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Review Article

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**MINI REVIEW OF *Drymoglossum piloselloides* AND BASIC ANALYSIS OF  
PHYSIOCHEMICAL COMPOSITION OF THE OIL PREPARED USING  
*Drymoglossum piloselloides***

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**ABSTRACT:**

**Context:**

*Drymoglossum piloselloides* (Sinhala name: *Panam pethi*) is one of the herbal plants belong to the family POLYPODIACEAE. Traditional physicians of Sri Lanka have using oil prepared with *D. piloselloides* in many years. However, the standardization and quality control assessments of this oil had not yet been done.

**Objective:** To study therapeutic uses of *D. piloselloides* and study the basic physiochemical parameters of prepared oil using *D. piloselloides*

Settings and Design: Institute of Indigenous Medicine, University of Colombo.

Methods and Material: Literature survey and analysis study

**Results:** Basic physiochemical parameters of prepare oil using *Drymoglossum piloselloides* as follows: Moisture content 5.0875 %, Relative density 0.9198 gcm<sup>-3</sup>, Acid value 4.3 mg KOH/g, and Peroxide value 4.0 Mili equivalents/ kg and *Drymoglossum piloselloides* has many therapeutic values.

**Conclusions:** It can be concluded that the physio-chemical approaches used in the present study is useful to the standardization of prepared herbal oil using *D. piloselloides* (*Panam pethi*) and also this plant has multi-faceted medicinal values. As it contains a wide range of phytochemical components, it is needed to validate its therapeutic utility through preclinical and clinical studies.

**Key-words:** *Drymoglossum piloselloide*, Herbal oil, *Panam pethi*, Physiochemical

## INTRODUCTION:

Ayurveda is one of the world's oldest medicinal sciences which were originated from India at least 5000 years ago. It is a Sanskrit name and combination of "Ayus" and "Veda". *Ayus* means the life or longevity and *Veda* means the deep knowledge or wisdom<sup>1</sup>. According to *Paradkar* who understand *Ayurveda* deeply state that every material, whether animate or inanimate is potentially medicine<sup>2</sup>.

Flora, fauna and minerals/metals are used in *Ayurveda* to prepare medicine. Over than 1500 plants were named as per habitat, shape, size and their different usages are listed in the codified work of *Ayurveda* dating from 2500 BC up to 1900 AD. Plants can be classified to trees, shrubs, herbs, climbers, creepers and some ferns, lichens and orchids<sup>3</sup>.

*D. piloselloides* (Family: POLYPODIACEAE; Sinhala name: *Panam pethi*) is a epiphytic plant climbing on the tree trunks, branches etc. This plant taken as a medicine in many years of Sri Lanka. Aim of this study is to assimilate existing data on medicinal uses of *D. piloselloides* and to analyze the basic physiochemical composition of the herbal oil prepared using *Panam pethi* (*D. piloselloides*) which is using for skin diseases.

## Subjects and Methods:

This study consisted of two components, that is; literal study on medicinal uses of *D. piloselloides* and to analyze the physiochemical composition of the herbal oil prepared using *Panam pethi* (*D. piloselloides*).

- a. Literal study on medicinal uses of *D. piloselloides*(*Panam pethi*) were gathered from *Ayurveda* and Sri Lankan traditional medical books, interviewing physicians, research journals and internet
- b. Basic analysis of herbal oil prepared using *Panam pethi* (*D. piloselloides*).

Preparation of oil using *D. piloselloides* (*Panam pethi*)

The preparation of oil and analysis were conducted at the pharmacy of *Dravyaguna Vignana*, Institute of Indigenous Medicine, University of Colombo, Rajagiriya, from October to November 2018.

*D. piloselloides* (*Panampethi*) was collected from Suriyagama area of Kadawatha, Gampaha District, Sri Lanka at date of 20 July 2018 and plant was identified by a

National Herbarium, Department of National Botanical Gardens, Peradeniya, Sri Lanka (06/01/H/03).

*Panampethi* leaves (Figure 1) were separated and washed well using tap water and removed impurities and dust. According to Sharangadhara Samhita, *Kalka: Taila: Swarasa* was taken in the proportion of 1:4:16 (*Panampethi* 85g: Coconut oil 340g: *Panampethi swarasa* 1360mL)<sup>4</sup>.



Figure 01: Morphology of *Drymoglossum piloselloides*

*Panam pethi* 85 g leaves were crushed in a mortar and pestle adding with 340mL of water make fine paste can occur finger print on paste (Figure 2). It used as a *Kalka dravya* of the oil. For as a *Swarasa* of the *Thaila* was used 1360mL squeezed juice of *Panampethi* which prepared using crushed of *Panampethi* (2000 g) (Figure 3).



Figure 2: *Kalka* of *D. piloselloides* leaves



Figure 3: *Swarasa* of *D. piloselloides* leaves

Homemade coconut oil was used as base oil. 340 mL of coconut oil was taken in the vessel and it was heated at the mild firm. When it was becoming warm, *Kalka dravya* and decoction was added to the vessel and the *Thaila* was heated up to *Kharapāka*.

Prepared samples were stored in air tight glass containers and in a dry place, at room temperature (Figure 4).



Figure 5: Prepared herbal oil using *D. piloselloides* leaves

#### Analysis of basic physiochemical characteristics of prepared herbal oil

To identify the basic chemical profile of prepared oil; Physiochemical parameters, Organoleptic characteristics, Moisture content, Density, Acid value, Peroxide value were done.

#### Organoleptic characters

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Color, odor, appearance, texture and touch of the oil sample were analyzed and repeated it three times and get the medium.

#### Determination of moisture content<sup>5</sup>

Air oven method was followed to analyze the moisture content of the oil sample.

Weighed 10g quantity of oil was taken in a crucible, heated to 105 °C for an hour until the stable weight could be obtained. After cooling, it was reweighed. The difference in the weight, before and after heating was used to determine the amount of moisture presents (loss on drying). Three repetitions were done and obtained the mean and the values were confirmed as percentages.

#### Determination of density

Intelligent density meter BHDM 2l 2003201110612 was used to determine the density of oil sample and repeated it for three times and obtained the mean value.

#### Determination of acid value<sup>5</sup>

Oil was dissolved in the neutral mixture of alcohol: ether (1:1). This mixture was titrated against 0.1 mol/l potassium hydroxide solution using Phenolphthalein as an indicator and detected the acid value using below equation. The procedure was repeated three times.

Acid value was calculated using formula given below.

$$\text{Acid value} = (v \times 5.61) / w$$

Where,

V= Number of mL of 0.1 KOH required

W= Weight of sample in g

#### Determination of Peroxide value<sup>5</sup>

Oil was dissolved in mixture Chloroform: Glacial acetic acid (3:2). Saturated Potassium iodide solution and water was added to it. After shaking, water was added. Then it was titrated against 0.1M Sodium thiosulphate using starch solution, as the indicator, near the end point. The procedure was repeated three times. Peroxide value was detected using below equation.

$$\text{Peroxide value} = 10 v/w$$

Where,

v = difference, in ml, between the titrations

w = Weight of sample in g.

#### Results:

The results of the mini review is consisting with information about *D. piloselloides* (*Panam pethi*) and also its properties and therapeutic values according to Ayurveda.

#### Taxonomy of *Drymoglossum piloselloides*<sup>6</sup>

Kingdom : Plantae

Sub kingdom : Tracheobionta

Division	: Pteridophyta
Class	: Pteridopsida
Sub-class	: Polypoditae
Order	: Polypodiales
Family	: Polypodiaceae
Genus	: <i>Drymoglossum</i>
Species	: <i>Drymoglossumpiloselloides</i> (L.) Presl

In earlier *D. piloselloides* was named as *Drymoglossum heterophyllum* (Linn.) Trimen. Also known as *Pyrrosia heterophylla* (L.) Price<sup>7,8</sup>

Vernacular names of *Drymoglossum piloselloides*

English	: Sita's necklace <sup>9</sup>
Sanskrit	: Swasthika <sup>10</sup>
Tamil	: Shallikkodi <sup>10</sup>
Sunda	: Duduwitan <sup>10</sup>
Sri lanka	: Panampethi, Kasi pethi, Kimbulvanna <sup>10</sup>
Malaysia	: Pakusisek Naga, Pakusakat riburibu <sup>11,12</sup>
Sumathra	: Dragon scale, Sisek naga <sup>13</sup>
Indonesia	: Pakusisik Naga, Picisan <sup>13</sup>
India	: Sikitang <sup>14</sup>
Philippine	: Pagong-pagongan <sup>15</sup>

Distribution of *D. Piloselloides*

*D. piloselloides* grows throughout the tropical regions of Asia below an elevation of 2000 feet. It is distributed in Sri Lanka, India, Burma, Indo-china, Phillippine islands, Malaya etc<sup>16,17,15</sup>

Habitat of *D. Piloselloides*

*D. piloselloides* is growing on the tree trunks, branches of trees, shrubs, woods, on humus deposit of rocks, fields and other places where in moisture fluctuating from lowland to an altitude of 1000m above sea level<sup>15</sup>.

#### Morphology of *D. Piloselloides*

*D. piloselloides* is an epiphytic plant climbing on the tree trunks, branches etc. Rhizomes are long, slender, scaly and creeping on trunks and branches. Strong roots are contained by the rhizome<sup>14</sup>. Rhizome is covered with scales which are small and round or heart shaped. Center of the scale is dark and edges are pale. When very young age of the scale contains white long hairs but it turn to brown soon<sup>18</sup>.

Leaves (fronds) are with short stems, grow in between small distances. There are two types of leaves, sterile and fertile. Sterile leaves are thick, fleshy and ellipsoid or oblong leaves. Leaves contain blunt or rounded tips and when it is young cuneate base covered with stellate hairs. Size of leaf is 1-5cm long and 1-2cm wide. Sterile leaves haven't stalks and have a smooth surface. Fertile leaves are narrow, 3-5cm long and 3-10mm wide. It has a stalk of about 1cm length. Cluster of sporangia organized in a sub marginal lines broadly<sup>15</sup>.

*D. piloselloides* can spread through the spores and root separation. Brown color spores can be seen in there<sup>15,18</sup>.

#### Chemical composition of *D. Piloselloides*

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According to the previous article essential oil, sterols / triterpenes, phenols, tannins and glucose are comprised at the *Panam pethi*<sup>19</sup>.

#### Ayurveda description

Parts used: Leaves

#### Pharmacodynamics properties

*Rasa* : *Kashaya, Madhura*<sup>13,20</sup>

*Guna* : *Laghu*<sup>10,20</sup>, *Ruksha, Vishada*<sup>20</sup>

*Virya* : *Sheetha*<sup>20</sup>

*Vipaka* : *Madhura*<sup>20</sup>

## Main actions

*Atisaranasana*<sup>10</sup>

*Vishagna*<sup>21</sup>

*Arshogna*<sup>15</sup>

*Mehagna*<sup>20</sup>

*Rasayana*<sup>20</sup>

*Rakthawardaka*<sup>10</sup>

*Medasnashaka*<sup>20</sup>

*Kotaprasamana*<sup>22</sup>

*Rakthasthambana*<sup>14</sup>

*Purisha sangrahaniya*<sup>20</sup>

*Srotovishodana*<sup>22</sup>

*Mootra virechaniya*<sup>10</sup>

*Vrana ropana*<sup>10</sup>

*Vrana shodana*<sup>10</sup>

*Kushtagna*<sup>10</sup>

*Sandhaniya*<sup>10</sup>

*Dahaprashmana*<sup>20</sup>

*Agnidepaka*<sup>20</sup>

*Rakthashodha*

## Therapeutic indications <sup>19,10,20,15</sup>

Diarrhea, piles, diabetic, body fat, swelling, skin diseases, parotitis, bleeding disorders, rheumatism, breast cancers, gum inflammation, pulmonary tuberculosis with blood coughing, abdominal pain, constipation, vaginal discharge, gonorrhea, jaundice, stomach pain, gingivitis, stomatitis, constipation, cough, leucorrhoea, scabies and ringworm manifestations.

Drug preparations using *D. piloselloides*



Previous studies had mentioned different types of drug preparation methods by using *D. piloselloides*. Those are oil or *Sneha kalpana*, Juice, Decoction, Poultice and Porridge<sup>23</sup>.

*D. piloselloides* is the one ingredient of “*Henarajathailaya*” and “*Vataviduranga thailaya*”<sup>24</sup>.

According to the previous studies, juice of *D. piloselloides* used to treat for cancer relieving mainly in breast cancer, piles, diarrhea and thirst<sup>23</sup>. *D. piloselloides* is one of the ingredients in some decoctions those are used to treat for diarrhea and thirst, diuretics, urinary disorders, piles, anemia and blood purification, paralysis and anti-hemorrhagic condition<sup>23</sup>.

*D. piloselloides* used to prepare porridge which is treatment for blood formation and purification, anemia and jaundice<sup>23</sup>.

Poultice also one of the drug preparation methods using *D. piloselloides*. It is a remedy for eye diseases, to reduce pungent feeling, wound healing, to reduce swelling, hemorrhagic conditions and subcutaneous lumps. Poultice as a “*Mellum*” used to treat for vaginal prolepses, rectal prolepses and bone fractures<sup>23</sup>.

*D. piloselloides* has a cooling effect. So it is used to prepare “*Hisakudichchiya*” which is a treatment for “*Unmada*”<sup>23</sup>.

The results of organoleptic characteristics of prepared oil are given below in Table 01.

Table 01: Organoleptic characteristics of prepared oil

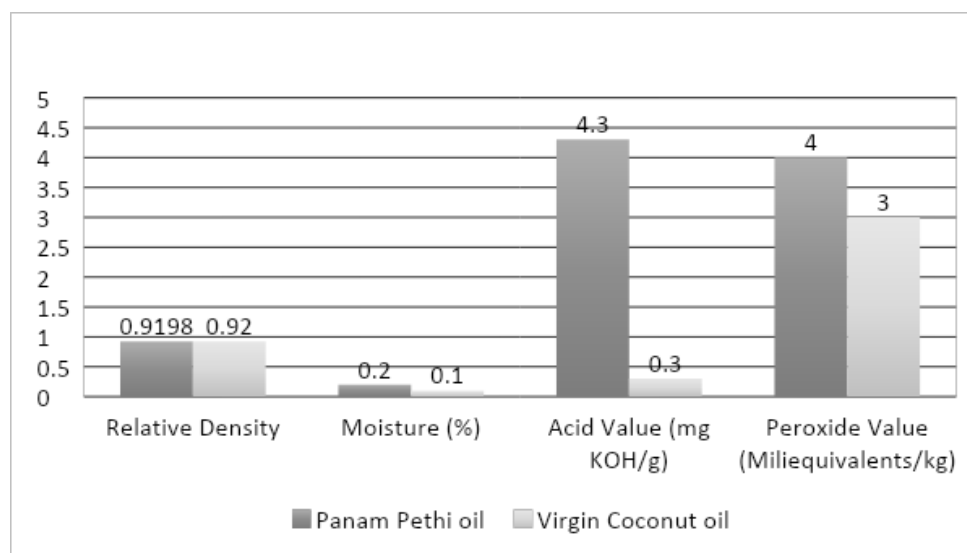
Character	Value of sample
Color	Brown color
Odor	Odor of coconut oil
Appearance	Viscous
Texture	Liquid
Touch	Oily

Physicochemical characteristics of prepared oil are given below in Table 02.

Table 02: Physicochemical characteristic of prepared oil

Parameter	Value
Moisture content	0.2 %
Relative density	0.9198
Acid value (mg KOH/g)	4.3
Peroxide value (Miliequivalents/kg)	4.0

Comparison of prepared herbal oil and virgin coconut oil is given below figure 13.

Figure 13: Comparison of *Panam pethi* oil and virgin coconut oil

## DISCUSSION:

*D. piloselloides* (*Panam pethi*) has used to treat many gastro intestinal diseases, skin diseases, diseases of genito urinary tract and bleeding disorders. Therefore, this plant has multi faced medicinal values.

In Sharangara Samhitha had described basic fundamental of drug manufacturing and standardization. They were followed to ensure the quality medicament in the purpose of obtaining a good efficacy of the drug. With the advancement in science, World Health Organization (WHO) has emphasized the need of ensure the quality of the medicinal plant products by using modern controlled techniques and applying suitable standards to get a detailed evaluation of a finished product.

This study was carried out to analyze the basic physiochemical characteristics of prepared oil using *D. piloselloides*. Organoleptic characters, relative density, moisture content, acid value and peroxide value were analyzed by using prepared oil (Table 1,2) and these parameters used to evaluate quality of the prepared oil.

Organoleptic properties provide baseline data to determine its suitability for consumption of the product. Color of the herbal oil is similar to the juice of the leaves of *D. piloselloides* (*Panam pethi*) then the odor of similar to the coconut oil. Viscous oil consistency may be due to dissolution of bio constituents to the oleaginous matter and removal of watery portion. Appearance, texture and touch of the prepared herbal oil are similar to the *Sneha* part (Virgin coconut oil).

Higher value of moisture content is predicate the rancidity of the oil. This prepared herbal oil contains 0.2% moisture and virgin coconut oil contained 0.1%.

Density of prepared herbal oil is lower than density of water. Relative densities of both oils are nearly similar to each other.

Acid value is one of the quality measurements. It used to consider the amount of free acid in the oil or fat. When increase the free fatty acids in the oil sample it indicates hydrolysis of triglycerides. Free fatty acids are a source of flavors and aroma <sup>24</sup>. Acid value is an indication of rancid state. Lower acid value evaluate the high quality of oil. 4.3 is the acid value of the prepared oil. When compared with the virgin coconut oil (0.3 mg KOH/g), prepared herbal oil contain high acid value.

Peroxide value is defined as the amount of peroxide oxygen per 1kg of fat or oil. It is used to measure the extent which is rancidity reactions have occurred during storage. High degree of unsaturation oil is most susceptible to auto-oxidation. When peroxide value is low it is better quality of oil and its status of preservation<sup>25</sup>. This prepared oil has 4.0mEq/kg of peroxide value and virgin coconut oil contained 3.0 mEq/kg of peroxide. In generally, fresh oil peroxide value is below to 10 mEq/kg. When it contains 30-40 mEq/kg range of peroxide value it will be generally associated with a rancid taste<sup>26</sup>. When peroxide value is high, skin irritation coefficient will consequently increase and there for many fragrances.

Method of preparation may have affected to the value of test parameters. Also, storage conditions like high temperature, visible light and oxygen, contact with metal surface can also affect to these values.

Quality of herbal drug depends on the originality of raw drugs, method of preparation, proper storage, proper indication, correct dose and dosage regimen<sup>27</sup>. Also quality of oil may get affected due to light, heat, water, acid, enzymes etc. Poor quality and quantity of raw materials, inappropriate manufacturing and storage conditions can be effect to the quality of the oil. The quality control parameters obtained after scientific evaluation of prepared herbal oil can be used as reference standard for quality control in order to have a proper quality check over its preparation and processing. Physio-chemical studies, toxicity studies and other standardization methods should be done to maintain quality of drug. Clinical trial should be done to evaluate efficacy of drug action.

However, to use this oil, preclinical and clinical efficacy should be evaluated and it should be applied for the different kinds of preparation methods to get the best correlation of higher yield and the efficacy. Therefore, further studies should be carried out before marketing this product including the market surveys as well.

## CONCLUSIONS

It can be concluded that the physio-chemical approaches used in the present study is useful to the standardization of prepared herbal oil using *D. piloselloides* (*Panam pethi*) and also this plant has multi-faceted medicinal values. As it contains a wide range of phytochemical components, it is needed to validate its therapeutic utility through preclinical and clinical studies.

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