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姓名：何旭华
学校：西南林业大学
院系：研究生院（生科）
身份证号：[REDACTED]

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云南金花茶叶不同极性提取物的抗氧化活性分析



HE Xuhua

何旭华¹, 石志娇¹, 彭小伟¹, 阚欢¹, 赵平², 刘云^{1*}

(1.西南林业大学 生命科学学院, 云南 昆明 650224; 2.西南林业大学 西南地区
林业生物质资源高效利用国家林业局重点实验室, 云南 昆明 650224)

摘要:以水、石油醚、氯仿、乙酸乙酯和正丁醇等不同极性溶剂对云南金花茶叶片中的多酚和总黄酮进行提取,以 DPPH·、·ABTS⁺ 和 ·OH 清除率以及总还原能力为考察指标,分析云南金花茶不同极性溶剂提取物的抗氧化能力。研究结果表明:不同极性溶剂对云南金花茶中多酚和总黄酮的提取能力不同,且提取物抗氧化能力存在差异。对多酚的提取能力依次为:水>乙酸乙酯>石油醚>氯仿>正丁醇,对总黄酮的提取能力依次为:水>乙酸乙酯>氯仿>石油醚>正丁醇。云南金花茶有较好的抗氧化活性,不同极性溶剂提取物的抗氧化能力之间存在一定的差异,水相和乙酸乙酯相的总体抗氧化能力高于氯仿相、正丁醇相和石油醚相。水相提取物对 DPPH· 和 ·ABTS⁺ 的清除率最强,其半数抑制质量浓度(IC₅₀) 值分别为(38.634±2.556)和(276.610±8.416) mg/L,乙酸乙酯相(50.845±3.985)和(362.754±22.555) mg/L 次之;石油醚相对 ·OH 清除率最强,其 IC₅₀ 值为(180.880±49.568) mg/L、氯仿相(1130.630±157.932) mg/L 次之。当云南金花茶不同极性提取物质量浓度为 1 750 mg/L 时,水相的总还原力最强,其吸光值为 2.281±0.103、乙酸乙酯相(1.504±0.021) 次之。

关键词:云南金花茶;不同极性提取物;多酚;总黄酮;抗氧化活性

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Antioxidant Activities Analysis of Different Polar Solvent Extracts from *Camellia fascicularis* H. T. Chang

HE Xuhua¹, SHI Zhijiao¹, PENG Xiaowei¹, KAN Huan¹, ZHAO Ping², LIU Yun¹

(1.College of Life Sciences, Southwest Forestry University, Kunming 650224, China; 2.Key Laboratory of State Forestry and Grassland Administration on Highly-Efficient Utilization of Forestry Biomass Resources in Southwest China, Southwest Forestry University, Kunming 650224, China)

Abstract: In this study, polyphenols and total flavonoids were extracted from *Camellia fascicularis* H. T. Chang using different polar solvents such as water, petroleum ether, chloroform, ethyl acetate, and *n*-butanol. The radical scavenging rate on DPPH·, ·ABTS⁺, and ·OH and the reducing power were used as indicators to analyze the antioxidant capacity of different polar solvents extracts from *C. fascicularis*. The results showed that extraction abilities for polyphenols and total flavonoids from *C. fascicularis* by different polar extract solvents and the antioxidant capacities of different polar extracts were different. The order of extraction abilities for polyphenols and total flavonoids were as follows: water>ethyl acetate>petroleum ether>chloroform>*n*-butanol and water>ethyl acetate>chloroform>petroleum ether>*n*-butanol, respectively. *C. fascicularis* showed good antioxidant activities, and there were some differences in antioxidant capacities of different polar extracts. The comprehensive antioxidant capacities of water and ethyl acetate phases were higher than that of chloroform, *n*-butanol, and petroleum ether phases. The water phase extract exhibited the strongest scavenging capacities for DPPH· and ·ABTS⁺, and the IC₅₀ values were (38.634±2.556) and (276.610±8.416) mg/L, respectively, followed by the ethyl acetate phase ((50.845±3.985) and (362.754±22.555) mg/L). The petroleum ether phase showed the strongest scavenging capacities for ·OH with an IC₅₀ value of (180.88±49.568) mg/L,

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作者简介:何旭华(1995—),女,湖南衡阳人,硕士生,研究方向为天然产物化学

* 通讯作者:刘云,高级实验师,博士,硕士生导师,研究领域为天然产物化学;E-mail:liuyun0402001@163.com。

何旭华, 石志娇, 王安娜, 等. 黑果腺肋花楸叶黄酮的提取工艺优化及抗氧化、结合胆酸盐能力分析 [J]. 食品工业科技, 2023, 44(2): 253–260. doi: 10.13386/j.issn1002-0306.2022040316

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· 工艺技术 ·

黑果腺肋花楸叶黄酮的提取工艺优化及 抗氧化、结合胆酸盐能力分析

何旭华, 石志娇, 王安娜, 赵春芳, 刘 云, 阚 欢*

(西南林业大学生命科学学院, 云南昆明 650224)

摘 要:以超声波辅助法提取黑果腺肋花楸叶黄酮 (Flavonoids from *Aronia melanocarpas*' leaves, AMF), 探究其体外抗氧化活性和胆酸盐结合能力。以黄酮得率为指标, 在单因素 (液料比、乙醇浓度、超声功率、超声时间) 的基础上, 结合响应面法, 优化 AMF 的提取工艺, 并以 DPPH·、ABTS⁺清除率及总还原能力为指标, 考察 AMF 的抗氧化活性; 以胆酸钠、牛黄胆酸钠、甘氨酸胆酸钠为结合对象, 考察 AMF 的胆酸盐结合能力。结果表明, AMF 的最优提取工艺为: 液料比 61:1 mL/g、乙醇浓度 60%、超声功率 100 W、超声时间 59 min, 黄酮得率为 24.22%±0.29%, 与模型预测值 (24.27%) 接近。最优工艺制备的 AMF 对 DPPH·、ABTS⁺清除率较强, 其 IC₅₀ 值分别为 0.32、0.16 mg/mL; 质量浓度为 0.5 mg/mL 时, 总还原能力较好, 其吸光值为 1.09; AMF 对胆酸钠、牛黄胆酸钠、甘氨酸胆酸钠具有较强结合能力, 结合率的 IC₅₀ 值分别为 0.76、3.01、6.49 mg/mL。综上, AMF 有较强的抗氧化和胆酸盐结合能力。本研究可为 AMF 进一步开发天然抗氧化剂和降血脂药物提供依据。

关键词:黑果腺肋花楸叶, 黄酮, 超声波辅助提取, 工艺优化, 抗氧化能力, 结合胆酸盐能力

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Optimization of Extraction Process of Flavonoids from *Aronia melanocarpas*' Leaves and Analysis of Their Antioxidant and Bile Salt Binding Capacity

HE Xuhua, SHI Zhijiao, WANG Anna, ZHAO Chunfang, LIU Yun, KAN Huan*

(College of Life Sciences, Southwest Forestry University, Kunming 650224, China)

Abstract: In this study, the antioxidant and bile salt binding activities of flavonoids from *Aronia melanocarpas*' leaves (AMF) by ultrasound-assisted extraction. Based on single factors (liquid-solid ratio, ethanol concentration, ultrasonic power and ultrasonic time) and response surface method, the extraction process of AMF was optimized with flavonoid yield as the index. The antioxidant activity of AMF was evaluated by DPPH·, ABTS⁺ scavenging rate and reduction power. The bile salt binding ability of AMF was investigated by using sodium cholate, sodium taurocholate and sodium glycocholate as binding objects. The results showed that the optimal extraction conditions were as follows: The liquid-solid ratio of 61:1 mL/g, the ethanol concentration of 60%, the ultrasonic power of 100 W, and the ultrasonic time of 59 min. Under the optimized conditions, the yield of flavonoids was 24.22%±0.29%, which approximated the predicted value (24.27%). The IC₅₀ of DPPH and ABTS⁺ radicals scavenging capacities of AMF were 0.32 and 0.16 mg/mL, respectively. The AMF demonstrated the strongest reducing power with an absorbance value of 1.09 at the sample concentration of 0.5 mg/mL. The IC₅₀ of AMF for the binding rate of sodium cholate, sodium taurocholate and sodium glycocholate were 0.76, 3.01 and 6.49 mg/mL, respectively. In summary, AMF exhibited strong antioxidant and bile salt binding capacity. This study could provide a basis for AMF to further develop natural antioxidants and hypolipidemic drugs.

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作者简介: 何旭华 (1995-), 女, 硕士研究生, 研究方向: 功能性森林食品加工, E-mail: 602898930@qq.com。

* 通信作者: 阚欢 (1965-), 女, 硕士, 教授, 研究方向: 功能性森林食品加工, E-mail: 13700650213@163.com。