

Hepato-Pancreatic Protective Effect of Green Tea in Alloxan Induced Diabetic Rat Model A Histological and Biochemical Study

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Introduction

Diabetes mellitus, is a metabolic disorder characterized by hyperglycaemia, which has been closely associated with diabetic complications.[1]

While the number of diabetic patients around the globe is predicted to reach 366 million by the year 2030, and with this rise in the prevalence of diabetes, exploring novel therapeutic interventions becomes imperative.[2]



Glibenclamide, a well-established oral hypoglycaemic agent, however glibenclamide like any medication, has potential drawbacks and side effects.
[3]

Emerging evidence suggests that green tea may have beneficial effects on glucose control and insulin sensitivity.[3]



Aim of the study

This study aims to explore the potential hypoglycemic impact of green tea in Alloxan diabetic Sprague Dawley rats, in comparison with the effects of Glibenclamide.

Additionally, we seek to examine the protective role of green tea on pancreatic and liver cells.

Study Hypothesis

Hypothesis:

The administration of green tea extract will exert a superior hypoglycemic effect compared to the standard antidiabetic drug, glibenclamide, in alloxan-induced diabetic Sprague-Dawley rat model.

Study Design:

This hypothesis will be tested through controlled, and parallel-group animal experiment using male Sprague-Dawley rats.

Methodology

The study involved Thirty-two Sprague-Dawley rats that were divided into four groups:

Group 1

Negative control (no intervention)

Group 2

Positive control (diabetes induced by Alloxan with no drug intervention)

Group 3

Glibenclamide treated (diabetes induced by Alloxan and treated with glibenclamide 0.5mg/kg)

Candasmy et al 2014

Group 4

Green tea treated (diabetes induced by Alloxan and treated with green tea 3g/kg)

Tan et al 2023



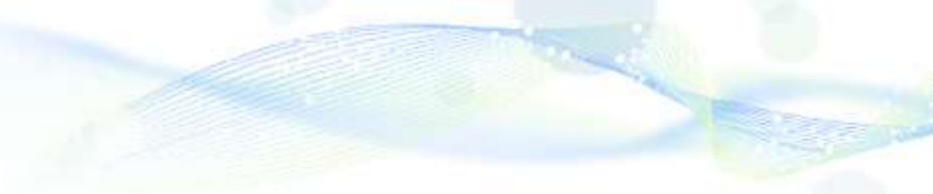
Methodology

Diabetes induction entailed intraperitoneal administration of Alloxan monohydrate at a dosage of 150mg/kg

6 hours afterwards, the rats were treated with an intraperitoneal injection of 20% glucose, then for the next 24 hours a 5% glucose solution was provided to rats to prevent hypoglycemia.

After 48 hours treatment of rats was initiated.[4-5]

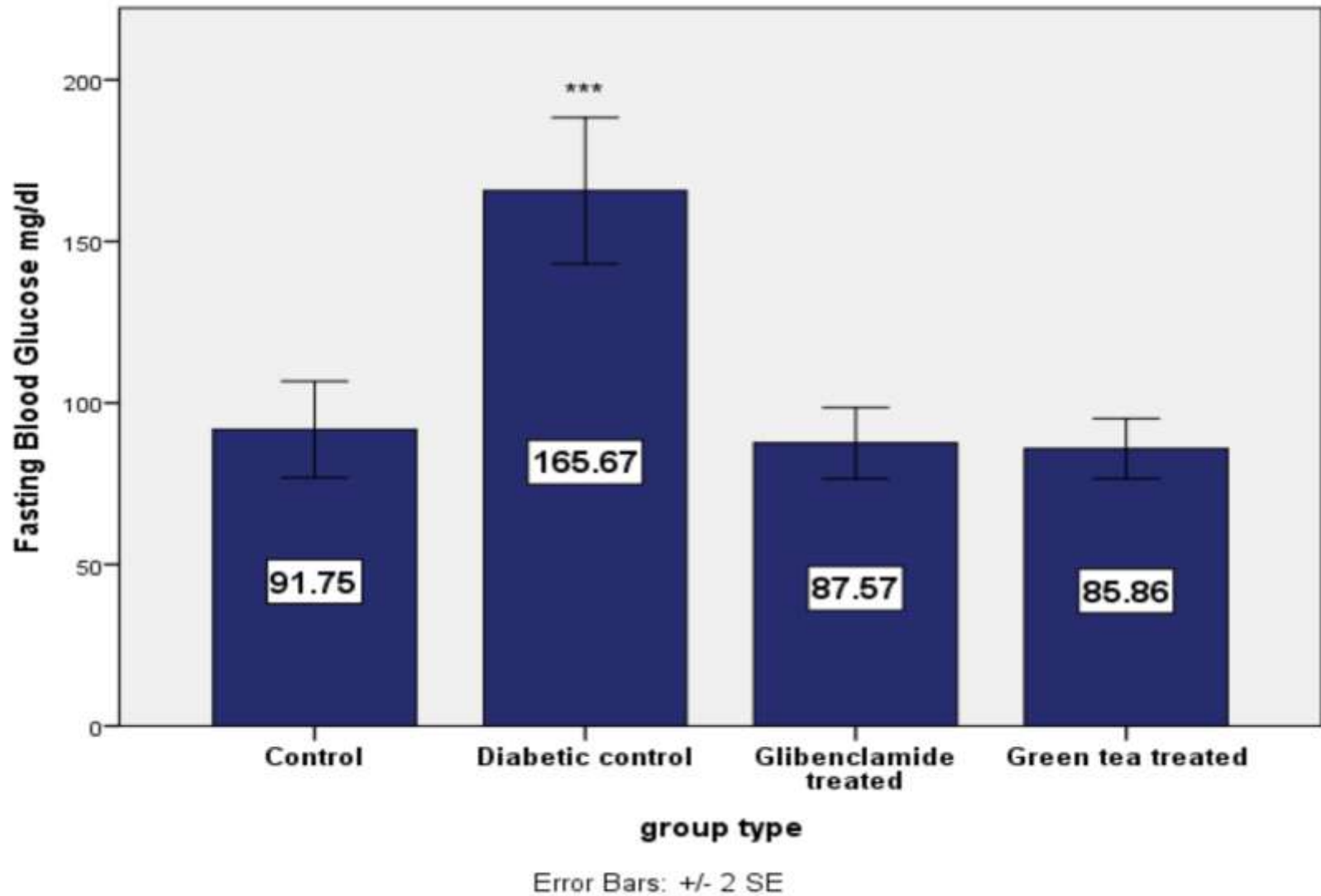




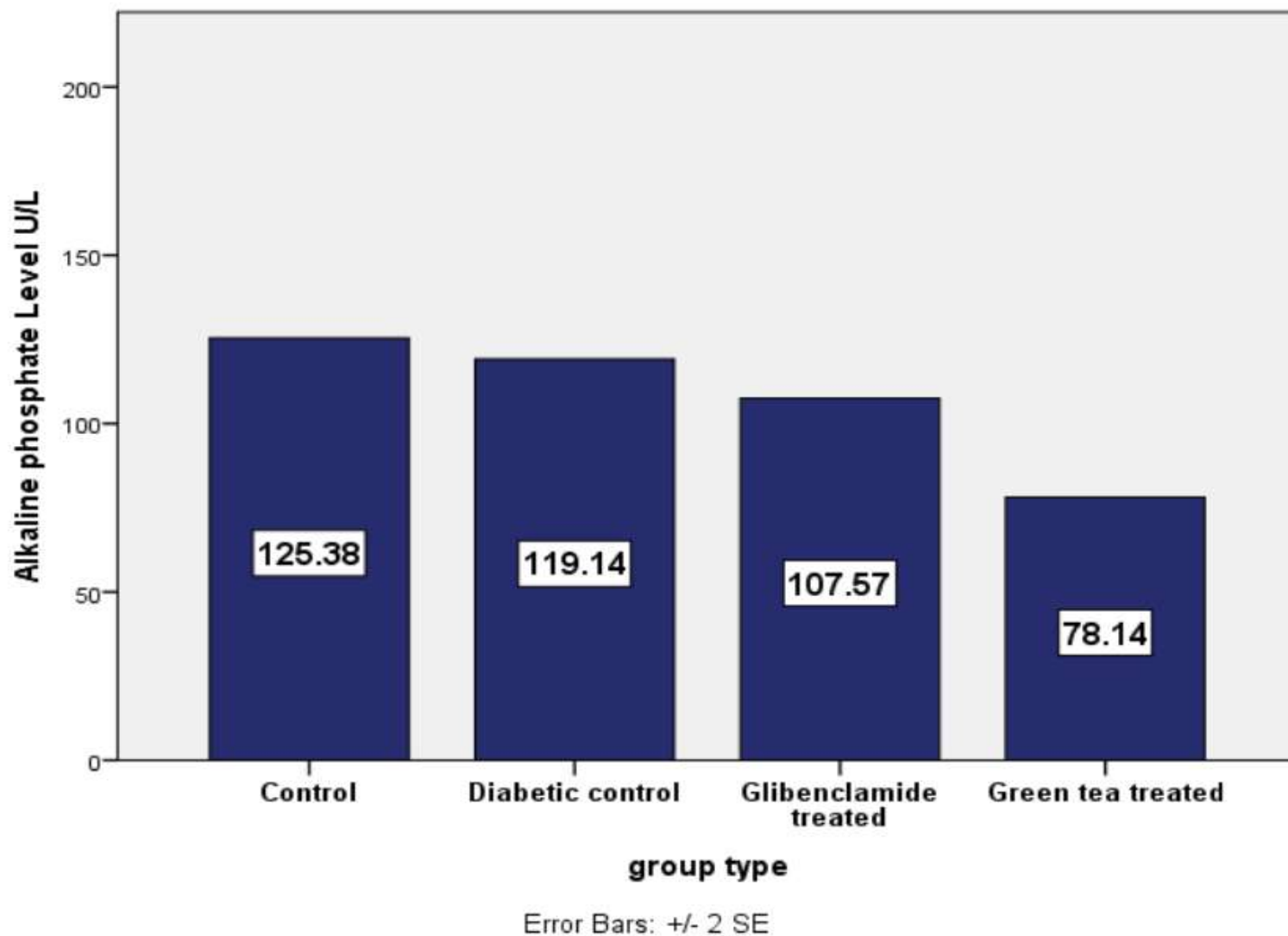
At the end of the experiment, the overnight fasted rats were sacrificed by decapitation and blood glucose levels, liver function tests, and histopathological analysis of liver and pancreatic tissue were evaluated.



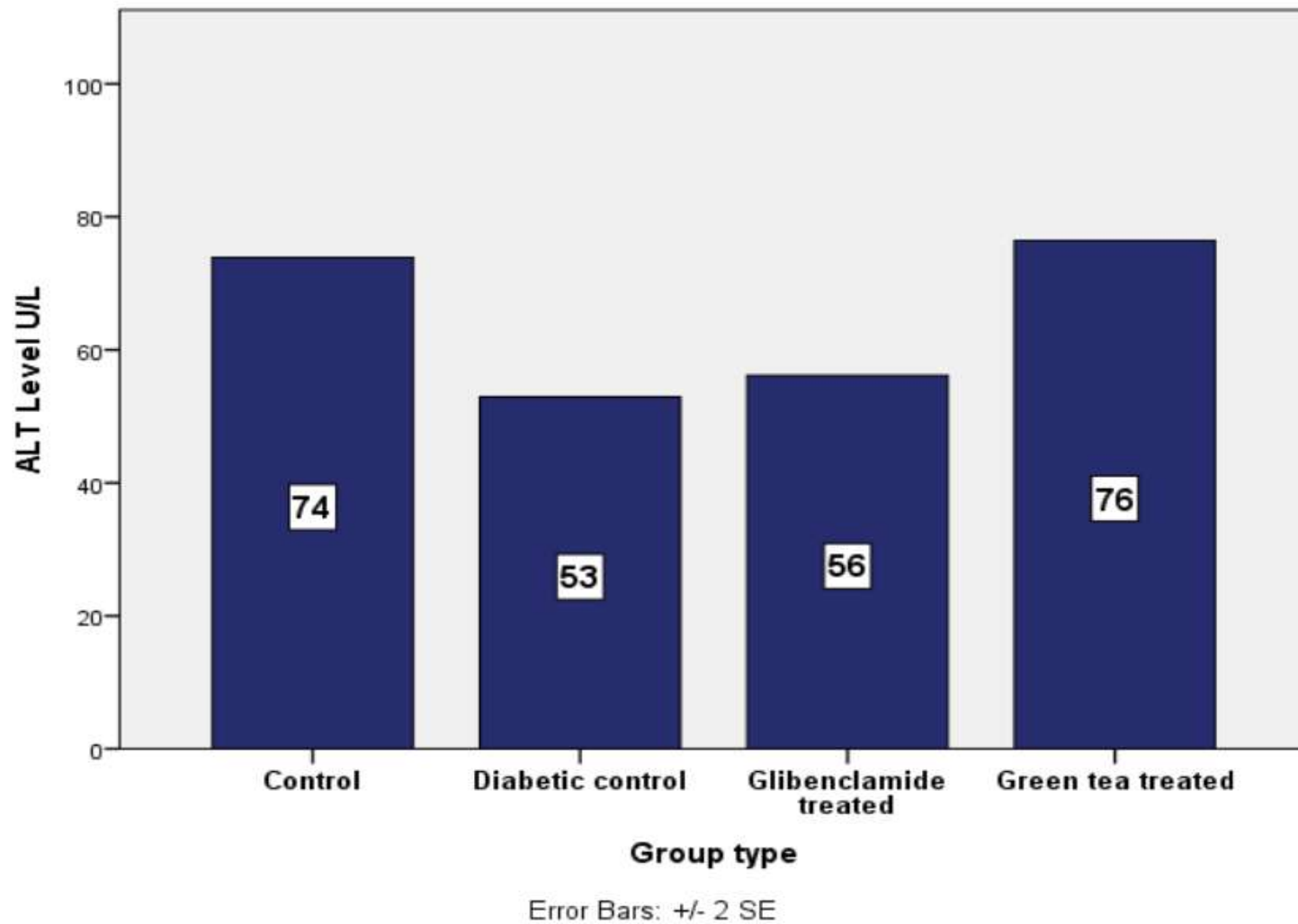
Results and Discussion



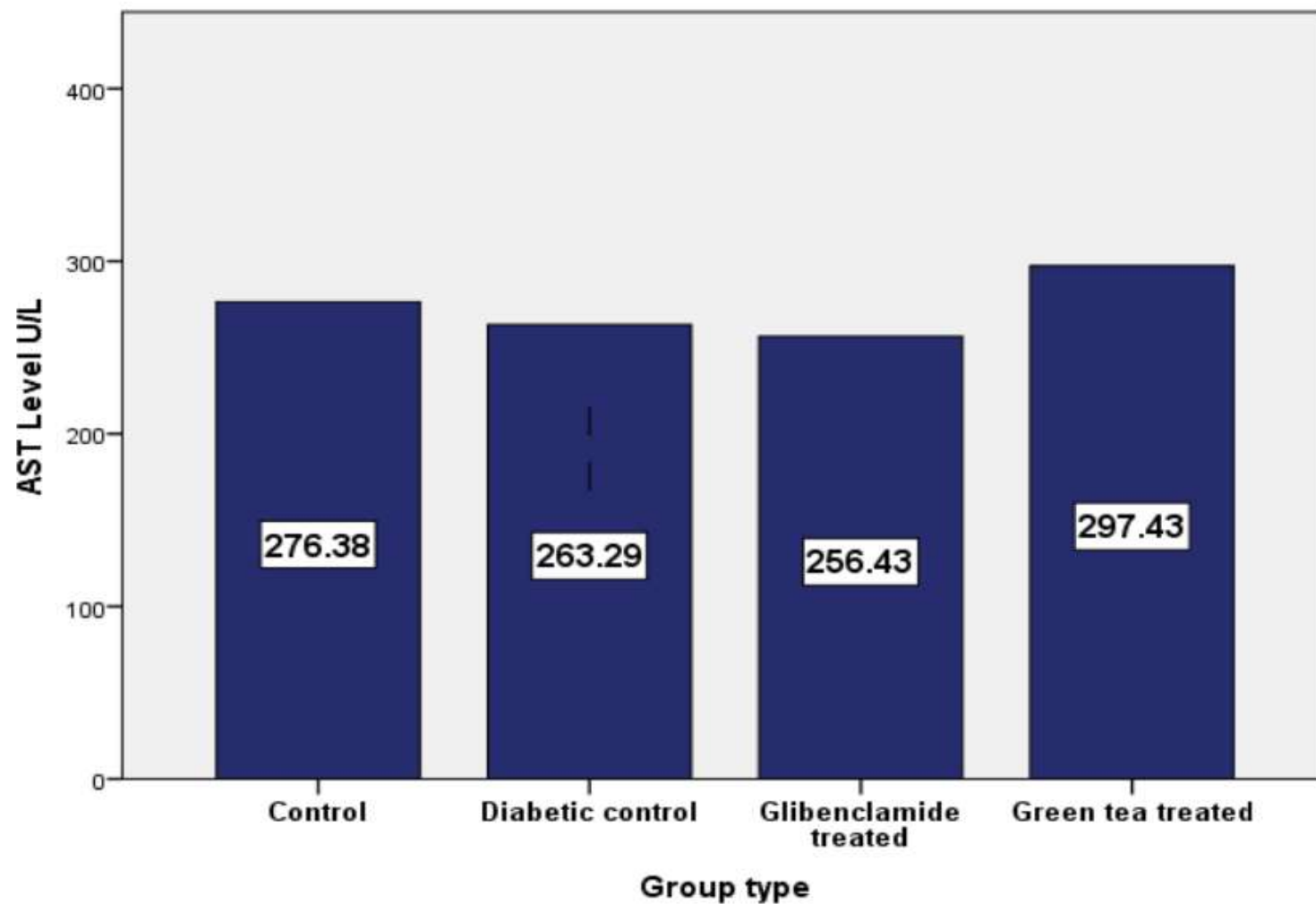
Results and Discussion



Results and Discussion

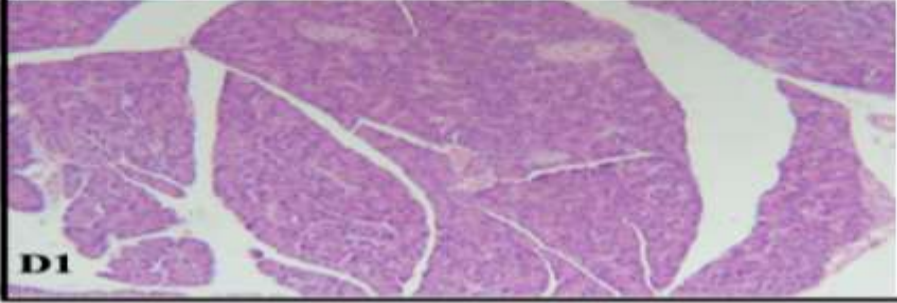
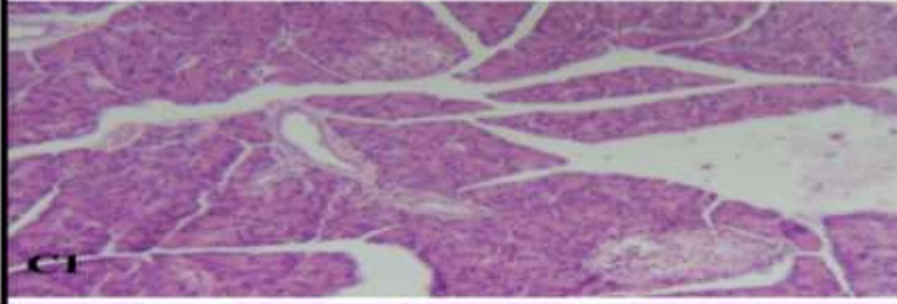
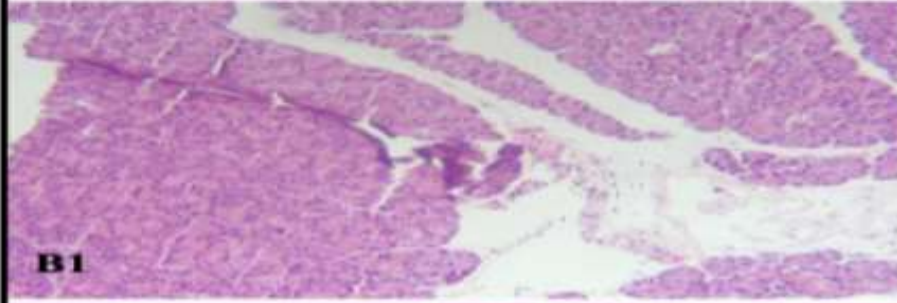
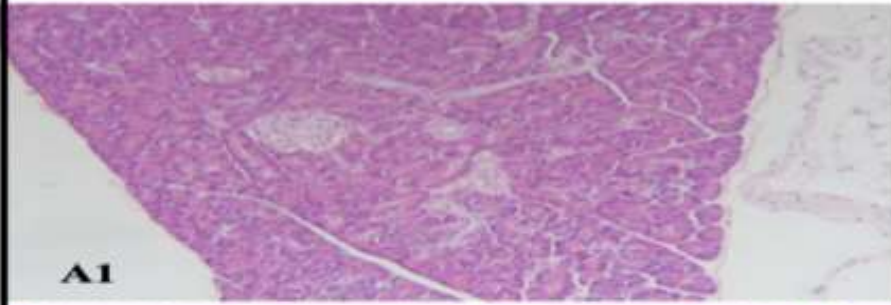


Results and Discussion

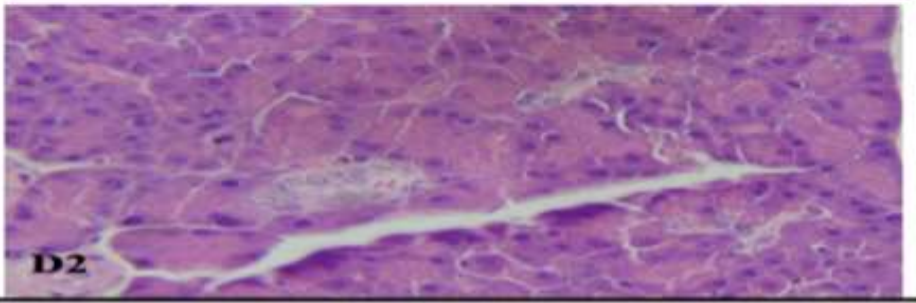
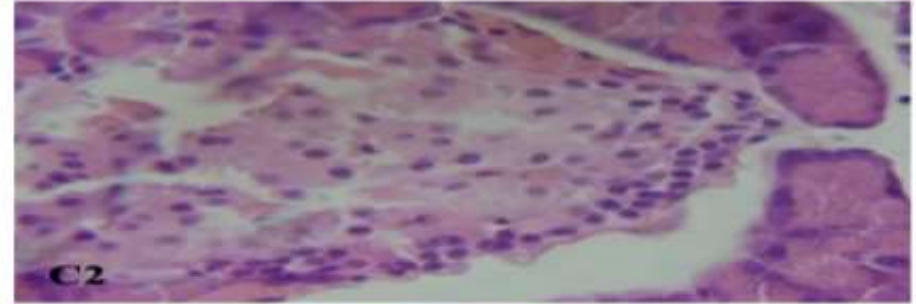
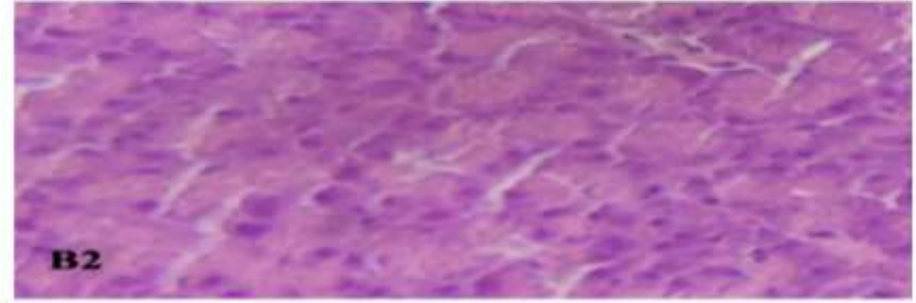
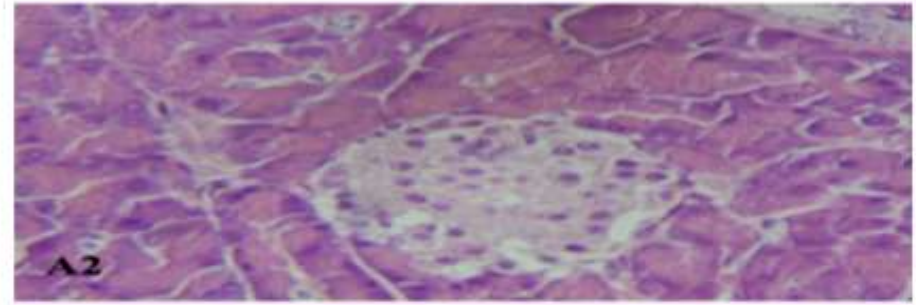


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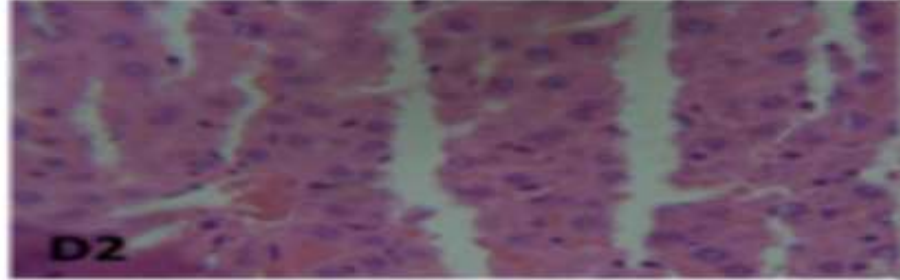
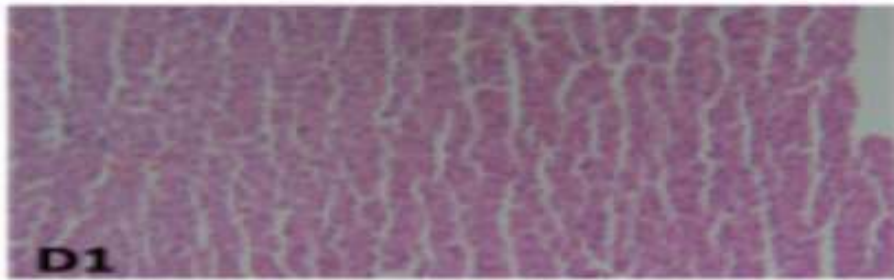
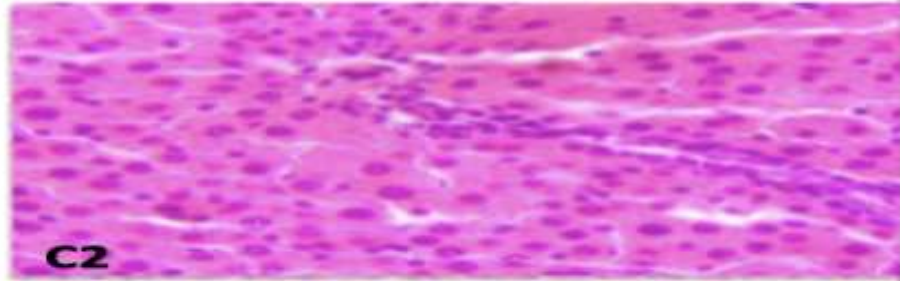
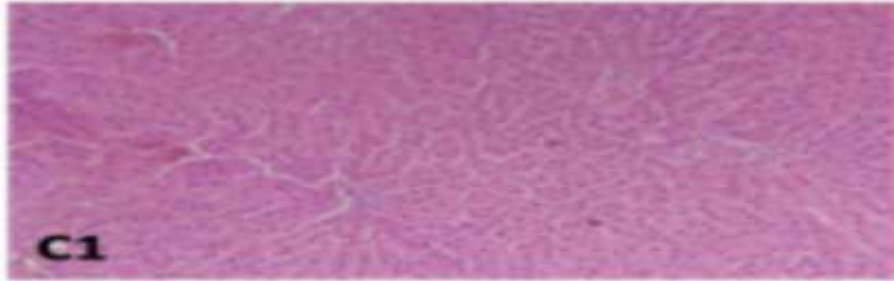
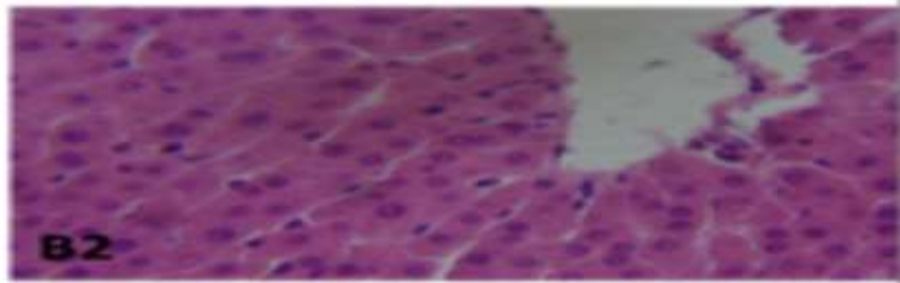
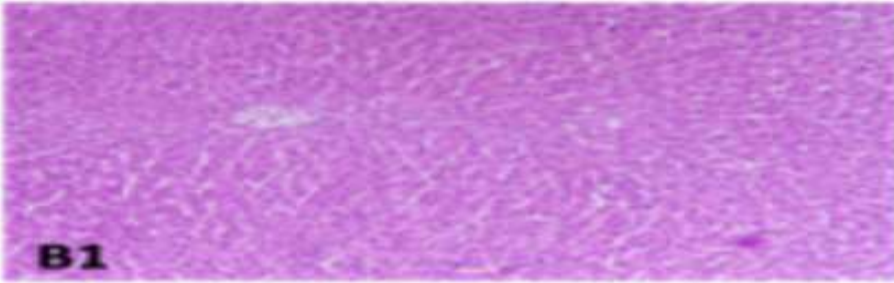
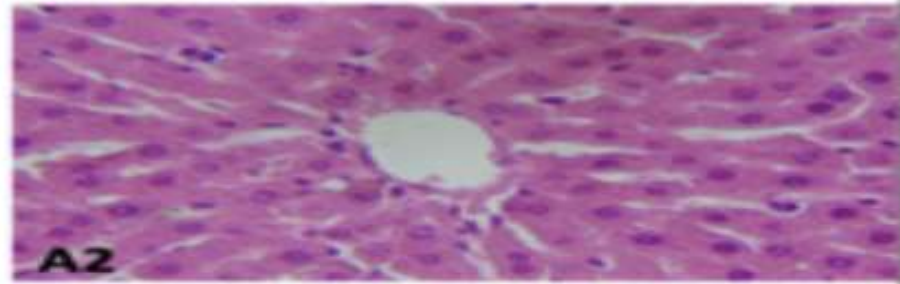
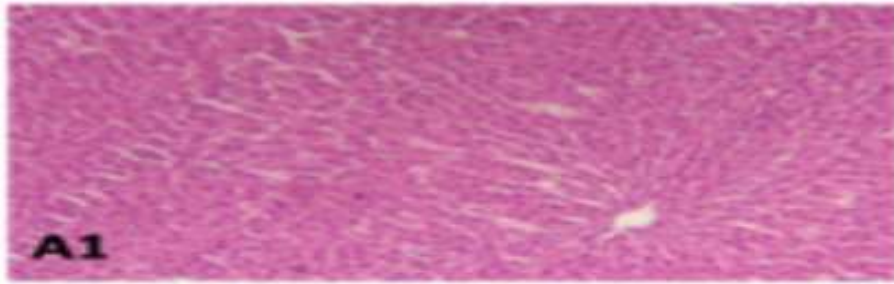
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Photomicrographs of Pancreatic sections of rats of the 4 study groups , with different magnifications 10x and 40x

10X

40X



Photomicrographs of Liver sections of rats of the 4 study groups, with different magnifications 10x and 40x

Conclusion

The findings of our study demonstrated that both green tea and glibenclamide exhibit significant hypoglycemic effects in diabetic rat model.

The similar hypoglycemic and protective effects observed between green tea and glibenclamide suggest that green tea could serve as a natural, cost effective alternative or complementary therapy for the management of diabetes.

Limitation of the study

- The 21-day duration of the study might be considerably short for assessing the long-term effect of green tea on diabetes.
- This study investigated the effect of green tea as a monotherapy.

Reference

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The background features a complex, abstract design. It consists of multiple overlapping, wavy lines in shades of light blue and pale green. These lines create a sense of movement and depth. Interspersed among the lines are several semi-transparent circles of varying sizes, some in blue and some in green, which add to the layered, ethereal feel of the composition. The overall aesthetic is clean, modern, and professional.

THANK YOU