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PHYSICOCHEMICAL STANDARDIZATION OF SIDDHA HERBAL FORMULATION NAAVAL NEI (NN)

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ABSTRACT

Introduction: Siddha medicine is a traditional system that emphasizes herbal formulations for disease management. Standardization is essential to ensure quality, safety, and reproducibility. Physicochemical analysis plays a key role in establishing quality control parameters. **Aim and Objective:** To evaluate the physicochemical parameters of the Siddha herbal formulation Naaval Nei for standardization. **Materials and Methods:** Naaval Nei was prepared using *Syzygium cumini*, *Momordica charantia*, *Allium cepa*, and cow's ghee as per classical Siddha methods. The formulation was subjected to organoleptic evaluation, solubility analysis, and physicochemical parameters including viscosity, refractive index, weight per ml, iodine value, saponification value, acid value, and peroxide value using standard pharmacopoeial procedures. All experiments were performed in triplicate and values expressed as mean. **Results:** The formulation was greenish, semisolid, viscous, greasy with a mild odour. It was soluble in chloroform and ethyl acetate. Physicochemical analysis revealed viscosity of 61.89 Pa.s, refractive index of 1.44, weight per ml of 0.88 g/ml, iodine value of 114.68 mg I_2/g, saponification value of 170.58 mg KOH/g, acid value of 0.87 mg KOH/g, and peroxide value of 4.23 mEq/kg. **Conclusion:** The obtained physicochemical parameters provide standard reference values for identification, quality control, and reproducibility of Naaval Nei, supporting its scientific standardization and safe therapeutic use.

KEYWORDS: Naaval Nei, Physicochemical analysis, Standardization, Siddha, Worm infestation.

INTRODUCTION

Siddha is an ancient traditional medical system practiced predominantly in South India. It emphasizes the use of herbal, mineral, and animal-based formulations for disease management. Standardization and quality evaluation of Siddha formulations are essential to ensure their safety, efficacy, and reproducibility.

Naaval Nei (NN) is a classical Siddha formulation described in *Madhalai Noi Thoguthi* Part 1 for the management of worm infestation (Kirumi Noi), a common condition in children. The formulation consists of *Syzygium cumini* leaves, *Momordica charantia* leaves, *Allium cepa* bulbs and cow's ghee.

Physicochemical analysis plays a crucial role in standardization of traditional formulations by establishing parameters such as organoleptic characteristics, solubility, and physicochemical parameters of the lipid-based formulation. These parameters ensure the identity, purity, and quality of the formulation. Hence, the present study aims to evaluate the physicochemical parameters of Naaval Nei and establish standard reference values for its quality control.

MATERIALS AND METHODS

The herbal preparation Naaval Nei for worm infestation is described in the Siddha text *Madhalai Noi Thoguthi* Part 1 by Dr.T.Mohanaraj. The ingredients of this preparation are mentioned in the Table 1,

Table 1: Ingredients of Naaval Nei.

S.No	Ingredient	Botanical Name	Part Used	Quantity
1.	Naaval	*Syzygium cumini*	Leaf	Equal quantity
2.	Paagal	*Momordica charantia*	Leaf	Equal quantity
3.	Sivappu ulli	*Allium cepa*	Bulb	Equal quantity
4.	Cow Ghee			Equal quantity

COLLECTION AND AUTHENTICATION OF THE DRUG

The raw materials were procured from a herbal drug shop in Chennai and authenticated by experts from Pachaiyappa's College, Chennai.

PURIFICATION OF THE DRUG

The plant materials were washed, dried and wiped with pure cotton white cloth according to Sigicha Rathna Deepam Siddha text book.

PREPARATION OF THE DRUG

Juices of the plant materials Naaval leaf (*Syzygium cumini*), Paagal leaf (*Momordica charantia*), Sivappu ulli bulb (*Allium cepa*) were extracted and mixed with equal quantity of cow's ghee and heated until *mezhugu patham* (non-sticky consistency) was attained.

PHYSICOCHEMICAL ANALYSIS OF NN

The formulation was evaluated using standard pharmacopoeial procedures for:

- Organoleptic characters
- Solubility profile
- Viscosity
- Refractive index
- Weight per ml
- Iodine value
- Saponification value
- Acid value
- Peroxide value

All experiments were performed in triplicate and expressed as mean values.

Determination of Iodine Value

About 20 g weight equivalent of test sample was transferred into Iodine flask. To which 10 mL of chloroform was added and warmed slightly and cooled for 10 minutes. Followed by this about 25 mL of Wiji's solution was added in the same flask and shaken well. The flask was allowed to stand for 30 minutes and refrigerated for an hour. About 10 mL of KI solution was added to this and titrated against 0.1 N Sodium thiosulphate solution until the appearance of yellow colour. 1 mL of starch indicator was added and again titrated against the sodium thiosulphate solution from the burette. Disappearance of blue colour indicates end point. Repeat the above procedure without taking sample and note the corresponding reading for blank titration.

Determination of Saponification Value

About 2 g weight equivalent of test sample was transferred into the round bottomed flak. To this about 20 mL of 0.5 N alcoholic KOH solution was added to the round bottomed flask. Repeat the same procedure without taking the sample for blank titration. Reflux both sample and blank round bottomed flasks for 1 hour. After reflux, allow both the round bottomed flasks to cool. Titrate the samples using 0.5 N HCL with phenolphthalein indicator. The disappearance of pink indicates the end point.

Determination of Viscosity Value

Viscosity determination was carried out using Ostwald viscometers. Measurement of viscosity involves the determination of the time required for a given volume of liquid to flow through a capillary. The liquid is added to the viscometer, pulled into the upper reservoir by suction, and then allowed to drain by gravity back into the lower reservoir. The time that it takes for the liquid to pass between two etched marks, one above and one below the upper reservoir, is measured.

Determination of Refractive Index

Determination of RI was carried out using Refractometer.

Determination of Weight per mL

Weight per mL was determined using the comparative weight calibration method, in which the weight of 1 mL of the base of the formulation was calculated and then weight of 1 mL of finished formulation were been calculated. The difference between weight variations of the base with respect to finished formulation calculated as an index of weight per mL.

Acid Value

Accurately 5 g weight equivalent of the test sample was weighed and transferred into a 250 mL conical flask. To this, a 50 mL of neutralized alcohol solution was added. This mixture was heated for 10 mins by heating mantle. Afterwards, the solution was taken out after 10 mins and 1 or 2 drops of phenolphthalein indicator was added. This solution was titrated against KOH solution from the burette. The appearance of pink colour indicated the end point. The volume of consumed KOH solution was determined and the titration of test sample was carried out in triplicate and the mean of the successive readings was used to calculate the acid value of the respective sample by following expression.

Acid value = Titre value x 0.00561 x 1000 / Weight of test sample (g)

Peroxide Value

5 g weight equivalent of the substance being examined, accurately weighed into a 250 mL glass stoppered conical flask, add 30 mL of a mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform, swirl until dissolved and add 0.5 mL volumes of saturated potassium iodide solution. Allow to stand for exactly 1 minute with occasional shaking, add 30 mL of water and titrate gradually, with continuous and vigorous shaking, with 0.01 M sodium thiosulphate until the yellow colour almost disappears. Add 0.5 mL of starch solution and continue the titration, shaking vigorously until the blue colour just disappears (a mL). Repeat the operation omitting the substance being examined (b mL). The volume of 0.01 M sodium thiosulphate in the blank determination must not exceed 0.1 mL.

Peroxide value = 10 (a-b) / w

RESULTS

Figure 1: Naaval Nei.

Table 2: Organoleptic Properties of NN.

Colour	Greenish
State	Semisolid
Nature	Viscous
Odour	Mild
Touch/Consistency	Greasy
Flow Property	Non-free flowing
Taste	Bitter

Table 3: Solubility Profile.

S. No	Solvent Used	Solubility/Dispersibility
1.	**Chloroform**	Soluble
2.	**Ethanol**	Insoluble
3.	**Water**	Insoluble
4.	**Ethyl acetate**	Soluble
5.	**DMSO**	Insoluble

Table 4: Physicochemical Parameters.

S. No	Parameter	Value
1.	Viscosity at 50^0 C (Pa.s)	61.89
2.	Refractive index	1.44
3.	Weight per ml (g/mL)	0.88
4.	Iodine value (mg I2/g)	114.68
5.	Saponification value (mg KOH/g)	170.58
6.	Acid value mg KOH/g	0.87
7.	Peroxide value mEq/kg	4.23

DISCUSSION

The physicochemical evaluation of Naaval Nei provides important baseline data for its standardization and quality control. The organoleptic properties observed are consistent with traditional lipid-based Siddha formulations, indicating proper preparation.

The solubility in chloroform and ethyl acetate confirms the lipid nature of the formulation. The viscosity indicates appropriate semisolid consistency, while the refractive index reflects the purity of the formulation.

The iodine value suggests a moderate degree of unsaturation in fatty components. The saponification value indicates the presence of fatty acids characteristic of ghee-based preparations. The low acid value indicates minimal free fatty acid content and reduced risk of rancidity. Similarly, the peroxide value suggests low oxidative degradation and good stability.

Overall, these findings confirm that the formulation meets essential quality parameters and can be reliably standardized.

CONCLUSION

The present study establishes key physicochemical parameters for Naaval Nei, which serve as reference standards for its identification and quality control. The low acid and peroxide values indicate good stability, while other parameters confirm its consistency and purity. The study supports the scientific standardization of this Siddha formulation and its safe therapeutic use. These parameters can serve as reference standards for future research and formulation development.

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