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**Physico-chemical analysis and heavy metal analysis of
Siddha formulation Idivallathi Mezhugu**

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Abstract

The use of traditional medicines rapidly increases all over the world. Standardization of herbo-mineral formulations is mandatory to assess the quality of the traditional medicine. Idivallathi Mezhugu (IVM) is one of the major siddha formulations which is widely used in Siddha system of medicine. This paper deals with the analysis of physico-chemical parameters and analysis of Heavy metal by Atomic Absorption Spectroscopy (AAS) of IVM. AAS reveals that the presence of lead, arsenic, cadmium and mercury is below detectable limit. Hence the drug possesses no toxic effect. In physico-chemical analysis its pH value is 3.65 which is acidic in nature, loss on drying is 5.86678% and its total ash value is 3.892% it reveals the bio- availability of drug.

Keywords: Siddha system, Idivallathi Mezhugu, physico-chemical parameters, AAS.

Introduction

It is one of the traditional medical systems in the world and deals with physical, psychological, social and spiritual well-being of an individual. The roots of this system are intertwined with the culture of ancient Tamil civilization. The system aims in attaining Eternal bliss and to defeat mortality. However to attain this one should possess enough physical and mental strength^[1].

The system was basically developed by 18 spiritual saints with supernatural divine powers belonging to southern part of India called as "SIDDHARS"^[1].

Siddhars were the concept that a healthy soul can be developed through healthy body. So they developed methods and medication that are believed to strengthen their physical body and thereby their souls too^[1].

The siddha system of medicine categorized into two classes

1. Internal medicine and
2. External medicine.

Among 32 internal medicine mezhugu is one among them and its shelf life is for 5 years^[2].

Mezhugu- This is of two types:

- A. Araippu mezhugu (Obtained by grinding drugs).
- B. Churukku mezhugu (Obtained by heating them by adding oily substances^[3])

Idivallathi mezhugu is one of the major Siddha medicine which is widely used to cure various ailments Soolai (Pain), Kushtam (Leprosy), Kiranthi(Syphilis), and Envgaigunmam (Peptic Ulcer)^[4].

The WHO estimates that perhaps 65 to 80% of the world population uses traditional medicine. The recent interest on traditional medicine has taken up great dimensions in changing the health care scenario across the globe^[5]

In present scenario standardization is need to prove the safety and chemical profile of any medicine. This may help the acceptance of the medicine worldwide.

Materials and Methods

Ingredients:-

- Cherangottai (*Semicarpus anacardium*)
- Ell (*Sesamum indicum*)
- Rasa Karpooram (*Hydragyrum subchloride*)
- Palm Jaggery (*Borassus flabellifer*)
- Kopparai Thengai (*Cocos nucifera* L.)
- Parangipattai (*Smilax china*)
- Amukkara (*Withania somnifera*)
- Chithira moolaverpattai (*Plumbago zeylanica*)
- Kasthoori Manjal (*Curcuma aromatica*)
- Karunjeeragam (*Nigella sativa*)
- Valuzhuvai (*Celastrus paniculatus*)
- Kurosani Omam (*Hyocyamus niger*)
- Kadukkai Thol (*Terminalia chebulla*)
- Vettrilai kambu (Twig of Piper bettle)
- Thippli (*Piper longum*)
- Koshtam (*Saussrea lappa*)^[4]

Procurement of raw drug:

All the ingredients were bought from reputed raw drug shop in Chennai.

Purification of raw drugs:

The raw drugs were purified as per the method mentioned in Siddha literature^[6].

Preparation of drug:

Take of the purified nut pieces along with sesame seeds and dry Kopparai Thengai and pound them in a stone mortar with the pestle having a wooded tip. Add each of the powder of *Smilax china*, *Withania somnifera*, *Plumbago zeylanica*, *Curcuma aromatic*, *Nigella sativa*, *Celastrus paniculatus*, *Hyocyamus niger*, twig of piper bettle, *Terminalia chebulla*, *Piper longum*, *Saussrea lappa* and calomel and pound to fineness. Finally add palm Jaggery and pound again to obtain a waxy Consistency.

Dosage -- Sundai alavu

Indication -- Soolai, Kushtam, kiranthi, araiyappu, envgaigunmam, megam, Sukkilavayu, ranamegam.

Duration -- 1 Mandalam^[4]

Physico-chemical analysis of Idivellathi Mezhugu

1. Colour Examination:

5gm of *Idivallathi mezhugu* were taken into watch glasses and positioned against white back ground in white tube light. Its colour was observed by naked eye^[6].

2. Moisture Content:

An accurately weighed 1g of *Idivallathi mezhugu* formulation was taken in a tarred glass bottle. The crude drug was heated at 105⁰C in an oven till a constant weight. Percentage moisture content of the sample was calculated with reference to the shade dried material.

3. Determination of total ash:

Weighed accurately 1g of *Idivallathi mezhugu* formulation was added in crucible at a temperature 6000C in a muffle furnace till carbon free ash was obtained. It was calculated with reference to the air dried drug.

4. Determination of acid insoluble ash:

Ash above obtained, was boiled for 5min with 25ml of 1M Hydrochloric acid and filtered using an ash less filter paper. Insoluble matter retained on filter paper was washed with hot water and filter paper was burnt to a constant weight in a muffler furnace. The percentage of acid insoluble as was calculated with reference to the air dried drug.

5. Determination of water soluble ash:

Total ash 1g was boiled for 5min with 25ml water and insoluble matter collected on an ash less filter paper was washed with hot water and ignited for 15min at a temperature not exceeding 4500C in a muffle furnace. Difference in weight of ash and weight of water.

6. Determination of water soluble Extractive:

1gm of air dried drug, coarsely powered *Idivallathi mezhugu* was macerated.

With 100ml of distilled water in a closed flask for twenty-four hours shaking frequently. Solution was filtered and 25 ml of filtrated was evaporated in a tarred flat bottom shallow dish, further dried at 1000 C and weighted. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

7. Determination of alcohol soluble extractive:

1 gm. of air dried drugs, coarsely powdered *Idivallathi mezhugu* was macerated with 100 ml. alcohol in closed flask for 24 hrs. With frequent shaking. It was filtered rapidly taking precaution against loss of alcohol. 25ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100°C and weighted. The percentage of alcohol soluble extractive was calculated with reference to air dried drug.

8. pH Value:

Potentiometrically pH value was determined by a suitable pH meter^[7].

Instrument details:

- Method of Analysis – AAS, UV – V is spectrometer
- Instrument/ Model – AA240 series, UV 8500
- Wavelength: Hg – 253.7nm

As – 193.7 nm
Cd – 228.8 nm
Cu – 324.8 nm
Pb – 500nm

Results**Physico-chemical analysis of IVM:**

Table 1& 2 shows the result of physico chemical analysis of IVM.

Table 1. Physico-chemical parameters of IVM

S No	Parameters	Results
1	Appearance	Dark brown coloured semisolid substance
2	pH at 25°C(1%w/v solution)	3.65
3	Solubility(NS)	Partially soluble in water Partially soluble in acid Dispersed in alcohol

Table 2. Physico-chemical parameters of IVM

1	Moisture content	5.86678%
2	Total ash value	3.892%
3	Acid insoluble ash	<1% (0.7%)
4	Water soluble ash	1.3%
5	Water soluble extraction	16%
6	Alcohol soluble extraction	51.32%

Atomic absorption spectroscopy:

Table 3 shows the presence of heavy metals lead, arsenic, cadmium and mercury.

Table 3. Heavy metal Analysis of IVM by AAS

S. NO	JW NO	Sample ID	Hg(mg/kg)	As(mg/kg)	Cd(mg/kg)	Pb(mg/kg)
1	2421	Idivallathi Mezhugu	BDL	BDL	BDL	BDL

Discussion

The **Physico-chemical analysis** of IVM (Table: 1 & 2) concludes the following results

It is dark brown in colour and semisolid in consistency. It is partially soluble in water and acid, dispersed in alcohol.

The loss on drying test is designed to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. Moisture is one of the major factors responsible for the deterioration of the drugs and formulations. Low moisture content is always desirable for higher stability of drugs.²⁰The percentage of loss on drying of IVM was 5.86678%. Since the loss of drying of IVM is low, the stability of the drug is higher.

The Ash limit Tests are designed to measure the amount of the residual. A high ash value is indicative of contamination, substitution, adulteration or carelessness in preparing the drug. The total ash values of IVM were 3.892%. Since the value of total ash in IVM is low, it implies that the inorganic constituents is Low this indicates the purity of the drug^[8].

The Acid-Insoluble Ash Limit Test is designed to measure the amount of ash Insoluble to diluted hydrochloric acid. Acid-insoluble ash value of IVM is 0.7% and it shows that a very small amount of the inorganic Constituent is insoluble in acid. It indicates the purity of the drug.

Extraction value determines the number of active constituents in a given amount of the formulation when extracted with a solvent media such as water and alcohol. The water soluble and alcohol soluble extract values provide an indication of the extent of polar and non polar compounds respectively present in IVM. The extract values of Alcohol in IVM are 51.32% and water is 16%. From the above result we conclude that water is a little better solvent of extraction than alcohol.

pH of the drug was 3.65. It denotes it is slightly acidic. Hence, in the oral administration of the drug it is expected to be absorbed quickly in the stomach. It reveals that IVM is expected to have better Bio-availability^[9].

The drug was quantitatively analyzed for heavy metals content by AAS (Table 3). This analysis reveals the below detection limit of metals Arsenic, Mercury, Cadmium, and Lead in sample IVM.

Conclusion

The results of this study are concluded that the Qualitative analysis of Idivallathi mezhugu (IVM)

reveals the Purity and Bioavailability of the drug. As heavy metals are below detection limit, the drug is safe enough for oral consumption.

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