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Short communication

Selection of the optimal extraction conditions of the polyphenolics from *Lavandula angustifolia* herbal raw materials

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Introduction

Today, in the structure of general pathology, lesions of the central nervous system are quite common, which, in addition to the impact of the coronavirus infection since 2019. In Ukraine are additionally caused by the harsh consequences of the military aggression of the Russian Federation. Certain neurological symptoms, organic and symptomatic mental disorders can persist for a long time. To correct the above-mentioned symptoms, therapy with powerful sedatives is used, but for a more "soft" intervention, it is possible to use herbal remedies.

Due to its chemical composition Lavandula angustifolia Mill. has a very wide range of pharmacological effects (antibacterial, antimicrobial, sedative, antispasmodic, anti-inflammatory and analgesic) and is actively used in medicine. The raw material is used as a mild sedative for nervous exhaustion and sleep disorders (López et al., 2017). It is part of soothing teas. Lavender tincture is believed to relieve depression, headaches, and anxiety (Malcolm et al., 2018). Special attention is drawn to the antioxidant activity of lavender, which it owes, in particular, to the phenolic compounds in its composition (Dobros et al., 2022). The pharmaceutical industry actively uses lavender to create various medicines and phytoremedies from extracts and essential oils with different modes of action. The aim of the current research is to select optimal conditions for extracting of the total phenolic compounds from different lavender raw materials.

Materials and methods

Flowers, stems and herb of lavender (Lavandula angustifolia Mill.) collected in the botanical garden named after I. Franka (Lviv, Ukraine) at the stage of mass flowering in July 2022. The following extracts were used: water, 50% ethanol, 80% ethanol. The experimental ratio of raw material: extractant was 1:10, 1:20 and 1:30. Raw material of lavender was crushed to the following size: flowers – 2-3 mm, stems and grass – 1-2 mm. The appropriate extractant was added to the required amount of raw materials, mixed and left to swell for 30 minutes in dark place at room temperature.

Further extraction was carried out using the Grant Digital Ultrasonic Bath XUB Series (Grant Instruments (Cambridge) Ltd Evolution House, UK), ultrasound frequency – 35 kHz. Extraction time was 10 min, 20 min, 30 min and 60 min. Extraction temperature was 30, 40, 50, 60, 70°C. To separate herb and sediment, the obtained extracts were centrifuged using a High speed centrifuge type Sigma 3-18KS (Germany) and decanted.

As auxiliary substances during extraction, the following were used: polysorbate 80 (Sigma-Aldrich, Germany), β-cyclodextrin (Sigma-Aldrich, Germany), polyethylene glycol 400 (Sigma-Aldrich, Germany), 1,2-propanediol (Sigma-Aldrich, Germany) in a concentration of 2%.

The total phenolic compounds content was determined on a Halo DB-20 UV-Vis spectrophotometer (Dynamica GmbH, Switzerland) according to the standard Folin-

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Chocalteau method (Cicco et al., 2009) at a wavelength of 750 nm in terms of gallic acid. The amount of phenolic compounds in the extracts was calculated as GRE mg/100 g of dry raw material.

Results and discussion

The optimal conditions for extracting Lavandula herbal raw material were established experimentally: the ratio of raw materials: extractant – 1:10, time – 20 min, temperature – 70°C (for the water extract), 30°C (for the water-ethanolic extract). The total phenolic compounds content in the order of output from greater to less can be determined as: 50% ethanol > water > 80% ethanol. Given this, 80% ethanol as an extractant for lavender was excluded by us from further studies.

In order to compare the yield of extractive substances in the lavander herb and separately in lavander flowers and stems, in order to clarify the need to separate lavender raw materials, the content of phenolic compounds was determined in all separate samples. As a result, it was established that the extracts from the stems had the lowest content of phenolic compounds – from 0.194 to 0.912 mgGA/g. Extracts obtained only from lavender flowers had a relatively higher content of phenolic compounds – from 0.072 to 0.994 mgGA/g. Lavandula herbal water extract and 50% ethanol extract showed the highest content of phenolic compounds – 1.14 and 1.21 mgGA/g, respectively.

The addition of various auxiliary substances in the extraction process can help improve the yield of active components, their chemical and biological properties in the complex, and also provide improved solubility and stability (Andryushayev et al., 2021, Carneiro et al., 2019). In our study, it was established that total phenolic compounds content when various excipients (polysorbate 80, β-cyclodextrin, polyethylene glycol 400, propanediol) were added was 2.5 times lower (from 0.418 to 0.455 mgGA/g) than for extracts without these substances. This indicates the irrationality of the use of auxiliary substances in the extraction of lavender grass.

Conclusion

Experimentally, rational technological parameters of the lavender herbal raw material extraction process were established. The obtained results make it possible to recommend choosing lavender herb for further research as a complex and rational use of plant raw materials for the pharmaceutical industry. It has been proven that the previous introduction of various auxiliary substances to the extractant did not contribute to a more complete extraction of the total amount of bioactive compounds from the lavender herb. The obtained results will be used in further work.

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