ABSTRACT

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Title of diploma thesis: Isolation of biologically active alkaloids from *Papaver rhoeas* with the use of separation methods

Alzheimer's disease is a neurodegenerative disorder characterized by progressive cognitive decline. This thesis focuses on the isolation of alkaloids from Papaver rhoeas L. as potential drugs for this disease. Isolating new substances in this area is significant due to the current inability to fully cure the patient through therapy, but rather only to positively influence the disease by delaying its severe stages.

A phytochemical study was conducted on an alkaloid extract obtained from the aerial parts and immature capsules of Papaver rhoeas L. Based on biological testing of inhibitory activities against acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE), the fraction exhibiting the highest activity against BuChE, which had not been previously explored, was selected for the isolation of active compounds. This fraction was identified as PPR Fr-B and contained compounds PPR-9 and PPR-10.

From the PPR Fr-B fraction, two aporphine-type alkaloids were isolated using separation chromatographic methods. These compounds were (+)-caaverine and lirinidine. Their structures were elucidated using HPLC-MS, GC-MS, and NMR. Both isolated compounds had previously demonstrated the ability to inhibit human cholinesterases, with (+)-cavermine particularly showing significant inhibitory activity against BuChE (IC_{50} = 4.09 ± 0.50 µM). The activity of lirinidine against BuChE was moderate (IC_{50} = 23.45 ± 0.55 µM).

These isolated compounds hold promise for further research in terms of potential Alzheimer's disease treatment or the development of their semi-synthetic derivatives for this purpose.

Key words: *Papaver rhoeas,* preparative chromatography, alkaloids, biological screening, mass spectrometry