



**ORIGINAL RESEARCH PAPER**

**Medicine**

**INHIBITORY PROPERTIES OF HIBISCUS ROSASINENSIS ROOT EXTRACTS AGAINST DIABETES**

**KEY WORDS:**

**Dr. Anila Chitra. R.A\***

Tutor, MD Pharmacology, ACS Medical College And Hospital. \*Corresponding Author

**Dr. B. Kalaiselvi**

HOD Dept Of Pharmacology, ACS Medical College And Hospital.

**ABSTRACT**

This study investigates the anti-diabetic potential of Hibiscus Rosa Sinensis root extracts by evaluating their inhibitory effects on alpha-amylase and alpha-glucosidase, crucial enzymes in carbohydrate metabolism. Extracts were tested at concentrations ranging from 100 to 500 µg, and results were compared with the standard drug acarbose. The study reveals a concentration-dependent increase in inhibitory effects on alpha-amylase, with percentage inhibitions ranging from 12.5% to 46.15%. Similarly, the extracts demonstrated significant inhibitory activity against alpha-glucosidase, with percentage inhibitions ranging from 16.6% to 44.4%. Notably, these inhibitory actions were comparable or superior to acarbose, highlighting the potential of Hibiscus Rosa Sinensis root extracts as a natural intervention in carbohydrate metabolism and diabetes management. Further research, including clinical trials, is warranted to validate these findings and explore the underlying molecular mechanisms.

**INTRODUCTION**

Diabetes mellitus is a metabolic disease that is common and is defined by sustained hyperglycemia. It is a major and growing worldwide health concern. Over 420 million people worldwide are estimated to have diabetes by the World Health Organization, and predictions for the next several years point to a worrisome rise in this figure [1]. In the middle of the challenging terrain of managing diabetes, there is an increasing interest in investigating natural sources that may have anti-diabetic qualities in order to overcome the drawbacks and adverse effects of traditional treatment modalities [2]. Despite their widespread usage, conventional anti-diabetic drugs have drawbacks such as adverse effects and the possibility of treatment resistance [3]. This has led to a greater focus on natural compounds that may have anti-diabetic effects in the hunt for alternative treatments. In this sense, phytochemicals obtained from medicinal plants have demonstrated promise, providing a possible path for the creation of innovative treatments [4]. The evergreen shrub Hibiscus Rosa Sinensis, which is prized for its elaborate blossoms, has long been used in traditional medical systems for medicinal purposes. Its potential as a source of bioactive chemicals with therapeutic effects, such as anti-diabetic characteristics, has been highlighted by recent research [5].

The primary focus of this study is to methodically investigate the inhibitory capabilities of Hibiscus Rosa Sinensis root extracts against two vital enzymes in carbohydrate metabolism: alpha-amylase and alpha-glucosidase. These enzymes play a crucial role in the postprandial phase, contributing to elevated blood glucose levels in individuals with diabetes. The study aims to systematically evaluate the potential of these extracts in controlling postprandial hyperglycemia and reducing the risk of diabetes development by inhibiting these enzymes.

A specific objective is to assess the inhibitory effects by comparing them with standard doses of acarbose, a well-established alpha-glucosidase inhibitor. The concentrations chosen for the inhibition tests of Hibiscus Rosa Sinensis root extracts (ranging from 100 to 500 µg) enable a thorough and precise evaluation of their potential anti-diabetic effects.

**MATERIALS AND METHODS**

**Plant Material And Extraction:**

Fresh roots of Hibiscus Rosa Sinensis were collected and authenticated. Ten grams of the plant material were weighed and soaked in 100 ml of ethanol in separate conical flasks. Cold extraction was carried out for 72 hours, and the resultant extracts were filtered using sterile filter paper. The filtrate was then subjected to evaporation at room temperature. The dried

extracts were carefully weighed to determine the yield.

**Antidiabetic Activity:**

**Inhibition of Alpha Amylase:**

Different concentrations of the Hibiscus Rosa Sinensis root extracts and a standard drug were prepared. One milliliter of α-amylase in 0.2 M sodium phosphate buffer (pH 6.9) was added to each tube, followed by a 30-minute incubation at 25°C. Subsequently, 1 ml of 1% starch solution in 0.2 M sodium phosphate buffer (pH 6.9) was added to each tube. The reaction mixtures were incubated at 25°C for 3 minutes. The reaction was stopped with 1 ml of 3,5-dinitrosalicylic acid, and 9 ml of distilled water was added. The absorbance was measured at 540 nm.

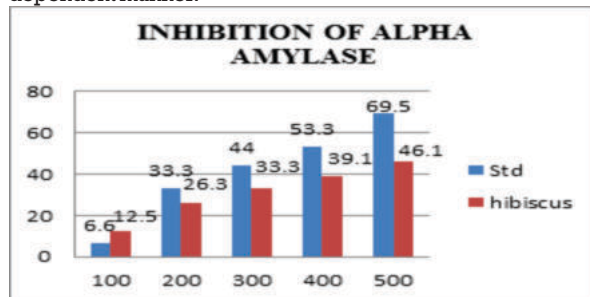
**Inhibition of Alpha Glucosidase:**

One hundred microliters of 0.1 U glucosidase were placed in different tubes. To this, 50 µl of Hibiscus Rosa Sinensis root extracts of different concentrations were added and incubated at 25°C for 10 minutes. Following this, 50 µl of p-nitrophenyl alpha-D-glucosidase was added, vortexed, and incubated at 25°C for 5 minutes. Eight hundred microliters of stop solution (0.1 M sodium carbonate) were added, and absorbance was measured at 405 nm.

**RESULTS**

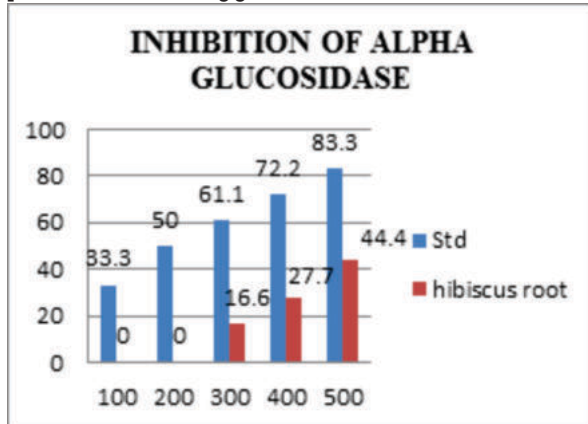
**Inhibition of Alpha Amylase:**

The inhibitory effects of Hibiscus Rosa Sinensis root extracts on alpha-amylase were examined at various concentrations (100, 200, 300, 400, and 500 µg). The standard optical density (O.D) exhibited a dose-dependent increase, ranging from 0.15 to 0.46, corresponding to percentage inhibitions of 6.6%, 33.3%, 44.0%, 53.3%, and 69.5%, respectively. In comparison, the Hibiscus root extracts displayed an increase in O.D from 0.16 to 0.26, resulting in percentage inhibitions of 12.5%, 26.3%, 33.3%, 39.1%, and 46.15%. These results suggest a notable inhibitory effect of Hibiscus Rosa Sinensis root extracts on alpha-amylase activity in a concentration-dependent manner.



**Inhibition of Alpha Glucosidase:**

The study also investigated the inhibitory potential of Hibiscus Rosa Sinensis root extracts on alpha-glucosidase at concentrations ranging from 100 to 500 µg. The standard O.D values decreased from 0.12 to 0.03, corresponding to percentage inhibitions of 33.3%, 50.0%, 61.1%, 72.2%, and 83.3%. In contrast, Hibiscus root extracts exhibited a decrease in O.D from 0.21 to 0.10, resulting in percentage inhibitions of 16.6%, 27.7%, and 44.4% at concentrations of 300, 400, and 500 µg, respectively. These findings underscore the significant inhibitory activity of Hibiscus Rosa Sinensis root extracts against alpha-glucosidase, emphasizing their potential in modulating glucose metabolism.



**DISCUSSION:**

The escalating global burden of diabetes has prompted a concerted exploration of novel therapeutic options, especially those derived from natural compounds. Traditional antidiabetic medications, while effective, often come with undesirable side effects and the risk of developing resistance [3]. Against this backdrop, the investigation into Hibiscus Rosa Sinensis, a plant deeply ingrained in traditional medicine, holds promise for its potential antidiabetic properties.

The objective of this investigation was to thoroughly evaluate the inhibitory effects that Hibiscus Rosa Sinensis root extracts demonstrated against alpha-amylase and alpha-glucosidase, two essential enzymes involved in the metabolism of carbohydrates. These extracts may be useful in regulating postprandial hyperglycemia, as evidenced by the concentration-dependent increase in their inhibitory actions against alpha-amylase. The discovery that the inhibitory effects on alpha-glucosidase were on par with or even greater than those of the commonly used medication acarbose is very significant since it highlights the effectiveness of Hibiscus Rosa Sinensis root extracts in regulating glucose metabolism. These findings align seamlessly with prior research highlighting the medicinal potential of Hibiscus Rosa Sinensis. The work of Deka and Lahkar (2019), reporting the antidiabetic and antioxidant properties of Hibiscus Rosa Sinensis root extract, serves as corroboration for the current study's focus on the inhibitory effects against diabetes-related enzymes [5]. The study thus contributes valuable insights into the specific bioactive compounds within Hibiscus Rosa Sinensis that contribute to its antidiabetic effects.

The comparison of results with acarbose, a widely used alpha-glucosidase inhibitor, adds significant weight to the study. The comparable or superior inhibitory effects demonstrated by Hibiscus Rosa Sinensis root extracts suggest their potential as an alternative or complementary approach to conventional antidiabetic drugs. This aligns with the broader trend in phytotherapy, where natural compounds are being fervently explored for their therapeutic benefits [4].

The discovered inhibitory effects on alpha-glucosidase

demonstrate Hibiscus Rosa Sinensis's potential to modify glucose metabolism, an essential component of diabetes care. It's crucial to remember, though, that more investigation is necessary to fully understand the molecular mechanisms underlying these results, evaluate long-term safety, and investigate any possible interactions or synergies with already available antidiabetic drugs. Examining the bioactive substances causing the noted effects might lead to the creation of new medicinal medicines. Moreover, broader sample sizes and a more varied population in clinical trials would improve the generalizability of these results. Additionally, clinical trials with larger sample sizes and diverse populations would enhance the generalizability of these findings. A systematic review and meta-analysis incorporating various studies on Hibiscus Rosa Sinensis and its antidiabetic properties could provide a comprehensive overview of its efficacy and safety, guiding future research directions in this promising area of phytotherapeutics.

The in vitro tests using isolated mouse pancreatic islets and clonal rat BRIN-BD11 cells showed a substantial increase in insulin release in response to HRS therapy in a study conducted by Prawej et al. Similar in its effects to those of glucagon-like peptide-1 (GLP-1), HRS may be involved in enhancing insulin secretion and pancreatic function.

Further investigation into the processes underlying insulin secretion showed that HRS caused membrane depolarization and raised intracellular calcium levels in BRIN BD11 cells. Furthermore, the in vitro inhibition of dipeptidyl peptidase-IV (DPP-IV) enzyme activity raises the possibility of a role in maintaining endogenous GLP-1 activity, which increases insulin release.

However, it is essential to acknowledge the study's inherent limitations. Further investigations aimed at identifying and isolating the specific bioactive compounds responsible for the observed effects are imperative. Moreover, while the in vitro results are promising, the translation of these findings to clinical applications necessitates rigorous human trials. Thus, this study serves as a stepping stone, paving the way for future research to unlock the full therapeutic potential of Hibiscus Rosa Sinensis root extracts in the context of diabetes management.

**CONCLUSION:**

This study establishes the concentration-dependent inhibitory effects of Hibiscus Rosa Sinensis root extracts on alpha-amylase and alpha-glucosidase, suggesting a potential role in regulating postprandial hyperglycemia. The comparable or superior inhibitory actions to acarbose highlight the extracts as a promising natural alternative for diabetes management. Despite promising in vitro results, further research is needed to identify specific bioactive compounds and conduct rigorous clinical trials for validation in human subjects. These findings underscore Hibiscus Rosa Sinensis's potential as a targeted intervention in the context of carbohydrate metabolism and diabetes.

**REFERENCES:**

- World Health Organization. (2016). Global Report on Diabetes. Retrieved from <https://www.who.int/publications/i/item/9789241565257>
- Cho, N. H., Shaw, J. E., Karuranga, S., Huang, Y., da Rocha Fernandes, J. D., Ohlrogge, A. W., & Malanda, B. (2018). IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Research and Clinical Practice*, 138, 271–281. <https://doi.org/10.1016/j.diabres.2018.02.023>
- Inzucchi, S. E., Bergenstal, R. M., Buse, J. B., Diamant, M., Ferrannini, E., Nauck, M., Peters, A. L., Tsapas, A., Wender, R., Matthews, D. R., & American Diabetes Association (2015). Management of hyperglycaemia in type 2 diabetes: A patient-centered approach. Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*, 58(3), 429–442. <https://doi.org/10.1007/s00125-014-3460-0>
- Eddouks, M., & Chattopadhyay, D. (2014). Phytotherapy in the management of diabetes: A review. *Journal of Diabetes & Metabolic Disorders*, 13(1), 60. <https://doi.org/10.1186/2251-6581-13-60>
- Deka, D. K., & Lahkar, M. (2019). Antidiabetic and antioxidant properties of

- Hibiscus Rosa Sinensis root extract. Pharmacognosy Research, 11(4), 349-353. [https://doi.org/10.4103/pr\\_117\\_18](https://doi.org/10.4103/pr_117_18)
6. Prawej Ansari, Shofiul Azam, J.M.A. Hannan, Peter R. Flatt, Yasser H.A. Abdel Wahab, Anti-hyperglycaemic activity of *H. rosa-sinensis* leaves is partly mediated by inhibition of carbohydrate digestion and absorption, and enhancement of insulin secretion, Journal of Ethnopharmacology, Volume 253, 2020, 112647, ISSN0378-