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HEAVY METAL ANALYSIS, PESTICIDE RESIDUE ANALYSIS AND AFLATOXIN ASSAY OF SIDDHA HERBAL FORMULATIONMADHUMEGA NIVARANI CHOORANAM

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Abstract

Aim: The aim of the study was to assess the Heavy metal analysis, pesticide residue and aflatoxin assay of Siddha herbal formulation "*Madhumega Nivarani Chooranam"*, used for the management of *Madhumegam* (Type-II Diabetes mellitus)

Materials and Method: According to the procedure that is stated in the Siddha text "The Pharmacopoeia of Siddha Research Medicines," the siddha poly herbal formulation was formulated in accordance with good manufacturing practises (GMP) regulations. Aflatoxin assay, pesticide residue analysis, and heavy metal analysis these studies were all carried out at Nobel Research Solutions in Chennai.

Results: The above assay, which used AAS to identify Heavy metals in the siddha medicine *Madhumega Nivaran iChooranam* revealed BDL (below detective level), presence of lead and arsenic at 1.14 PPM and 0.34 PPM level as listed in the table. The study revealed absence of Aflatoxin and pesticide residues in the given sample. It is indicating that this drug is safe to use.

Conclusion: According to the results, the sample Madhumega Nivarani Chooranam (MNC) has been determined to be safe throughout the present screening process, with the presence of heavy metals below the detection limit, Devoid of aflatoxins, as well as Residues of Pesticides**.** Hence, the current study reveals the drug was safe for therapeutic use.

Keywords: Siddha, Heavy metal analysis, Aflatoxins, pesticide, *Madhumega Nivarani Chooranam.*

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1. Introduction

India is a country with an extensive range of customs and heritage, cultures, languages, and religions, including a variety of medical practises. Indian medicine has its own history, classification systems, and methods. This system, which has existed since the beginning of time, is said to have enjoyed Lord Siva's blessing and favour because it was constructed by him. The medical system is full since it not only deals with medicine but also explains how to live in this materialistic world because the name "Siddha" itself symbolises totality [1].

A holistic medical approach is used in the Siddha system of medicine. In order to assure the efficacy and safety of herbal medicines in the healthcare system, standardisation is crucial. Compared to synthetic medications, which frequently alter the quality of herbal pharmaceuticals, herbal drugs are more susceptible to influence since they are made up of numerous components from various sources and the quality of plant materials [2].

In order to evaluate the quality, purity, safety, and efficacy of medications based on the concentration of their active components, standardisation of herbal formulations is a crucial component. When utilised in large quantities, plant material may vary in its chemical composition and, as a result, in its therapeutic impact depending on distinct batches of collection, such as collection at various seasons and/or from sites with various environmental circumstances or geographical locations. There must be some level of uniformity due to the rising demand from the populace and the persistent scarcity of genuine raw materials [3].

The polyherbal siddha composition *Madhumega Nivarani Chooranam*is effective at lowering blood sugar.Heavy Metal Analysis, Aflatoxins, pesticide residue, have been studied. The parameters listed above were assessed in the current investigation. The purpose of this study was to assess the safety parameters of *Madhumega Nivarani Chooranam* (aflatoxin, pesticide residue).

2. Materials and Methods

2.1 Ingredients of *Madhumega Nivarani Chooranam*

(Ref**:** The Pharmacopoeia of siddha research medicines Page.No:106)(4)

Tab no: 1Parameters of MadhumegaNivaraniChooranam

INGREDIENTS	RATIO
Avaraiverpattai(5)	24 Tolas(288grams)
SeendhilSarkarai(6)	6 Tolas(72 grams)
Navarkottai(7)	6 Tolas(72 grams)
Nellikai juice powde(8)	6 Tolas(72 grams)
Chirukurinjan(9)	6 Tolas(72 grams)
Adutheendapalaipalai extract or *Adutheendapalai* leaves chooranam(10)	6 Tolas(72 grams)

2.3 Authentication and Source of the Raw Drug

The ingredients of Madhumega Nivarani Chooranam have been confirmed by Gunapadam's experts; their proof of authenticity number is GSMC/MD- 565-569, which is located at the Government Siddha Medical College in Arumbakkam, Chennai (106).

2.4 Sample Preparation:

2.4 1 Purification of Raw Drugs

Drugs have been purified utilising techniques described in Siddha literature. It is a medicinal herb. In accordance with "Sikitcha Rathna Deepam Ennum Vaithiya Nool," the Madhumega Nivarani Chooranam medications have been purified [11].

2.4.2sample Preparation

Avaraiverpattai was well pounded in a stone martar placed in a mud pot, then added required amount of water and boiled ,reduced to the1/4th part or less ,cooled and then the decoction filtered after well crushing the bark sediments with the hands . This decoction is again boiled in to kulambu Pakuvam exposed to the sun,dries, powdered, weighed and preserved. The other five ingredients *Seendhilsarkarai (Tinosporacordifolia), Navarkottai (Syzygium cumini), Nellikai juice powder (Phyllanthusemblica), Chirukurinjan (Gymnemasylvestris), Adutheendapalai (Aristolochia bracteolate*) was taken purified and dried.Then the purified ingredients are powdered each of 6tolas separately by mortar. Then the powders are mixed together. Then the powder will be stored in an air tight container [12].

2.5drug Storage

The trail medicine was stored in a clean, dry; air tight container and it were dispensed in a labelled container.

3. Methodology

3.1 Heavy Metals Analysis By Atomic Absorption Spectroscopy (AAS):

Atomic Absorption Spectroscopy is an instrumental analysis technique used to detect trace metals promptly. It is based on the absorption of element-specific wavelength light by ground state atoms in a flame or electro thermal graphite furnace. It is widely used in the assessment of trace metals in soils, lakes, rivers, as well as in medicines, foods, geological and mineralogical samples, biological fluids and specimens, and forensic science. When utilizing graphite furnace atomisation, it is typical to obtain findings at ppm levels and a higher sensitivity of ppb levels.

3.1.1 Methodology

Atomic Absorption Spectrometry (AAS) is a very common and reliable technique for detecting metals and metalloids in environmental samples. The total heavy metal content of the sample was performed by Atomic Absorption Spectrometry (AAS) Model AA 240 Series. In order to determination the heavy metals such as mercury, arsenic, lead and cadmium concentrations in the test item.

3.1.2 Sample Digestion

Test sample was digested with 1mol/L HCl for determination of arsenic and mercury. Similarly, for the determination of lead and cadmium the sample were digested with 1mol/L of HNO3.

3.1.3 Standard Reparation

As & Hg- 100 ppm sample in 1mol/L HCl

Cd &Pb- 100 ppm sample in 1mol/L HNO3

3.2 Methodology for Pesticide

Test sample were extracted with acetone and followed by homogenization for brief period. Further filtration was allowed and subsequent addition of acetone to the test mixture. Heating of test sample was performed using a rotary evaporator at a temperature not exceeding 40ºC until the solvent has almost completely evaporated. To the residue add a few milliliters of toluene and heat again until the acetone is completely removed. Resultant residue will be dissolved using toluene and filtered through membrane filter

3.3 Aflatoxin Procedure

Standard aflatoxin was applied on to the surface to pre coated TLC plate in the volume of 2.5 µL, 5 µL, 7.5 µL and 10 µL. Similarly, the test sample was placed and Allow the spots to dry and develop the chromatogram in an unsaturated chamber containing a solvent system consisting of a mixture of chloroform, acetone and isopropyl alcohol (85: 10: 5) until the solvent front has moved not less than 15 cm from the origin. Remove the plate from the developing chamber, mark the solvent from and allow the plate to air-dry. Locate the spots on the plate by examination under UV light at 365 nm.

4. Results

4.1 Heavy metal analysis Result:

The above assay, which used AAS to identify Heavy metals in the siddha medicine *MadhumegaNivaraniChooranam* revealed BDL (below detective level), presence of lead and arsenic at 1.14 PPM and 0.34 PPM level as listed in the table. It is indicating that this drug is safe to use.

Tab no: 2 Test report of Heavy metal analysis

Name of the Heavy Metal	Absorption Max Λ max	Result Analysis	Maximum Limit
Lead	217.0 nm	1.14 PPM	10 ppm
Arsenic	193.7 nm	0.34 PPM	3 ppm
Cadmium	228.8 nm	BDL	0.3 ppm
Mercury	253.7 nm	BDL	1ppm

The results showed that there were no traces of pesticides residues such as Organo chlorine, Organo phosphorus, Organo carbamates and pyrethroids in the sample provided for analysis.

4.2 Pesticide Residue analysis

BDL- Below Detection Level

4.3 Aflatoxin Assay Result

Tab no 3 Reports of pesticide Residue analysis

Pesticide Residue I.Organo Chlorine Pesticides	Sample MMNC	AYUSH Limit (mg/kg)
Alpha BHC	BQL	0.1mg/kg
Beta BHC	BQL	0.1mg/kg
Gamma BHC	BQL	0.1mg/kg
Delta BHC	BQL	0.1mg/kg
DDT	BQL	1mg/kg
Endosulphan	BQL	3mg/kg
II.Organo Phosphorus Pesticides		
Malathion	BQL	1mg/kg
Chlorpyriphos	BQL	0.2 mg/kg
Dichlorovos	BQL	1mg/kg
III. Organo carbamates		
Carbofuran	BQL	0.1mg/kg
III.Pyrethroid		
Cypermethrin	BQL	1mg/kg

Tab no 4 Reports of Aflatoxin assay

Aflatoxin	Sample MMNC	AYUSH Specification Limit
B1	Not Detected - Absent	0.5 ppm
B2	Not Detected - Absent	0.1 ppm
G1	Not Detected - Absent	0.5 ppm
G2	Not Detected - Absent	0.1 Ppm

The results shown that there were no spots were being identified in the test sample loaded on TLC plates when compare to the standard which indicates that the sample were free from Aflatoxin B1, Aflatoxin B2, Aflatoxin G1, Aflatoxin G2.

5. Conclusion

The study drug was analysed for Heavy Metal analysis, aflatoxins and pesticide residues was estimated. The sample Madhumega Nivarani Chooranam (MNC) has been determined to be safe throughout the present screening process, with the presence of heavy metals below the detection limit, Devoid of aflatoxins, as well as Residues of Pesticides. This defends MNC's quality profile from biological chain contamination. Subsequent clinical studies and research would benefit from the fundamental quality support provided by this early standardisation investigation.

6. Conflict of Interest

No Conflict of Interest

7. Funding

No funding was received for this study

8. Author Contribution

Dr.N.Suresh Balaji performed the study and prepared the manuscript. Dr.N.Anbu guided the study and approved the manuscript.

9. Inform Consent and Ethical Approval

Not Required

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11. Ethical Statement

All the guidelines provided by the ethical committee of the Government Siddha Medical College, Arumbakkam, Chennai Were followed.

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