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IN-VITRO ANTI-DIABETIC EVALUATION OF NAGAVANGA PARPAM BY ALPHA AMYLASE AND ALPHA GLUCOSIDASE ENZYME INHIBITION ASSAY

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ABSTRACT

Background: Diabetes mellitus remains a global health challenge, with postprandial hyperglycemia being a key therapeutic target. Nagavanga Parpam (NP), a classical Siddha herbo mineral preparation containing Naagam(zinc) velvangam(tin) and extract of *Pandanus odorattissimus*, has been traditionally used for metabolic disorders. This study aims to scientifically validate its anti-diabetic potential. Methods: In-vitro enzyme inhibition assays against α-amylase and α-glucosidase were conducted using NP at varying concentrations (100–500 µg/ml), with Acarbose as the standard reference. Percentage inhibition and IC_{50} values were determined. Results: NP exhibited dose-dependent inhibition of α-amylase (maximum 30.83 ± 1.53%, IC_{50} = 804.1 ± 48.5 µg/ml) and α-glucosidase (maximum 25.43 ± 3.76%, IC_{50} = 990.8 ± 145.3 µg/ml). Compared to Acarbose, NP showed moderate potency but measurable activity. Conclusion: The findings highlight the potential role of NP in glycemic control, supporting its further evaluation in preclinical and clinical models.

KEYWORDS: Nagavanga Parpam, Siddha medicine, Anti-diabetic, α-Amylase inhibition, α-Glucosidase inhibition.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia due to insulin deficiency, resistance, or both. Globally, DM prevalence is rapidly increasing, warranting novel and cost-effective therapeutic interventions. Management strategies often include inhibition of carbohydrate-metabolizing enzymes such as α-amylase and α-glucosidase, which delay glucose absorption and lower postprandial glucose spikes.

Traditional Siddha formulations, including Nagavanga Parpam (NP), this formulation contains Nagam(zinc) velvangam(tin) and the extract of Pandanus odarittissimus the parpam is prepared by traditional calcinations(pudam) method by producing excessive amount of heat, naga vanga parpam indicated in *yacobu vaithya sinthamani 700* book have been widely used for metabolic disorders. However, there is limited systematic scientific validation of their anti-diabetic properties. The present study was designed to evaluate the in-vitro enzyme inhibitory activities of NP to establish pharmacological evidence supporting its therapeutic role in diabetes management.

MATERIALS AND METHODS

Preparation of Test Sample

Nagavanga Parpam (NP) was procured and prepared as per Siddha classical guidelines. The test solution was prepared by serial dilution to concentrations ranging from 100–500 µg/ml in double-distilled water.

α-Amylase Inhibition Assay

The α-amylase enzyme inhibition activity was determined using a spectrophotometric method. α-Amylase enzyme (0.5 U/ml) was incubated with varying concentrations of NP and the substrate CNPG3. Absorbance was recorded at 405 nm. Acarbose (100 µg/ml) served as the reference drug. The percentage inhibition was calculated using the standard formula.

α-Glucosidase Inhibition Assay

The α-glucosidase inhibition activity was evaluated using PNPG as a substrate. Reaction mixtures containing NP, enzyme, and substrate were incubated at 37°C. The release of p-nitrophenol was quantified.

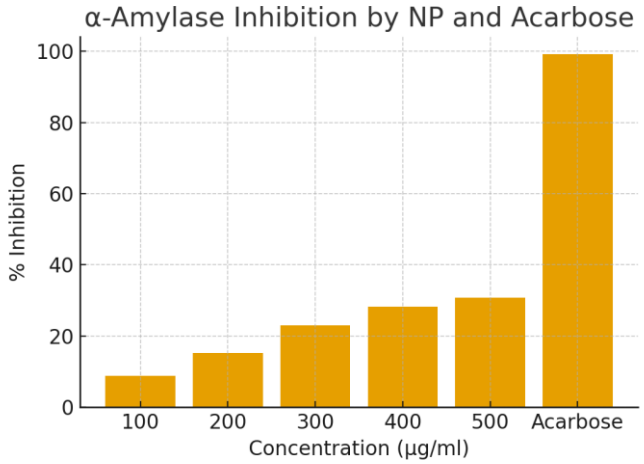
spectrophotometrically at 405 nm. Acarbose was used as the positive control. IC_{50} values were derived from dose-response curves.

RESULTS

α-Amylase Inhibition Assay

Concentration (µg/ml)	% Inhibition (Mean ± SD)
100	8.71 ± 0.88
200	15.23 ± 2.04
300	23.06 ± 2.87
400	28.30 ± 1.48
500	30.83 ± 1.53
Acarbose	99.13 ± 0.79

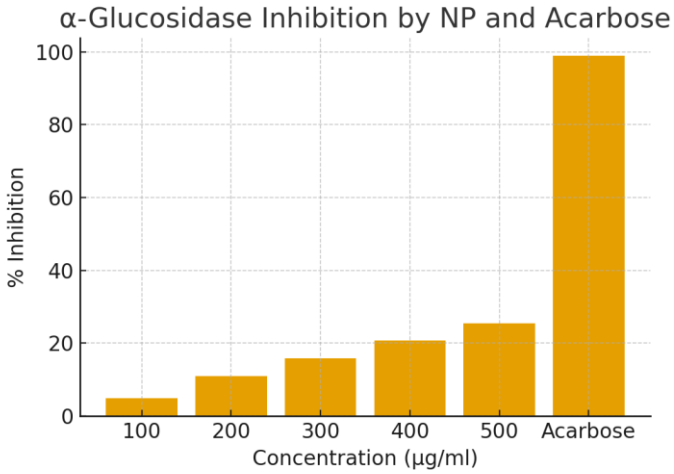
IC_{50} (NP): 804.1 ± 48.5 µg/ml | IC_{50} (Acarbose): 35.05 ± 1.21 µg/ml.



α-Glucosidase Inhibition Assay.

Concentration (µg/ml)	% Inhibition (Mean ± SD)
100	4.90 ± 0.97
200	10.97 ± 1.18
300	15.80 ± 2.60
400	20.74 ± 2.78
500	25.43 ± 3.76
Acarbose	98.90 ± 0.87

IC_{50} (NP): 990.8 ± 145.3 µg/ml | IC_{50} (Acarbose): 41.98 ± 0.85 µg/ml.



DISCUSSION

The current investigation confirmed that NP exhibits concentration-dependent inhibitory activity against both α-amylase and α-glucosidase enzymes, although the potency was considerably lower compared to Acarbose. The observed effects may be attributed to the presence of phytoconstituents such as flavonoids, alkaloids, and phenolic compounds in the formulation. These classes of compounds are known to modulate carbohydrate metabolism and delay glucose absorption.

Previous reports on Siddha and herbal formulations demonstrated similar inhibitory activities, validating the role of traditional medicines in glycemic regulation. However, the relatively high IC_{50} values of NP indicate that higher concentrations may be required for significant clinical effects. Nonetheless, its traditional use, safety profile, and potential for synergistic effects in polyherbal combinations justify further in-vivo and clinical studies.

CONCLUSION

Nagavanga Parpam demonstrated measurable α-amylase and α-glucosidase inhibitory activity in vitro. Though less potent than Acarbose, its activity supports its traditional use in Siddha medicine for diabetes management. Future directions should include isolation of bioactive compounds, in-vivo efficacy testing, and clinical validation.

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