERMACEAE	
	<i>Ocimum tenuiflorum</i> Linn.	LABIATAE	
	<i>Zea mays</i> Linn.	GRAMINEAE	
	<i>Cocos nucifera</i> Linn. var. <i>nucifera</i>	PALMAE	
	<i>Capscum frutescens</i> Linn var. <i>frutescens</i>	SOLANACEAE	
	<i>Piper chaba</i> Hunt.	PIPERACEAE	
	<i>Piper nigrum</i> Linn.	PIPERACEAE	
	<i>Cymbopogon citratus</i> Stapf	GRAMINEAE	
Coughing, fever, convulsion in children, and upper respiratory tract infection	<i>Allium sativum</i> Linn.	ALLIACEAE	In this preparation, the dried or fresh plants are pounded into a powder form. A few minerals such as Calcium Oxide, Alum, and Sodium Chloride will be added. Before being used, a small portion of lemon juice or liquor is added as an aqueous adjuvant. Which aqueous adjuvant is used, relates to the type of disease and symptoms. For example, lemon juice and salt are utilized for coughing. Liquor is used for fever, while the combination of liquor, lemon juice, and salt is mixed with to cure the patient who has coughing with fever. Paste this medicinal herb onto the throat of the patient two or three times a day.
	<i>Acorus calamus</i> Linn.	ARACEAE	
	Aluminium alimini sulfate.	(Al ₂ (SO ₄) ₂ ·24H ₂ O)	

Treatment	Scientific name	Family	Preparation
Immune stimulant	<i>Ipomoea obscura</i> (Linn.) Ker-Gawl. <i>Rhinacanthus nasutus</i> (L.) Kurz <i>Aegle marmelos</i> (L.) Correa ex Roxb. <i>Maerua siamensis</i> (Kurz) Pax <i>Streblus asper</i> Lour. <i>Derris scandens</i> (Roxb.) Benth.	CONVOLVULACEAE ACANTHACEAE RUTACEAE CAPPARACEAE MORACEAE LEGUMINOSAE - PAPILIONOIDEAE	Place all ingredients in a pot of water and wait until it is boiling. Drink approximately 1/2 cup per day to increase immunity.

Table 1 (continued) Medicinal plants commonly used by the key informant

Treatment	Scientific name	Family	Preparation
Herpes zoster and herpes simplex	<i>Achyranthes aspera</i> Linn. <i>Flacourtia indica</i> (Burn.f.) Merr.	AMARANTHACEAE FLACOURTIACEAE	All ingredients are mixed together with the clay and used as an anti-herpes paste until the symptoms are moderated.
Immune stimulant	<i>Ipomoea obscura</i> (Linn.) Ker-Gawl. <i>Rhinacanthus nasutus</i> (L.) Kurz <i>Aegle marmelos</i> (L.) Correa ex Roxb. <i>Maerua siamensis</i> (Kurz) Pax <i>Streblus asper</i> Lour. <i>Derris scandens</i> (Roxb.) Benth.	CONVOLVULACEAE ACANTHACEAE RUTACEAE CAPPARACEAE MORACEAE LEGUMINOSAE - PAPILIONOIDEAE	Place all ingredients in a pot of water and wait until it is boiling. Drink 1/2 cup per day to increase immunity.

Treatment	Scientific name	Family	Preparation
Malaria	<i>Imperata cylindrica</i> (L.) P.Beauv. <i>Piper chaba</i> Hunt. <i>Piper nigrum</i> Linn. <i>Sida rhombifolia</i> Linn. <i>Zingiber officinale</i> Roscoe. <i>Citrus aurantifolia</i> (Christm. Et Panz.) Swingle <i>Piper sarmentosum</i> Roxb. <i>Erythrina fusca</i> Lour. <i>Cyperus rotundus</i> Linn.	GRAMINEAE PIPERACEAE PIPERACEAE MALVACEAE ZINGIBERACEAE RUTACEAE PIPERACEAE LEGUMINOSAE- PAPILIONOIDEAE CYPERACEAE	All herbs in the same proportion are boiled. Drink approximately one coffee cup, two times a day, in the morning and evening, until the fever has gone.

REFERENCES

- Anderson, E. F. (1986). Ethnobotany of hill tribes of northern Thailand. I. **Medicinal plants of Akha**. *Economic Botany*, 40: 38-53
- Arseculeratne, S.N. (2002). Interactions between Traditional Medicine and ‘Western’ Medicine in Sri Lanka. **Social Scientist**; 30, (5/ 6): 4-17.
- Charulxananan, S. & Chentanez, V. (2007). History and evolution of western medicine in Thailand. **Asian Biomedicine** 1 (1), 97-101.
- Chiramongkolgarn, U. & Paisooksantivatana, Y. (2002) Medicinal Plants in Tao Dam Forest, Wangkrajae Village, Sai Yok District, Kanchanaburi Province. **Thai Journal of Phytopharmacy**, 9(2), 47-56.
- Chuakul W, Saralump P, Boonpleng A. (2001). Medicinal plants used by Hmong hill tribe at Maneephruet village, Pua district, Nan province. **Thai Journal of Phytopharmacy**; 8(1): 31-41.
- Gaston, K. J. (ed.) (1996), **Biodiversity: A Biology of Numbers and Differences**, Blackwell Science, Oxford, pp. 283-308.
- Howe, E., Keiwiarnka, B., Khan, M.I. (2004). Traditional Medicine and Medicinal Plants: Utilization, Policy and Research in Thailand. **Journal of Public Health and Development**, 2(1); 101-118.
- Itharat, A. Singchungchai, P., Supavita, T., Ratanasuwan, P., Chongchirasiri, N., Saengphun, J., Jeaubong, V. & Sarankavin, S. (2002). Folk wisdom of traditional doctors in the lower South of Thailand on utilization of herbal medicine, **Songklanagarind Medical Journal**, 20(2); 121-136.
- Oldfield, M. L. (1989). The Value of Conserving Genetic Resources, **National Park Service**, Washington.
- Queiroz, M.S. (1984). Hot and cold classification in traditional Iguape medicine. **Ethnology**; 23 (1): 63-72.
- Riewpaiboon, A., Pansang, N. & Sooksriwong, C. (2005). Efficiency evaluation of herbal

- production in community hospital: a case study of U-thong hospital, Suphan Buri province. **Journal of Health Science**, 14(4). 631-639.
- Sangvichien S, (1978). Ending of traditional medicine and emerging of modern medicine in Thailand, **Journal of Medical Social Sciences**, 1(2), 22.
- Simsek I, Aytekin, F., Yesilada, E. & Yildirimli, S. (2004). An ethnobotanical survey of the Beupazari, Ayas and Gudul district towns of Ankara province (Turkey). **Economic Botany**, 58(4), 705-720.
- Tewtrakul, S., Itharat, A., & Rattanasuwan, P. (2006). Anti-HIV-1 protease- and HIV-1 integrase activities of Thai medicinal plants known as Hua-Khao-Yen. **Journal of Ethnopharmacology** 105 (2006) 312-315.
- Tongdonae, S. & Paisooksantivatana, Y. (2006). Ethnobotany of Thaisongdum Community in Changwat Kanchaburi and Changwat Nakhon Pathom **44th Annual conference of Kasetsart University** 2006 [online]. Available at [http://kucon.lib.ku.ac.th/Fulltext/KC4405 018.pdf](http://kucon.lib.ku.ac.th/Fulltext/KC4405%2018.pdf).
- Tovaranonte, J. & Chukeatirote, E. (2005). Ethnobotanical survey of indigenous plants used by Tai Lue community at Wiang Kaen, Chiang Rai. **31st Congress on Science and Technology of Thailand at Suranaree University of Technology**, 18 - 20 October 2005 [Online]. Available at http://www.scisoc.or.th/stt/31/sec_b/paper/stt31_B0112.pdf.
- Upho, U., Trisonthi, C. & Chayamarit, K. (2004). Ethnobotanical Studies in Muslim Thai Communities Located Around Toh-Daeng Peat Swamp Forest in Thailand. **Chiang Mai J. Sci.** 2004; 31(2): 157-170