

THESIS

**QUALITATIVE AND QUANTITATIVE ANALYSIS OF
ALLICIN COMPOUNDS IN EXTRACTS AND FRACTIONS OF
GARLIC (*Allium sativum* L.) USING HPLC**



Written by:
Nabila Fadiatussalma
422021718051

DEPARTMENT OF PHARMACY
FACULTY OF HEALTH SCIENCE
UNIVERSITAS DARUSSALAM GONTOR
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VALIDITY SHEET

It is hereby stated that the thesis with the title:

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IN GARLIC (*Allium sativum* L.) EXTRACTS AND FRACTIONS USING AN HPLC
INSTRUMENT**

Written:

Nabila Fadiatussalma
NIM 422021718051

Has been tested and approved & before the Thesis Examiner Board

On: 1 Januari 2025

Examiner Board:

Supervisor I

Indriyanti Widyaratna M.Farm.
NIDN. 0713119603

Supervisor II

Yulisa Raras Dewi, M.Farm
NIY. 180709

Examiner

Anggun Mahirotun Nur Sholikah
NIDN. 0716089501



Approved by:

Head of Pharmacy Department
Faculty of Health Science, University of Darussalam Gontor



Apt. Nadia Iha Fatihah, M.Clin.Pharm.
NIDN. 0714059105

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ABSTRACT

QUALITATIVE AND QUANTITATIVE ANALYSIS OF ALLICIN COMPOUNDS IN EXTRACTS AND FRACTIONS OF GARLIC (*Allium sativum* L.) USING HPLC INSTRUMENT

Nabila Fadiatussalma

NIM 422021718051

Allicin is the primary bioactive compound in garlic when garlic crushed or chopped. Allicin is reactive and unstable. Purpose of this research is to perform qualitative and quantitative analysis of allicin in garlic extraction with the maceration method using 96% ethanol as a solvent, and garlic fractionation liquid-liquid method using water, n-hexane, and ethyl acetate as solvent. Qualitative analysis was performed using complexometric titration and thin-layer chromatography (TLC) methods. Quantitative analysis of allicin was conducted using an HPLC. Yield of garlic extract was 1.16%. Yield of liquid-liquid fractionation was: 2.5% for the water fraction, 0.39% for the ethyl acetate fraction, and 1% for the n-hexane fraction. The results of the qualitative analysis using the complexometric method on the ethanol extract, water fraction, and n-hexane fraction of garlic showed positive results for the presence of organosulfur compounds, indicated by the formation of black precipitate. In contrast, the ethyl acetate fraction showed negative results for organosulfur compounds. The qualitative analysis of allicin compounds using the TLC method showed positive results in the ethanol extract and water fraction, indicated by yellow spots on the TLC plates and R_f value of 0.8. In contrast, negative results for allicin compounds were observed in the ethyl acetate fraction. The quantitative analysis of allicin using the HPLC method showed that the allicin concentration in the ethanol extract was 90 ppm (0.10%), while the allicin concentration in the water fraction was 0.14%. This research concludes that the maceration method, followed by fractionation, is effective approach for extracting allicin compounds from garlic.

Keywords: Allicin compound, Extraction, Fractionation, HPLC.

ABSTRAK

ANALISIS KUALITATIF DAN KUANTITATIF SENYAWA ALLICIN PADA EKSTRAK DAN FRAKSI BAWANG PUTIH (*Allium sativum* L.) MENGUNAKAN INSTRUMEN HPLC

Nabila Fadiatussalma

NIM 422021718051

Senyawa allicin dalam bawang putih merupakan senyawa bioaktif utama dalam bawang putih saat bawang putih dihancurkan atau dipotong. Senyawa allicin bersifat reaktif dan tidak stabil. Tujuan penelitian ini adalah untuk melakukan analisis kualitatif dan kuantitatif kadar allicin pada ekstrak bawang putih metode maserasi dengan pelarut etanol 96% dan fraksinasi bawang putih metode cair-cair menggunakan pelarut air, n-heksan, dan etil asetat. Analisis kualitatif dilakukan dengan metode titrasi kompleksometri dan kromatografi lapis tipis. Analisis kuantitatif allicin menggunakan instrumen HPLC. Hasil rendemen ekstrak bawang putih metode maserasi memiliki hasil sebesar 1,16%. Hasil rendemen fraksinasi metode cair-cair diperoleh: fraksi air sebesar 2,5%, fraksi etil asetat sebesar 0,39% dan fraksi n-heksan sebesar 1%. Hasil analisis kualitatif metode kompleksometri pada ekstrak etanol, fraksi air dan fraksi n-heksan bawang putih menunjukkan hasil positif mengandung senyawa organosulfur dengan adanya endapan berwarna hitam, kemudian hasil negatif organosulfur metode kompleksometri terdapat pada sampel fraksi etil asetat. Hasil analisis kualitatif senyawa allicin metode KLT menunjukkan hasil positif pada ekstrak etanol dan fraksi air dengan terdapat adanya bercak berwarna kuning pada plat KLT dan hasil nilai R_f 0.8, kemudian hasil negatif senyawa allicin metode KLT terdapat pada fraksi etil asetat. Hasil analisis kuantitatif allicin metode HPLC terdeteksi kadar allicin pada ekstrak etanol konsentrasi 90 ppm sebesar 0,10%, kemudian kadar allicin pada fraksi air sebesar 0,14%. Kesimpulan dari penelitian ini metode maserasi yang dilanjutkan dengan fraksinasi merupakan metode yang efektif digunakan untuk mendapatkan kandungan senyawa allicin dalam bawang putih..

Kata Kunci: Ekstraksi, Fraksinasi, HPLC. Senyawa allicin.

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Mantingan, December 15th, 2024

Writer,

(Nabila Fadiatussalma)

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AUTHENTICITY STATEMENT

It is hereby declared by,

Name : Nabila Fadiatussalma
NIM : 422021718051
Faculty : Faculty of Health Science
Study Program : Pharmacy
Thesis Title : Qualitative And Quantitative Analysis of Allicin Compounds in
Extracts and Fractions of Garlic (*Allium Sativum* L.) Using HPLC
Instrument

I sincerely declare that the research contained in this thesis is my own work and does not belong to anyone else. This thesis has never been published before, except for some parts with original references.

If in the future it is found that this work is plagiarism, I am ready to be given administrative and academic sanction.

Ponorogo, 12 January 2025

Writer,



Nabila Fadiatussalma

NIM 422021718051

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