

**IN VITRO ANTIHIPERGLIKEMIJSKA AKTIVNOST ETANOLNIH EKSTRAKATA PLODA CRNOG BIBERA (*Piper nigrum* L.)****Aleksandra Milenković\*, Saša Savić, Vesna Nikolić, Jelena Stanojević, Dragan Cvetković, Goran Nikolić, Ljiljana Stanojević**

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Globalna prevalencija dijabetesa u 2019. bila je procenjena na 9,3% (463 miliona ljudi), sa porastom na 10,2% (578 miliona) do 2030. godine (1). Jedan od važnijih mehanizama odgovornih za lečenje dijabetes melitusa je smanjenje gastrointestinalne apsorpcije glukoze inhibicijom enzima  $\alpha$ -glukozidaze. Zbog toga se inhibitorima  $\alpha$ -glukozidaze pridaje sve veća pažnja zbog njihovog terapijskog potencijala u tretiranju dijabetesa (2). Sposobnost etanolnih ekstrakata ploda crnog bibera (BPFEEs) da inhibiraju  $\alpha$ -glukozidazu određena je metodom prema Apostolidisu i sar., uz neznatne modifikacije (3). Ekstrakti su dobijeni maceracijom (M), refluksum (RE), ultrazvučnom (UE) i Soxhlet ekstrakcijom (SE). Svi analizirani ekstrakti pokazali su *in vitro* antihiperглиkemijsku aktivnost (M:  $EC_{50} = 6,689 \pm 0,109$  mg/ml; RE:  $EC_{50} = 5,189 \pm 0,046$  mg/ml; UE:  $EC_{50} = 5,565 \pm 0,065$  mg/ml; SE:  $EC_{50} = 6,166 \pm 0,069$  mg/ml), sa najvećom inhibicijom (najniža  $EC_{50}$  vrednost)  $\alpha$ -glukozidaze RE ekstraktom, dok je najmanja inhibicija postignuta M ekstraktom. Pretpostavlja se da je alkaloid piperin, koji je najčešće prisutan u BPFEEs, odgovoran za antihiperглиkemijsku aktivnost. Stoga će zadatak budućih istraživanja biti usmeren na određivanje kvalitativnog i kvantitativnog hemijskog sastava BPFEEs. Ova studija je od velikog interesa zbog činjenice da je danas imperativ potraga za prirodnim jedinjenjima koja bi se mogla razviti u lek za lečenje dijabetes melitusa.

**Literatura**

1. Saeedi P., Petersohn I., Salpea P., Malanda B., Karuranga S., Unwin N., Colagiuri S., Guariguata L., Motala A.A., Ogurtsova K., Shaw J.E., Bright D., Williams R., IDF Diabetes Atlas Committee. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. *Diabetes Res. Clin. Pract.*, 2019; 157: 107843.
2. Sulaimon L. A., Anise E. O., Obuotor E. M., Samuel T. A., Moshood A. I., Olajide M., Fatoke T. In vitro antidiabetic potentials, antioxidant activities and phytochemical profile of african black pepper (*Piper guineense*). (2020). *Clin. Phytoscience*, 2020; 6(1): 1-13.
3. Apostolidis E., Kwon Y. I., Shetty K. Inhibitory potential of herb, fruit, and fungal-enriched cheese against key enzymes linked to type 2 diabetes and hypertension. *Innov. Food Sci. Emerg. Technol.*, 2007; 8(1): 46-54.

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## **IN VITRO ANTIHYPERGLYCEMIC ACTIVITY OF BLACK PEPPER (*Piper nigrum* L.) FRUCTUS ETHANOLIC EXTRACTS**

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The global diabetes prevalence in 2019 was estimated to be 9.3% (463 million people), rising to 10.2% (578 million) by 2030 (1). One of the more important mechanisms responsible for the treatment of diabetes mellitus is the reduction of gastrointestinal absorption of glucose by inhibiting enzyme  $\alpha$ -glucosidase. Therefore,  $\alpha$ -glucosidase inhibitors are receiving increasing attention due to their therapeutic potential in reducing diabetes (2). The ability of black pepper fructus ethanolic extracts (BPFEEs) to inhibit the  $\alpha$ -glucosidase was determined by method according to Apostolidis et al., with slight modifications (3). The extracts were obtained by maceration (M), reflux (RE), ultrasonic (UE) and Soxhlet extraction (SE). All examined extracts showed *in vitro* antihyperglycemic activity (M: EC<sub>50</sub> = 6.689 ± 0.109 mg/ml; RE: EC<sub>50</sub> = 5.189 ± 0.046 mg/ml; UE: EC<sub>50</sub> = 5.565 ± 0.065 mg/ml; SE: EC<sub>50</sub> = 6.166 ± 0.069 mg/ml), with the highest inhibition (the lowest EC<sub>50</sub> value) of  $\alpha$ -glucosidase by RE extract, while the lowest inhibition was detected in M extract. It is assumed that the alkaloid piperine, which is most often present in the BPFEEs, responsible for the antihyperglycemic activity. Therefore, the task of future research will be focused on determining the qualitative and quantitative chemical composition of BPFEEs. The present study is of great interest due to fact that nowadays is imperative in search for natural compounds that could be developed into a drug for the management of diabetes mellitus.

### **References**

1. Saeedi P., Petersohn I., Salpea P., Malanda B., Karuranga S., Unwin N., Colagiuri S., Guariguata L., Motala A.A., Ogurtsova K., Shaw J.E., Bright D., Williams R., IDF Diabetes Atlas Committee. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. *Diabetes Res. Clin. Pract.*, 2019; 157: 107843.
2. Sulaimon L. A., Anise E. O., Obuotor E. M., Samuel T. A., Moshood A. I., Olajide M., Fatoke T. *In vitro* antidiabetic potentials, antioxidant activities and phytochemical profile of african black pepper (*Piper guineense*). (2020). *Clin. Phytoscience*, 2020; 6(1): 1-13.
3. Apostolidis E., Kwon Y. I., Shetty K. Inhibitory potential of herb, fruit, and fungal-enriched cheese against key enzymes linked to type 2 diabetes and hypertension. *Innov. Food Sci. Emerg. Technol.*, 2007; 8(1): 46-54.

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