

Diabetes & its Complications

The Antidiabetic Effect of *Cinnanomum zeylenicum* (Girfa) Aqueous Extract on Induced Diabetic Albino RatsMohamed H. saeed¹, Siham M. A. Bakhit² and Laila E. Taha¹

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ABSTRACT

Objective: This study aimed to study the antidiabetic effect of some Sudanese plants used traditionally by diabetic patients in Khartoum state, Sudan. The problem of this study lied under that Sudanese diabetic patients using some Sudanese medicinal plants without knowing their pharmaceutical effect and their recommended dose.

Materials & Methods: Twenty four albino rats were used in this study. All groups were loaded with 5% glucose (2gm/kg-body weight) after eighteen hours fasting, to induce diabetes, blood samples were taken to investigate blood glucose level, animals with blood glucose (70-110mg/dl) were served as control group (1) (N=6), animals with blood glucose levels higher than 120mg/dl were diagnosed as diabetic, groups (2, 3 and 4). then were administered with *Cinnanomum zeylenicum* (Girfa) aqueous extract (200, 400 and 800mg/kg-body weight) respectively, Blood specimens were collected from each group and serum levels of blood glucose, cholesterol and α -amylase concentrations were estimated.

Result: The results obtained from this study showed that there was a significant difference between treated groups which were administered with different doses of *Cinnanomum zeylenicum* (Girfa) aqueous extract and control group in blood glucose, cholesterol and α -amylase concentration.

Conclusion: It can be concluded from this study that *Cinnanomum zeylenicum* (Girfa) had hypoglycemic and hypocholesterolemic effect with no side effect. Furthermore, α -amylase concentration decreased with increasing the dose of *Cinnanomum zeylenicum* (Girfa) aqueous extract.

Keywords

α -amylase, *Cinnanomum zeylenicum* (Girfa), Diabetes mellitus, Hypoglycemic.

Introduction

Based on current epidemiological research, the number of diabetic patients worldwide has reached 200 million and is estimated to increase to over 330 million by 2025 [1]. Due to the increasing incidence of diabetes mellitus type 2, new sustainable treatments are greatly needed. Although currently, a number of effective Western diabetes mellitus medications are available for treatment of diabetes mellitus using medications with fewer side effects at lower costs is still a big challenge [2]. These medications frequently have side effects, such as weight gain, bone loss, and an increased risk of cardiovascular events [3]. These side effects

can become more prevalent due to continued use. Furthermore, treatment is costly since diabetes mellitus is a chronic disease, and long-term medications are necessary. Herbal medications can be a good alternative to replace or at least supplement Western medications [3-5].

In Sudan, several herbal medications have been proven to be clinically effective. Because herbal medicines are usually derived from natural plants, they are considered to be relatively safe and have fewer side effects when compared to conventional drugs. Herbal medications treating diabetes mellitus can target multiple mechanisms, including the enhancement of insulin sensitivity, stimulation of insulin secretion, or a reduction of carbohydrate absorption [3]. Western drugs are typically more potent than herbal medicines in lowering blood glucose levels; however, herbal

supplements have been shown to treat diabetic complications [6]. Traditional plant remedies and herbal formulations have been in existence since ancient times and are still widely used, despite the controversy concerning their efficacy and safety [7]. Herbal medicine can also be used as supplementation, or in combination with Western medicine to improve therapeutic outcomes [2]. Cinnamon was the most bioactive product. The glucose oxidation enhancing bioactivity was lost from cinnamon by polyvinylpyrrolidone (PVP) treatment, indicating that the active phytochemical were likely to be phenolic in nature. They concluded that the extract of cinnamon had improved the glucose and insulin metabolism. Cinnamon has been shown to be generally safe when ingested and to have many pharmacological properties, such as antioxidants activity and antibacterial effects [8].

Materials and Methods

According to the method described by Harborne, 300g of plant sample was soaked in 2000 ml of hot distilled water, and left till cooled down with continuous stirring at room temperature. Extract was then filtered and Freezed in a deep. Freezed extract was dried using Freeze drying apparatus till powdered extract obtain.

Treatment experiment

In this experiment twenty four albino rats were used, all animals were loaded with 5% glucose (2gm/kg-body weight) after eighteen hours fasting, to induce diabetes, blood samples were taken to investigate blood glucose level, animals with blood glucose levels (70-110mg/l) were serve as control group (group 1), other animals with blood glucose higher than 120mg/dl after two hours were diagnosed as diabetic, groups (2, 3, 4,) (N=6). Treated groups (2,3 and 4) were administered with different doses of *Cinnanomum zeylanicum* (Girfa) aqueous extract, (200, 400 and 800mg/kg-body weight) respectively, blood samples were collected and transferred to the National central research laboratories, Khartoum Sudan to investigate blood glucose level, cholesterol and α -amylase concentration.

Statistical Analysis

Statistical Package for Social Science (SPSS) computer software was used for data analysis. Independent T-test was used (11) Significance levels were set at ($P \leq 0.05$).

Results

Group 2 which administered with (200mg/kg body weight) showed insignificant difference in blood glucose level (88.9mg/dl) when compared with control group (98.3mg/dl), while groups (3 and 4) which administered with (400 and 800 mg/kg-body weight *Cinnanomum zeylanicum* (Girfa) aqueous extract respectively showed significant decrease in blood glucose level (80.66 mg/dl and 81.96mg/dl) respectively after four hours compared with control group (98.3mg/dl) (Figure 1).

Groups (2,3 and 4) which administered with (200, 400 and 800 mg/kg-body weight *Cinnanomum zeylanicum* (Girfa) aqueous extract respectively showed significant decrease in blood cholesterol concentration (35.09, 33.66and 36.41 mg/dl) respectively after

four hours compared with control group (45.5mg/dl) (Figure 2).

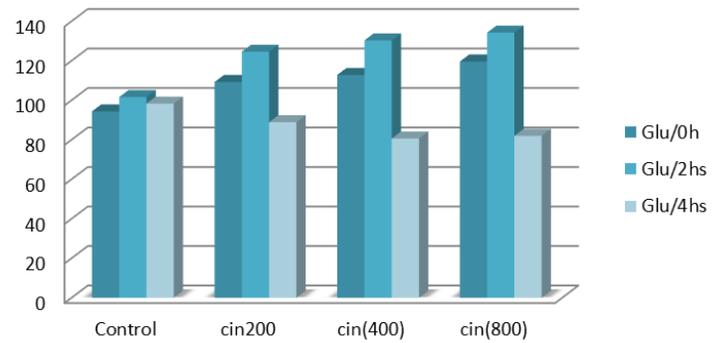


Figure 1: The effect of cinnamon aqueous extract on blood glucose concentration to induced diabetic rats.

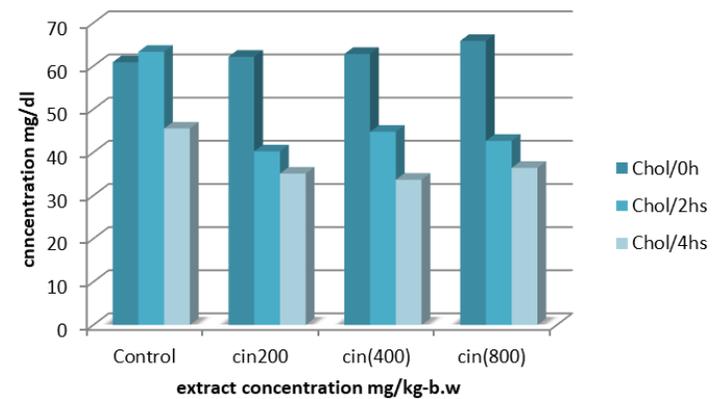


Figure 2: The effect of cinnamon aqueous extract on blood cholesterol concentration to induced diabetic rats.

Groups (2,3 and 4) which administered with (200, 400 and 800 mg/kg-body weight *Cinnanomum zeylanicum* (Girfa) aqueous extract respectively showed significant decrease in α -amylase concentration (1418.5, 1342.2 and 1245.5 mg/dl) respectively after four hours compared with control group (1630.1mg/dl) (Figure 3).

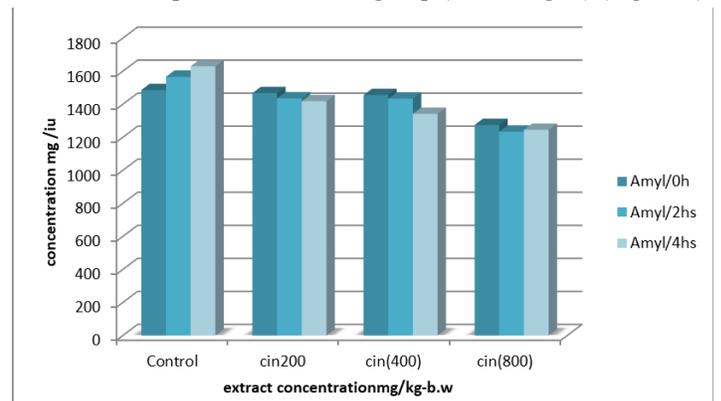


Figure 3: The effect of cinnamon aqueous extract on blood α -amylase concentration to induced diabetic rats.

Discussion

There are many herbal formulations available throughout the world used to treat diabetes. These formulations contain variety of herbs with varying doses but their safety, efficacy and cost-effectiveness

has not been assessed on scientific basis. *Cinnamomum zeylanicum* (Girfa) are among the important herbs used in different formulations for the treatment of diabetes in Sudan. It is well established that many herbal drugs have various adverse effects and shows drug interactions (Dennehy and Tsourounis, 2012). This study; carried out to evaluate the antidiabetic effect of *Cinnamomum zeylanicum* (Girfa).

Results obtained from this study revealed that the aqueous extract of *Cinnamomum zeylanicum* (Girfa) had a reducing effect on blood glucose, cholesterol and α -amylase concentration. This agreed with Several previous studies Talpur N. et al., who indicated that administration of cinnamon oil or polyphenolic oil rich extracts of cinnamon have valuable anti hyperglycemic, hypolipidemic effects in STZ-induced diabetic rats. and Broadhurst and his colleges (2000) when compared (49) herbs, spices and medicinal plant extracts for their insulin-like or insulin-potentiating action in an in vitro model, found that the aqueous extracts of cinnamon potentiated insulin activity more than 20-fold, higher than any other compound, tested at comparable dilutions. The result of this study confirms previous study done by (Anderson 2005) and his colleges who demonstrated that the in vitro insulin-potentiating activity found in cinnamon was present in the aqueous fraction.

A significant decrease in α -amylase concentration in this study confirmed the study done by (Mohamed S. H. et al, 2011) who demonstrated that: the acute effect of a methanol Ceylon cinnamon extract at 300 mg/kg of body weight on the glycemic response to maltose and sucrose in rats suggested an effect on alpha-glycosidase.

Conclusion

It can be concluded from this study that *Cinnamomum zeylanicum* (Girfa) had hypoglycemic and hypocholesterolemic effect with

no side effect. However α -amylase concentration decreased with increasing the dose of *Cinnanomum zeylenicum* (Girfa) aqueous extract.

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