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THE PHYSICO CHEMICAL & PHYTO-CHEMICAL ANALYSIS OF *KANDUPARANGI CHOORANAM* (PYGMAEOPREMNA HERBACEA)

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ABSTRACT

Introduction: Based on WHO guidelines, the herbal products need to be standardized before releasing into the market. Preliminary standardization steps are essential for identification of genuine drug and setting analytical standards. Therapeutic potential of herbal drugs are attributed to the presence of phytochemicals. ***Kanduparangi Chooranam*** coded as **KC**, is a classical Siddha mono herbal formulation chosen from **"*Gunapadam - Mooligai Vagupu*"** text book for the management of *Iyairaippu* which can be correlated in modern medicine as "Bronchial Asthma" as well as the drug is indicated for *Vatha*, *Pitha* and *Kabha* related disorders. **Aim and objectives:** The study was performed to document the physico-chemical and phyto-chemical (qualitative) parameters of single-herbal formulation *Kanduparangi chooranam* (KC). **Materials and Methods:** The ingredient was authenticated by Department of Medicinal Botany. The raw drug was purified as per standard methods. The drug was dried well in shadow and made into micronized powder. The percentage of total ash, acid-insoluble ash, water soluble ash, and sulphated ash were calculated by the standard methods. The different extracts of the formulation were prepared for the study of extractive value such as alcohol, water soluble extract and for the estimation of pH values. Further estimation such as Loss on drying, total fat, swelling index and foaming index were carried out as per WHO guidelines. Qualitative estimation of phytochemicals were determined by standard methods. **Results and Discussion:** Organoleptic characters: Colour – mild brownish, Odour- Typical, Taste - Bitter and Astringent and Consistency- powder (chooranam). The physico-chemical parameters were determined, Loss on drying of KC was

calculated as 9.60% that denotes moisture content of the drug. Ash values are helpful in determining the quality and purity of the crude drugs in powder form. High ash content explains its unsuitable nature to be used as drug. In this study, the ash content of a crude drug are determined by total- ash 4.43 %, sulphated ash 6.61%, acid- Insoluble ash 0.57% and water- soluble ash 2.03 %. Extractive values of crude drugs, water-soluble extractive 17.14% and alcohol-soluble extractive 14.14% are useful for their evaluation; these values indicate the nature of the constituents present in a crude drug. The pH of the sample had shown 5.97 which is slightly acidic and also swelling Index (3.5 ml), foaming index (100), volatile oil (0.5 %) and total fat (1.29 %) of KC were determined. Preliminary phyto-chemical screening of KC established the presence of chemical constituents like Terpenoids, Quinones, Glycosides, Alkaloids, Lignans and Saponins. **Conclusion:** The drug *Kanduparangi chooranam* (KC) is physico and phyto- chemically standardized should take into consideration most of aspects contributing to the quality of the drugs.

KEYWORDS: Physico-chemical, phyto-chemical, *Kanduparangi chooranam*, Bronchial asthma, *Pygmaeopremna herbacea.*

1. INTRODUCTION

The various traditional system of medicine is using many countries, but siddha medicine is predominantly practiced in South India especially in Tamilnadu. While accepting its benefits global community demands evidence based scientific explanation to understand the concept of Siddha system of medicine and demands quality matching International standards to reassure the efficacy of Siddha medicine. The subject of herbal drug standardization[13] is very necessitating one in AYUSH systems. India can emerge as the major country and play the main role in production and standardized the effective herbal formulations by using modern techniques of standardization. The study was performed to document the physico and phyto-chemical (qualitative) parameters of single herbal formulation *Kanduparangi chooranam* (KC).

1.1. PYGMAEOPREMNA HERBACEA *(KANDUPARANGI)* – AN OVERVIEW

1.1.1. Synonyms

Table 1: Synonyms of Kanduparangi (*Pygmaeopremna herbacea).*

S.No	Synonyms	Languages
1.	Bharangi	Hindi, Gujrati , Marathi, Urdu
2.	GantuBharangi	Kannada, Telgu , Tamil
3.	Cherutekku	Malayalam
4.	Vamunahati	Bengali
5.	Chinda	Oriya
6.	Blue glory	English

1.1.2. Biological source

Pygmaeopremna herbacea is perennial woody, flowering shrub of Verbenaceae.[15]

1.1.3. Geographical source

Pygmaeopremna herbacea is distributed throughout in the forest of India and Sri lanka. It is cultivated up to altitude 1400 ft. above sea level (Sharma *et al*., 2009). It is also found in lower Himalaya from Kumaun eastwards, west Bengal and Bihar. It is documented to be found in Madagascar, South Africa, South Asia and Asian countries also.

1.1.4. Macroscopic characters (Rueda, 1993; Lahoti, 2015)

Table 2: Macroscopic characters of *Pygmaeopremna herbacea.*

S.No	Parts	Macroscopic characters
1	Leaves	Leaves are usually three at a node Opposite oblong or elliptic, and acute at base
2	Root	Root are 5 cm thick, cylindrical, hard, woody (light brown))incolour.
3	Stem	Usually quadrangular
4	Flower	Flowers are arranged in dichotomous cymes (purple)
5	Fruit	Four lobed
6	Seed	With or without endosperm

1.1.5. Taxonomical hierarchy of *Pygmaeopremna herbacea*[9]

Table.3. Taxonomical hierarchy

Kingdom	**–**	**Plantae**
Division	**-**	**Magnoliphyta**
Class	**-**	**Magnoliopsida**
Order	**-**	**Lamiales**
Family	**-**	**Verbenaceae**
Genus	**-**	**Pygmaeopremna**
Species	**-**	**Herbacea**

Figure 1. *Pygmaeopremna herbacea*

1.2. *Kanduparangi Chooranam*– An Overview

Kanduparangi Chooranam **(KC)** is a classic Siddha drug mentioned in the text "***Gunapadam***[11] {First Part- ***Mooligai Vagupu***, Page No: 215,216}. KC is indicated for curing *vatha*, *pitha* and *kabha related* diseases especially in bronchial asthma (*Iyairaippu*).

2. AIM AND OBJECTIVES

The aim of this study is to determine the physico-chemical and phyto-chemical properties of *Kanduparangi chooranam*.

3. MATERIALS AND METHODS

3.1. Collection and Identification of plant materials

The ingredient was authenticated by the Professors of Department of Medicinal Botany at Government Siddha Medical College & Hospital, Palayamkottai, Tirunelveli district, Tamilnadu.

3.2. Purification of raw drugs

The raw drug was purified by removing unnecessary parts as per the methods mentioned in the Siddha literature.

Figure 2: Before Purification

Figure 3: After purification.

3.3. Preparation of the drug *KANDUPARANGI CHOORANAM* (KC)

The purified drug was dried well in shadow and made into micronized powder. Finally the powder was sieved using pure white cloth which is mentioned as *Vasthirakayam* in Siddha. Finally stored in a clean and air tight container.

Table 4: Ingredient of *Kanduparangi Chooranam*.

S. No	Ingredient	Botanical Name	Family Name	Part Used	Quantity
1	*Kanduparangi*	*Pygmaeopremna herbacea* Linn	Verbenacae	Root	100 gms

3.4. Determination of Physico-Chemical Parameters

Percentage of total ash, acid-insoluble ash, water soluble ash, and sulphated ash were calculated as per the Indian Siddha pharmacopoeia.[4] Standard Methods were used for the study of extractive values such as water soluble extract and alcohol soluble extract and pH value (Lohar.`D.R. et al, 2011). The swelling index, foaming index and loss on drying were determined as per WHO guidelines.[1][2] The extracts were concentrated under reduced pressure at room temperature.

3.5. Determination of Phyto-Chemical Qualitative Parameters

5g of KC was taken in a 250ml clean beaker and 50 ml of distilled water was added, boiled well and allowed to cool. It was filtered in a 100ml volumetric flask and made up to 100ml with distilled water. The KC was subjected to following screenings.

3.5.1. Terpenoids

Noller's test: Warm the substance with 2 or 3 tin bits and 2ml of thionyl chloride.

3.5.2. Flavonoids

Shinado's test: To the substance in alcohol, a few magnesium turnings and a few drops of conc. HCl was added and boiled over a water bath for two minutes.

3.5.3. Steroids

Liebermann Burchard test: Dissolve the substance in 2 ml of chloroform, 1 ml of acetic anhydride and 1 ml of glacial acetic acid. Warm and cool under tap. 2 drops of conc. H_2SO_4 was added along the sides of the test tube.

3.5.4. Quinones

To the test substance, NaOH was added.

3.5.5. Anthraquinones

Borntrager's test: To the substance aqueous ammonia or caustic soda was added.

3.5.6. Glycosides

Mix the substance with a little anthrone on a watch glass, then one drop of conc. H_2SO_4 was added and make into a paste and warm gently over a water bath.

3.5.7. Alkaloids

To the test substance, 1 ml of dragendroff's reagent and 1% H_2SO_4 was added.

3.5.8. Tannins

Substance was treated with alcoholic and lead acetate solution.

3.5.9. Lignans-Wiesner test

A solution of hydrochloric acid and phloroglucinol is also used for the detection of lignin (Wiesner **test**). A brilliant red color develops, owing to the presence of coniferaldehyde groups in the lignin.

3.5.10. Saponins

Substance was diluted separately with 20ml of distilled water and it was agitated on a graduated cylinder for 15 min.

3.5.11. Amino acids

Treat the substance in alcohol or water with ninhydrin in alcohol.

4. RESULTS AND DISCUSSION

Indian and Siddha pharmacopoeia has been working on developing monographs by using the various quality parameters outlined.

4.1. Organoleptic characters of KC

Table 5: Organoleptic characters of KC

S.No	Characters	*Kanduparangi Chooranam*
1	Colour	Mild Brown
2	Odour	Typical
3	Taste	Bitter , Astringent
4	Consistency	Powder

Figure. 4. *Kanduparangi chooranam*

4.2. Physico-Chemical Parameters of KC

The results of the physicochemical parameters are given in table No.6. Loss on drying is the loss in weight in percentage w/w determined. It determines the amount of volatile matter of any kind (including water) that can be driven off under the condition specified (Desiccators or hot air oven). Loss on drying of KC was calculated as 9.60% that the moisture content of the sample.

Minimal amount of Volatile oil (0.5%) is collected during the process.

Ash values are helpful in determining the quality and purity of the crude drugs in powder form. The total ash content is the measure of inorganic constituents present in the drug that indicates the present of inorganic matters as impurity.

Mostly, the inorganic matter is present in small amounts which are difficult to remove in the purification process and which are not objectionable if only traces are present. High ash content shows its unsuitable nature to be used as drug.

In this study, the ash content of a crude drug is determined by total- ash, sulphated ash, acid-insoluble ash and water- soluble ash.

Table 6: Physico-Chemical Parameters of KC.

Sl. No	Parameters	Result of *Kanduparangi Chooranam*
1.	Loss on drying at 105^0c	9.60%
2.	Total- Ash	4.43%
3.	Sulphated ash	6.61%
4.	Acid- Insoluble ash	0.57%
5.	Water- soluble ash	2.03%
6.	Water- soluble extractive	17.14%
7.	Alcohol- soluble extractive	14.14%
8.	pH	5.97
9.	Volatile oil	0.5%
10.	Total fat	1.29%
11.	Swelling index	3.5 ml
12.	Foaming index	100

Extractive values of crude drugs are useful for their evaluation, especially when the constituents of a drug cannot be readily estimated. Further, these values indicate the nature of the constituents present in a crude drug.

The sample has shown pH value 5.97 which is slightly acidic.

The Swelling Index determination is based on the addition of water or a swelling agent as specified in the test procedure. Swelling Index is used to measure a coal's swelling properties.

Foaming Index of the root of the plant material is 100.

4.3. Qualitative Estimation Of Phytochemicals

Qualitative estimation of phytochemicals revealed the presence of Terpenoids, Quinones, Glycosides, Alkaloids, Lignans and Saponins (Table no .7).

Table No 7: Qualitative Estimation of Phyto-Chemical Constituents.

Qualitative Phytochemical Analysis	Observation	Results
Terpenoids	Magenta colour formed	Present
Flavanoids	No Magenta or red colour formed	Absent
Steroids	No blue green colour formed	Absent
Quinones	Red colour formed	Present
Anthraquinones	No pink colour in the aqueous layer	Absent
Glycosides	Dark green formed	Present
Alkaloids	Orange- red precipitation	Present
Tannins	No Bulky precipitation	Absent
Lignans	Brilliant red colour developed	Present
Saponins	Foam formed	Present
Amino acids	No blue to pink colour change	Absent

5. CONCLUSION

The more number of herbal products is available in the market. The quality of herbal drugs is the sum of all factors, which contribute directly or indirectly to the safety, effectiveness and acceptability of the product. The development of modern analytical tools[10] in testing the various quality parameters for an effective quality control herbal product cannot be over emphasized. Analytical tests are essential tool for authentication, standardization and quality control assessment of raw drugs. Selection of such genuine drugs in the manufacturing of traditional medicines are need of the hour.

Predictable changes may occur in herbal medicinal product during storage and in shelf life determination like Hydrolysis, Oxidation, Racemisation, Geometric isomerisation, Temperature, Moisture and Light.[14]

The assurance of the safety and efficacy of herbal drug requires monitoring of the quality of the product from collection through processing to the finished packaged product.

Due to advancement in the physical, chemical and botanical knowledge of crude drugs various methods like Loss on drying at 105^0c, ash values such as total- ash, sulphated ash, acid- insoluble ash and water- soluble ash, extractive values, water- soluble extractive and alcohol- soluble extractive, pH, volatile oil, total fat, swelling index and foaming index are used for estimating the physico chemical properties of *Kanduparangi chooranam*.

Qualitative estimation of phytochemicals in *Kanduparangi chooranam* revealed the presence of Terpenoids, Quinones, Glycosides, Alkaloids, Lignans and Saponins. The above phytochemicals are useful in the management of Bronchial Asthma.

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