

# *Kyllinga nemoralis* (Hutch & Dalz) (Cyperaceae): Ethnobotany, Phytochemistry and Pharmacology

Raju S<sup>\*1</sup>, Kavimani S<sup>2</sup>, Uma Maheshwara rao V<sup>3</sup>, Sreeramulu Reddy K<sup>4</sup>

<sup>1</sup>Assistant Professor, Vijaya College of Pharmacy, Munaganoor, Ranga Reddy Dist, Andhra Pradesh, India-505511.

<sup>2</sup>Mother Theresa Post Graduate Institute of Health Sciences, Gorimedu, Puducherry, India. <sup>3</sup>Nalla Narsimha Reddy College of Pharmacy, Korremula, Ranga Reddy Dist, Andhra Pradesh. <sup>4</sup>Assistant manager –Clinical R&D, Shantha Biotechnics Limited, Hyderabad, Andhra Pradesh. India- 500004.

## ABSTRACT

Many herbal remedies have so far been employed for the treatment and management of various ailments since the beginning of human civilization. *Kyllinga nemoralis* (Hutch & Dalz) (Cyperaceae) is a plant widely used throughout the world and frequently used for its anti-venom property. The aim of this review was to collect all available scientific literature published and combine it into this review. The present review comprises the ethnobotanical, phytochemical and pharmacological potential of *Kyllinga nemoralis*. The present review includes 19 references compiled from major databases as Chemical Abstracts, Science Direct, SciFinder, PubMed, Dr. Dukes Phytochemical and Ethnobotany. An exhaustive survey of literature revealed that flavonoids, saponins, phenols, terpenes, lipids and glycosides constitute major classes of phytoconstituents of this plant. Pharmacological reports revealed that it is having analgesic, antidiabetic, anticancer, antioxidant, antimicrobial, hepatoprotective and antimalarial properties. *Kyllinga nemoralis* seems to hold great potential for in-depth investigation for various biological activities. Through this review, the authors hope to attract the attention of natural product researchers throughout the world to focus on the unexplored potential of *Kyllinga nemoralis*, and it may be useful in developing new formulations with more therapeutic value.

**Key words:** Ethnobotany, Phytochemistry, Pharmacology, Antivenom, *Kyllinga nemoralis*

## INTRODUCTION

The use of natural products with therapeutic properties is as ancient as human civilization and, for a long time, mineral, plant and animal products were the main sources of drugs. De Pasquale, 1984 A. De Pasquale, Pharmacognosy: the oldest modern science, *Journal of Ethnopharmacology* **11** (1984), pp. 1-16. Abstract | PDF (1361 K) | View Record in Scopus | Cited By in Scopus (15) In recent years, there has been growing interest in alternative therapies and the therapeutic use of natural products, especially those derived from plants. This interest in drugs of plant origin is due to several reasons, namely, conventional medicine can be inefficient (e.g. side effects and ineffective therapy), abusive and/or incorrect use of synthetic drugs results in side effects and other problems.<sup>[1]</sup> The Indian subcontinent The Indian sub-continent comprising of the countries India, Pakistan, and Bangladesh is the site of one of the oldest civilizations,

and it has seen the development of many traditional health care systems. Their development was supported by the great biodiversity in flora and fauna due to variations in geography and climate.<sup>[2]</sup> Many weedy plants possess medicinal and therapeutic and therapeutic activities.<sup>[3,4]</sup>

The Cyperaceae family comprising of monocotyledonous flowering plants known as sedges, which superficially resemble grasses or rushes. The family is large, with some 5,500 species described in about 109 genera. These species are widely distributed, with the centers of diversity for the group occurring in tropical Asia and tropical South America. Members of the family Cyperaceae are called Motha as a folkore name in different parts of the country and used as ethno medicinal plants for treatment of diverse ailments.<sup>[5]</sup> Some well-known sedges include the water chestnut (*Eleocharis dulcis*) and the papyrus sedge (*Cyperus papyrus*), from which the Ancient Egyptian writing material was made. This family also includes cotton-grass (*Eriophorum*), spike-rush (*Eleocharis*), sawgrass (*Cladium*), nutsedge or nutgrass (*Cyperus rotundus*, a common lawn weed), the large genus of *Carex*, and white star sedge (*Rhynchospora colorata*) and Whitehead spike sedge (*Kyllinga nemoralis*). This review aims at describing the traditional uses, phytochemical profiles

\*Address for correspondence:

Ph: +91 9966164766

Email:rajenderreddysama@gmail.com

DOI: 10.5530/pj.2011.24.2

and therapeutic potential of various parts of *Kyllinga nemoralis*, which has been used in traditional practice for many years.

## CLASSIFICATION<sup>[6]</sup>

- Domain: Eukaryota
- Kingdom: Plantae – Plants
- Subkingdom: Tracheobionta – Vascular plants
- Superdivision: Spermatophyta – Seed plants
- Division: Magnoliophyta – Flowering plants
- Class: Liliopsida – Monocotyledons
- Subclass: Commelinidae
- Order: Cyperales
- Family: Cyperaceae – Sedge family
- Genus: *Kyllinga* Rottb. – spike sedge
- Species: *Kyllinga nemoralis* (J.R. Forst. & G. Forst.) Dandy ex Hutch. & Dalziel – whitehead spike sedge

## DESCRIPTION OF KYLLINGA NEMORALIS

*Kyllinga nemoralis* (Hutch & Dalz) (Family; Cyperaceae) is a perennial herb, grass-like in habit, propagated by seed and a creeping rhizome with many synonyms and common names. Synonyms include *Cyperus kyllingia* Endl, *Kyllinga monocephala* Rottb and *Kyllinga cephalotes* (Jacq.) and Common names include Whitehead spike sedge, white kyllinga, white water sedge, white-flowered kyllinga, poverty grass. Grow



chiefly in marshy and wet places and is well distributed over all parts of the world. This plant is commonly known as Apavisha, Nirbishi and Velutta nirbasi.

It is found in waste places, open grasslands, etc., at low and medium altitudes. It is pantropic in distribution. The plant is more or less glabrous, arising from creeping rootstocks. The stems are usually solitary, 10 to 40 centimeters high. The leaves are up to 15 centimeters in length or longer, 3 to 4 millimeters wide; with the bracts similar. The spikes are ovoid, simple, white, 8 to 13 millimeters long. The spikelets are very numerous, 3 to 3.5 millimeters long, the flowering glume distinctly winged along the keel. The fruit is an achene, approximately 1.2-1.5 mm long x 0.5-0.7 mm wide.<sup>[7]</sup>

## ETHNOBOTANY

*Kyllinga nemoralis* leaves and rhizomes contain many biologically active chemicals, and extracts from those tissues have been used in traditional folk medicine to treat many diseases and conditions. The plant leaves are traditionally used for the relief of malarial chills, pruritus of the skin, and thirst due to fever and diabetes.<sup>[8]</sup> In India plant leaves are used as anti-venom.<sup>[9, 10]</sup> The rhizomes of the plant are fragrant, sweet, refrigerant, antidiarrhoeal, diuretic, stomachic, and expectorant.<sup>[11, 12]</sup> The paste of rhizomes mixed with milk is used internally for worm infection.<sup>[13]</sup> It is also used in fever, hepatopathy, splenopathy, diabetes and tumours.<sup>[14]</sup>

## PHYTOCHEMISTRY

Only a few studies have reported on the Phytochemistry of *K. monocephala*. Underground parts contain essential oils rich in terpenes  $\alpha$ -cyperone,  $\beta$ -selinene, and  $\alpha$ -humulene.<sup>[15]</sup> The methanolic and aqueous extract from the plant leaves were positive for terpenoids, saponins and phenolic compounds.<sup>[16]</sup> More recently, ethanolic extract of the rhizomes possesses flavonoids, triterpenoids and glycosides and the petroleum ether extract was found to possess triterpenoids and glycosides.<sup>[17]</sup> Essential oil from fresh aerial parts by hydrodistillation from *Cyperus kyllingia* Endl. was analyzed by a GC, GC-MS. Twenty-three compounds were identified, mainly of oxygenated sesquiterpenes, particularly sesquiterpene hydrocarbons, and carboxylic acid. The most representative compounds were  $\alpha$ -cadinol, caryophyllene oxide,  $\alpha$ -muurolol,  $\alpha$ -humulene, and  $\alpha$ -atlantone.<sup>[18]</sup>

## PHARMACOLOGICAL SCREENING

### Analgesic activity

The analgesic activity of the methanol extract of the leaves of *Kyllinga monocephala* Rottb. (Cyperaceae) was evaluated using

the acetic acid-induced writhing test on mice and was found to significantly reduce the number of writhes in mice by half. Following a bioassay-guided fractionation scheme, statistically significant analgesic activity was observed with both the hexane and ethyl acetate partitions.<sup>[19]</sup> In another report the methanol extract of *K. monocephala* was found to significantly reduce the number of writhes in mice administered intraperitoneally with acetic acid to induce abdominal constriction.<sup>[16]</sup>

## HEPATOPROTECTIVE ACTIVITY

Hepatoprotective activity of ethanolic and petroleum ether extracts of rhizomes of *Kyllinga nemoralis* was evaluated against carbon tetrachloride (CCl<sub>4</sub>)-induced hepatotoxicity in rats at a dose 100 and 200 mg/kg, p.o. Both extracts showed significant hepatoprotection when compared to control, similar to standard silymarin. Histology of liver sections also revealed that the extracts protected liver from injury. Ethanolic extract possesses flavonoids, triterpenoids and glycosides and the petroleum ether extract was found to possess triterpenoids and lipids. The hepatoprotective effect produced may be probably due to the triterpenoids, which is common in both of these extracts.<sup>[17]</sup>

## HYPOLYCEMIC ACTIVITY

The hypoglycemic activity of Fresh plant infusion of *Kyllinga nemoralis* was monitored using the Oral Glucose Tolerance Test. Screening of the Blood glucose level of the animals was performed by the glucose oxidase method using a commercially available glucometer. *Kyllinga nemoralis* exhibited significant hypoglycemic activity when given 15 min after glucose load.<sup>[16]</sup>

## ANTIMALARIAL, ANTICANCER AND ANTIMICROBIAL ACTIVITIES

Essential oil from fresh aerial parts by hydrodistillation from *Kyllinga nemoralis* was evaluated for antimalarial, anticancer and antimicrobial Activities. Antimalarial activity against *P. falciparum* (K1) was determined by microculture radioisotope Techniques. The anticancer activity tested against the NCI-H187 cells. The preliminary antimicrobial activities were also evaluated using the agar diffusion method. The microorganisms used were: *Escherichia coli* ATCC25922, *Staphylococcus aureus* ATCC25923, *Pseudomonas aeruginosa* ATCC27553, *Candida albican*, *Aspergillus flavus* and *Trichophyton mentagrophyte*. The oil showed significant activities against *P. falciparum* (K1) and NCI-H187 (Small Cell Lung Cancer) with the IC<sub>50</sub> values of 7.52 and 7.72 µg/mL, respectively. The potent activities of the oil might be attributable to its high sesquiterpene content.<sup>[18]</sup>

## CONCLUSION

*Kyllinga nemoralis* is a wealth of indigenous knowledge and traditional uses have been documented for this species. While this review has attempted to unite the relevant information for this species the data clearly suggests future research priorities. Convincing ethnopharmacological evidence is presented alluding to the extensive use of *Kyllinga nemoralis* as antivenom. It is interesting to note that the earlier scientific investigations of this plant, *Kyllinga nemoralis*, showed the crude extracts exhibited analgesic, antimicrobial, hypoglycemic, anticancer, hepatoprotective and antimalarial properties. This review revealed that flavonoids, triterpenoids especially sesquiterpenes, glycosides, saponins, phenolic compounds and lipids constitute major classes of phytoconstituents of this plant. Monoterpenes, Polyphenols, saponins and flavonoids are well known for their biological properties and although a suite of compounds belonging to this class of phytochemicals have been identified, very few have been subjected to pharmacological assays. This plant can become important sources of novel drugs and lead compounds.

## REFERENCES

1. Rates SMK, Plants as source of drugs, Toxicon, 2001, 39(5):603-613.
2. Sarfaraj Hussain Md, Sheeba Fareed, Mohd Ali, Hygrophila auriculata (K. Schum) Heine: Ethnobotany, Phytochemistry and pharmacology, Asian Journal of Traditional Medicines, 2010, 5 (4):122-131.
3. Kirtikar K.R and Basu BD. Indian Medicinal Plants, Vol. IV, Bhisnan Singh Mahendra Paul Singh, DehraDun, India, 1935, 2634.
4. Jain SK. Dictionary of Indian Folk Medicine and Ethnobotany, Deep Publications, New Delhi, 1991, p. 68.
5. Kumar K, Upadhyay OP, and Tiwari RK. Ethano-medico studies on Motha-A folkore name used by tribal community for different species of Cyperaceae family, Sachitra Ayurved, 1996; 49(5):369-372.
6. Harold SJ. Nomenclature of plants, The Ronald press company USA, 1958, P. 55.
7. Kirtikar KR, Basu B.D. Indian Medicinal Plants, third ed. Indological and Orient Publishers, New Delhi, 2000, p. 2634.
8. Quisumbing E. Medicinal Plants of the Philippines. Quezon City, Philippines, Katha Publishing, 1978, pp. 116-117.
9. Oudhia P. Medicinal weeds in the rice fields of Chattisgarh, India, 1999, IRRN 24:40.
10. Manju Panghal, Vedpriya Arya, Sanjay Yadav, Sunil Kumar, Jaya Parkash Yadav. Indigenous knowledge of medicinal plants used by Saperas community of Khetawas, Jhajjar District, Haryana, India. Journal of Ethnobiology and Ethnomedicine 2010, 6:4:1-11.
11. Khory NR and Katrak NN. Materia medica of india and their therapeutics, BDH Printers, New Delhi, 1999, 380.
12. Sivarajan VV and Balachandran I. Ayurvedic Drugs and Their Plant Sources. Oxford and IBH Publishing Co. Pvt. Ltd., Oxford, 1994, 136.
13. Silja VP, Samitha Verma K, Mohanan KV, Ethnomedicinal plant knowledge of the Mullu Kuruma tribe of wayanad district, Kerala, Indian journal of Traditional knowledge, 2008; 7(4):604-612.
14. Warriar PK, Nambiar VPK, Ramankutty C. Indian Medicinal Plants: A Compendium of 500 Species, Orient Longman Ltd., Madras, 1995, 3, 285-286.
15. Komai K, Tang CH. Chemical constituents and inhibitory activities of essential oils from *Cyperus brevifolius* and *C. kyllingia*, Journal Chemical Ecology, 1989; 15:2171-2176.

16. Jusal P. Quanico, Evangeline C. Amor<sup>1</sup>, and Grace G. Perez. Analgesic and Hypoglycemic Activities of *Bixa orellana*, *Kyllinga monocephala* and *Luffa acutangula*, Philippine Journal of Science, 2008; 137 (1):69-76.
17. Arumugam S, Ramadoss K, Vadivel V, Balasubramanian D and Muthu R. Evaluation of hepatoprotective activity of *Kyllinga nemoralis* (Hutch & Dalz) rhizomes, Journal of Ethnopharmacology, 2010; 127:555-557.
18. Sorachai Khamsan, Boonsom Liawruangrath, Saisunee Liawruangrath, Aphiwat Teerawutkulrag, Stephen G. Pyne and Mary J. Garson. Antimalarial, Anticancer, Antimicrobial Activities and Chemical Constituents of Essential Oil from the Aerial Parts of *Cyperus kyllingia* Endl, Records of Natural Products, 2011; 5(4):324-327.
19. Amor Evangeline C, Quanico Jusal P, Perez Grace G. Analgesic activity of extracts of *Kyllinga monocephala*, Pharmaceutical Biology, 2009; 47(7):624-627.

MINDMAX SAMPLE

# Pharmacognostic Studies on the Leaves of *Dyschoriste Perrottetii* Nees

\*Odoh, U. E., Ezugwu, C. O. and Ezejiolor, M.

Department of Pharmacognosy and Environmental Medicine, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka.

## ABSTRACT

To ensure reproducible quality of herbal products, proper control of starting material is important. The first step towards ensuring quality of starting material is authentication. Thus, in recent years there has been a rapid increase in the standardization of selected medicinal plants of potential therapeutic significance. Despite the modern techniques, identification of plant drugs by pharmacognostic studies is more reliable. *Dyschoriste perrottetii* Nees (Family-Acanthaceae) is an important medicinal plant used in various ways in the treatment of microbial infections, fever, measles and pains. Macroscopic, microscopic and chemo-microscopic studies of powdered and anatomical sections of the leaf were carried out using standard methods. This is necessary, for the purpose of identification and monograph preparation. The result shows diacytic stomata on the lower and upper surface, surrounded by wavy walled epidermal cells, unicellular covering trichomes, calcium oxalate crystal, which are mostly single and prismatic, lignified fibres and a characteristic collenchyma cells below the epidermis. Chemo-microscopic examination revealed the presence of starch, tannin, mucilage and cellulose. Quantitative evaluation of the powdered leaves gave moisture content of 7.5 %, total ash 12.5 %, water soluble ash 5.3 %, acid insoluble ash of 4.0 %, and alcohol extractive and water soluble extractive of 31.2 and 21 .08 % respectively. These findings are of importance in the establishing diagnostic indices for the identification, Result could be used for identification and preparation of monograph on the plant.

**Key words:** *Dyschoriste perrottetii*, macroscopy, microscopy, pharmacognostic evaluation.

## INTRODUCTION

The plant *Dyschoriste perrottetii* Nees (Family-Acanthaceae) is a shrub of about half a meter high, with branches and square woody stem rooting at lower nodes.<sup>[1]</sup> It is widely distributed in the tropics frequently in temperate and completely absent in arctic region.<sup>[2]</sup> In Nigeria among the Hausas and Fulani communities, it is commonly known as *fidda hakukuma* the plant is used in traditional medicine for easy labour and in treatment of yellow fever and measles and the seeds used for the removal of foreign material in the eyes.<sup>[3]</sup> Members of the Acanthaceae are of used for the relief of pain during child birth.<sup>[4]</sup> Pharmacological and biological study of the family shows that some members exert anticholinestrase activity, histamine antagonist, cardiac depressants, antimicrobial and antifungal effects.<sup>[5]</sup> Recently some were found to exhibit antitumour activity.<sup>[6]</sup> Preliminary phytochemical screening on the herb revealed the presence

of phenolic compounds, alkaloids, steroids, saponins and tannin.<sup>[3]</sup> It was deemed of interest to investigate this plant pharmacognostically such as macroscopical, microscopical and other diagnostic character of the leaves of *Dyschoriste perrottetii* Nees, with a view of preparing monograph for its proper identification and inclusion in the pharmacopoeia.

## MATERIAL AND METHODS

### Plant collection and identification

The plant was collected in February 2009 from Nsukka, Enugu State, Nigeria. It was identified and authenticated by Mr. A. Ozioko, a taxonomist of the Bio-resources and Development Conservation Programme Centre (BDPC) Nsukka and a Voucher Specimen (UN/PCOG/09/392) deposited in the Herbarium of Department of Pharmacognosy and Environmental Medicine, University of Nigeria, Nsukka.

### Macroscopical Examination

The macroscopical features of the leaves were studied using both the fresh and dried plant collected as described by Evans.<sup>[7]</sup>

\*Address for correspondence:

Phone No. 08063831237

E-mail: Email address: estellamaris5@yahoo.com

DOI: 10.5530/pj.2011.24.3

### Microscopical Examination

The powdered and transverse section of the leaf was employed for this study; to carry out quantitative and qualitative studies using the method employed.<sup>[7]</sup> Chemo-microscopical examination was carried out to detect the presence or absence of various chemical compounds such as starch, cellulose, tannins, and lignin, fat and oil, mucilage and calcium oxalate crystals.

### Phytochemical studies

The preliminary phytochemical screening of the leaf powder was performed following standard qualitative chemical tests<sup>[7,8]</sup> in order to detect the presence or absence of major secondary plant metabolites of pharmacognostic importance which include; alkaloids, tannins, flavonoids, saponins, glycosides, proteins, fats and oils, steroids and carbohydrates.

### Quantitative microscopy

The moisture content of the powdered leaves was determined by loss on drying method.<sup>[8]</sup> The ash value, acid insoluble

ash and water—soluble ash was determined as determined as described.<sup>[9]</sup> The water and alcohol extractive value were obtained using the method outline.<sup>[8]</sup>

## RESULTS

### Macroscopical examination

The leaves are simple, opposite. The shape is lanceolate with 2.5-5.0 cm wide and 6-12 cm long. The base of the leaf is decurrente. The leaves are glabrous dark green in with apex sub acute, the margin shallowly wavy, reticulate venation, smooth and soft texture and petiole about 1.0-2.2 cm . It has characteristic, agreeable odour and slightly bitter.

### Microscopical Examination

The microscopical features of the fresh and leaves powder were described as follows; diacytic stomata numerous on lower epidermis and moderate on upper epidermis, unicellular covering trichome 4-12 µm in size, phloem

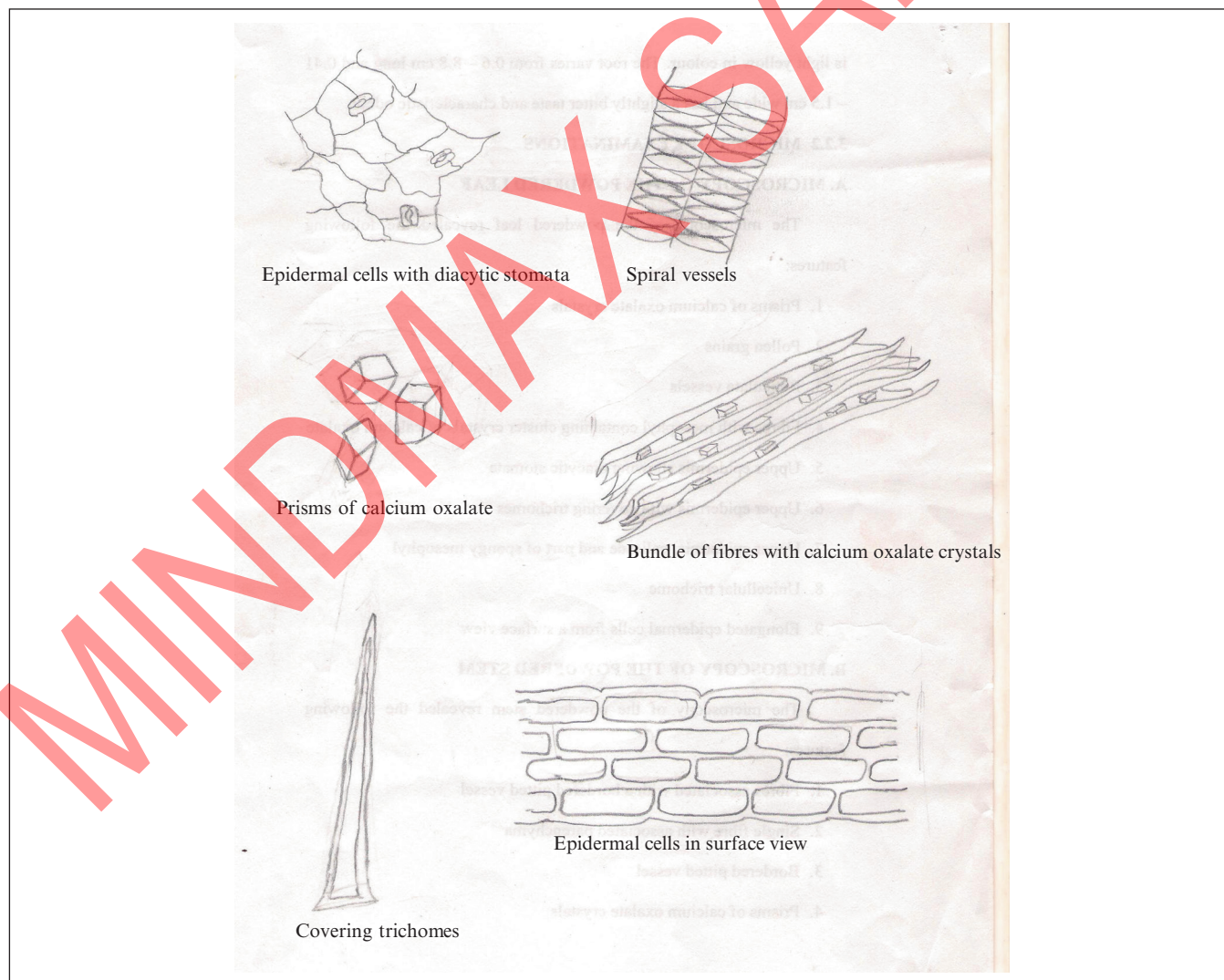
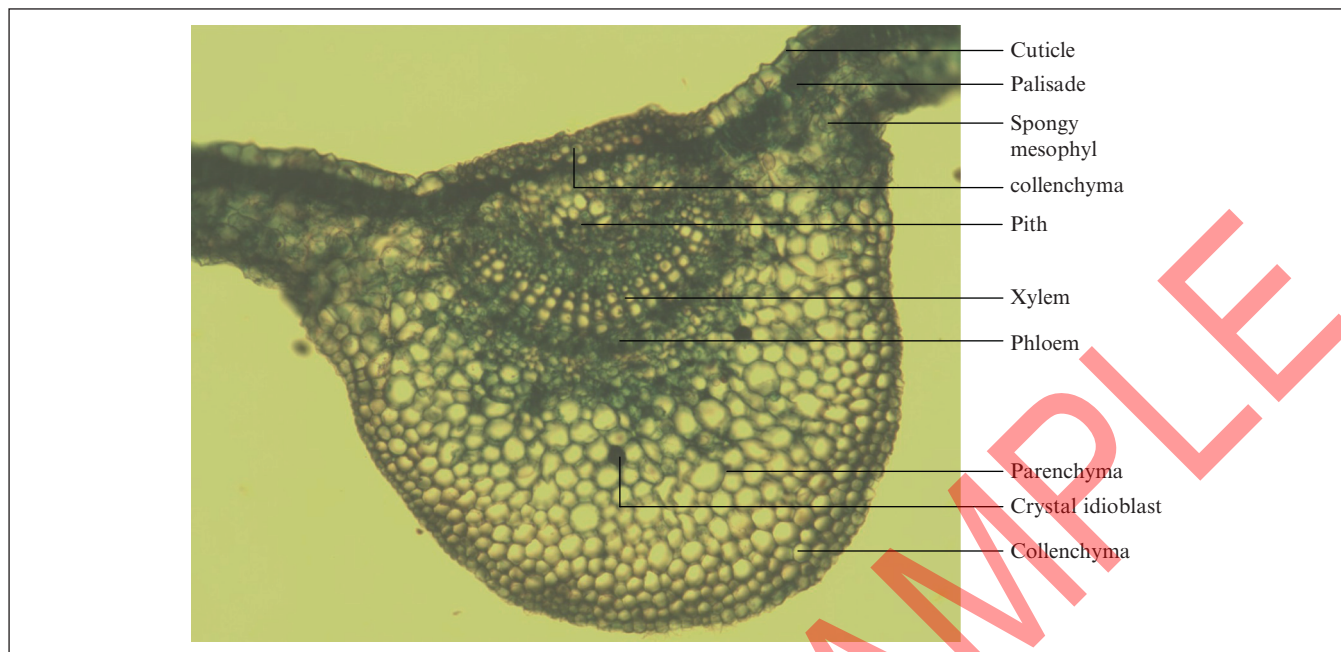


Figure 1: Macroscopical features of the leaf of *Dyschoriste perrottetii* Nees



**Figure 2:** Transverse section showing the midrib of the leaf of *Dyschoriste perrottetii* Nees

fibers moderate, 100-200 µm long with tapering apex, spiral xylem vessels, prisms of calcium oxalate 25-30 µm in size. The transverse section of the lamina through the midrib (Figure 2) revealed that the leaf is dorsoventral with epidermis covered externally by a wavy cuticle, mesophyll, diacytic stomata and a characteristic collenchyma cells below the epidermis

**Phytochemical studies**

Phytochemical screening of the leaf powder revealed the presence of alkaloids, flavonoids, tannins, glycosides, saponins and sterols.

**Chemo-microscopical examination**

This revealed the presence of chemical constituents in the cell wall and cell of *Dyschoriste perrottetii* (Table 1).

**Quantitative leaf microscopy**

The results of quantitative microscopy and pharmacognostic standards were presented in Table 2.

**Physicochemical standards**

The water extractive and alcohol extractive, total ash, acid insoluble ash, water soluble ash and moisture content were shown in Table 3.

**DISCUSSION**

The macroscopical features of the plant can be used, as its diagnostic parameters. The microscopical features such as the presence of diacytic stomata on both epidermal surfaces, aggregate of calcium carbonate (cystolith), the parenchymatous cells containing prismatic calcium oxalate crystals conformed with major characteristic features of the family Acanthaceae.<sup>[10]</sup> The chemo-microscopical result indicated the presence of mucilage and tannins. Phytochemical screening reveals the presence alkaloids, flavonoids, tannins, glycoside, saponins and sterols. The commonly encountered alkaloid in the Acanthaceae family is the trophan alkaloids, quinazoline found to have

**Table 1: Results of chemomicroscopy of the leaf of *Dyschoriste perrottetii* Nees**

Test Reagent	Observation	Inference
Chlo-zinc-iodide	Blue to black colour observed on epidermal cells	Cellulose (+)
Ferric chloride solution	Greenish leaves in some parenchyma cells	Tannins (+)
N 50 – Iodine	Blue-black colouration observed on some few grains in parenchyma cells. In transverse section and in powdered leaves.	Starch (+)
Phloroglucinol and conc. HCL	No. red colouration observed in the xylem vessels	Lignin (-)
Ruthenium red	Red colouration observed	Mucilage (+)
80 % H <sub>2</sub> SO <sub>4</sub>	Crystals of calcium oxalate dissolved	Calcium oxalate crystals (+)

**Table 2: Results of quantitative microscopy of the Leaf of *Dyschoriste perrottetii* Nees**

Standard	Value
Palisade ratio	8.4 ± 0.11
Stomatal number	23.0 ± 1.32
Upper epidermis	19.9 ± 0.50
Lower epidermis	37.1 ± 0.16
Stomatal index	1.12 ± 1.08
Vein islet	15.0 ± 0.84
Vein termination	13.0 ± 2.06

Values are mean 3 determinations

**Table 3: Results of Analytical standards of the leaf of *Dyschoriste perrottetii* Nees**

Determination	Values
Moisture content	7.5 ± 1.50
Total ash	17.5 ± 1.92
Acid-insoluble ash	4.0 ± 0.21
Alcohol extractive	13.2 ± 1.55
Water extractive	31.2 ± 0.10

Values are mean 3 determinations

utrotonic.<sup>[11]</sup> This may be responsible for the use of the plant in easing labour. The presence of tannin and other phenolic compounds which are known to have antimicrobial activity were revealed in the phytochemical analysis and chemomicroscopy. This therefore justifies the use of the plant in the traditional treatment venereal diseases, urinary tract infection and diarrhoea.<sup>[5]</sup>

The pharmacognostics standards such as moisture content (7.5 % w/w) of the leaf, which is low, showed that there is less chance for microbial degradation of the drug during storage.

## CONCLUSION

The results presented in this study could serve as diagnostic parameters for proper identification as well as preparation of a monograph on *Dyschoriste perrottetii* Nees.

## ACKNOWLEDGEMENT

The authors thank Department of Pharmacognosy and Environmental Medicine and Department of Botany, University of Nigeria, Nsukka for providing the facilities for the research.

## REFERENCES

- Grahams VC, Tropical Wild Flowers: Fulton Education Pub. Ltd. London, p. 126, 1963.
- Clerk CB, Flora of Tropical Africa Vol. 5, p. 72, 1955.
- Dalziel JM, Useful plants of West Africa, Crown Agents for Overseas Government and Administration. Millbank, London, pp. 78-91, 1958.
- Harbone JB and Herbert B, Phytochemical Dictionary .A Handbook of Bioactive Compounds from Plant, Taylor and Frances Ltd., pp.270-280, 1993.
- Murakami A, Possible anti-tumor promoting properties of traditional Thai food items and some of their active constituents. *Asia Pacific J. Chim.Nutr*, 1994, 3, 155-191.
- Ciulei 1, Methodology for Analysis of Vegetable Drugs, UNIDO Romania, pp. 17-25, 1988.
- Hutchison J and Dalziel JM, Flora of the West Tropical Africa, 2<sup>nd</sup> edition, Vol. 2, Crown Agents for Overseas Government and Administration. Millbank, London, pp. 51-54, 1963.
- Evans CW, Trease and Evans "Pharmacognosy" 14<sup>th</sup> edition, WB Saunders Ltd., Baillere Tindal, London, pp. 576, 1996.
- British Pharmacopoeia, Vol.2, Appendiix X1 Her Majesty's Stationary Office London, A108 - A113, 1988.
- Sharma BB and Trivedi BS, Introductory Taxonomy of Angiosperms, 2<sup>nd</sup> edition., Allah Bad Kitab, Mahd, India, pp. 286-287, 1978.
- Kokate CK, Purohit AP and Gokhale, SB, Pharmacognosy 18<sup>th</sup> edition, Pub. Nirali Prakashan, India, p. 520, 2002.



# Medicinal Plants used for Postnatal Care in Malay Traditional Medicine in the Peninsular Malaysia

Jamia Azdina Jamal<sup>1\*</sup>, Zakiah Abd. Ghafar<sup>2</sup> & Khairana Husain<sup>1</sup>

<sup>1</sup>Drug and Herbal Research Centre, Faculty of Pharmacy, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia. <sup>2</sup>National Pharmaceutical Control Bureau, Ministry of Health Malaysia, Lot 36, Jalan Universiti, 46200 Petaling Jaya, Selangor Darul Ehsan, Malaysia.

## ABSTRACT

Malay traditional medicine practice concentrates on the primary healthcare including physical and spiritual aspects of human being. Most traditional practitioners use medicinal plants in the treatment. Hence, the study is aimed to compile preparations and local medicinal plants used traditionally by the women in postnatal care. Five Malay traditional practitioners based in the district of Muar in Johor and two in the district of Kuala Pilah in Negeri Sembilan were interviewed. From the study, information on 23 preparations, consisting of 128 medicinal plants, was successfully compiled. The preparations were categorised as jamu, fresh herbs, eye drop, poultice, medicated talcum powder and bathing solution. The medicinal plants comprised of 52 species belonging to 42 genera and 27 families. Some species were found to occur frequently, such as *Curcuma longa* L., *Zingiber officinale* Roscoe, *Cinnamomum zeylanicum* Blume, *Kaempferia galanga* L., *Piper cubeba* Bojer, *Zingiber cassumunar* Roxb., *Acorus calamus* L., *Piper nigrum* Beyr. ex Kunth, *Alyxia stellata* Roem. & Schult., *Coriandrum sativum* L., *Foeniculum vulgare* Mill., *Nigella sativa* L. and *Usnea barbata* Fries. The part of plants utilised in the preparations include rhizomes, fruits/berries, leaves, seeds, barks, flowers, roots, whole plant, gall and bulb. The study provided useful and important information on the diversity of medicinal plants used by different Malay traditional practitioners in postnatal care.

**Key words:** medicinal plants, postnatal care, Malay traditional medicine

## INTRODUCTION

The practice of Malay traditional medicine has various influences, for example by the Indonesian, Chinese and Indian traditional medicines, *orang asli* medicine and including those introduced by the Arabs, Persians and Europeans.<sup>[1]</sup> However, nowadays the practice is mainly dominated by the Arabic Unani medicine and Galenic philosophy. In the context of socioanthropology, structure of the Malay traditional medicine is not fixed and rigid, thus allowing improvements and changes to be made according to suitability and current needs.<sup>[2]</sup>

The Malay traditional medicine system believes that a person consists of two aspects: (a) physical, that is the body; and

(b) spiritual.<sup>[3,4]</sup> The physical characteristic of a person comprises of four elements (fire, earth, wind and water) and humours (damp, cold, dry and hot).<sup>[5]</sup> Often a cold condition, due to either consuming “cold” foods and drinks or being in a cold weather, may result to the person building up excessive wind within the body and consequently this will cause the immediate or precipitating illness.<sup>[6]</sup> The spiritual aspect, on the other hand, constitutes of the mind and soul substance or vital force (*semangat*); thus a person with a loss of *semangat* is said to be vulnerable to the influence of supernatural or evil spirits.<sup>[3]</sup> The cause of an ailment is often thought to be due to the imbalance of the above mentioned physical elements and/or loss of *semangat*.

Various methods are used in the treatment of illnesses including use of herbal medicines such as spices, medicinal plants and animals; physical treatment such as massage, suction therapy and circumcision; as well as spiritual treatment such as recitation and performing prayers. Medication of physical illness is usually prescribed, of which characteristics must be opposite to those of the ailment.

### \*Address for correspondence:

Tel: +603-9289 7303; Fax: +603-26983271.  
E-mail: jamia@pharmacy.ukm.my

DOI: 10.5530/pj.2011.24.4

For example, a “cold” ailment or that caused by excessive wind in the body will be prescribed with a “hot” medicine. Medications containing single or compound medicinal plants may be dispensed in many forms such as powder, capsules, pills, “makjun”, medicated oil, simple distillate, decoction, infusion, paste and poultice. Herbal medicines are often used for medicinal purposes and are sometimes self-prescribed for relief of minor illnesses such as colds, fevers, coughs, diarrhea, stomach-aches and headaches. These are also more popularly taken as health supplements for the maintenance of physical fitness and health, restoration of new power and spirit of life, as well as reassuring matrimonial happiness.

In Malay traditional medicine, traditional midwife (*mak bidan*) is an important practitioner owing to her role in treating and advising women on health care and health problems. The fundamental function of a traditional midwife is taking care of a pregnant mother before, during and after childbirth. Frequently, women seek help from the traditional midwife when they have problems associated with the reproductive system. Treatment is often carried out by body massage with either ordinary cooking oil or medicated oil. Massage has been found to be beneficial for relaxation of the body, as well as for relieve of joint and muscle pain and stiffness. Sometimes a mixture of medicinal plants, commonly known as jamu (unprocessed or dried natural materials used for medicinal or health care purposes), is prescribed to the patient. Jamu is traditionally used for the relief of minor illnesses, as health supplements and food supplements, as well in cosmetics. Other preparations made by the traditional midwife include *air selusub* (medicine for before and during childbirth), *ubat periuk* (medicine for after childbirth), *makjum* (spherical semi-solid preparation), *bedak sejuk* (rice talcum powder), *param* (medicated talcum paste), liniment and hot compression.<sup>[1]</sup> Most Malay communities believe that special attention and care should be given to a new mother during her confinement period in order to help restore energy and vitality. Jamu is usually given in the morning, followed by body massage for at least three consecutive days. Later, hot compression using a wrapped hot stone is applied onto the abdominal part. A medicated paste is then spread over the stomach and the waist is bound tightly with a long piece of cloth. Additionally, a medicated paste may be applied onto the forehead and face.

Proper documentation of the use of plants in the Malay traditional medicine practice is very limited, such as publications by Ridley,<sup>[7]</sup> Gimlette,<sup>[8,9]</sup> Gimlette and Burkill,<sup>[10]</sup> Gimlette and Thomson,<sup>[11]</sup> and Burkill,<sup>[12]</sup> and these are not regularly updated. No formal training of traditional Malay practitioners is currently available. Knowledge and traditional prescriptions are passed from generation to generation merely by word of mouth. Thus, this paper provides

preliminary information on plants used traditionally by the women in postnatal care in Malaysia and possible justifications based on previously published traditional uses and scientific data for selected medicinal plants. The objective of the study is to compile information on the type and purpose of preparations, as well as the type and part of medicinal plants. This was done by oral interview of randomly selected Malay traditional medicine practitioners who are based in the districts of Muar in Johor and Kuala Pilah in Negeri Sembilan, in the Peninsular Malaysia.

## MATERIALS AND METHODS

Seven Malay traditional medicine practitioners were individually interviewed based on a set of pre-piloted questionnaire. Five of them were based in Muar, Johor and two were in Kuala Pilah, Negeri Sembilan (Figure 1). The practitioners were Hussain, Kalsom, Painah and Salmi from Kampung Parit Medan, Muar, Johor. Zainab was from Kampung Tiang Baru, Muar, Johor. Yah and Ujang were from Kampung Tanjung Jati, Kuala Pilah, Negeri Sembilan.

Information enquired in the questionnaire include: (i) type of preparation, (ii) name of medicinal plant(s), (iii) part of the medicinal plant used, (iv) method of preparation and (v) use of the preparation. The data gathered from the interview was analysed. Most of the names of medicinal plants were given in Malay, therefore, the scientific names were cross-checked with several ethnobotanical references such as Burkill,<sup>[13]</sup> Zakaria and Mohd,<sup>[1]</sup> and Mat-Salleh and Latiff.<sup>[14]</sup> The reported traditional uses of these plants in Malaysia by Burkill<sup>[13]</sup> were also obtained from Dr. Duke's Phytochemical and Ethnobotanical Databases.<sup>[15]</sup>

## RESULTS AND DISCUSSION

### Preparations Used for Postnatal Care in Malay Traditional Medicine

Twenty three preparations consisting of 128 medicinal plants were compiled, as summarised in Table 1. The types of preparations included jamu, *ulam* (fresh herb), eye drops, *tapel* (poultice), *pilis* (medicated talcum paste applied onto the forehead), *param* (medicated talcum paste applied to the whole body) and *mandian* (herbal bath).

In the Malay traditional medicine, jamu is traditionally used in post-partum medication to help improve blood flow, warming and refreshing of the body, speed up contraction of the uterus and tightening of the vagina, encourage bowel movement and prevent vaginal discharge. Jamu often contains a mixture of various medicinal plants and plant parts that is evidenced from this study (Table 1: J1-J8). It is given orally in a form of either herbal pills or hot water



**Figure 1:** A map of Peninsular Malaysia showing the sites of study

decoction or hot water mixture. The composition of jamu is found to vary according to the Malay traditional practitioners. The finding seems to agree with the statement of Salleh<sup>[2]</sup> that the practice is not rigid. This is unlike other traditional or complementary practices whereby certain ailment is treated with a specified medicine. In this study, 61 medicinal plants of 35 species are found to be used in the jamu preparations and the most frequently used include *Curcuma longa* L. (in 5 preparations), *Coriandrum sativum* L. (3), *Kaempferia galanga* L. (3), *Parkia roxburghii* G. Don (3), *Quercus infectoria* Oliv. (3) and *Usnea barbata* Fries (3). The applications of *C. longa* in the Malay traditional medicine have been recorded by Burkill<sup>[13]</sup> for parturition and other ailments related to afterbirth such as amenorrhea, diuretic, lactagogue,

swelling, tonic, urogenital problems and wound healing (Table 2). Previous studies on *C. longa* have revealed that the extracts have antidepressant,<sup>[16]</sup> hypotensive and vasorelaxant<sup>[17]</sup> effects in vivo. Curcumin isolated from *C. longa* rhizome has been shown to exhibit activity against various pro-inflammatory diseases such as cancer, diseases of the heart, lung, liver and skin, neurodegenerative and endocrine disorders, infectious diseases and others,<sup>[18]</sup> whereas ar-turmerone is a potent inhibitor for collagen-induced platelet aggregation<sup>[19]</sup> and an immunomodulator.<sup>[20]</sup>

Poultice, medicated talcum paste applied onto the forehead, medicated talcum paste applied to the body parts and herbal bath are used as external preparations. In this study, the

**Table 1: Plant species, local Malay name, parts of plants and applications of medicinal plants used in postnatal care by the Malay traditional medicine practitioners in Muar, Johor and Kuala Pilah, Negeri Sembilan**

No. <sup>a</sup>	Species	Malay Name	Part Used	Applications
J1	<i>Acorus calamus</i> L.	Jerangau	Rhizome	Hot water mixture of the ground plant materials is given to improve blood circulation, to make the body feel warm, to encourage contraction of the uterus, to expel wind, to prevent fit and as a laxative.
	<i>Alpinia conchigera</i> Griff.	Lengkuas padang	Rhizome	
	<i>Alyxia stellata</i> Roem. & Schult.	Pulasari	Bark	
	<i>Carum carvi</i> L.	Jemuju	Fruit	
	<i>Cinnamomum zeylanicum</i> Blume	Kayu manis	Stem bark	
	<i>Coriandrum sativum</i> L.	Ketumbar	Fruit	
	<i>Curcuma longa</i> L.	Kunyit	Rhizome	
	<i>Elaeocarpus grandiflorus</i> Sm.	Anyang-anyang	Bark	
	<i>Foeniculum vulgare</i> Mill.	Adas pedas	Fruit	
	<i>Illicium tenuifolium</i> (Ridl.) A.C.Sm.	Bunga lawang bukit	Flower	
	<i>Kaempferia galanga</i> L.	Cekur	Leaf	
	<i>Nigella sativa</i> L.	Jintan hitam	Seed	
	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz	Bonglai	Fruit	
	<i>Parkia roxburghii</i> G.Don	Kedaung	Seed	
	<i>Peucedanum japonicum</i> Thunb.	Ganti	Rhizome	
	<i>Piper cubeba</i> Bojer	Kemungkus	Berry	
	<i>Piper nigrum</i> Beyr. ex Kunth	Lada putih & hitam	Fruit	
	<i>Piper retrofractum</i> Vahl	Cabai sirih	Fruit	
	<i>Quercus infectoria</i> Oliv.	Manjakani	Gall	
	<i>Rheum officinale</i> Baill.	Kelembak	Root	
	<i>Saussurea lappa</i> C.B.Clarke	Pucuk	Root	
<i>Usnea barbata</i> Fries	Kayu angin	Whole plant		
<i>Zingiber officinale</i> Roscoe	Halia	Rhizome		
J2	<i>Coriandrum sativum</i> L.	Ketumbar	Fruit	Hot water mixture of ground plant materials is given to improve blood circulation, to regain body strength, to expel wind, to ease muscular and joint pain, as well as to ease abdominal discomfort.
	<i>Curcuma longa</i> L.	Kunyit	Rhizome	
	<i>Parkia roxburghii</i> G.Don	Kedaung	Seed	
	<i>Piper nigrum</i> Beyr. ex Kunth	Lada putih	Fruit	
	<i>Usnea barbata</i> Fries	Kayu angin	Whole plant	
	<i>Zingiber aromaticum</i> Valetton	Lempoyang	Rhizome	
J3	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome	Hot water mixture of ground plant materials is given to regain body strength, to prevent bad body odour, to expel wind, to encourage contraction of the uterus, to encourage wound healing, to reduce bleeding, to stimulate lactation and as a contraceptive.
	<i>Alyxia stellata</i> Roem. & Schult.	Pulasari	Bark	
	<i>Carum carvi</i> L.	Jemuju	Fruit	
	<i>Cinnamomum zeylanicum</i> Blume	Kayu manis	Stem bark	
	<i>Coriandrum sativum</i> L.	Ketumbar	Fruit	
	<i>Eurycoma longifolia</i> Jack	Kayu pasak bumi	Root	
	<i>Foeniculum vulgare</i> Mill.	Adas pedas	Fruit	
	<i>Illicium tenuifolium</i> (Ridl.) A.C.Sm.	Bunga lawang bukit	Flower	
	<i>Kaempferia galanga</i> L.	Cekur	Leaf	
	<i>Litsea odorifera</i> Valetton	Terawas	Flower	
	<i>Nigella sativa</i> L.	Jintan hitam	Seed	
	<i>Parameria polyneura</i> Hook.f.	Kayu rapat	Stem bark	
	<i>Parkia roxburghii</i> G.Don	Kedaung	Seed	
	<i>Piper cubeba</i> Bojer	Kemungkus	Berry	
	<i>Quercus infectoria</i> Oliv.	Manjakani	Gall	
<i>Usnea barbata</i> Fries	Kayu angin	Whole plant		
J4	<i>Curcuma longa</i> L.	Kunyit	Rhizome	Juice mixture with dark brown sugar and salt is given for slimming.
	<i>Tamarindus indica</i> L.	Asam jawa	Fruit	
J5	<i>Quercus infectoria</i> Oliv.	Manjakani	Gall	Ground dried gall is given to encourage contraction of the uterus, to regain body strength, to treat vaginal discharge and to treat abdominal discomfort.
J6	<i>Rourea humilis</i> Blume	Akar kayu mengecut	Root	Its water decoction is given to encourage contraction of the uterus.
J7	<i>Ananas comosus</i> (L.) Merr.	Nanas	Young leaf	Its juice mixture is given to stimulate lactation.
	<i>Curcuma longa</i> L.	Kunyit	Rhizome	
	<i>Curcuma heyneana</i> Valetton & Zijp	Temu giring	Rhizome	
	<i>Curcuma mangga</i> Valetton & Zijp	Temu pauh	Rhizome	
	<i>Curcuma xanthorrhiza</i> D.Dietr.	Temu lawak	Rhizome	
	<i>Kaempferia galanga</i> L.	Cekur	Leaf	
	<i>Musa acuminata</i> Colla	Pisang kapas	Fruit	
	<i>Tamarindus indica</i> L.	Asam jawa	Fruit	
	<i>Zingiber aromaticum</i> Valetton	Lempoyang	Rhizome	

No. <sup>a</sup>	Species	Malay Name	Part Used	Applications	
J8	<i>Acorus calamus</i> L.	Jerangau	Rhizome	Hot water mixture of ground plant materials with tamarind and dark brown sugar is given to stimulate lactation and to prevent bad odour of the breasts.	
	<i>Curcuma longa</i> L.	Kunyit	Rhizome		
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Rhizome		
U9	<i>Centella asiatica</i> (L.) Urb.	Pegaga	Leaf	Fresh leaf is eaten to stimulate lactation.	
U10	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome	Fried rhizome is eaten to make the body feel warm.	
E11	<i>Piper cubeba</i> Bojer	Kemungkus	Berry	Its juice is applied into the eyes to improve eyesight.	
T12	<i>Tamarindus indica</i> L.	Asam jawa	Fruit	Mixture of its juice and lime is applied onto the abdomen for slimming and to encourage contraction of the uterus.	
T13	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome		
T14	<i>Citrus aurantifolia</i> Swingle	Limau nipis	Fruit	Mixture of the ground plant materials and water is applied onto the forehead to help improve eyesight.	
P15	<i>Acorus calamus</i> L.	Jerangau	Rhizome		
	<i>Alyxia stellata</i> Roem. & Schult.	Pulasari	Bark		
	<i>Cinnamomum zeylanicum</i> Blume	Kayu manis	Stem bark		
	<i>Eugenia aromatica</i> Kuntze	Cengkiah	Flower bud		
	<i>Foeniculum vulgare</i> Mill.	Adas pedas	Fruit		
	<i>Illicium tenuifolium</i> (Ridl.) A.C.Sm.	Bunga lawang bukit	Flower		
	<i>Nigella sativa</i> L.	Jintan hitam	Seed		
	<i>Peucedanum japonicum</i> Thunb.	Ganti	Rhizome		
	<i>Piper cubeba</i> Bojer	Kemungkus	Berry		
	<i>Rheum officinale</i> Baill.	Kelembak	Root		
	<i>Sesbania grandiflora</i> (L.) Pers.	Turi	Leaf		
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Rhizome		
	P16	<i>Cinnamomum zeylanicum</i> Blume	Kayu manis		Stem bark
		<i>Entada phaseoloides</i> (L.) Merr.	Sintok		Seed
		<i>Eugenia aromatica</i> Kuntze	Cengkiah	Flower bud	
P17	<i>Nigella sativa</i> L.	Jintan hitam	Seed		
	<i>Piper cubeba</i> Bojer	Kemungkus	Berry		
	<i>Piper nigrum</i> Beyr. ex Kunth	Lada putih	Fruit		
	<i>Allium sativum</i> L.	Bawang putih	Bulb		
P18	<i>Cinnamomum zeylanicum</i> Blume	Kayu manis	Stem bark		
	<i>Eugenia aromatica</i> Kuntze	Cengkiah	Flower bud		
	<i>Piper cubeba</i> Bojer	Kemungkus	Berry		
	<i>Piper nigrum</i> Beyr. ex Kunth	Lada hitam	Fruit		
	<i>Sesbania grandiflora</i> (L.) Pers.	Turi	Leaf		
	<i>Alyxia stellata</i> Roem. & Schult.	Pulasari	Seed		
	<i>Foeniculum vulgare</i> Mill.	Adas pedas	Fruit		
R19	<i>Kaempferia galanga</i> L.	Cekur	Leaf		
	<i>Oryza sativa</i> L.	Beras	Seed		
	<i>Peucedanum japonicum</i> Thunb.	Ganti	Rhizome		
	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome		
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Rhizome		
	R20	<i>Curcuma longa</i> L.	Kunyit	Rhizome	
		<i>Kaempferia galanga</i> L.	Cekur	Leaf	
<i>Oryza sativa</i> L.		Beras	Seed		
<i>Usnea barbata</i> Fries		Kayu angin	Whole plant		
R21	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome		
	<i>Curcuma longa</i> L.	Kunyit	Rhizome		
	<i>Kaempferia galanga</i> L.	Cekur	Rhizome		
	<i>Oryza sativa</i> L.	Beras	Seed		
	<i>Piper nigrum</i> Beyr. ex Kunth	Lada putih	Fruit		
	<i>Vetiveria zizanioides</i> Stapf	Larasetu	Root Rhizome		
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Rhizome		
M22	<i>Zingiber officinale</i> Roscoe	Halia	Rhizome		
	<i>Acorus calamus</i> L.	Jerangau	Leaf		
	<i>Alpinia galanga</i> Willd.	Lengkuas	Leaf		
	<i>Carica papaya</i> L.	Betik	Leaf		
	<i>Citrus aurantifolia</i> Swingle	Limau nipis	Leaf		
	<i>Coriandrum sativum</i> L.	Ketumbar	Leaf		
	<i>Curcuma longa</i> L.	Kunyit	Leaf		

(Continued)

Table 1: Continued

No. <sup>a</sup>	Species	Malay Name	Part Used	Applications
M23	<i>Curcuma xanthorrhiza</i> D.Dietr.	Temu lawak	Leaf	Mixture of the water decoction and plenty of water is used for bathing in order to remove bad body odour and to make the body feel warm.
	<i>Cymbopogon citratus</i> Stapf	Serai makan	Leaf	
	<i>Piper betle</i> L.	Sireh	Leaf	
	<i>Psidium guajava</i> L.	Jambu batu	Leaf	
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Leaf	
	<i>Alpinia galanga</i> Willd.	Lengkuas	Leaf	
	<i>Coleus blumei</i> Benth.	Ati-ati	Leaf	
	<i>Cymbopogon nardus</i> (L.) Rendle	Serai wangi	Leaf	
	<i>Datura fastuosa</i> L.	Kecubung	Leaf	
	<i>Pandanus odoratus</i> Ridl.	Pandan	Leaf	
	<i>Zingiber cassumunar</i> Roxb.	Bongelai	Leaf	

<sup>a</sup>Indicates the type of preparation, that is, J=Jamu, U=Ulam (fresh herbs), E=Titisan Mata (eye drops), T=Tapel (poultice), P=Pilis (medicated talcum powder applied onto the forehead), R=Param (medicated talcum powder applied to the body), M=Mandian (bathing solution). Definition of each preparation is described in the text.

Table 2: Families of the medicinal plant species used medicinal plants used after childbirth by the Malay traditional medicine practitioners in Muar, Johor and Kuala Pilah, Negeri Sembilan and the reported traditional uses

Family	Species	Reported Traditional Uses by Burkill (1966)
Acoraceae	<i>Acorus calamus</i> L.	Diarrhea, odontosis, parturition, pediculifuge, splenomegaly, venereal, vermifuge.
Apiaceae	<i>Carum carvi</i> L.	—
	<i>Centella asiatica</i> (L.) Urb.	—
	<i>Coriandrum sativum</i> L.	Cough, fever, nausea, ophthalmia, rheumatism.
	<i>Foeniculum vulgare</i> Mill.	Abdomen, dermatosis, gastralgia, hepatitis, rheumatism.
	<i>Peucedanum japonicum</i> Thunb.	Constipation, fever, giddiness, miscarriage, parturition, sapraemia, smallpox.
Apocynaceae	<i>Alyxia stellata</i> Roem. & Schult.	—
	<i>Parameria polyneura</i> Hook. f.	Parturition, tonic, toothblack, uteromegaly.
Asteraceae	<i>Saussurea lappa</i> C.B. Clarke	—
Bignoniaceae	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz	Ache (stomach and tooth), cholera, diarrhea, dysentery, enterosis, fever, gastrostis, parturition, rheumatism, splenomegaly, swelling, vertigo.
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr.	Abortifacient, diphtheria, diuretic, emmenagogue, gonorrhoea, vermifuge.
Caricaceae	<i>Carica papaya</i> L.	Abortifacient, arthritis, asthma, boil, colic, dysuria, fever, fumitory, gravel, vermifuge.
Connaraceae	<i>Rourea humilis</i> Blume	—
Elaeocarpaceae	<i>Elaeocarpus grandiflorus</i> Sm.	Sore, tonic.
Fabaceae	<i>Entada phaseoloides</i> (L.) Merr.	Abdomen, cosmetic, enterosis, hematochezia, parturition, piscicide, shampoo, watervine, wound.
	<i>Parkia roxburghii</i> G. Don	—
	<i>Sesbania grandiflora</i> (L.) Pers.	Aperient, bruise, cosmetic, diarrhea, dysentery, edema, emetic, enterosis, gastrostis, glossitis, leucorrhoea, ophthalmia, scabies, sore (throat), sprain, sprue, stomatitis, thrush, tonic, tonsillitis.
	<i>Tamarindus indica</i> L.	Abortive, boil, conjunctivitis, cosmetic, dermatosis, fever, itch, mucositis, pimple, rheumatism, sore, sting (caterpillar), thrush, wound.
Fagaceae	<i>Quercus infectoria</i> Oliv.	—
Illiciaceae	<i>Illicium tenuifolium</i> (Ridl.) A.C.Sm.	—
Lamiaceae	<i>Coleus blumei</i> Benth.	Cachexia, dyspepsia, ophthalmia
Lauraceae	<i>Cinnamomum zeylanicum</i> Blume	—
	<i>Litsea odorifera</i> Valetton	Lactagogue
Liliaceae	<i>Allium sativum</i> L.	Vermifuge
Musaceae	<i>Musa acuminata</i> Colla	—
Myrtaceae	<i>Eugenia aromatica</i> Kuntze	Ache (head and tooth), colic, parturition, tonic, vaginomegaly.
	<i>Psidium guajava</i> L.	Ache (stomach), dermatosis, diarrhea, emmenagogue, epilepsy, hysteria, leucorrhoea, swelling, vermifuge.
Pandanaceae	<i>Pandanus odoratus</i> Ridl.	Anemia, cosmetic, gonorrhoea, measles, parturition, sapraemia, syphilis.
Parmeliaceae	<i>Usnea barbata</i> Fries	—

Family	Species	Reported Traditional Uses by Burkill (1966)
Piperaceae	<i>Piper betle</i> L.	Abscess, ache (tooth), antiseptic, asthma, cough, earache, epistaxis, gingivitis, gonorrhoea, halitosis, hoarseness, itch, lactafuge, leucorrhoea, mucositis, otosis, parturition, pimple, sore, stimulant.
	<i>Piper cubeba</i> Bojer	Aphrodisiac, diuretic, dysentery, dyspepsia, enterosis, gonorrhoea, panacea, rheumatism, stimulant.
	<i>Piper nigrum</i> Beyr. ex Kunth	Abortifacient, ache (head), cholera, colic, gonorrhoea.
Poaceae	<i>Piper retrofractum</i> Vahl	Cramps, dyspepsia, hepatitis, osteosis, weakness.
	<i>Cymbopogon citratus</i> Stapf	Ache (tooth), diaphoretic, diuretic, dyspepsia, emmenagogue, gingivitis, neuritis, rheumatism, sprain.
	<i>Cymbopogon nardus</i> (L.) Rendle	Dyspepsia, emmenagogue.
	<i>Oryza sativa</i> L.	—
Polygonaceae	<i>Vetiveria zizanioides</i> Stapf	Cosmetic, parturition.
	<i>Rheum officinale</i> Baill.	Cosmetic, freckles, fumitory, purgative, tonic.
Ranunculaceae	<i>Nigella sativa</i> L.	—
Rutaceae	<i>Citrus aurantifolia</i> Swingle	Ache (head and stomach), cough, dermatosis, dysentery, gonorrhoea, neuralgia, yaws.
Simaroubaceae	<i>Eurycoma longifolia</i> Jack	Ache (head), fever, malaria, parturition, smallpox, sore, syphilis, wound.
Solanaceae	<i>Datura fastuosa</i> L.	—
Zingiberaceae	<i>Alpinia conchigera</i> Griff.	—
	<i>Alpinia galanga</i> Willd.	—
	<i>Curcuma heyneana</i> Valetton & Zijp	Deodorant, obesity, wound.
	<i>Curcuma longa</i> L.	Abscess, amenorrhoea, cold, conjunctivitis, cosmetic, diarrhea, diuretic, dysentery, gonorrhoea, gravel, hepatitis, jaundice, lactagogue, parturition, pyuria, scabies, sore, swelling, tonic, urogenital, wound.
	<i>Curcuma mangga</i> Valetton & Zijp	Fever, stomachic.
	<i>Curcuma xanthorrhiza</i> D.Dietr.	Amenorrhoea, choloretic, constipation, dyspepsia, emmenagogue, gallstones, hepatitis, parturition, rheumatism.
	<i>Kaempferia galanga</i> L.	Abdomen, cosmetic, cough, fever, mastitis, ophthalmia, otosis, rheumatism, sore (throat), swelling.
	<i>Zingiber aromaticum</i> Valetton	Bilious, chlorosis, cholecystosis, gout, parturition, pertussis, tonic.
	<i>Zingiber cassumunar</i> Roxb.	Abdomen, ache (head), ache (stomach), anodyne, colic, constipation, cosmetic, cramps, fever, flatulence, gonorrhoea, jaundice, malaria, numbness, parturition, vermifuge.
	<i>Zingiber officinale</i> Roscoe	Abortive, ache (back, head and stomach), ague, colic, congestion, cosmetic, cough, dyspepsia, fever, gingivitis, gynecology, hepatitis, infection, panacea, parturition, puerperium, rheumatism, rhinosis, sore, swelling, syphilis, tonic.

(-) Information not available in Burkill (1966).

poultice is made up of a mixture of lime (*Citrus aurantifolia* Swingle) and juice of either *Tamarindus indica* L. or *Zingiber officinale* Roscoe and is applied onto a mother's abdomen. This is said to encourage contraction of the uterus and slimming of the abdominal part (Table 1: T12-T14). The latter traditional use could be associated with the findings that methanol and ethyl acetate extracts of *Z. officinale* reduce abdominal fat deposition in vivo.<sup>[21]</sup> Additionally, the use of *Z. officinale* in this preparation is also in accordance to the reported traditional use of *Z. officinale* in parturition and during puerperium<sup>[13]</sup> (Table 2). Furthermore, the Sundanese in West Java, Indonesia have also used *T. indica* fruit in their post-partum remedies.<sup>[22]</sup>

The medicated talcum paste, *pilis*, applied onto a mother's forehead is traditionally believed to help improve poor vision and to treat headache after childbirth. Fifteen species in 4 preparations have been compiled in this study.

*Cinnamomum zeylanicum* Blume (in 4 preparations), *Eugenia aromatica* Kuntze (3) and *Piper cubeba* Bojer (3) are three most commonly utilised in the *pilis* (Table 1: P15-P18). Only *E. aromatica* has been reported to be used traditionally in the treatment of headache<sup>[13]</sup> (Table 2). Eugenol, which is the active ingredient of *E. aromatica*, is found to inhibit monoamine oxidase A in vitro and has antidepressant activity in vivo.<sup>[23]</sup>

Traditionally, medicated talcum paste *param* used for massaging or applied to the entire body is considered to help regain body figure, expel wind, eliminate stretch marks and smoothen the skin. In *param*, *K. galanga* (in 3 preparations), *Oryza sativa* L. (3) and *Z. officinale* (3) are most popular ingredients (Table 1: R19-21). It has been revealed that methanolic extract of *K. galanga* has antinociceptive effect in vivo<sup>[24]</sup> and the hexane extract has sedative property.<sup>[25]</sup> In addition, *O. sativa* has been used in the traditional

preparation of the Sundanese in West Java, Indonesia in the treatment of dermatitis.<sup>[22]</sup> *O. sativa* could also be used as an excipient in the powdered mixture due to the high content of starchy materials for easy and uniform application of the paste.

In the Malay traditional medicine, new mothers are encouraged to bathe with water-boiled leaves or roots. In this study, 17 medicinal plants in 2 preparations were compiled and *Alpinia galanga* Willd. (in 2 preparations), *Zingiber cassumunar* Roxb. (2) and *Cymbopogon* spp. (2) are found to be common ingredients of the solutions (Table 1: M22-M23). The use of aromatic herbs is believed to help remove bad body odour, to freshen the body, to make the body feel warm, to help expel wind from the body and to smoothen the skin. The applications on the skin could be supported by the fact that essential oil of *Z. cassumunar* is active against dermatological infections caused by bacteria, dermatophytes and yeasts<sup>[26]</sup> and *C. citratus* oil has potent *in vitro* antifungal effect against *Candida* spp.<sup>[27]</sup> In addition, *A. galanga* extract has protective effects on UVA-dependent melanogenesis.<sup>[28]</sup>

In this study, it is found that fresh herbs (Table 1: U9-U10) are consumed, for example, leaf of *Centella asiatica* (L.) Urb. for stimulation of breast milk and rhizome of *Z. officinale* for warming of the body. Although there is no scientific evidence that *C. asiatica* is galactagogue, interestingly its water extract has been shown to enhance learning and memory of mice during the postnatal developmental stage.<sup>[29]</sup> Additionally, the methanolic extract of *C. asiatica* has antioxidant activity<sup>[30]</sup> and the asiaticoside has wound healing effects.<sup>[31]</sup> One of the practitioners also mentioned the use of *P. cubeba* juice eye drop to improve poor eyesight of a mother after childbirth. The use of herbal eye drop in postnatal treatment is not a common practice. However, methanolic extract of *P. cubeba* has been shown to exhibit anti-inflammatory activity.<sup>[32]</sup>

Most of the medicinal plants used in the preparations obtained from the study are believed to be “heaty” components so as to complement the “cold” condition after childbirth. This probably explains why most preparations are meant to improve blood circulation, to make the body feels warm, to expel wind, to ease abdominal discomfort and cramps, to ease muscular and joint pain, to stimulate lactation and to act as a laxative and a contraceptive. In fact, the external preparations utilise mainly aromatic medicinal plants, especially the Zingiberaceae species. In aromatherapy, essential oils of *C. zeylanicum*, *E. aromatica* and *Z. officinale* have been used to ease emotional and mental fatigue. Thus, the use of these aromatic species could help the new mothers to reduce anxiety, reduce stress and improve mood after childbirth.<sup>[33]</sup>

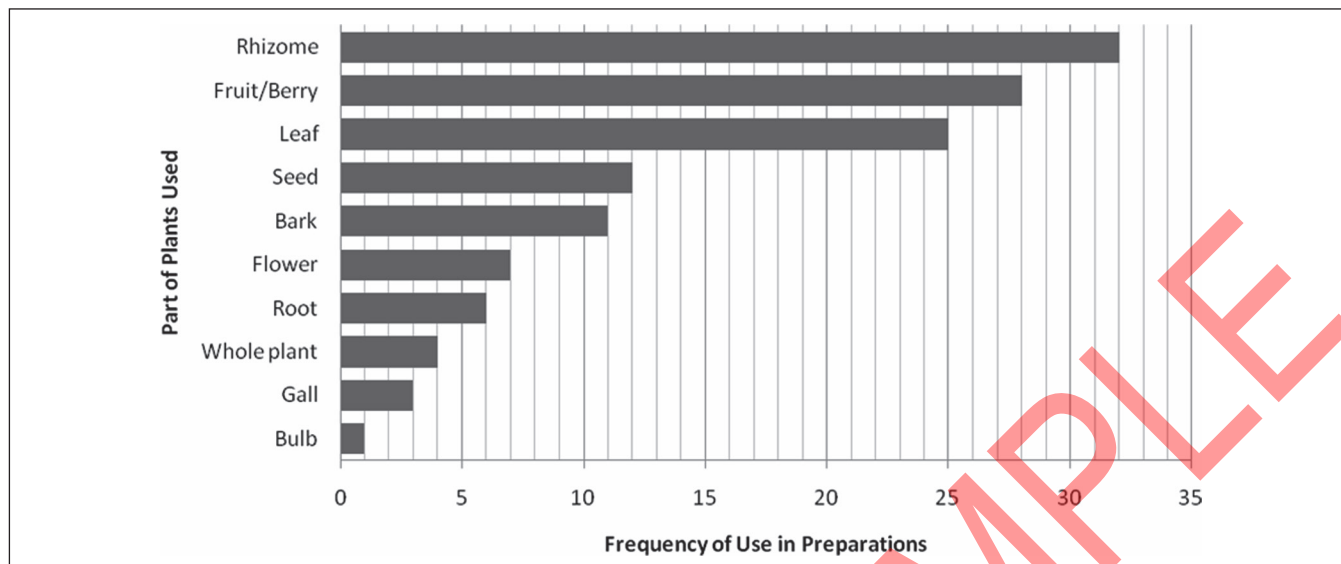
## Medicinal Plants Used for Postnatal Care in Malay Traditional Medicine

In this study, as many as 52 species of medicinal plants from 42 genera are found to be used in the 23 post-partum traditional preparations. These species belong to 27 families, that is, Zingiberaceae (10 species), Apiaceae (5), Fabaceae (4), Piperaceae (4), Poaceae (4), Apocynaceae (2), Lauraceae (2), Myrtaceae (2), Acoraceae (1), Asteraceae (1), Bignoniaceae (1), Bromeliaceae (1), Caricaceae (1), Connaraceae (1), Elaeocarpaceae (1), Fagaceae (1), Illiciaceae (1), Lamiaceae (1), Liliaceae (1), Musaceae (1), Pandanaceae (1), Parmeliaceae (1), Polygonaceae (1), Ranunculaceae (1), Rutaceae (1), Simaroubaceae (1) and Solanaceae (1) (Table 2).

Some medicinal plants are found to be commonly utilised in the preparations such as *Curcuma longa* L. (7 preparations), *Z. officinale* (7), *C. zeylanicum* (6), *K. galanga* (6), *P. cubeba* (6), *Z. cassumunar* (6), *Acorus calamus* L. (5), *Piper nigrum* Beyr. ex Kunth (5), *Alyxia stellata* Roem. & Schult. (4), *C. sativum* (4), *Foeniculum vulgare* Mill. (4), *Nigella sativa* L. (4) and *U. barbata* (4). It is anticipated that Malay traditional medicine practitioners make use of the easily accessible and inexpensive herbs and spices such as turmeric (*C. longa*), ginger (*Z. officinale*), aromatic ginger (*K. galanga*), cassumunar (*Z. cassumunar*), cinnamon (*C. zeylanicum*), white and black pepper (*P. nigrum*), coriander (*C. sativum*) and sweet fennel (*F. vulgare*) in their preparations. These can be either collected from their home gardens or the neighbouring forests, or purchased from retail stores or local herbal suppliers. However, the use of black seed or black cumin (*N. sativa*) that is not grown locally is rather surprising but could suggest the influence of Prophetic Medicine in the Malay traditional medicine because of the belief that black cumin is a remedy for every disease except death.<sup>[34]</sup> Besides, several pharmacological properties of *N. sativa* have been reported including CNS-depressant,<sup>[35]</sup> anti-inflammatory and analgesic,<sup>[36]</sup> hypotensive, anti-nociceptive, uricosuric, choleric, anti-fertility, anti-diabetic and anti-histaminic,<sup>[37]</sup> as well as anti-oxidant, anti-microbial, antitumor and immunomodulatory properties.<sup>[38]</sup>

Parts of the medicinal plants frequently utilised in the preparations are rhizomes (25%), fruits/berries (22%) and leaves (19%); followed by seeds (9%), barks (9%), flowers (5%), roots (5%), whole plant (3%), gall (2%) and bulb (1%) (Figure 2). Most of the preparations use rhizomes of the Zingiberaceae species; whereas the leaves are mainly used in the bathing preparations. It is also interesting to learn that different parts of a plant are used for different preparations and purposes. For example, the *Z. cassumunar* rhizome is used as internal jamu preparation whereas the leaves are used in the external herbal bath. Frequency of the use of plant parts found in this study is different from the previously reported ethnobotanical studies, whereby





**Figure 2:** Frequency of plant parts used in the preparations of the Malay traditional medicine for postnatal care

roots and leaves are the most commonly utilised plant parts in the remedies.<sup>[39,40]</sup> This may exemplify the diversity of traditional practices based on cultural differences.

## CONCLUSION

In conclusion, the study has successfully gathered information on the 23 preparations containing 128 medicinal plants used for postnatal care in the Malay traditional medicine at Muar, Johor and Kuala Pilah, Negeri Sembilan. Diverse types of species and parts of plants were used by different practitioners. These are traditionally prepared in various forms, either freshly prepared or dried; powdered or extracted; in a single or compound composition and either taken internally or used externally. Similar studies should be carried out elsewhere in order to compile more data on the use of medicinal plants in the Malay traditional medicine.

## ACKNOWLEDGEMENTS

The authors would like to thank the Malay traditional practitioners who were willing to contribute to the study and to the development of knowledge on medicinal plants of Malaysia.

## REFERENCES

- Zakaria M, Mohd MA. Traditional Malay Medicinal Plants. Kuala Lumpur: Penerbit Fajar Bakti Sdn. Bhd.; 1994.
- Salleh H. Perubatan tradisi Malaysia dari aspek sosio-antropology. In: Soepadmo E, Goh SH, Wong WH, Din L, Chuah CH, editors. Malaysian Traditional Medicine, Kuala Lumpur. Kuala Lumpur: Institute of Advanced Studies, University of Malaya and Malaysian Institute of Chemistry; 1988; p. 281.
- Kasimin A. Asas dan falsafah perubatan Melayu tradisional dari perspektif Islam. In: Din L, Sulaiman NA, Hussein FN, Mohd-Riji H, Mohd-Anuar H, editors. Proceedings: National Workshop on the Integration of Traditional Medicine in Primary Health Care. Kuala Lumpur: (publisher unknown); 1990; p. 20-23.
- Rahman HAA. Asas dan falsafah Perubatan Melayu. In: Din L, Sulaiman NA, Hussein FN, Mohd-Riji H, Mohd-Anuar H, editors. Proceedings: National Workshop on the Integration of Traditional Medicine in Primary Health Care. Kuala Lumpur: (publisher unknown); 1990; p. 13-16.
- Jamal JA. Malay traditional medicine: An overview of scientific and technological advancement. Asia Pacific Tech Monitor. 2006; 23(6):37-49.
- Supathan R. The role of the Malay Traditional Medicine. In: Shaari K, Abd-Kadir A, Mohd-Ali, AR, editors. Medicinal Products from Tropical Rain Forest. Kuala Lumpur: Forest Research Institute of Malaysia; 1992; p. 57-62.
- Ridley HN. Materials for a Flora of the Malayan Peninsula. Singapore: Methodist Publishing House; 1907.
- Gimlette JD. Some Superstitious Beliefs Occurring in the Theory and Practice of Malay Medicine. (Publisher unknown); 1913.
- Gimlette JD. Malay Poisons and Charm Cures. New York: Oxford University Press; 1971.
- Gimlette JD, Burkill IH. The Medical Book of Malayan Medicine. Singapore: Botanic Gardens; 1930.
- Gimlette JD, Thomson HW. A Dictionary of Malay Medicine. London: Oxford University Press; 1939.
- Burkill IH. A dictionary of the economic products of the Malay Peninsula. London: Crown Agents; 1935.
- Burkill I H. A dictionary of the economic products of the Malay Peninsula. Kuala Lumpur: Ministry of Agriculture and Co-operatives; 1966.
- Mat-Salleh K, Latiff A. Tumbuhan Ubatan Malaysia. Selangor: Pusat Pengurusan Penyelidikan, Universiti Kebangsaan Malaysia; 2002.
- Dr. Duke's Phytochemical and Ethnobotanical Databases. (<http://www.ars-grin.gov/duke>)
- Xia X, Cheng G, Pana Y, Xia ZH, Kong LD. Behavioral, neurochemical and neuroendocrine effects of the ethanolic extract from *Curcuma longa* L. in the mouse forced swimming test. Journal of Ethnopharmacology. 2007; 110:356-363.
- Adaramoye OA, Anjos RM, Almeida MM, Veras RC, Silvia DF, Oliveira FA, et al. Hypotensive and endothelium-independent vasorelaxant effects of methanolic extract from *Curcuma longa* L. in rats. Journal of Ethnopharmacology. 2009; 124:457-462.

18. Aggarwal BB, Harikumar KB. Potential therapeutic effects of curcumin, the anti-inflammatory agent, against neurodegenerative, cardiovascular, pulmonary, metabolic, autoimmune and neoplastic diseases. *The International Journal of Biochemistry and Cell Biology*. 2009; 41:40-59.
19. Lee HS. Antiplatelet property of *Curcuma longa* L. rhizome-derived *ar-turmerone*. *Bioresource Technology*. 2006; 97:1372-1376.
20. Yue GGL, Chan BCL, Hon PM, Lee MYH, Fung KP, Leung PC, et al. Evaluation of in vitro anti-proliferative and immunomodulatory activities of compounds isolated from *Curcuma longa*. *Food Chemistry and Toxicology*. 2010; 48:2011-2020.
21. Goyal RK, Kadnur SV. Beneficial effects of *Zingiber officinale* on goldthioglucose induced obesity. *Fitoterapia*. 2006; 77:160-163.
22. Roosita K, Kusharto CM, Sekiyama M, Fachrurozi Y, Ohtsuka R. Medicinal plants used by the villagers of a Sundanese community in West Java, Indonesia. *Journal of Ethnopharmacology*. 2008; 115:72-81.
23. Tao G, Irie Y, Li DJ, Keung WM. Eugenol and its structural analogs inhibit monoamine oxidase A and exhibit antidepressant-like activity. *Bioorganic and Medicinal Chemistry*. 2005; 13:4777-4788.
24. Ridditid W, Sae-wonga C, Reanmongkol W, Wongnawa M. Antinociceptive activity of the methanolic extract of *Kaempferia galanga* Linn. in experimental animals. *Journal of Ethnopharmacology*. 2008; 118:225-230.
25. Huang L, Yagura T, Chen S. Sedative activity of hexane extract of *Keampferia galanga* L. and its active compounds. *Journal of Ethnopharmacology*. 2008; 120:123-125.
26. Pithayanukul P, Tubprasert J, Wuthi-Udomlert M. *In vitro* antimicrobial activity of *Zingiber cassumunar* (Plai) oil and a 5% Plai oil gel. *Phytotherapy Research*. 2007; 21(2):164-169.
27. Silva Cde B, Guterres SS, Weisheimer V, Schapoval EE. Antifungal activity of the lemongrass oil and citral against *Candida* spp. *Brazilian Journal of Infectious Diseases*. 2008; 12(1):63-66.
28. Panich U, Kongtaphan K, Onkoksoong T, Jaemsak K, Phadungrakwittaya R, Thaworn A, et al. Modulation of antioxidant defense by *Alpinia galanga* and *Curcuma aromatica* extracts correlates with their inhibition of UVA-induced melanogenesis. *Cell Biology and Toxicology*. 2009; 26(2):103-116.
29. Rao SB, Chetana M, Uma Devi P. *Centella asiatica* treatment during postnatal period enhances learning and memory in mice. *Physiology and Behaviour* 2005; 86:449-457.
30. Zainol MK., Abd-Hamid A, Yusof S, Muse R. Antioxidative activity and total phenolic compounds of leaf, root and petiole of four accessions of *Centella asiatica* (L.) Urban. *Food Chemistry*. 2003; 81:575-581.
31. Shukla A, Rasik AM, Jain GK, Shankar R, Kulshrestha DK, Dhawan BN. In vitro and in vivo wound healing activity of asiaticoside isolated from *Centella asiatica*. *Journal of Ethnopharmacology*. 1999; 65:1-11.
32. Choi EM, Hwang JK. Investigations of anti-inflammatory and antinociceptive activities of *Piper cubeba*, *Physalis angulata* and *Rosa hybrid*. *Journal of Ethnopharmacology*. 2003; 89:171-175.
33. Louis M, Kowalski SD. Use of aromatherapy with hospice patients to decrease pain, anxiety, and depression and to promote an increased sense of well-being. *American Journal of Hospital Palliative Care*. 2002; 19:381-386.
34. Sahih Bukhari. Translation of Sahih Bukhari. Volume 7, Book 71, Number 591. ([http://www.iium.edu.my/deed/hadith/bukhari/071\\_sbt.html](http://www.iium.edu.my/deed/hadith/bukhari/071_sbt.html))
35. Al-Naggar TB, Gómez-Serranillos MP, Carretero ME, Villar AM. Neuropharmacological activity of *Nigella sativa* L. extracts. *Journal of Ethnopharmacology*. 2003; 88:63-68.
36. Al-Ghamdi MS. The anti-inflammatory, analgesic and antipyretic activity of *Nigella sativa*. *Journal of Ethnopharmacology*. 2001; 76:45-48.
37. Ali BH, Blunden G. Pharmacological and toxicological properties of *Nigella sativa*. *Phytotherapy Research*. 2003; 17:299-305.
38. Salem ML. Immunomodulatory and therapeutic properties of the *Nigella sativa* L. seed. *International Immunopharmacology*. 2005; 5:1749-1770.
39. Ragnathan M, Solomon M. The study of spiritual remedies in orthodox rural churches and traditional medicinal practice in Gondar Zuria district, Northwestern Ethiopia. *Pharmacognosy Journal*. 2009; 1(3): 178-183.
40. Afolayan AJ, Mbaebie BO. Ethnobotanical study of medicinal plants used as anti-obesity remedies in Nkonkobe Municipality of South Africa. *Pharmacognosy Journal*. 2010; 2(11):368-373.