

# Antioxidant Activity of Ingredients of Mathumeha Chooranam, A Drug Used for the Treatment of Diabetes Mellitus in Siddha System of Medicine

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## ABSTRACT

In the Siddha system of Medicine there are several chooranams are used to cure the Mathumeham (Diabetes mellitus). Among the chooranams, different varieties of Mathumeha chooranam are used in Siddha system. Mathumeha chooranam contains *Terminalia chebula*, *Phyllanthus embelica*, *Murraya keonigii*, and *Gymnema sylvestrae*. This chooranam is widely used in Siddha Hospitals and Dispensaries of North and Eastern Province of Sri Lanka. The Objective of this study was to determine antioxidant level of the ingredients of the Mathumeha chooranam. Two different Hot and cold extracts were obtained from this ingredients of skin of the seeds of *Terminalia chebula*, Unripe fruit of *Phyllanthus embelica* leaves of *Murraya keonigii*, and *Gymnema sylvestrae*. They were assessed for their antioxidant activity by measuring Total Phenolic Content. Among the ingredients of the mathumeha chooranam studied, *Terminalia chebula* showed significant content of phenolics (TPC) in mg TAE/g of dry weight in cold as well as in hot extracts at Room temperature (383.9±70.2, 336.9±23.5) followed by *Phyllanthus embelica* (184.2±22.01, 172.8±16.06), *Gymnema sylvestrae* (9.0±0.27, 9.8±0.42) and *Murraya keonigii*. There was no significant difference in the mean TPC between room temperature and refrigerator. When compared with the cold extracts of ingredients of mathumeha chooranam with hot extracts, hot extracts contained higher antioxidant content. The cold and hot aqueous extracts of the dried powder of the ingredients of the mathumeha chooranam possess antioxidant activity. Among the four ingredients, *Terminalia chebula* was found to possess significantly higher antioxidant activity than the others. Next to the *Terminalia chebula*, *Phyllanthus embelica* had higher content of the antioxidant.

**Key words;** - antioxidant activity, Mathumeha chooranam, Total Phenolic content, Siddha Medicine, Diabetes mellitus, Mathumeham

## I. INTRODUCTION

Antioxidants as compounds that when present in low concentration in relation to the oxidant-, prevent or delay the oxidation of the substrate [1]. Free radicals are involved in many disorders like neurodegenerative diseases, cancer, aids and diabetes mellitus. Oxidative stress in cells and tissues results from the increased generation of reactive oxygen species and / or from decreases in antioxidant defense potential [2]. Antioxidants works to maintain the oxidant at optimum level and to reduce free radical before disturb living cells in our body

The following symptoms are cited for this disease. Excessive excretion of urine, collection ants and flies in places where a person passes urine, loss of physical strength, exhaustion of body, dry mouth, etc [3],[4] The symptoms of Diabetes mellitus signs and symptoms of Mathumeham is almost similar to Diabetes mellitus. Diabetes mellitus is a metabolic disorder characterized by fasting hyperglycemia, and alteration in carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion and or insulin action [5] Antioxidant actions are key to preventing or reversing Diabetes and its complications.[6] Thus the aim of the present study was to evaluate the Antioxidant activity of the ingredients of the mathumeha chooranam used in Mathumeham (Diabetic mellitus). Diabetes mellitus has been presumed that Diabetes result from inherent stress in modern lifestyle and the rising incidence of diabetes is becoming a significant public health



problem. many herbal plants possess both effect and have been used in traditional medicinal for the treatment of diabetes mellitus. [7],[ 8],[ 9] Mathmeha chooranam is widely used to treat Diabetes mellitus in Siddha hospitals and Dispensaries. This chooranam is prepared From the leaves of *Gymnema sylvestrae*, Skin of the seeds of *Terminalia chebula*, Fruit of *Phyllanthus embelica*, and leaves of *Murrya keonigii* in 1/2: 1: 1: 1 ratio respectively

*Gymnema sylvestrae* is an herb native to the tropical forests of Southern and Central India and Sri Lanka. It belongs to the family of Asclepiadaceae. In Tamil it is called as Chakkaraikolli, In English small Indian epeacuanha, and In Sinhala Bin nuga. *Gymnema sylvestrae* possesses Insulinotropic activity of Human islets of Langerhans. [10] *Gymnema sylvestrae* has regeneration of the islets of Langerhans in streptozotocin diabetic rats [11]

*Phyllanthus embellica* belongs to the family of Euphorbiaceae. In English it is called as Indian gooseberry, and in Sinhala called as nelli. It has an antioxidant property. [12] Another study with alloxan-induced rats given *Phyllanthus* extract has shown significant decrease of the blood glucose, as well as triglyceridemic levels and an improvement of liver function [13] it reduces oxidative stress [14]

The leaves, barks and the roots of *Murrya keonigii* are used as a tonic, stomach ache, stimulant and carminative [15], [16] it belongs to the family of Rutaceae. In English it is called as curry leaves In Tamil karivepillai, and In Sinhala it is called as curryppincha. It possesses antidiabetic activity [17] The antioxidant carbazole alkaloids present in *Murrya keonigii*. [18],[19],[20],[21]

*Terminalia chebula* is commonly called as black myrobalam, ink tree. It belongs to the family of Combretaceae. In English it is called as Chebulic myrobalan In Tamil Kadukkaai, In Sinhala Aralu. It possesses anti diabetic activity. [22] It possesses the antioxidant and reactive oxygen species scavenging properties. [23]

## 2. MATERIALS AND METHODS

### Plant material

Leaves of *Gymnema sylvestrae*, leaves *Murrya keonigii*, Seeds of the *Terminalia chebula* and Fruit of *Phyllanthus embellica* were collected from Karaveddy and Meesalai in September 2013. The above plant material were cleaned, washed and dried under shade at

room temperature, powered and sieved by muslin cloth. Mathumeha chooranam was prepared from the above powders in 1/2: 1: 1: 1 ratio respectively. 10mg of each powder of plant material were packed in airtight polythene material separately and kept in room temperature and refrigerator (4°C)

### Preparation of plant Extract

The cold and hot aqueous extract of each powder of plant material were prepared which were kept in refrigerator and room temperature in monthly interval. Mathumeha chooranam and its ingredients (10mg) were used to prepare the cold and hot aqueous extract. 10mg of each powder was dissolved in 10ml distilled water and one part was kept in room temperature, other part was kept in water bath at 100°C for 5 minutes. Then these were centrifuged at 10,000 rpm for 10 minutes. Supernatant was taken from the centrifuged extract.

### Determination of Antioxidant

TPC was determined based on total phenolic content by using a spectrophotometric method [24] at monthly intervals for six months. Total phenolic content of the ingredients of mathumeha chooranam were measured by employing the method described by involving Folin-Ciocalteu reagent as an oxidizing agent and tannic acid as a standard. To 0.05ml of extract solution (1mg/1ml) in water, 0.5ml of Folin-Ciocalteu reagent (diluted 10 times with water) and 0.4ml of sodium carbonate (7.5% w/v) solution were added. After 30 minutes incubation at room temperature the absorbance was measured at 765nm using a UV-visible spectrophotometer. The phenolic contents of the sample were expressed as in mg of TAE/gm of the dried extract.

## 3. RESULTS AND DISCUSSION

### Total Phenolic content assay

TPC of the different cold and hot extracts are given in the table

Plant material	Total Phenolic content mg/g			
	Room temperature		4°C	
	Hot extract	cold extract	Hot extract	Cold extract
<i>Terminalia chebula</i>	383.9±70.2	336.9±23.5	352.0±7.6	337.8±11.6
<i>Phyllanthus embellica</i>	184.2±22.01	172.8±16.06	178.4±16.31	172.2±14.3
<i>Gymnema sylvestrae</i>	9.0±0.27	9.8±0.428	9.7±0.918	9.1±0.78
<i>Murrya keonigii</i>	8.43±1.15	8.05±0.90	8.7±1.09	8.18±0.82



Among the ingredients of the mathumeha chooranam studied, *Terminalia chebula* showed significant content of phenolics (TPC) in mg TAE/g of dry weight in cold as well as in hot extracts at Room temperature and 4°C (383.9±70.2, 336.9±23.5) (352.0±7.6, 337.8±11.2) followed by *Phyllanthus embelica* (184.2±22.01, 172.8±16.06), (178.4±16.31, 172.2±14.3) *Gymnema sylvestrae* (9.0±0.27, 9.8±0.42), (9.7±0.918, 9.1±0.78) and *Murrya keonigii*. (8.43±1.15, 8.05±1.09, 8.18±0.82) There was no significant difference in the mean TPC which was kept in room temperature and refrigerator.

The cold and hot aqueous extracts of the dried powder of the ingredients of the mathumeha chooranam possess antioxidant activity. When compared with the cold extracts of ingredients of mathumeha chooranam with hot extracts, hot extracts contained higher antioxidant activity than cold extracts. Among the four ingredients, *Terminalia chebula* was found to possess significantly higher antioxidant activity than others. next to the *Terminalia chebula*, *Phyllanthus embelica* had higher antioxidant activity

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