

## In-vitro alpha-glucosidase inhibitory activity of abraga chendhooram, a Siddha drug

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### ABSTRACT

The present study was carried out to evaluate alpha-glucosidase inhibitory activity of abraga chendhooram which is a Siddha drug being used to treat diabetes mellitus. The ingredient of abraga chendhooram includes biotite ( $(K(Mg,Fe)_3AlSi_3O_{10}(F,OH)_2$ ), *Sesbania grandiflora*, *Calotropis gigantea* and *Momordica charantia*. In-vitro alpha-glucosidase inhibitory assay was performed by standard procedure. Different concentrations of abraga chendhooram and miglitol (standard drug) were used. Abraga chendhooram exhibited a dose dependent alpha-glucosidase inhibitory activity, but it was less than standard drug. Further studies are warranted to look other possible mechanisms for its antidiabetic claim and to assess its safety

**Key words:** Ayurveda, diabetes mellitus, herbo-metallic, biotite, abraga, mica, basma

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### INTRODUCTION

Siddha system of medicine practiced in India describes number of formulations using herbals, minerals, metals, animals and combination of above for the management of diabetes mellitus. Siddha literature describes the diabetes mellitus as madhamegam or neezhivu, which means sweet urine. It emphasizes to use herbo-mineral preparations if herbals alone could not provide relief in diabetes mellitus.<sup>[1]</sup>

Siddha and Ayurveda literature describe different preparations / formulations of abraga chendhooram. Although biotite or mica is the common mineral component, each formulation varies by different herbal ingredients. Abraga chendhooram used in this study is a herbo-mineral Siddha drug prepared from biotite ( $(K(Mg,Fe)_3AlSi_3O_{10}(F,OH)_2$ ), *Sesbania grandiflora*, *Calotropis gigantea* flower and *Momordica charantia* (bitter melon) by traditional calcination (putam) process by applying heavy heat. This drug is indicated for

the management of diabetes mellitus, genito-urinary infection, epilepsy and leprosy.<sup>[2]</sup> A 45 day clinical trial by abraga chendhooram in non-insulin dependent diabetes mellitus has shown statistically significant fall in both fasting as well as post prandial blood glucose level without toxic report.<sup>[3]</sup> Cochrane systematic review and meta-analysis revealed that fasting and postprandial blood glucose level were reduced by  $\alpha$ -glucosidase inhibitors.<sup>[4]</sup>

The literature survey revealed that no scientific study has been carried out to evaluate the mechanism of action of this drug. Hence, this study was aimed to evaluate  $\alpha$ -glucosidase inhibition activity of abraga chendhooram.

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**MATERIALS AND METHODS**

Abraga chendhooram which is in powder form was purchased from SKM Siddha and Ayurveda pharma, India. Different concentrations of test drug (abraga chendhooram) and standard drug (miglitol) were prepared by dissolving in dimethyl sulfoxide (DMSO).

In-vitro α-glucosidase inhibitory activity was evaluated as per standard procedure.<sup>[5]</sup> In short; the α - glucosidase inhibitory assay is based on the breakdown of sucrose to glucose. 200 µl of α - glucosidase enzyme solution was pre-incubated with different concentrations of test and standard drug solution for 5 min. The reaction was initiated by adding 200 µl of 37 mM sucrose to all the tubes. All tubes were incubated for 30 min at 37°C to allow enzymatic action as well as drug action. The enzymatic action was terminated by heating at 100°C for 10 min. The liberated glucose was determined by glucose oxidase–peroxidase (GOD-POD) method at 546 nm and by calculating with relative blank controls. The α-glucosidase inhibitory activity of the test drug was calculated as follows;

$$\% \alpha\text{-glucosidase inhibition} = \frac{\text{Absorbance (blank)} - \text{Absorbance (test/standard)}}{\text{Absorbance (blank)}} \times 100$$

**RESULTS**

The α-glucosidase inhibitory activity of standard drug was increased in dose dependent manner upto 54.76% as a maximum inhibition. This maximum inhibitory effect was achieved at the dose of 31.25 µg/ml, whereas test drug showed 21% inhibitory effect at the same dose. This was the maximum α-glucosidase inhibitory capacity of abraga chendhooram. Further increasing in dose did not show any further inhibitory action, rather showed a decline in the inhibitory effect (Table 1, Figure 1).

**DISCUSSION**

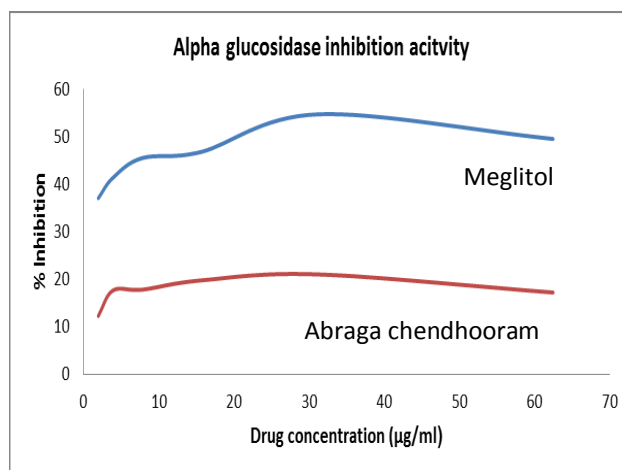
Traditional medicine formulations are aimed for holistic health care. It is believed that different ingredients of one formulation produce synergistic effect by acting in multiple targets and also nullify the adverse effect caused by each other.

**Table 1: α-glucosidase inhibitory activity of standard and test drug**

Drug concentration (µg/ml)	% α-glucosidase inhibition	
	Miglitol (standard)	Abraga chendhooram (test)
1.95	37.07 ± 0.68	12.25 ± 0.20
3.91	41.39 ± 0.98	17.64 ± 0.96
7.81	45.55 ± 1.14	17.80 ± 0.20
15.63	46.82 ± 1.38	19.75 ± 0.54
<b>31.25</b>	<b>54.76 ± 1.60</b>	<b>21.01 ± 0.48</b>
62.50	49.56 ± 0.25	17.20 ± 0.57
125.00	49.92 ± 0.81	16.03 ± 0.37
250.00	47.21 ± 0.35	14.66 ± 0.89
500.00	41.27 ± 1.52	12.29 ± 0.66
1000.00	35.70 ± 0.39	9.35 ± 0.47

Values are expressed in mean ± SEM (n = 3).

**Figure 1: Alpha-glucosidase inhibitory activity of standard and test drugs**



Although abraga chendhooram exhibited a dose dependent α-glucosidase inhibitory activity, it was not comparable with miglitol, a standard drug. Unlike other α-glucosidase inhibitors, abraga chendhooram did not produce any gastrointestinal adverse effects.<sup>[3,4]</sup> *Sesbania grandiflora*, *Calotropis gigantea* and *Momordica charantia*

are three herbal ingredients in abraga chendhooram. The α-glucosidase inhibitory effect was proved for *Sesbania grandiflora*<sup>[6]</sup> and *Calotropis gigantea*.<sup>[7]</sup> *Momordica charantia* was already proved for its antidiabetic and anti-lipidemic properties in rats. Sitosteryl glucoside, stigmasteryl glycoside and polypeptide-p derived from this plant have similar chemical structure to insulin and these natural products could potentially replace insulin treatment.<sup>[8]</sup>

Biotite is the only mineral ingredient in this formulation. Biotite is otherwise called as 'iron mica' which is a natural ore compost of potassium, magnesium, iron and aluminium. Previous animal study has shown that biotite increased the immunity by increasing IgG antibodies about 86%, as protection against infection. It is considered as antibiotic substitute,

natural nutritional supplement and environmental friendly feed additive for livestock.<sup>[9]</sup> It might be helpful to improve immunity and to prevent infections in diabetes mellitus patients. The antidiabetic effect and safety of biotite are yet to be studied.

In conclusion, abraga chendhooram produced dose dependent α-glucosidase inhibitory activity, but was less than miglitol. Future studies on chemical standardization of abraga chendhooram, pharmacological action of each ingredients and rationale of this combination would reveal the scientific basis of traditional claim of abraga chendhooram in the treatment of diabetes mellitus.

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Not reported.

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