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Glucosidase Inhibitory Effects of Some Popularly used Unani, Ayurvedic and Homeopathic medicines

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ABSTRACT

The glucosidase enzymes are responsible for carbohydrate metabolism and increase free glucose in blood, which is one of the major causes of diabetes. This study evaluates alpha-amylase inhibitory effects (*in vitro*) of some popularly used Ayurvedic, Unani, and Homeopathic drugs taking an Allopathic standard, acarbose (sugatrol). Spectrophotometric method was used for this purpose. Results suggest that the Homeopathic drug *Syzygium jambolinum* at all concentration strongly inhibited glucosidase activity in comparison to the other drugs of the same a different treatment systems. The Ayurvedic drug, Jambadharists also inhibited alpha-amylase activity significantly ($p < 0.01$ and $p < 0.001$) in comparison to the control group. The standard Alopathic drug, Sugatrol at 200 µg/mL inhibited alpha-amylase by 78.31%. In conclusion, *S. jambolinum* and Jambadharists have a glycosidase inhibitory effect.

Keywords: diabetes; glucosidase; medicines.

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INTRODUCTION

Diabetes is the 7th leading cause of death among Americans [1]. Although type 2 diabetes remains far less common than Type 1 diabetes, but the incidence is continuing rise in children and young people in some countries [2]. Alpha-glucosidase inhibitors are oral anti-diabetic drugs used in the treatment of type 2 diabetes mellitus (non-insulin-dependent). They work by preventing the digestion of carbohydrates (such as starch and sugar). Carbohydrates are normally converted into simple sugars (monosaccharides), which can be absorbed through the intestine. Hence, alpha-glucosidase inhibitors reduce the impact of carbohydrates on blood sugar [3].

Currently used common alpha-glucosidase inhibitors are Acarbose, Miglitol and Voglibose. Weight loss, kidney and heart failure, lactic acidosis, hypoglycemia, vit. B_{12} deficiency, metallic taste, gastrointestinal disorders, anemia, and edema are the common side effects of the anti-diabetic drugs, including alpha-glycosidase inhibitors [4].

To date a number of Unani, Ayurvedic and Homeopathic anti-diabetic drugs are available in the world. In India and Bangladesh are also available of such kinds of drugs. Although, these kinds of drugs have been used popularly for a long-time, but there is a lack of scientific evidence concerning action mechanisms and effectivity. The aim of the present study is to compare the alpha-glucosidase inhibitory activities of some Unani, Ayurvedic, and Homeopathic drugs (**Table 1**).

Table 1: Drug profile

Drug name	Composition	Main indication(s)	Sources
Unani			
Alisa	*Syzygium cumini*, *S. aramaticum*, *Mangifera indica*, *Myristica fragrans*	Diabetes, bronchitis, asthma, hypertension	Hamdard Laboratories Ltd.
Arq-maul-lahm	*Smilax china*, *Nepta hindostana*, *Nardostachys jatamansi*, *Onosma bracteatum*, *Usnea longissima*, *Aquilaria agallocha*, *Amomum subulatum*, *Centaurea behen*, *Myristica fragrans*, *Apium graveolens*, *Pistacia lentiscus*, *Pyrethrum indicum*, *Crocus sativus*	Diabetes, General & sexual debility	
Dolabi	*Gymnema syivestre*, *Bambusa balnbos*, *Rumex vesicarius*	Diabetes	
Ayurvedic			
Jambadharists	Jambiz, Jaghdumur	Diabetes	Sadhana Ausadhualaya Ltd.
Hemnath	Not found.		
Somnath	Lohovombo		
Homeopethic			
Biolife	Ca, P, Fe	Diabetes mellitus (type 2)	Bangladesh Homoeopathic

Cephalindra indica	*Cephalandra*	Diabetes	Pharmacopoeia (B.H.P)
Syzygium jambolinum	*Syzygium jambolinum, Gymnema* sp., *Abroma* sp., *Cephalandra indica*		
Standard (Allopathic)			
Sugatrol	Acarbose	Diabetes mellitus (type 2)	Pacific Pharmaceuticals Ltd.

MATERIALS AND METHOD

Preparation of samples

Amylase and all the other drugs were dissolved in distilled water to attain the required concentration. Before adding into the test tubes the samples were filtered by Watman filter paper no 1.

Blank preparation

20 µL of α-amylase solution was taken in the test tube. Then 1.3 mL of Tris-HCl buffer was added to it. Finally 100 µL of starch solution and 2 mL acidic iodine solution was added to the test tube.

Preparation for control

To 20 µL of α-amylase solution, 1.3 mL of Tris-HCl buffer was added, which was then treated with 80 µL of aqueous extract and 2 mL acidic iodine solution.

Experimental design

The activity of α-amylase was measured using the starch-iodine method by Komaki et al. [5]. Briefly, 20 µL of α-amylase solution (0.050 mg/mL) was mixed with 1.3 mL of Tris-HCl buffer (0.01 M containing 0.006 M NaCl, pH 6.8) and 80 µL of test sample (drug/standard). After incubation at 37 ºC for 20 min, 100 µL of the starch solution (0.1%) was added, and the mixture was re-incubated for 20 min. Then 2 mL of 0.01% acidic iodine solution was added and the absorbance was measured at 578 nm by using a spectrophotometer. The percentage inhibition of amylase inhibitory capacity was calculated by comparing with the negative control group using the following equation:

$$\text{Percentage inhibition of alpha-amylase} = [(A - C) \times 100] \div (B-C)$$

Where, A, B and C stand for absorbance of the sample, blank and control (no drug), respectively.

Stastical analysis

The data were analyzed by means of analysis of variance (ANOVA) followed by Newman-Keuls's (one-way) or Tukey's test (two-way) *post-hoc* test by using the software GraphPad Prism (version 6.0).

RESULTS AND DISCUSSION

Among Unani drugs Dolabi and Alisa at 200 µg/mL exhibited 37.58 and 33.26% alpha-glucosidase inhibitory capacity, while Arq- maul-lahm by 30.93%. In case of Ayurvedic drugs Jambadharists exhibited the highest inhibitory effect than the Somnath and Hemnath. On the other hand, the Homeopathic drug *Syzygium jambolinum* was found to inhibit glucosidase activity strongly at 100 and 200 µg/mL. The standard Sugatrol at 200 µg/mL inhibited glucosidase activity by 78.31%. The negative control showed a negligible enzyme inhibitory capacity (**Table 2**).

Table 2: Comparative alpha-amylase inhibitory activity (%) of Unani, Ayurvedic and Homeopathic medicines

Treatment systems	**Concentrations (µg/mL)**	**Medicaments**		
Unani		*Alisa*	*Arq- maul-lahm*	*Dolabi*
	50	8.15 ± 0.03[a]	2.50 ± 0.02	18.48 ± 0.01[b]
	100	16.74 ± 0.04[b]	9.89 ± 0.04[a]	27.07 ± 0.02[b]
	200	33.26 ± 0.09[b]	30.93 ± 0.03[b]	37.58 ± 0.04[b]
Ayurvedic		*Hemnath*	*Jambadharists*	*Somnath*
	50	8.24 ± 0.01[a]	18.30 ± 0.02[b]	3.00 ± 0.02
	100	15.43 ± 0.07[b]	42.0 ± 0.02[b]	46.24 ± 0.02[b]
	200	28.25 ± 0.01[b]	79.32 ± 0.02[c]	52.66 ± 0.08[c]
Homeopathic		*Biolife*	*Cephalindra indica*	*Syzygium jambolinum*
	50	11.35 ± 0.04[a]	33.85 ± 0.02[b]	24.85 ± 0.05[b]
	100	17.46 ± 0.04[b]	41.92 ± 0.01[b]	71.30 ± 0.08[c]
	200	28.94 ± 0.04[b]	54.49 ± 0.02[c]	86.30 ± 0.02[c]
Standard (Alopathic)		*Sugatrol*		
	50	10.00 ± 0.03[a]		
	100	20.60 ± 0.01[b]		
	200	78.31 ± 0.05[c]		
Negative control	-	*Distilled water* 1.00 ± 0.00		

Values are mean ± SEM (n = 5); [a]p <0.05; [b]p <0.01; [c]p <0.001

Diabetes is one of the major common consequences of death in the world [6]. Among the antidiabetic drugs, regardless of cost, effectively, and safety the Unani, Ayurvedic and Homeopathic drugs also gaining much attention of the consumers, especially those are poor. In this context, sufficient attention should be given for producing, gathering and transferring scientific reports on these kinds of therapeutics.

Therefore, the results observed in our present study may be helpful for the physicians, scientists, and consumers in this sector.

CONCLUSION

The tested drugs of Unani, Ayurvedic, and Homeopathic have amylase-inhibitory activities. The *Syzygium jambolinum* (Homeopathic) and Jambadharists (Ayurvedic) showed better glycosidase inhibitory effects. More researches are necessary in this area.

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REFERENCES

1. T. Vos, A.D. Flaxman, M. Naghavi, R. Lozano, C. Michaud, M. Ezzati, K. Shibuya, J.A. Salomon, S. Abdalla, V. Aboyans, et al., Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, Lancet 380 (2012) 2163-2196.
2. T.P. Candler, O. Mahmoud, R.M. Lynn, A.A. Majbar, T.G. Barrett, J.P.H. Shield, Continuing rise of Type 2 diabetes incidence in children and young people in the UK, Diabet. Med. 2018. doi: 10.1111/dme.13609.
3. W. Liu, C. Hu, Y. Liu, S. Dai, W. Lu, X. Lv, W. Yao, X. Gao, Preparation, characterization, and α-glycosidase inhibition activity of a carboxymethylated polysaccharide from the residue of Sarcandra glabra (Thunb.) Nakai, Int. J. Biol. Macromol. 99 (2017) 454-464.
4. https://www.diabetes.co.uk/features/diabetes-medication-side-effects.html.
5. E. Komaki, S. Yamaguchi, I. Maru, M. Kinoshita, K. Kakeyi, Y. Ohta, Y. Tsukada Identification of anti-α-amylase components from olive leaf extracts, Food Sci. Technol. Res. 9 (2003) 35-39.
6. N. Wang, J. Cheng, Z. Ning, Y. Chen, B. Han, Q. Li, C. Chen, L. Zhao, F. Xia, D. Lin, L. Guo, Y. Lu, Type 2 diabetes and adiposity induce different lipid profile disorders: A Mendelian randomization analysis, J. Clin. Endocrinol. Metab. 2018. doi: 10.1210/jc.2017-02789.