Targeting G4 represents a promising way for enhancing radiotherapy effectiveness, though further research is needed to find selective ligands and evaluate clinical applications.

LITERATURE

1. Yoshida, K. Role of BRCA1 and BRCA2 as regulators of DNA repair, transcription, and cell cycle in response to DNA damage / K. Yoshida, Y. Miki // Cancer science. – 2004. – Vol. 95, № 11. – P. 866–871.

2. Rhodes, D. G-quadruplexes and their regulatory roles in biology / D. Rhodes, H. J. Lipps // Nucleic acids research. – 2015. – Vol. 43, № 18. – P. 8627–8637.

3. Hänsel-Hertsch, R. DNA G-quadruplexes in the human genome: detection, functions and therapeutic potential / R. Hänsel-Hertsch, M. Di Antonio, S. Balasubramanian // Nature reviews Molecular cell biology. – 2017. – Vol. 18, № 5. – P. 279–284.

4. G-quadruplexes: a promising target for cancer therapy / N. Kosiol [et al.]. // Molecular Cancer. – 2021. – Vol. 20, № 1. – P. 40.

5. G4IPDB: A database for Gquadruplex structure forming nucleic acid interacting proteins / S. K. Mishra [et al.]. // Scientific reports. – 2016. – Vol. 6, № 1. – P. 38144.

6. Гринкевич, М. В. Сравнительный анализ методов биоинформатики для идентификации гуаниновых квадруплексов в митохондриальном геноме Kluyveromyces lactis / М. В. Гринкевич, А. О. Власенко // Молодые исследователи – регионам : материалы Международной научной конференции, Вологда, 22 апреля 2025 года. – Вологда : Вологодский государственный университет, 2025. – С. 353–355.

7. Nomika, S. Identification and analysis of guanine quadruplexes in the mitochondrial DNA of Saccharomyces cerevisiae / S. Nomika, Ya. Lekhana // Молодые исследователи – регионам : материалы Международной научной конференции, Вологда, 22 апреля 2025 года. – 2025. – P. 343–345.

УДК 664.56:612.122.1]:577.175.722

E. S. N. Perera

Scientific supervisor: Associate Professor, PhD A. V. Litvinchuk

Educational Establishment
"Gomel State Medical University"
Gomel, Republic of Belarus

THE EFFECT OF CINNAMON CONSUMPTION ON BLOOD GLUCOSE REGULATION AND INSULIN SENSITIVITY IN INDIVIDUALS

Introduction

The prevalence of diabetes is increasing worldwide. There're insulin-dependent diabetes mellitus (IDDM) and non-insulin-dependent diabetes mellitus (NIDDM). About 90% of patients are NIDDM with insulin resistance playing a key role in the development of the disease Insulin resistance includes decreased stimulation of muscle glycogen synthesis, defects in glycogen syntheses and hexokinase activity.

Nowadays, cinnamon (Cinnamomum's) has gained considerable attention for its potential therapeutic effects on metabolic disorders, particularly diabetes mellitus as it is a widely used spice which belongs to Lauralee family. While *Cinnamomum zeylanicum* is recognized as true cinnamon ,*Cinnamomum cassia* spices is considered to be superior for its glucose-lowering therapeutic potential, Phytochemically, these species are characterized by primary metabolites such as cinnamaldehyde, cinnamic acid alongside a secondary metabolite profile rich in flavonoids, phenolic acids, terpenoids. Although, the effect of cinnamon on blood glucose regulation and insulin sensitivity involves multiple molecular mechanisms that contribute to its antidiabetic properties [1].

Goal

The primary goal of this study is to elucidate the biochemical interaction of cinnamon on insulin signaling pathways and to evaluate their effects on blood glucose regulation and insulin sensitivity.

Material and methods of research

An online survey was conducted and the data were collected via a structured self-administered questionnaire. 58 participants consisting of 31% (18) Male and 69% (40) Female responders of ages 16 to 79 were distributed among the following 3 countries: Sri Lanka – 41 (96.6%) Belarus – 1 (1.7%), Nigeria – 1 (1.7%) Many other well-known sources like WHO Foundation, ScienceDirect and ResearchGate articles were also utilized.

The results of the research and their discussion

Instrumental analyses have found over 80 aromatic compounds which present in cinnamon [2]. However, little is known about the biochemical interaction between cinnamon and blood glucose regulation. Major active components responsible for its anti-diabetic effects are in aqueous extract as water soluble doubly-linked procyanidin type – A polymers (Figure 1).

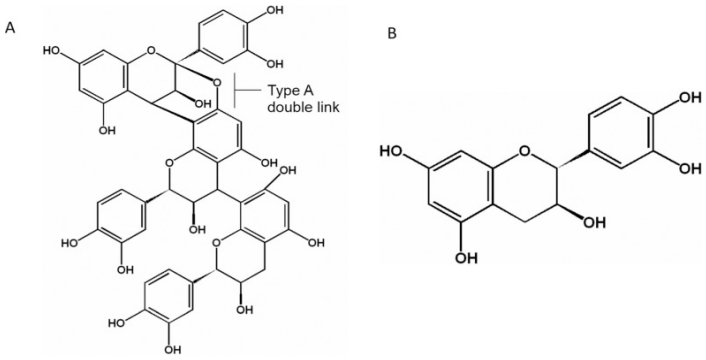


Figure 1 – Procyanidin type-A polymer

They were able to upregulate glucose uptake, increase glycogen synthesis by activating glycogen synthase and inhibiting glycogen synthase kinase 3β. This signaling cascade facilitates the translocation of glucose transporter type 4 (GLUT4) to the plasma membrane. Additionally, cinnamon inhibits carbohydrate-digesting enzymes, including α-glucosidase and pancreatic amylase, leading to reduced postprandial glucose absorption in the small intestine through increasing in glucosidase enzymes and inhibition of intestinal ATPase [3]. The other compounds of cinnamon that showed little or no insulin like activity included; cinnamic acid, cinnamide, cinnamyl alcohol, eugenol and 2-methoxy-cinnamaldehyde [4].

Results of the study as illustrated in Figure 2 indicate the distribution of population according to the glycemic status. As it depicts 85% of females do not have diabetes or prediabetes. However, prediabetes is more prevalent in 18–30 age group while presence of type 1 diabetes is recorded in 18–30 (2.5%) age group as well as females over age 60 (2.5%). Considering male 83.3% of the population are healthy. However, 5.6% in 46–60 age group with prediabetes also there's a prevalence of type 1 diabetes individuals under age 18.

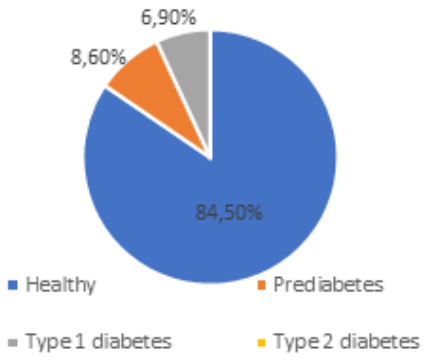


Figure 2 – The distribution of population according to the glycemic status

According to the survey conducted, Figure 2 presents the results of ways of cinnamon consumption in population. 43.1% of population consume cinnamon daily, indicating a strong belief in its benefits. 62.1% of the population has experienced significantly lowered the blood sugar levels in cinnamon consumption.

As shown in figure 3 primary way of cinnamon consumption is use cinnamon as grounded powder (53.7%) while 48.8% of individuals consume raw cinnamon. Some of them perceive cinnamon as supplements as it is shown in figure as 2.4%.

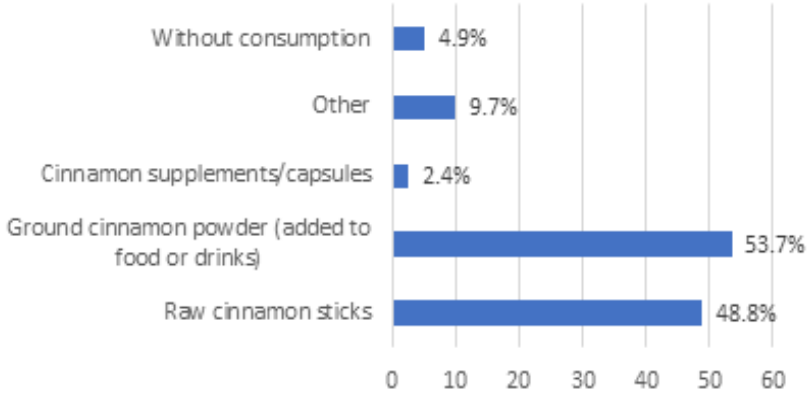


Figure 3 – The ways of cinnamon consumption in population

Conclusions

Cinnamon works by mimicking insulin and increasing glucose transport into cells, which helps improve insulin sensitivity

major active compounds responsible for anti-diabetic effect of cinnamon are procyanidin type – A polymers.

Majority of individuals who consume cinnamon for blood glucose regulation report a positive effect on their blood glucose levels, suggesting perceived efficiency that derived frequent consumption.

Cinnamon powder significantly reduces hepatic gluconeogenesis while enhancing glycogen synthesis.

LITERATURE

1. Essa, A. F. Composition and bioactive compounds of cinnamon / A. F. Essa, R. F. Taher, M. M. Elghonemy // InCinnamon. – 2025. – P. 89–109.

2. Jayaprakasha, G. K. Chemistry, biogenesis, and biological activities of Cinnamomum zeylanicum / G. K. Jayaprakasha, L. J. Rao // Critical reviews in food science and nutrition. – 2011. – Vol. 51, № 6. – P. 547–62.

3. Mollazadeh, H. Cinnamon effects on metabolic syndrome: a review based on its mechanisms / H. Mollazadeh, H. Hosseinzadeh // Iranian journal of basic medical sciences. – 2016. – Vol. 19, № 12. – P. 1258.

4. Medagama, A. B. The glycaemic outcomes of Cinnamon, a review of the experimental evidence and clinical trials / A. B. Medagama // Nutrition journal. – 2015. – Vol. 16, № 14. – P. 108.