

# Antidiabetic Activity of Piper Longum and Stevia Herbal Formulation

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## ABSTRACT

**AIM:** The aim of the study is to find the antidiabetic activity of piper longum and stevia herbal formulation.

**INTRODUCTION:** Diabetes Mellitus also known as diabetes is a metabolic disorder which is characterised with increased blood glucose level. Frequent urination, increased thirst and increased appetite are the common symptoms. Three types of diabetes are there namely type 1, type 2, and gestational diabetes. Piper longum also known as indian long pepper, belongs to the family piperaceae. It belongs to the indo-malaya region and tropical rainforest region. Stevia rebaudiana commonly known as candly leaf, sweet leaf and sugar leaf belongs to the genus stevia. Stevia is a natural sweetener and natural sugar substitute.

**MATERIALS AND METHOD:** Ipha-amylase inhibition was determined by quantifying the amount of maltose liberated during the experiment. Different concentration of nanoparticles (10, 20, 30, 40, 50 $\mu$ L.) was pre-incubated with 100 $\mu$ L of amylase solution (1U/mL) at room temperature for 30 minutes. DNSA reagent was added to stop the reaction and the solution was heated in a water bath for 5 minutes. Control was maintained where the equal quantity of enzyme extract was replaced by sodium phosphate buffer maintained at a pH value of 6.9.

**RESULTS AND DISCUSSION:** The bar graph represents the antidiabetic activity of piper longum and stevia herbal formulation in various concentrations in  $\mu$ L. 10 $\mu$ L of concentration shows 45% of inhibition, 20 $\mu$ L of concentration shows 50% of inhibition, 30 $\mu$ L of concentration shows 65% of inhibition, 40 $\mu$ L of concentration shows 70% of inhibition and 50 $\mu$ L of concentration shows 80% of inhibition.

**CONCLUSION:** From this study it is clear that the fruit of piper longum and stevia leaves has proven to be a better choice for antidiabetic activity.

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## INTRODUCTION

Diabetes mellitus also known as diabetes is a metabolic disorder which is characterised with increased blood glucose level. Frequent urination, increased thirst and increased appetite are the common symptoms. Diabetic ketoacidosis, hyperosmolar hyperglycemic state and death are the acute complications(1). Long term symptoms include cardiovascular diseases, stroke, chronic kidney failure, foot ulcer, and damage to eyes and nerves. Three types of diabetes are there namely type 1, type 2, and gestational diabetes(2).

Type 1 diabetes is due to failure of pancreas to produce enough insulin due to loss of beta cells. It is also called insulin dependent diabetes mellitus or juvenile diabetes(3). Autoimmune is responsible for this type of diabetes mellitus. Type 1 diabetes mellitus can be managed by insulin injections(4). Type 2 diabetes mellitus also known as non insulin dependent diabetes mellitus or adult-onset diabetes is a condition where cells fail to respond properly to insulin. Excessive body weight and lack of exercise causes type 2 diabetes(5). Healthy diet, regular exercise and avoiding use of tobacco prevents the risk of type 2 diabetes. Drugs such as insulin stabilizer may be used to treat type 2 diabetes. Gestational diabetes occurs mostly to the pregnant women without any previous history of diabetes mellitus(6). Gestational diabetes mostly cured automatically after the birth of the baby(7).

## KEYWORDS:

Antidiabetic activity,  
Herbal formulation,  
Piper longum.

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Antidiabetic drugs are used to control and stabilize the blood glucose levels(8). The drugs used to treat diabetes are insulin, pramlintide, GLP-1 receptor agonist and oral hypoglycemics. Most common drug used to treat diabetes is insulin(9). Basically antidiabetic drugs are not designed to treat diabetes, is it used to control the blood glucose level. These drugs are life long drugs(10). Piper longum also known as indian long pepper, belongs to the family *piperaceae*. It belongs to the indo-malaya region and tropical rainforest region. Piper longum is used as a spice and seasoning agent(11). The leaves of piper longum are about 5 - 9 cm long and 5 cm in width. Flowers are unisexual with spikes. Female spikes are about 1.25 - 2.00 cm in length and male spikes are about 2.5 - 7.5 cm in length(12). Piper longum used to treat bronchitis, asthma, constipation, gonorrhoea, paralysis of the tongue, diarrhea, cholera, malaria, hepatitis, respiratory infections, stomachache, spleen diseases, cough and tumors(13).

Stevia rebaudiana commonly known as candly leaf, sweet leaf and sugar leaf belongs to the genus stevia. Stevia is a natural sweetener and natural sugar substitute(14). In Brazil and Paraguay it is used as a sweetening agent and medicines for hundreds of years. It is a non-nutritive sweetener and herbal supplements(15). Sweeteners with little or no calories are known as non-nutritive sweeteners. Stevia is used as a healthy alternative to added in many meals and beverages(16). Our team has extensive knowledge and research experience that has translate into high quality publications(2,6,17-19),(20),(21),(22),(23),(24),(25),(18,26,27),(28-34).

## MATERIALS AND METHODS

### Preparation of Plant Extract

Piper longum and stevia were dried for 7 days and made into a powder. 1g of Piper longum and stevia were collected and dissolved in distilled water and were boiled for 5-10 min at 50°. The solution was filtered by using Whatman no. 1 filter paper. The filtered extract was collected and stored in 4µ.

### Alpha-amylase Inhibitory Assay

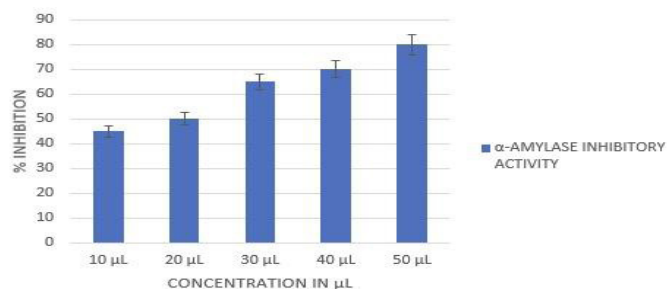
Alpha-amylase inhibition was determined by quantifying the amount of maltose liberated during the experiment. The method reported by Bhutkar and Bhise has been followed (Bhutkar and Bhise, 2012). Different concentration of nanoparticles (10, 20, 30, 40, 50µL.) was pre-incubated with 100µL of amylase solution (1U/mL) at room temperature for 30 minutes. 100µL of starch solution (1% w/v) was further added to it and the mixture was incubated at room temperature for 10 minutes. 100µL of 96 mM (3, 5 - dinitrosalicylic acid solution) DNSA reagent was added to it to stop the reaction and the solution was heated in a water bath for 5 minutes(22). Control was maintained where the equal quantity of enzyme extract was replaced by sodium phosphate buffer maintained at a pH value of 6.9. Reading was measured at 540nm. The experiment was performed in triplicate. Acarbose was used as a positive control. % inhibition was calculated using the formulae -

$$\% \text{ inhibition} = \frac{C - T}{C} \times 100. \text{ where,}$$

$$C = \text{control, } T = \text{test sample.}$$

## RESULTS AND DISCUSSION

### ANTIDIABETIC ACTIVITY OF PIPER LONGUM AND STEVIA HERBAL FORMULATION.



**Graph 1:** Bar graph showing antidiabetic activity of piper longum and stevia herbal formulation. Where in X axis denotes concentration in µL and Y axis denotes % inhibition

### Antidiabetic activity

The bar graph represents the antidiabetic activity of piper longum and stevia herbal formulation in various concentrations in µL. 10µL of concentration shows 45% of inhibition, 20µL of concentration shows 50% of inhibition, 30µL of concentration shows 65% of inhibition, 40µL of concentration shows 70% of inhibition and 50µL of concentration shows 80% of inhibition. Similarly a study on antidiabetic activity of triamcinolone acetone-loaded lipid nanocapsules, humanin peptide with elastin like polypeptide nanoassembly, loaded poly lactic-co-glycolic acid nanoparticles showed positive results(35). The study on algal mass shows that it has antimicrobial activity(36). Similarly a study shows that silver and graphene oxide bio based nanoparticles have antimicrobial activity with minimum cytotoxic effects(37). Similarly a study shows that silymarin mediated HAP and ZnO nanoparticles have antimicrobial activity against oral pathogens such as *Pseudomonas* sp, *Staphylococcus aureus*, *Streptococcus mutans*, *Enterococcus faecalis* and *Candida albicans*(38).

## CONCLUSION

From this study it is clear that the fruit of piper longum and stevia leaves has proven to be a better choice for antidiabetic activity. Hence this extract may be used for lowering blood glucose level in diabetic patients. In future this extract can be used to treat numerous diseases.

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### CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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