CODEN: WJAPAC Impact Factor: 3.87 ISSN: 3049-3013

World Journal of Advance Pharmaceutical Sciences

Volume 2, Issue 4. Page: 111-114 Research Article www.wjaps.com

IN-VITRO EVALUATION OF α-GLUCOSIDASE INHIBITORY ACTIVITY OF *POLYALTHIA LONGIFOLIA* SEED EXTRACT

Preethi B. H.[1]*, Dr. T. Balasubramanian[2], Dr. Suresh B. S.[3], Ahalya Devi K. H.[4], Kavya M. K.[5]

[1,5]PG Scholar, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.
[2,3]Professor, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.
[4]Assistant Professor, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.

How to cite this Article Preethi B. H.*, Dr. T. Balasubramanian, Dr. Suresh B. S., Ahalya Devi K. H. and Kavya M. K. (2025). *IN-VITRO* EVALUATION OF α-GLUCOSIDASE INHIBITORY ACTIVITY OF *POLYALTHIA LONGIFOLIA* SEED EXTRACT, 2(4), 111-114.

Article Info

Article Received: 21 September 2025,

Article Revised: 11 October 2025,

Article Accepted: 31 October 2025.

DOI: https://doi.org/10.5281/zenodo.17573067

***Corresponding author:**

***Preethi B. H.**

PG Scholar, Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara – 571422.

ABSTRACT

Diabetes mellitus (DM) is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. One of the effective therapeutic strategies for managing postprandial hyperglycemia is the inhibition of carbohydrate hydrolysing enzymes such as α-glucosidase. *Polyalthia longifolia* is belongs to the Annonaceae family, commonly known as the Ashoka tree, is traditionally used in Indian medicine for its diverse pharmacological activities including antidiabetic potential. The present study was aimed to evaluate in vitro α glucosidase inhibitory activity of ethanolic extract of *Polyalthia longifolia* seeds. The seeds of *Polyalthia longifolia* were shade dried, powdered, and extracted with ethanol using a Soxhlet apparatus. The α-glucosidase inhibitory activity was determined spectrophotometrically using p-nitro-D-glucopyranoside (pNPG) as a substrate. Acarbose was used as the standard inhibitor. The % inhibition and IC_{50} values were calculated to assess the potency of the extract. The ethanolic seed extract of *Polyalthia longifolia* showed significant α glucosidase inhibitory activity in a dose dependent manner. The extract demonstrated an IC_{50} value of 109.16±2.29 µg/ml, which was comparable to that of acarbose IC_{50} 69.05±3.48 µg/ml. The findings suggest that polyalthia longifolia seed ethanolic extract possesses potent α-glucosidase inhibitory activity, indicating its potential as a natural source for the development of antidiabetic agents.

KEYWORDS: Polyalthia longifolia, α glucosidase inhibition, ethanolic extract, antidiabetic activity, medicinal plants.

INTRODUCTION

Diabetes mellitus is a multifactorial metabolic disease marked by persistently high blood sugar levels and abnormalities in the metabolism of carbohydrates, fats, and proteins due to deficiencies in either the action or secretion of insulin, or both.[1] The primary causes of diabetes are either insufficient insulin production by the pancreas or improper insulin delivery by the body's cells.[2] With a prevalence rate of 150 million in 2010 and expected to quadruple to 300 million by 2025, diabetes is a disease that affects people of all ages worldwide.[3] Diabetes significantly affects the number of microvascular and macrovascular diabetic complications. Heart attack, stroke, and peripheral vascular diseases are the macrovascular complication of diabetes, while retinopathy, neuropathy, and nephropathy are the microvascular complication of the disease. Both complications could reduce the quality of life and increase mortality.[4]

Polyalthia longifolia, popularly known as Buddha tree, is one of the most common species in the genus *Polyalthia* belonging to family *Annonaceae*. They found in India, Sri Lanka, Malaysia, Pakistan, Bangladesh, Taiwan, and Ghana. It is an important medicinal plant that is widely spread through the world's subtropical and tropical grounds.[5] *Polyalthia longifolia* is commonly known as the False Ashoka, Buddha Tree, Green Champa, Indian Mast Tree, and Indian Fire Tree.[6] In India, traditionally *Polyalthia longifolia* used as a remedy for fever, gonorrhea, ulcer, skin diseases, and helminthiasis. It is also traditionally used to treat various disorders, such as diabetes, hypertension, fever, skin diseases, pyrexia.[7]

The last stage of the digestion of carbohydrates is catalysed by α-glucosidase. One of the most manageable challenges of type II diabetes mellitus is postprandial hyperglycemia, which can be suppressed by its inhibitors by delaying the absorption of food carbohydrate. Acarbose, miglitol, and voglibose are examples of a-glucosidase inhibitors that are known to lower postprandial hyperglycemia mainly by interfering with the enzymes that break down carbohydrates and postponing the absorption of glucose. Many a-glucosidase inhibitors, some of which are clinically significant, have recently been discovered from plants.[8]

The Traditional claims of α glucosidase inhibitory activity of *Polyalthia Longifolia* Seeds is yet to be scientifically explored. Hence the current research has been planned to evaluate α glucosidase inhibitory properties in ethanolic extract of *Polyalthia Longifolia* seeds.

MATERIALS AND METHODS

Plant material

The fresh seeds of *Polyalthia longifolia* was collected during the month of September 2024 from the local area of Bharathinagara, Mandya District and Karnataka state and authenticated by Dr. Thejesh Kumar, M. P. M.Sc., Ph.D. Co-Ordinator, Department of botany (PG), Bharathi College (PG & RC), Bharathinagara. Then fresh seeds of *Polyalthia longifolia* was dried under shade and crushed into coarse powder using an electrical grinder. The powdered plant material stored in a air tight container for future use.

Preparation of the extract

The shade dried coarse powdered seeds of *Polyalthia longifolia* was extracted with 70% ethanol and 30% water by using Soxhlet apparatus at a temperature 50-60 ^{0}C. Extraction was continued until the solvent in the thimble became clear. After complete extraction, the extract was concentrated by using rotary evaporator and stored in refrigerator until used.

α GLUCOSIDASE INHIBITORY ACTIVITY[9,10]

The ethanolic seeds extract of *Polyalthia longifolia* was dissolved in of 10% DMSO to give concentrations ranging from 20 to 120µg/ml., The α-glucosidase was dissolved in 100 mM phosphate buffer pH 6.8. A volume of 10µL α-glucosidase (1 U/mL) was mixed with concentration range from 20, 40, 60, 80, 100, 120µL of the extract and was pre incubated at 37°C for 15 min. Then, 20 µL P-NPG (5 mM) was added as a substrate and further incubated at 37°C for 20 min. Add 3 ml of 50 mM sodium hydroxide was added to the mixture and the absorbance was measured at 410 nm using a UV-Visible spectrophotometer. The blank was prepared by replacing the seed extract with 50µl of buffer. A blank reaction was similarly prepared using the plant extract at each concentration in the absence of the enzyme solution. A positive control sample was prepared using Acarbose (20µg/ml–120µg/ml) and the reaction was performed similarly to the reaction with seeds extract as mentioned above and each experiment was performed in triplicate. The α-glucosidase inhibitory activity was expressed as percent inhibition and was calculated using the equation given below: The % α- glucosidase inhibition was plotted against the extract concentration and the IC50values were obtained from the graph.

$$\%\ \alpha\ \text{glucosidase inhibition} = \frac{\text{Abs(control)} - \text{Abs(Extract)}}{\text{Abs(Control)}} \times 100$$

RESULT

The results of α glucosidase inhibitory activity of the ethanolic seed extract of polyalthia longifolia are presented in the Table 1. The extract exhibited a dose dependent increase in enzyme inhibition when compared with the standard drug acarbose. The percentage inhibition increased proportionally with the concentration of extract.

The IC_{50} value of the ethanolic seed extract of polyalthia longifolia was found to be 109.16±2.29 µg/ml, whereas acarbose showed an IC_{50} value of 69.05±3.48 µg/ml. This indicates that the extract possesses notable α glucosidase inhibitory activity, though slightly less potent than the standard drug.

The dose dependent inhibitory pattern was further confirmed by figure 1, showing a gradual increase in enzyme inhibition with increasing concentration of extract.

Table 1: α-glucosidase inhibition by *Polyalthia longifolia* seeds ethanol extract.

Sample	Concentration (µg/ml)	% inhibition	IC50µg/ml
P. longifolia seeds	20	10.72±2.41	109.16±2.29
	40	16.96±1.26	
	60	26.23±1.26	
	80	36.63±1.34	
	100	47.57±0.98	
	120	54.16±0.06	
Acarbose (standard)	20	14.37±2.00	69.05±3.48
	40	26.91±4.01	
	60	41.47±4.01	
	80	55.78±4.83	
	100	72.78±4.51	
	120	91.21±3.40	

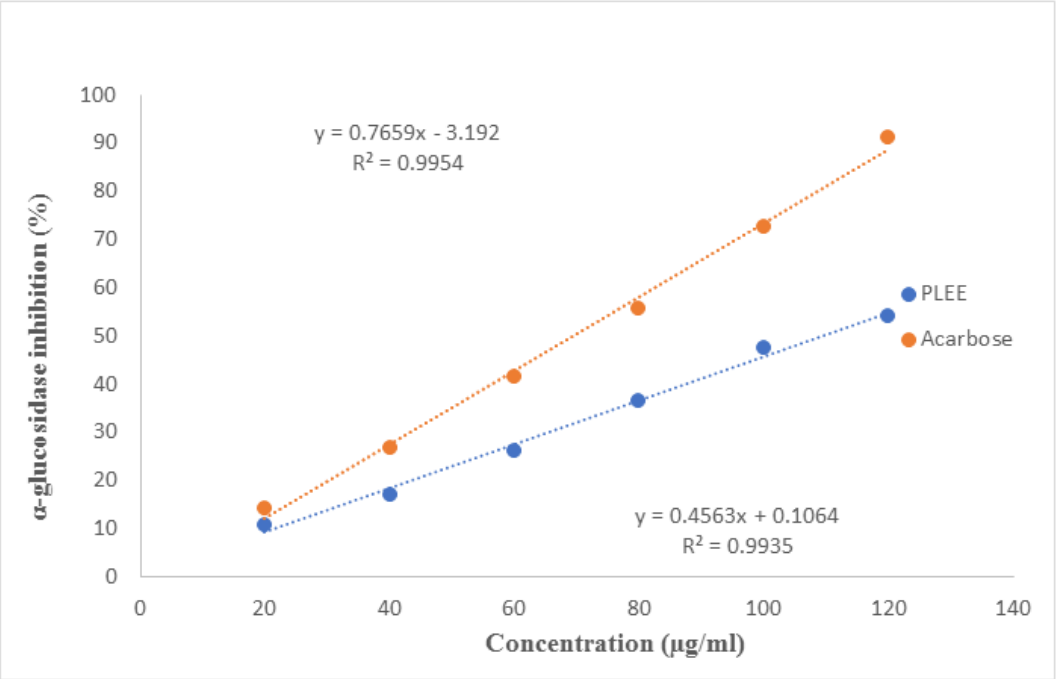

Figure 1: Percentage inhibition by α-glucosidase inhibition (%) assay.

DISCUSSION

One proven treatment method for postprandial hyperglycemia is the inhibition of α-glucosidase, which delays the breakdown and absorption of carbohydrate. According to the current study, *Polyalthia longifolia* ethanolic seed extract demonstrated strong α-glucosidase inhibitory activity in vitro, confirming its long-standing use as an antidiabetic.

The secondary metabolites found in *P. Longifolia* seeds, including alkaloids, flavonoids, tannins, and terpenoids, which are known to have enzyme-modulating qualities, may be responsible for the observed inhibitory activity. The significant enzyme inhibition seen was probably caused by the ethanolic solvent's improved ability to extract the bioactive ingredients.

The extract's natural origin and potential for less side effects make it a good candidate for more pharmacological development, even though it showed lower potency than acarbose. Similar flavonoid compounds that block α-glucosidase, confirming the phytochemicals' antidiabetic properties.

To validate the extract's mechanism of action and therapeutic significance, more purification and structural characterization of the active ingredients are needed, in addition to in vivo research.

CONCLUSION

The results of this study show that *polyalthia longifolia* seed ethanolic extract has strong α-glucosidase inhibitory activity, suggesting that it could be used as a natural source to create new antidiabetic drugs. The results support the plant's long-standing use in the treatment of diabetes and offer a solid scientific foundation for the future pharmacological analysis, characterisation, and isolation of its active ingredients.

ACNOWLEDGEMENT

I would like to express my sincere gratitude to Bharathi College of pharmacy, Bharathinagara, Mandya, Karnataka for their invaluable support. I am also thankful to Dr. T. Balasubramanian, Dr. Suresha B S, Ahalya devi K H for their support.

REFERENCE

1. Surya S, Salam AD, Tomy DV, Carla B, Kumar RA, Sunil C. Diabetes mellitus and medicinal plants-A review. Asian Pacific J Tropic Dis., 2014; 4(5): 337-47.
2. Kumar H. Evaluation of anti-diabetic activity of polyalthia longifolia extract in rat's models. Asian J. Res. Biol. Pharm. Sci., 2018; 6(2): 78-84.
3. Gupta PP, Haider J, Yadav RP, Pal U. Preclinical evaluation of antidiabetic activity of poly herbal plant extract in streptozotocin induced diabetic rats. The Journal of Phytopharmacology, 2016; 5(2): 45-49.
4. Yusuf H, Yusni Y, Meutia F, Fahriani M. Pharmacological evaluation of antidiabetic activity of Chromolaena odorata leaves extract in streptozotocin-induced rats. Sys Rev Pharm., 2020 Oct 1; 11(10): 772-8.
5. Mudhafar M, Zainol I, Desa S, Jaafar CN. Mini-review of phytochemistry for Polyalthia Longifolia. Eurasian J of Analytical Chem., 2019 May 23; 14(2): 119-47.
6. Lavanya C, Rao BG, Ramadevi D. Phytochemical and pharmacological studies on Polyalthia longifolia. Int. J. Pharma. Sci. Res., 2018; 3(4): 01-7.
7. Dattatray TV, Baburao SP, Shivaji CS. Comprehensive review on Polyalthia longifolia. J. Tradit. Med. Res., 2021 Jan 4; 6(2): 19.
8. Srivsatava R, Srivastava SP, Jaiswal N, Mishra A, Maurya R, Srivastava AK. Antidiabetic and antidyslipidemic activities of Cuminum cyminum L. in validated animal models. Medicinal Chemistry Research, 2011 Dec; 20(9): 1656-66.
9. Nair SS, Kavrekar V, Mishra A. In vitro studies on α-glucosidase inhibition (%) and α glucosidase inhibitory activities of selected plant extracts. Eur J Exp Biol., 2013; 3(1): 128-32.
10. Mourya P. In-vitro studies on inhibition of α-glucosidase inhibition (%) and α glucosidase by plant extracts of alternanthera Pungens kunth. J Drug Deliv Ther., 2018; 8(6-A): 64-8.