

Antioxidant Activity of Ingredients of Mathumeha Chooranam and Mathumeha Chooranam used in Mathumeham (Dibetes mellitus)

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Abstract- In the Siddha system of Medicine, various 'chooranams' are used to treat 'Mathumeham' (Diabetic mellitus). 'Mathumeha chooranam' is prepared from Terminalia chebula, Phyllanthus embelica, Murraya keonigii, and Gymnema sylvestrae. This 'chooranam' is widely used in North and Eastern Province of Sri Lanka Siddha Hospitals and Dispensaries. The Objective of this study was to determine the antioxidant activity of the 'Mathumeha chooranam' and its ingredients. The cold and hot water extracts (10mg in 10ml) of the dry powders of the skin of the seeds of Terminalia chebula, unripened fruits of Phyllanthus embelica, leaves of Murraya keonigii and Gymnema sylvestrae, and 'Mathumeha chooranam' were tested for their Total Antioxidant Content (TAC) by measuring Ferric Reduction method.

Among the 'mathumeha chooranam' and its four ingredients, Terminalia chebula contained the highest TAC in cold as well as in hot extracts [10.13 (± 3.1) and 12.83 (± 2.4) $\mu\text{g}/\text{mg}$ of dry weight respectively followed by 'Mathumeha chooranam' [4.6 (± 1.16) and 5.6 (± 0.91) $\mu\text{g}/\text{mg}$ of dry weight respectively, Phyllanthus embelica [4.38 (± 1.72) and 6.3 (± 2.05) $\mu\text{g}/\text{mg}$ of dry weight respectively, Murraya keonigii [0.506 (± 0.372) and 0.696 (± 0.336) $\mu\text{g}/\text{mg}$ of dry weight respectively and Gymnema sylvestrae [0.359 (± 0.262) and 0.759 (± 0.665) $\mu\text{g}/\text{mg}$ of dry weight respectively. The cold and hot aqueous extracts of the dried powder of the ingredients of the 'mathumeha chooranam' and its ingredients contains antioxidant activity. When compared with the cold extracts of 'Mathumeha chooranam' and its ingredients with hot extracts, hot extracts contained higher antioxidant activity than cold extracts.

Keywords: Antioxidant activity, 'Mathumeha chooranam', Ferric Reduction method, 'Mathumeham', Siddha Medicine

I. INTRODUCTION

Halli well and Gutteridge(1989) defined antioxidants as compounds that when present in low concentration in relation to the oxidant, prevent or delay the oxidation of the substrate. 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 (Gumieniczek et al 2002) Antioxidants work to maintain the oxidant at optimum level and to reduce free radical before disturbing living cells in our body

The symptoms of Diabetes mellitus can be correlated symptoms of Mathumeham. 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 (Barar FSK 2000) Antioxidant actions are key to preventing or reversing Diabetes mellitus and its complications (DeFronzo, R, 1999). Thus the aim of the present study was to evaluate the Antioxidant activity of the Mathumeha chooranam and its ingredients used in Mathumeham. Continuous use of synthetic anti diabetic drugs causes side effects and toxicity (Luo-2004, Alarcon et al 2004) Diabetes mellitus is known from ancient time onwards and numerous medicinal plants are used to control Diabetes mellitus in traditional medicine (Ajikumara et al 2006)

Mathumeha 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 *Murraya keonigii* in 0.5:1:1:1 ratio respectively

Gymnema sylvesrae is an herb native to the tropical forests of southern and central India and Sri Lanka. It has been used to treat the Diabetes mellitus for nearly two millennia (Gurmar 2011). It belongs to the family of Asclepiadaceae. In Tamil it is called as Chakkaraikolli, In English small Indian epecacuanha, and In Sinhala Bin nuga. Liubo 2009 reported that *Gymnema sylvesrae* possesses Insulinotropic activity of Human islets of langerhans. Shanmugasundram et al 1990 reported that *Gymnema sylvesrae* has regeneration of the islets of langerhans in streptozotocin diabetic rats

Phyllanthus embellica belongs to the family of Euphorbiaceae. In English it is called as Indian gooseberry, and in Sinhala called as nelli. Sandip et al (1999) stated that it has an antioxidant property. 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 (Qureshi SA et al 2009)

Murraya keonigii 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. Tembhurne and sarkarkar (2009) reported that it possesses antidiabetic activity. Iyer and Uma (2008); Chakarbarty et al 1997; and Tachibana et al 2003 demonstrated that the antioxidant carbozole alkaloids is presents in *Murraya keonigii*.

Terminalia chebula is commonly called as black myrobalam, ink tree. It belongs to the family of compretacea. In English it is called as Chebulic myrobalan In Tamil Kadukkaai, In Sinhala Aralu. Ghandipuram Periyasamy et al (2006) reported that it possesses anti diabetic activity. Hazra B et al reported that It possesses the antioxidant and reactive oxygen species scavenging properties. Chia-Lin and Che-san Lin reported that it has an antioxidant activity

V. MATERIALS AND METHODS

A. Plant material

Leaves of *Gymnema sylvesrae*, leaves *Murraya keonigii*, Seeds of the *Terminalia chebula* and Fruit

of *Phyllanthus embellica* were collected from Karaveddy and Meesalai of Jaffna peninsula

B. Preparation of plant Extract

Leaves of *Gymnema sylvesrae*, leaves *Murraya keonigii*, Seeds of the *Terminalia chebula* and Fruit of *Phyllanthus embellica* were cleaned, washed and dried under shade at room temperature for 10 days. The individual parts were powdered and sieved with muslin cloth. Then stored in airtight container. *Mathumeha chooranam* was prepared from the above powders in 0.5:1:1:1 ratio respectively. *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.

C. Determination of Antioxidant Activity

Total Anti oxidant Activity was determined based on Ferric Reduction method by using spectrophotometric method (Yildirm, et, al, 2001) at monthly intervals for six month, For this analysis different volumes of 0.025ml, 0.050ml, 0.075ml, 0.100ml, 0.150ml, 0.200ml of each extracts were mixed with 0.5ml of 0.2M phosphate buffer (PH 6.6) and 0.5ml of 1% Potassium ferricyanide. The mixture was incubated at 50°C for 20 minutes, then rapidly cooled, mixed with 0.5ml of 10% Trichloroacetic acid and centrifuged at 6500 rpm for 10 min. An aliquot (1ml) of the supernatant were diluted with distilled water (1ml) and then 0.1% Ferric chloride (0.2ml) was added, vortexed and allowed to stand for 30 minutes. The absorbance were read spectrophotometrically measured at 700nm

VI. RESULTS AND DISCUSSION

A. Ferric reduction method

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

Plant material	Total Antioxidant Content µg/mg	
	Hot extract	Cold extract
<i>Terminalia chebula</i>	12.83±2.4	10.13±3.1
<i>Mathumehachooranam</i>	5.6±0.91	4.6±1.16

Phyllanthusemblica	6.3±2.05	4.38±1.72
Murryakeonigii	0.696±0.336	0.506±0.372
Gymnemasylvestrae	0.759±0.665	0.359±0.262

Among the four ingredients of the mathumeha chooranam and mathumeha chooranam studied, Terminalia chebula showed highest total antioxidant content (TAC) in µg/mg of dry weight in cold as well as in hot extracts (10.13±3.1, 12.83±2.4)µg/mg of dry weight respectively followed by Mathumeha chooranam (4.6±1.16, 5.6±0.91)µg/mg of dry weight respectively, Phyllanthus emblica (4.38±1.72, 6.3±2.05) µg/mg of dry weight respectively. Murrya keonigii (0.506±0.372, 0.696±0.336)µg/mg of dry weight respectively and Gymnema sylvestrae (0.359±0.262 0.759±0.665)µg/mg of dry weight respectively.

The cold and hot aqueous extracts of the dried powder of the ingredients of the mathumeha chooranam And Mathumeha chooranam possess antioxidant activity. When compared with the cold extracts of mathumeha chooranam and its ingredients with hot extracts, hot extracts contained higher antioxidant activity than cold extracts. Among the four various ingredients, Terminalia chebula was found to possess significantly higher amount of antioxidant content than other ingredients

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