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Yours sincerely,

Open Readings 2022 Organizing Team



RESEARCH OF ANTI-INFLAMMATORY PROPERTIES CICHORIUM INTYBUS EXTRACT

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Inflammation is a local response of the body to damage, aimed at destroying and removing the pathogenic agent, as well as eliminating the consequences of its action. Chronic inflammation occurs as a result of oxidative stress, which progress due to the formation of metabolites of the peroxidation reaction of polyunsaturated fatty acids under the catalytic action of 15-lipoxygenase (15-LOX) and other Redox enzymes in cells. Pharmacological inhibition of oxygenases reduces the symptoms of inflammation and pain.

Therefore, the study of compounds capable of inhibiting 15-LOX activity is potentially interesting. Although many compounds have been found and biologically studied that can affect the activity of this enzyme, there are still a small number of drugs on the pharmaceutical market that contain lipoxygenase inhibitors. Registered drugs do not have a specific effect, so it is important to isolate and study substances and natural biological mixtures that can affect on 15-lipoxygenase. It is known that flavonoids have an appropriate effect and are low-toxic. Therefore, an extract from *Cichorium intybus*, which is rich in these compounds, selected for this study to model a new anti-inflammatory drug.

UV-Vis spectrophotometry was used to study the ex vivo kinetic patterns and mechanisms of 15-lipoxygenase inhibition; for the development of the composition of anti-inflammatory drugs in the form of suppositories – mathematical planning of a complete factorial experiment.

The study of anti-inflammatory properties of *Cichorium intybus* extract is based on the determination of 15-LOX activity in the enzymatic oxidation reaction of linoleic acid as a substrate. Measurements were performed using the spectrophotometric method, recording the increase in the absorbance of the conjugated diene chromophore in the molecule of linoleic acid hydroperoxide over time at a wavelength of $\lambda = 235$ nm [1]. To determine the most acceptable kinetic model and the according type of inhibition, a series of calculations were performed under different conditions, ranking the results by the criterion of the correlation coefficient R^2 . The calculation of kinetic parameters was performed in accordance with standard methods and kinetic models in the software package SigmaPlot 12.5. When ranking kinetic models by the criterion of the value of the correlation coefficient, it was found that the most suitable kinetic model is Mixed (Partial), inhibition of 15-LOX ($R^2 = 0,9608$). The concentration of semi-maximal inhibition is $IC_{50} = 84.13 \pm 7.22$ μ M. The kinetic constants calculated according to the selected model have the following values: $K_i = 23.29 \pm 5.42$ μ M, $K_m = 57.44 \pm 7.52$ μ M.

Cichorium intybus extract is an effective inhibitor of 15-LOX by a mixed (partial) mechanism of inhibition, it means that the inhibitor binds both in the active site of the enzyme and externally, and the enzyme-substrate complex retains partial activity compared to the native enzyme. The obtained results suggest that the extract of *Cichorium intybus* can potentially be used as an API of drugs with anti-inflammatory properties, as it is highly effective as a 15-LOX inhibitor.

[1] Kharytonenko, H. I., Skaterna, T. D., Mel'nyk, A. K., Babiĭ, L. V., & Kharchenko, O. V. (2008). *Ukrains'kyi biokhimichnyi zhurnal* (1999), 80(3), 31–39.