



## Research Article

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### PHYSICOCHEMICAL ANALYSIS OF SIDDHA POLY-HERBAL FORMULATION *NELIMULLI ILAGAM*

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#### ABSTRACT

Introduction: The *Siddha* system is an ancient, holistic system. The medicine in this system is prepared from raw materials of herbs, metals, minerals and animal products. In recent years, considerable research has focused on validation and standardisation aspects. *Nellimulli ilagam* is a polyherbal *Siddha* formulation used to manage *Veluppu noi*. Aim: To study the physicochemical analysis of *Nellimulli ilagam*. Methods: Standardization parameters such as organoleptic characteristics, physicochemical analysis, test for aflatoxins, pesticide residues, specific pathogens, and heavy metal analysis were carried out as per PLIM guidelines. Results: The results obtained from the trial drug *Nellimulli ilagam* study show that it has a dark, brownish-coloured semi-solid texture with a strong characteristic odour and is non-free-flowing. Physicochemical analysis reveals that pH was 7.2, total ash value was 10±0.4 and acid insoluble ash value was 0.02±0.004. Loss on drying at 105 °C is 8.4±0.9. The test for aflatoxins and pesticide residues showed negative results. Test for microbial contamination and specific pathogen shows absent. Test for heavy metals shows below the limit of quantification (BLQ).

**Keywords:** *Nellimulli ilagam*, *Veluppu noi*, Physicochemical analysis, Drug standardisation, *Siddha* poly-herbal formulation.

#### INTRODUCTION

The *Siddha* system of medicine is a prestigious system that originated in South India. According to the *Siddha*, medicine is a substance that helps alleviate the disease, gives strength to the body, and normalises the body's functions. According to the International Union for Conservation of Nature and the World Wildlife Fund, there are between 50,000 and 80,000 flowering plant species that have the potential to be used as medicinal plants<sup>1,2</sup>. The ancient system of herbal medicines utilized by Indians has also gained attention worldwide due to its long-term benefits, overall wellness with no side effects, eco-friendly and locally available.

Although many *Siddha* formulations mentioned in the literature have been witnessed in treating various diseases, there is a striving for global acceptance due to a lack of scientific validation and documentation to overcome the limitations and ensure quality, safety and therapeutic efficacy. Normally, raw drugs are submitted to a series of processes, i.e., purification, trituration, incineration and calcination, to get the end product. Standardization of the drug is essential to exhibit confirmation of its identity and determination of its purity, quality and quantity<sup>3</sup>. It has become necessary to develop reliable, specific, and sensitive quality control methods<sup>4</sup>.

Approximately 60% of the population uses herbal medicines to treat medical illnesses. Thus, the present study deals with the standardization of *Siddha* herbal preparation, *Nellimulli ilagam*, which is mentioned in the *Sasthirik Siddha* textbook *Agasthiyar*

*vallathi-600* for the treatment of anaemia, ulcer, oedema, and dysuria. WHO currently encourages and promotes traditional systems worldwide<sup>5</sup>.

This research aims to give information about the standardisation of *Nellimulli ilagam* through physicochemical analysis. Physicochemical studies such as loss on drying, ash values, extract values and pH have been developed for *Nellimulli ilagam*. The drug *Nellimulli ilagam* contains *Phyllanthus emblica*, *Vitis vinifera*, *Glycyrrhiza glabra*, *Maranta arundinacea*, *Phoenix dactylifera*, *Piper longum*, *Saccharum officinarum* and honey<sup>1</sup>. Many studies have reported that the ingredients of the study drug *Nellimulli ilagam* contain nutrients such as iron and vitamin C, and pharmacological activities are haematinic, hepato-protective, antioxidant properties, immunity enhancer, laxative and migraine reliever<sup>6</sup>. *Phyllanthus emblica* (Amla) is a major ingredient for treating anaemia, jaundice, diarrhoea, vomiting, menorrhagia and haemorrhoids<sup>7</sup>.

#### MATERIALS AND METHODS

##### Plant collection

The required drugs for the preparation of *Nellimulli Ilagam* were purchased from a well-reputed country shop and authenticated by the medicinal botanist of NIS (Certificate No: NISMB5522023). The authentic drugs were purified, and the medicine *Nellimulli ilagam* was prepared in the *Gunapadam* lab of the National Institute of *Siddha*, Ayothidos Pandithar *Siddha* Hospital, Tambaram sanatorium, Chennai, Tamil Nadu, India.

## Ingredients

*Nellimulli ilagam* contains eight different ingredients, as listed in Table 1.

### Preparation of *Nellimulli ilagam*

20 *palam* (700 gm) of dried fruit of *Nelli* (*Phyllanthus emblica*) was taken, and 32 *padi* (48 litres) of fresh water was boiled and reduced to 4 *padi* (6 litres). 25 *palam* (875 gm) of sugar was added and boiled till it attained "paagu patham". 2 *palam* (70 gm) of each *Athimadhuram* (*Glycyrrhiza glabra*), *Koogai neeru* (*Maranta arundinacea*), *Thiratchai* (*Vitis vinifera*) and 3 *palam* (105 gm) of *Perinthu* (*Phoenix dactylifera*), *Thippili* (*Piper longum*) were powdered and mixed with above prepared *pagu*. ½ *padi* (750 ml) of honey was added till it attained *Legium* consistency.

### Physiochemical analysis

All the physiochemical parameters of *Nellimulli Ilagam* were carried out as per the PLIM Guidelines (Pharmacopoeia Laboratory for Indian Medicine). The study was conducted at Noble Research Solutions, Perambur, Chennai, Tamil Nadu, India.

## RESULTS AND DISCUSSION

### Organoleptic evaluation

The organoleptic characters of the *Nellimulli Ilagam* are shown in Table 2. *Nellimulli Ilagam* was a dark brownish semi-solid state with a strong characteristic odour, soft with greasy in touch and non-free flowing<sup>8</sup>.

### Physiochemical parameters

The physiochemical parameters of the *Nellimulli Ilagam* are tabulated in Table 3. The loss of drying at 105 °C in the *Nellimulli Ilagam* was found to be 8.4%, which denotes the moisture, including volatile substances. The moisture content of the drug reveals its stability and its shelf-life.

The total ash was determined as 10±0.4%, which shows that 90% of the drug is organic and purified. Acid-insoluble ash, water-soluble extractive and alcohol-soluble extractive were found to be 0.02±0.05%, 15.3±0.8% and 10.4±1.3% respectively. These water-soluble and alcohol-soluble results denote that the drug *Nellimulli ilagam* has good solubility and is easily absorbed. The pH value of the trial drug is 7.2. So, the bioavailability of the drug is high.<sup>8</sup>

Table 1: Ingredients of *Nellimulli Ilagam*

Tamil name	Botanical name	Quantity
<i>Nellimulli</i>	<i>Phyllanthus emblica</i>	700 gm
<i>Athimathuram</i>	<i>Glycyrrhiza glabra</i>	70 gm
<i>Koogaineeru</i>	<i>Maranta arundinacea</i>	70 gm
<i>Dhiratchai</i>	<i>Vitis vinifera</i>	70 gm
<i>Perinthu</i>	<i>Phoenix dactylifera</i>	105 gm
<i>Thippili</i>	<i>Piper longum</i>	105 gm
<i>Sarkkarai</i>	<i>Saccharum officinarum</i>	875 gm
Then	Honey	650 ml

Table 2: Organoleptic characters of the *Nellimulli Ilagam*

State	Semi Solid
Nature	Soft
Odour	Strong Characteristic
Touch	Greasy
Flow Property	Non-Free flowing
Appearance	Dark Brownish

Table 3: Physiochemical values of *Nellimulli Ilagam*

Parameter	Mean (n=3) SD
Loss on Drying at 105 °C (%)	8.4±0.8185
Total Ash (%)	10±0.4359
Acid insoluble Ash (%)	0.023±0.0045
Water soluble Extractive (%)	15.27±0.7767
Alcohol Soluble Extractive (%)	10.43±1.305
pH	7.2

Table 4: Heavy metals of *Nellimulli Ilagam*<sup>[9]</sup>

Name of the Heavy Metal	Absorption Maxλ max	Result Analysis	Maximum Limit
Lead	217.0 nm	3.517	10 ppm
Arsenic	193.7 nm	0.458	3 ppm
Cadmium	228.8 nm	BDL	0.3 ppm
Mercury	253.7 nm	BDL	1 ppm

BDL – Below Detection Limit

Table 5: Aflatoxin of *Nellimulli Ilagam*<sup>[10]</sup>

Aflatoxin	Sample NMI	AYUSH Specification Limit
B1	Not Detected – Absent	0.5 ppm (0.5 mg/kg)
B2	Not Detected – Absent	0.1 ppm (0.1 mg/kg)
G1	Not Detected - Absent	0.5 ppm (0.5 mg/kg)
G2	Not Detected - Absent	0.1 ppm (0.1 mg/kg)

Table 6: Pesticide residue of *Nellimulli Ilagam*

Pesticide residue	Sample	AYUSH Limit (mg/kg)
<b>1. Organo Chloride Pesticide</b>		
Alpha BHC	BQL	0.1 mg/kg
Beta BHC	BQL	0.1 mg/kg
Gamma BHC	BQL	0.1 mg/kg
Delta BHC	BQL	0.1 mg/kg
DDT	BQL	1 mg/kg
<b>2. Organo Phosphorus Pesticides</b>		
Malathion	BQL	1 mg/kg
Chlorpyrifos	BQL	0.2 mg/kg
Dichlorovos	BQL	1 mg/kg
<b>3. Organo carbamates</b>		
Carbofuran	BQL	0.1 mg/kg
<b>4. Pyrethroid</b>		
Cypermethrin	BQL	1 mg/kg

Table 7: Test for a specific pathogen

Organism	Specification	Result	Method
<i>E-coli</i>	Absent	Absent	As per AYUSH specification
<i>Salmonella</i>	Absent	Absent	
<i>Staphylococcus Aureus</i>	Absent	Absent	
<i>Pseudomonas Aeruginosa</i>	Absent	Absent	

### Heavy metal analysis of *Nellimulli Ilagam*

This Atomic Absorption Spectrometry (AAS) revealed that the sample had no trace of Cadmium and Mercury. Lead and Arsenic are present in the sample at 3.517 ppm and 0.5 ppm, within the advised limit. (Table 4) clearly showed that *Nellimulli Ilagam* is safe for human consumption.

### Aflatoxin of *Nellimulli Ilagam*

Table 5 shows that Aflatoxin B1, B2, G1, and G2 were absent in the *Nellimulli Ilagam* sample.

### Pesticide residues of *Nellimulli Ilagam*

Due to agricultural spraying techniques and the application of fumigants during storage, pesticide residues are easily impacted on herbal constituents. This method revealed that the given sample was free from pesticide residues like organochloride, organophosphorus, organocarbamates and pyrethroids mentioned in Table 6.<sup>11,12</sup>

### Test for a specific pathogen

This study confirms that no growth/colonies were observed in any of the plates inoculated with the test sample *Nellimulli Ilagam* in Table 7.

### CONCLUSION

Standardising *Siddha* herbal formulations and developing effective quality protocols employing contemporary analytical methods are critical. This study gives information about the physiochemical profile of *Nellimulli ilagam*, which is helpful in the quality assessment of the drug. Heavy metal analysis revealed that the study drug *Nellimulli Ilagam* is safe for human

consumption. Drugs are readily available and palatable. This experimental study demonstrates that the qualitative and quantitative analysis of *Nellimulli Ilagam* will help conduct clinical studies and standard research.

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