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SECTION: CHEMISTRY AND PHARMACEUTICALS

SELECTION OF AN EXTRACTANT TO OBTAIN A LIQUID EXTRACTION PREPARATION FROM *LINARIA VULGARIS* GRASS

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Introduction. Increasing public knowledge is contributing to a shift in patients' preferences towards natural medicines. Medicinal plants are a rich source of diverse biologically active substances (BAS), which exhibit unique therapeutic effects.

Linaria vulgaris Mill., a perennial herb belonging to the Plantaginaceae family, has gained recognition and is now listed in the State Pharmacopoeia of Ukraine (Supplement 7) and the 11th edition of the European Pharmacopoeia. Often considered a weed in sandy fields, this plant can reach heights of up to 90 cm and is widely distributed across Ukraine [1, 3].

Aim. This study aims to review the available scientific literature on preparation methods, including extractants and extraction techniques, used to obtain liquid extraction products from *Linaria vulgaris*.

Methods. The research utilized data structuring and generalization techniques to analyze and synthesize information.

Results. According to the literature, *Linaria vulgaris* has been extensively studied for its chemical composition. The main goal of our study is to determine the most suitable extractant and extraction method to produce a liquid extract preparation from *Linaria vulgaris* herb that optimizes the yield of flavonoids, a class of BAS standardized in medicinal plant material. To accomplish this, we examined various literature sources focusing on extraction methods and extractants used for this plant.

Here are some key findings from the literature:

Kornievska V.G. et al. (2023): Investigated tinctures prepared in a 1:5 ratio using 70% ethanol as the extractant. The GCM method was applied for analysis (specific details on tincture preparation were not provided). Significant concentrations of the following compounds were reported: ethyl alpha-d-glucopyranoside (35.27%), ethyl ester of hexadecanoic acid (18.34%), ethyl ester of 9,12,15-octadecatrienoic acid (14.64%), and ethyl ester of linoleic acid (10.83%) [4].

Krutsikh A. A. et al. (2014, 2016): Identified 33 volatile compounds in *Linaria vulgaris* grass. The most abundant compounds included saturated fatty palmitic acid (256.1 mg/kg), tricosan (140.5 mg/kg), saturated fatty myristic acid (121.2 mg/kg), and

2-methoxy-4-vinylphenol (113.3 mg/kg). Phenolic compounds, including 4 flavonoids and 4 phenolic carboxylic acids, were extracted using 70% ethanol, with flavonoid content measured at $9.34 \pm 0.02\%$ in terms of acetylpectolarin. Iridoids were extracted using chloroform, followed by 70% ethanol and circular extraction, yielding $0.16 \pm 0.03\%$ in terms of harpagid acetate [5, 6].

Omelchenko, Z. I. and Nerod, K. S. (2014): Prepared tinctures in a 1:10 ratio using water and varying ethanol concentrations (40%, 70%, and 96%). Although the study did not publish comparative BAS content results, it concluded that 70% ethanol provided the best extraction outcomes [8].

Vrchovská, V. et al. (2008): Detected several organic acids (oxalic, aconitic, citric, ketoglutaric, ascorbic, malic, shikimic, and fumaric) and the phenolic compound linarin in aqueous infusions of *Linaria vulgaris* grass [2].

Conclusions. Our findings indicate that 70% ethanol is the most frequently used extractant for *Linaria vulgaris*. However, no studies directly comparing flavonoid content across different solvents were identified. To address this, we plan to employ fractional maceration to extract flavonoids from *Linaria vulgaris* grass using 40%, 70%, and 90% ethanol. By analyzing the flavonoid content of these extracts, we aim to identify the optimal ethanol concentration for maximizing flavonoid yield.

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