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Phytochemical Analysis of Siddha Polyherbal Formulation Maantha Kuligai

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ABSTRACT

INTRODUCTION- Siddha medicine, a traditional healing system predominantly practiced in Tamil Nadu, India, has been used for centuries to treat a wide range of physical and mental health conditions using herbal and natural formulations. Despite its rich history, scientific research on its therapeutic mechanisms and the phytochemical properties of its formulations remains limited. *Maantha Kuligai*, a polyherbal Siddha preparation, has been used to manage various neurological conditions, including Autism Spectrum Disorder (ASD). However, a comprehensive scientific investigation into its chemical constituents and their potential therapeutic roles in ASD is yet to be fully explored.

AIM AND OBJECTIVE-This study aims to conduct an in-depth phytochemical analysis of *Maantha Kuligai*, identifying its active compounds and assessing their potential therapeutic effects. The primary objective is to evaluate the bioactive compounds in *Maantha Kuligai* and explore their possible efficacy in the treatment of Autism Spectrum Disorder (ASD).

MATERIALS AND METHODS-*Maantha Kuligai* was prepared following traditional Siddha practices as described in *Bala Vaithiya Thirattu*, after which it underwent extraction for phytochemical analysis. Standard laboratory techniques were utilized to detect the presence of key bioactive compounds, including alkaloids, flavonoids, glycosides, steroids, triterpenoids, coumarins, phenols, tannins, saponins, proteins, sugars, anthocyanins, and betacyanins. A qualitative analysis was performed to assess the chemical composition of the formulation.

RESULTS-The phytochemical screening of *Maantha Kuligai* revealed the presence of various bioactive compounds, such as alkaloids, flavonoids, steroids, triterpenoids, coumarins, phenols, tannins, saponins, sugars, and betacyanins. These compounds are known for their pharmacological properties, including antioxidant, anti-inflammatory, and neuroprotective effects, which may be beneficial in managing conditions like Autism Spectrum Disorder.

CONCLUSION- The initial phytochemical analysis of *Maantha Kuligai* provides a valuable chemical profile, which is essential for guiding future clinical research and establishing its therapeutic potential, safety, and quality standards.

Keywords: *Maantha Kuligai*, Autism Spectrum Disorder, Phytochemical Analysis.

INTRODUCTION

Siddha medicine, a traditional system of healing that originated in Tamil Nadu, India, has been practiced for centuries to address a wide range of physical and mental health conditions. This ancient system focuses on achieving a harmonious balance between the body, mind, and spirit, utilizing natural remedies derived from plants, minerals, and other substances. A fundamental aspect of Siddha medicine is the use of polyherbal formulations, which are combinations of multiple plant-based ingredients specifically designed to treat particular ailments. One such formulation, Maantha Kuligai, is traditionally used to manage neurological conditions, including Autism Spectrum Disorder (ASD), a developmental disorder affecting communication, behavior, and social interaction. Although Maantha Kuligai has long been recognized for its therapeutic benefits in traditional practice, scientific studies investigating its chemical composition and the underlying mechanisms of its effects remain limited. Given the increasing global prevalence of Autism Spectrum Disorder and the limitations of current conventional treatments, there is a growing need for alternative therapies. This research seeks to fill this gap by conducting a detailed phytochemical analysis of Maantha Kuligai. The goal is to identify the bioactive compounds present in the formulation and assess their potential therapeutic properties, specifically in relation to managing Autism Spectrum Disorder.

MATERIALS AND METHODS:

SELECTION OF THE TRIAL DRUG:

For this study, the Polyherbal formulation "Maantha kuligai" a combined therapeutic preparation for Maantha sanni (Autism spectrum Disorder) has been Selected from the classical Siddha literature –"Bala Vaithiya Thirattu" -Page no:85.

Table No1: Ingredients with Botanical name of Maantha kuligai [1]

S.No	Ingredients	English name	Botanical name	Part used	Quantity
1	NARSEERAGAM	Cumin seeds	Cuminum cymimum	Fruit	5.1GRAMS
2	KOTHTHAMALLI	Coriander seeds	Coriandrum sativum	Fruit	5.1GRAMS
3	PERUNJEERAGAM	Anise seeds	Foeniculum vulgare	Fruit	5.1GRAMS
4	KUROSANI OMAM	Henbane seeds	Hyoscymus niger	Seed	5.1GRAMS
5	CHUKKU	Dried ginger	Zingiber officinale	Rhizome	5.1GRAMS
6	SARANAI KIZHANGU	Horse purslane	Trianthema decandra	Tuber	5.1GRAMS
7	OMAM	Bishops weed	Trachyspermum ammi	Fruit	5.1GRAMS
8	THIPPLI	Long pepper	Piper longum	Fruit	5.1GRAMS
9	VASAMBU	Sweet-flag	Acorus calamus	Rhizome	5.1GRAMS

COLLECTION OF THE DRUG MATERIALS

The raw medicinal materials,including Cuminum cymimum, Coriandrum sativum, Foeniculum vulgare, Hyoscymus niger, Zingiber officinale, Trianthema decandra, Trachyspermum ammi, Piper longum and Acorus calamus were purchased from a certified country drug store in Chennai.

IDENTIFICATION AND AUTHENTICATION OF THE DRUGS

The raw materials used in the study were identified and authenticated by botanical and pharmacological experts at the Government Siddha Medical College in Arumbakkam and Chennai. Specimen samples of each raw material—Cuminum cymimum, Coriandrum sativum, Foeniculum vulgare, Hyoscyamus niger, Zingiber officinale, Trianthema decandra, Trachyspermum ammi, Piper longum, and Acorus calamus—were labeled and stored in the PG Gunapadam department of the Government Siddha Medical College, Chennai-100, for future reference.

METHODS OF PURIFICATION

The drug purification process was carried out according to the methods described in the ancient Siddha text, Sikicha Rathna Deepam Sarakku Suthimuraigal.

- Cuminum cymimum- Remove any impurities, such as dirt, and dry roast it.
- Coriandrum sativum -Tie them in a bundle, dip in hot water or fruit juice, burn, and then powder.
- Foeniculum vulgare was fried in low flame.
- Hyoscymus niger was Thoroughly scrub and remove impurities then fried in low flame.
- Zingiber officinale- Remove the outer skin.
- Trianthema decandra was washed thoroughly and clean the outer skin.
- Trachyspermum ammi was soaked in lime water and dried.
- Piper longum was fried in low flame.
- Acorus calamus – char it well.

PREPARATION OF THE DRUG

Cuminum cymimum, Coriandrum sativum, Foeniculum vulgare, Hyoscyamus niger, Zingiber officinale, Trianthema decandra, Trachyspermum ammi, Piper longum, and Acorus calamus are dried separately and make them in a fine powder form, then it is grinded with hot water and make them in a tablet form.

PHYTOCHEMICAL ANALYSIS OF MAANTHA KULIGAI

Test for alkaloids:

Mayer's Test: To the test sample, 2ml of mayer's reagent was added, a dull white precipitate revealed the presence of alkaloids.

Test for coumarins:

To the test sample, 1 ml of 10% sodium hydroxide was added. The presence of coumarins is indicated by the formation of yellow color.

Test for saponins:

To the test sample, 5 ml of water was added and the tube was shaken vigorously. Copious lather formation indicates the presence of Saponins.

Test for tannins:

To the test sample, ferric chloride was added, formation of a dark blue or greenish black color showed the presence of tannins.

Test for glycosides- Borntrager's Test

Test drug is hydrolysed with concentrated hydrochloric acid for 2 hours on a water bath, filtered and the hydrolysate is subjected to the following tests. To 2 ml of filtered hydrolysate, 3 ml of choloroform is added and shaken, choloroform layer is separated and 10% ammomia solution is added to it. Pink colour indicates presence of glycosides.

Test for flavonoids:

Alkaline reagent test. Two to three drops of sodium hydroxide were added to 2 mL of extract. Initially, a deep yellow colour appeared but it gradually became colourless by adding few drops of dilute HCL, indicating that flavonoids were present.

Test for phenols:

Lead acetate test: To the test sample; 3 ml of 10% lead acetate solution was added. A bulky white precipitate indicated the presence of phenolic compounds.

Test for steroids:

To the test sample, 2ml of chloroform was added with few drops of conc. Sulphuric acid (3ml), and shaken well. The upper layer in the test tube was turns into red and sulphuric acid layer showed yellow with green fluorescence. It showed the presence of steroids.

Triterpenoids

Liebermann–Burchard test: To the chloroform solution, few drops of acetic anhydride was added then mixed well. 1 ml concentrated sulphuric acid was added from the sides of the test tube, appearance of red ring indicates the presence of triterpenoids.

Test for Cyanins

A. Aanthocyanin:

To the test sample, 1 ml of 2N sodium hydroxide was added and heated for 5 min at 100°C. Formation of bluish green colour indicates the presence of anthocyanin.

Test for Carbohydrates - Benedict's test

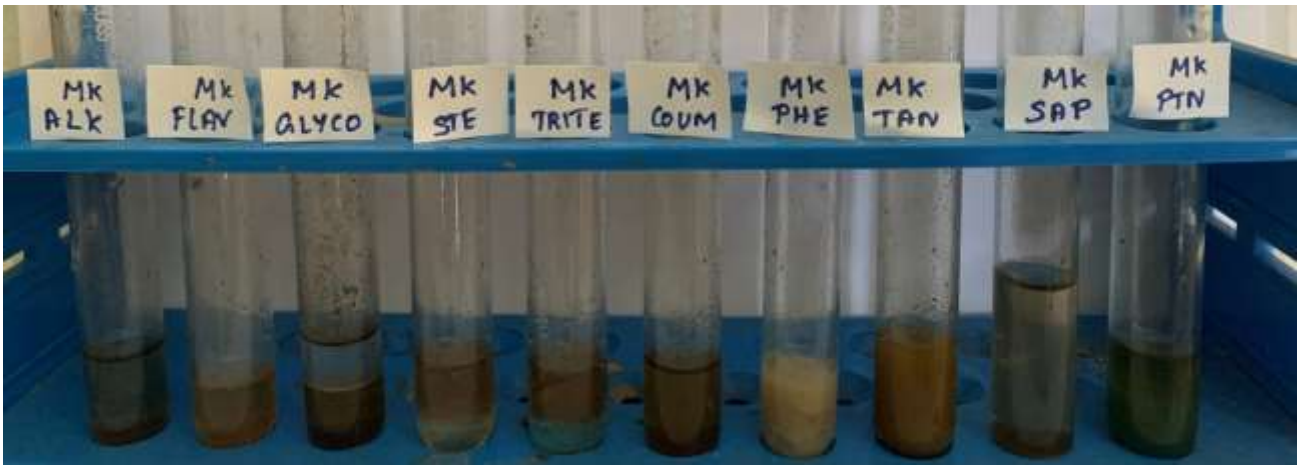
To the test sample about 0.5 ml of Benedic's reagent is added. The mixture is heated on a boiling water bath for 2 minutes. A characteristic coloured precipitate indicates the presence of sugar.

Proteins (Biuret Test)

To extracts 1% solution of copper sulphate was added followed by 5% solution of sodium hydroxide, formation of violet purple colour indicates the presence of proteins.

RESULTS

Qualitative Phytochemical Investigation



Phytochemical Analytical Report

S.no	Test	Observation
1	ALKALOIDS	+
2	FLAVANOIDS	+
3	GLYCOSIDES	-
4	STEROIDS	+
5	TRITERPENOIDS	+
6	COUMARIN	+
7	PHENOL	+
8	TANIN	+
9	PROTEIN	-
10	SAPONINS	+
11	SUGAR	+
12	ANTHOCYANIN	-
13	BETACYANIN	+

(+) -> Indicates Positive and (-) -> Indicates Negative

DISCUSSION

The phytochemical evaluation of Maantha Kuligai reveals a range of bioactive compounds, including alkaloids, flavonoids, steroids, triterpenoids, coumarins, phenolic compounds, saponins, tannins, and betacyanins. These compounds may contribute to the formulation's potential therapeutic effects in managing Autism Spectrum Disorder (ASD). Alkaloids are known for their anti-inflammatory and neuropharmacological properties, which may help alleviate symptoms of neuroinflammation in ASD. Flavonoids possess antioxidant, anti-inflammatory, and anti-allergic effects, potentially reducing oxidative stress and inflammation in the brain. Steroids, with their ability to inhibit phospholipase A2, offer potent anti-inflammatory effects, while triterpenoids support antioxidant and anti-inflammatory functions that could help regulate neuroinflammation.Phenolic compounds, with their broad spectrum of anti-inflammatory, antioxidant, and neuroprotective effects, could be beneficial in reducing the oxidative stress and inflammation often associated with ASD.Tannins, with their astringent properties, may aid in reducing mucosal inflammation and promoting healing, while saponins, through their immune-modulating effects, may help control inflammatory responses.Betacyanins, known for their antioxidant properties, may protect against oxidative damage in neural tissues, supporting overall brain health.The combined antioxidant and anti-inflammatory effects of Maantha Kuligai suggest it could potentially alleviate ASD symptoms by reducing oxidative stress and inflammation. However, further clinical studies are needed to confirm its safety and efficacy. This research can help integrate traditional remedies like Maantha Kuligai into contemporary treatments for ASD.

CONCLUSION

The phytochemical profile of Maantha Kuligai highlights the presence of several bioactive compounds known for their antioxidant, anti-inflammatory, and neuroprotective properties. These components suggest potential therapeutic benefits for managing Autism Spectrum Disorder (ASD). However, additional clinical research is needed to validate its effectiveness and safety for use in ASD treatment.

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