CORRELATION BETWEEN TOTAL PHENOLIC COMPOUNDS AND ANTIDIABETIC ACTIVITY OF SOME TRADITIONAL INDIAN HERBS

Pramila Soni* and Madhvi Tiwari

Department of Chemistry, Swami Vivekanand University, Sironja Road, Sagar - 470 228, India.
*e-mail: pramila2like@gmail.com

(Received 12 August 2023, Revised 30 September 2023, Accepted 11 October 2023)

ABSTRACT: The current study establishes a correlation between the overall phenolic content and the antidiabetic properties of traditional Indian herbs that are recognized for their effectiveness in managing diabetes. A total of ten medicinal plants were selected for inclusion in the study, with the selection criteria being based on traditional knowledge. The plant components were subjected to extraction using several solvents including water, methanol, ethyl acetate and petroleum ether. The total phenolic content was determined in triplicate for each extract. The antidiabetic activity of α-amylase inhibition was assessed and the obtained results were compared to those of acarbose, which served as the positive control. The findings of the study indicated that the methanol extraction method yielded the greatest quantity of phenolic compounds, with ethyl acetate extraction method producing a somewhat lower amount. The plant species *Momordica charantia* exhibited the highest concentration of phenolic compounds. The methanolic extract of *Momordica charantia* exhibited the most significant inhibition of α-amylase, while the methanol extract of *Gymnema sylvestre* shown a somewhat lower level of inhibition. A significant correlation was observed between the total phenolic content and the inhibitory action of α-amylase.

Key words: Diabetes, phenolic compounds, traditional Indian herbs, alpha amylase.

INTRODUCTION

Diabetes mellitus is a chronic condition commonly referred to as a lifestyle illness. Diabetes mellitus was referred to as “madhumeha” by Indian physicians due to its characteristic of attracting ants, which was associated with the presence of sweet urine. The identification of two forms of diabetes, now known as Type I and Type II was attributed to the ancient Indian physician Sushruta and the surgeon Charaka during the period of 400-500 A.D. (Lakhtakia, 2013).

The global transition from a predominance of infectious diseases to chronic diseases has led to the emergence of type 2 diabetes mellitus as a significant issue in international public health. India is positioned to emerge as the global frontrunner in the prevalence of type 2 diabetes mellitus, surpassing all other nations in terms of the sheer number of individuals affected by this condition. The escalating prevalence of diabetes in India and the corresponding future forecasts present a significant challenge to public health (Weaver and Narayan, 2008). Maintaining optimal blood glucose levels is the most effective approach for managing diabetes.

Throughout the course of human history, herbal medicines have garnered significant admiration as a prominent source of medicinal remedies. The reduction in blood glucose levels and the natural therapeutic properties against numerous diseases exhibited by medicinal plants can be attributed to the presence of phenolic compounds, flavonoids, terpenoids, coumarins, glycosides and other ingredients. Glycosides are considered to be a significant class of phytochemicals due to their ability to effectively lower blood glucose levels. Therefore, herbal medicines containing a significant quantity of glycosides may serve as viable home treatments for managing diabetes.

The key to managing diabetes is to minimise postprandial hyperglycemia, which can be accomplished by inhibiting the major carbohydrate hydrolyzing enzymes (α-amylase and α-glucosidase) to reduce the rate of carbohydrate digestibility. The inhibition of these enzymes leads to a suboptimal conversion of sugars derived from starch, hence aiding in the regulation of hyperglycemia. Numerous phenolic compounds derived from plants have demonstrated the ability to hinder the action of α-amylase,
CONCLUSION

Numerous investigations have been dedicated to examining the inhibitory effects of diverse phytochemicals, including flavonoids, coumarin and tannins, on the activity of $\alpha$-amylase. The majority of these phytochemicals exhibit a polyphenolic compound structure (Sun et al., 2020). The inhibitory effect of polyphenols against $\alpha$-amylase is an area of research that has received limited attention. However, it has been established that this inhibitory activity is attributed to the relationships between the structure of polyphenols and their ability to inhibit $\alpha$-amylase (Feng and Cong, 2022). Given that a significant proportion of bioactive secondary metabolites are phenolic compounds, it is reasonable to hypothesise that an increased concentration of phenolic compounds in plants would correspond to a greater antidiabetic effect.

Fig. 2: Inhibition of $\alpha$-amylase activity by different herbal extracts. Negative control is without the inhibitors, while positive control is with acarbose as inhibitor. A: Aqueous, B: Methanol, C: ethyl acetate and D: petroleum ether extract.

However, the selection of an appropriate herbal remedy for diabetes may be contingent upon various additional aspects, such as the accessibility of the plant, its potential toxicity, the convenience of administration and any potential accompanying adverse effects, among others.

ACKNOWLEDGEMENT

Authors acknowledge the Managing Director, Excellent Bio Research Solutions Pvt. Ltd., Jabalpur (M.P.) For the technical help.

REFERENCES


Correlation between total phenolic compounds and antidiabetic activity of some traditional Indian herbs


