

**INHIBITION OF  $\alpha$ -AMYLASE *IN VITRO* AND *IN VIVO* HYPOGLYCEMIC EFFECT OF METHANOL EXTRACT OF *ALCHEMILLA VIRIDIFLORA* ROTHM**

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Dry methanol extract (DER 3.95:1) of aerial flowering parts of *Alchemilla viridiflora* Rothm., Rosaceae, obtained after successive extraction with cyclohexane and dichloromethane, predominantly contains polyphenols, tannins (3.74%), mostly ellagic, and flavonoids (0.30%), hexosides of quercetin and kaempferol. It shows ACE inhibitory and anti-*Helicobacter pylori* activity *in vitro* (1). Based on the traditional use of the common *A. vulgaris* in the treatment of diabetes (2), the effect of this *A. viridiflora* extract on  $\alpha$ -amylase activity *in vitro* and lowering blood glucose in rats were investigated.  $\alpha$ -Amylase inhibitory activity was assessed using the 3,5-dinitrosalicylic acid method. Extract in doses of 50, 100 and 200 mg/kg, p.o., was administered to streptozotocin-induced diabetic rats for 20 days, and blood glucose level and weight of rats were monitored during treatment. Extract inhibited  $\alpha$ -amylase activity at IC<sub>50</sub> 5.47 ± 0.30 mg/mL. A dose of 200 mg/kg significantly decreased blood glucose level after 10 (32.2%) and 20 days of treatment (38.3%). The effect of this dose was similar to the effect of the reference drug, glibenclamide. A dose of 100 mg/kg significantly increased glucose level by day 10 (50.5%) and a reduction in blood sugar level of 51.2% was observed only after 10 days. Body weight was correlated with changes in blood sugar levels. A dose of 50 mg/kg had no statistically significant effect. Results indicate a significant potential of *A. viridiflora* aerial parts in the treatment of diabetes, which must be confirmed by additional studies, and active ingredients need to be identified.

**References**

1. Radović J, Suručić R, Niketić M, Kundaković-Vasović T. *Alchemilla viridiflora* Rothm.: the potent natural inhibitor of angiotensin I-converting enzyme. *Mol Cell Biochem* 2022; Mar 29. doi: 10.1007/s11010-022-04410-7.
2. Akbulut S, Ozkan ZC. Traditional usage of some wild plants in Trabzon region (Turkey). *Kastamonu Univ. Journal of Forestry Faculty* 2014; 14:135–145.

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## INHIBICIJA $\alpha$ -AMILAZE *IN VITRO* I *IN VIVO* HIPOGLIKEMIJSKI EFEKAT METANOLNOG EKSTRAKTA HERBE *ALCHEMILLA VIRIDIFLORA* ROTHM

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Suvi metanolni ekstrakt (DER 3,95:1) nadzemnih delova u cvetu *Alchemilla viridiflora* Rothm., Rosaceae, dobijen nakon sukcesivne ekstrakcije cikloheksanom i dihlormetanom, sadrži visok nivo polifenola, tanina (3,74%), uglavnom elagnih, i flavonoida (0,30%), heksozida kvercetina i kemferola. Pokazuje ACE inhibitornu i anti-*Helicobacter pylori* aktivnost *in vitro* (1). Na osnovu podataka o tradicionalnoj upotrebi herbe *A. vulgaris*, najčešće korišćene *Alchemilla* vrste, u lečenju dijabetesa (2), ispitivan je uticaj navedenog ekstrakta *A. viridiflora* na aktivnost  $\alpha$ -amilaze *in vitro* i na snižavanje nivoa glukoze u krvi kod pacova. Uticaj na aktivnost  $\alpha$ -amilaze procenjen je primenom metode sa 3,5-dinitrosalicilnom kiselinom. Ekstrakt *A. viridiflora* u dozama od 50, 100 i 200 mg/kg, p.o., aplikovan je pacovima sa dijabetesom izazvanim streptozotocinom tokom 20 dana, a nivoi glukoze u krvi i težina pacova su praćeni u određenim vremenskim intervalima tokom trajanja tretmana. Ekstrakt je inhibirao aktivnost  $\alpha$ -amilaze, a vrednost IC<sub>50</sub> iznosila je 5,47±0,30 mg/mL. Doza od 200 mg/kg značajno je smanjila nivo glukoze u krvi nakon 10 (32,2%) i 20 dana tretmana (38,3%). Efekat ove doze bio je sličan efektu referentnog leka, glibenklamida. S druge strane, doza od 100 mg/kg značajno je povećala nivo glukoze do 10. dana (50,5%) a do značajnog poboljšanja, tj. sniženja nivoa šećera od 51,2% dovela je tek nakon 10 dana. Telesna težina bila je u korelaciji sa promenama nivoa šećera u krvi. Doza od 50 mg/kg nije imala statistički značajan efekat. Rezultati ukazuju na značajan potencijal herbe *A. viridiflora* u lečenju dijabetesa, što mora biti potvrđeno dodatnim studijama, a aktivni sastojci identifikovani.

### Literatura

1. Radović J, Suručić R, Niketić M, Kundaković-Vasović T. *Alchemilla viridiflora* Rothm.: the potent natural inhibitor of angiotensin I-converting enzyme. *Mol Cell Biochem* 2022; Mar 29. doi: 10.1007/s11010-022-04410-7.
2. Akbulut S, Ozkan ZC. Traditional usage of some wild plants in Trabzon region (Turkey). *Kastamonu Univ. Journal of Forestry Faculty* 2014; 14:135–145.

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