International Journal of Pharmacy and Applied Health Sciences
Volume 1, Issue 1, pp 6-9, June 2023

GC-MS Analysis of Metabolite Composition in Edible Bird's Nest From Jenamas Central Kalimantan

Aulia Damayanti[1], Ali Rakhman Hakim[1*], Rina Saputri[1]
[1]*Departement of Pharmacy, Faculty of Health, Sari Mulia University, Banjarmasin, Indonesia*

*Corresponding author: alirakhmanhakim@gmail.com

Received:
01 June 2023

Accepted:
15 June 2023

Published:
30 June 2023

ABSTRACT

Edible bird's nest (EBN) is known to contain high levels of glycoprotein, amino acids, carbohydrates, calcium, sodium, and potassium. Edible bird's nest is considered capable of helping to increase appetite, boost the immune system, lower blood sugar levels, and overcome canker sores. It is commonly consumed by pregnant women so that the fetus in the womb remains healthy. Edible bird's nest are not only used as medicine but are also used as food ingredients, such as swallow nest soup, porridge, jelly, boiled swallow nests, and often syrup. The purpose of this study was to identify the metabolites of the Edible bird's nest from Jenamas District, Central Kalimantan using GC-MS (*Gass Chromatografi–Mass Spektrometry*). Identification using the GC-MS instrument yielded 6 metabolites namely Hexadecanoic acid, methyl ester (CAS), Hexadecanoic acid (CAS), 9-Octadecanoic acid (Z)-, methyl ester (CAS), 9-Octadecanoic acid (Z)- (CAS), Hexadecanoic acid, 2-hydroxy-1- (hydroxymethyl) ethyl ester (CAS), and Oleic acid, 3-hydroxypropyl ester (CAS).

Keywords: Edible bird's nest, GC-MS

INTRODUCTION

Edible bird's nest (EBN) contains protein namely glycoprotein, amino acids, carbohydrates such as sialic acid (9%), galactosamine (7.2%), glucosamine (5.3%), galactose (16.9%) and fructose (0.7%), and carbohydrate mineral salts, mineral salts contained in swiftlet nests namely sodium, calcium, magnesium, zinc, manganese and iron in small amounts. The EBN is widely used by the community for various food, economic, and health needs (Elfita, 2014). The amino acid content in swallow's nest is more complete than that of other foods, so EBN is known as a complete food with amino acids. Therefore, EBN is known as a food that is useful as a cure for various diseases because of its benefits in increasing the body's immunity, metabolism, and repairing damaged organ parts (Sirenden et al, 2018). EBN are mainly from the species of Collocalia and Aerodramus which can be found in South East Asian countries such as Indonesia, Malaysia, Philippines, Thailand, Vietnam and small part of southern China (Marcone, 2005).

In the profile of metabolites, the content of EBN has been proven to have benefits, one of which is protein compounds. The quality of a protein can be determined from the type and total number of amino acids and various constituents. Amino acids consist of two types, namely essential and non-essential amino acids. Essential amino acids are amino acids that cannot be synthesized by the body and are obtained from food, while non-essential amino acids are amino acids that can be synthesized by the body (Arsih, 2014).

Data regarding the identification of metabolite profiles in EBN is still limited, while metabolite profiles can provide new possible explanations regarding their benefits, especially in the health sector. Factors that can affect the nest of the white swiftlet (Aerodramus fuciphaga) are environmental factors such as geographical location, temperature, region, light intensity, etc. In this study, an analysis of the metabolites contained in the EBN will be carried out using the GC-MS (Gas chromatography mass spectrometry) instrument which is a combination of Gas chromatography and Mass Spectrometry which contributes to the exploration of broader scientific information. This information has the potential to lead to the discovery of bioactive compounds that have therapeutic activity for certain diseases.

MATERIALS AND METHODS

Sample

In this study, the sample used was the EBN originating from Jenamas District, South Barito Regency, Central Kalimantan. The EBN is an animal simplicia.

GC-MS

EBN water extract was identified using the GC-MS instrument model, GCMS-QP2010 Plus (Shimadzu, Kyoto, Japan), was attached with a polar fused silica capillary column Zebron ZB-FFAP (30 m length × 0.2525 mm ID × 0.25 m film thickness). Helium was used as the carrier gas at a flow rate of 1 mL/min and the injector split ratio was set at 1:5. An injection volume of 1 L was used, and the solvent cut-off time was 1.5 minutes. The injector temperatures were set at 200°C and 220°C, respectively. The column oven temperature was set at 100°C (held for 3 minutes) and increased by 200°C per minute to 210°C (held for 5 minutes). The mass spectrometer was operated in the electron impact ionization mode at 70 eV. Data scanning is performed in full scan mode from mass-to-charge (m/z) 35 to 300 with a scan time of 0.5 seconds and a total run time of 13 minutes (Ibrahim et al., 2021).

RESULTS AND DISCUSSION

Results

The results of sample identification using gc-ms can be seen in table 1.

Table 1. Metabolite composition of EBN analyzed by GC-MS

No.	Retention Time (min)	Retention Indices	Peak A/H	Compound Name	Similarity Index (%)	Normalizes Area (%)	Compound Nature
1	22.141	22.095	3.24	*Hexadecanoic acid, methyl ester (CAS)*	94	3.78	Carboxylic acid
2	22.860	22.735	9.31	*Hexadecanoic acid (CAS)*	93	13.45	Carboxylic acid
3	23.822	23.765	4.53	*9-Octadecanoic acid (Z)-, methyl ester (CAS)*	94	7.98	Carboxylic acid
4	24.532	24.415	12.56	*9-Octadecanoic acid (Z)- (CAS)*	94	63.12	Carboxylic acid
5	25.182	25.025	11.62	*Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester (CAS)*	71	4.14	Carboxylic acid
6	26.900	26.825	7.41	*Oleic acid, 3-hydroxypropyl ester (CAS)*	87	2.99	Carboxylic acid

Discussion

In the identification study of the metabolites of the EBN using GC-MS, it was found that the compounds obtained were Hexadecanoic acid, methyl ester (CAS), Hexadecanoic acid (CAS), 9-Octadecanoic acid (Z)-, methyl ester (CAS), 9-Octadecanoic acid (Z)- (CAS), Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester (CAS), and Oleic acid, 3-hydroxypropyl ester (CAS).

Hexadecanoic acid, methyl ester (CAS) with the chemical formula C17H34O2 and BM 270, also known as methyl palmitate or hexadecanoate methyl ester, belongs to a class of organic compounds known as fatty acid methyl esters. Hexadecenoic acid, methyl ester is a saturated fatty acid that has potential for health as an antidiabetic (Sediarso et al., 2011).

Hexadecenoic acid, also known as Palmitic acid, with the chemical formula C16H32O2 and BM 256 is one of the most common saturated fatty acids found in animals, plants, and microorganisms. Hexadecenoic acid is a fatty acid that has potential as an antibacterial. Besides that, hexadecenoic acid has the mechanism of inhibiting or deactivating the growth of Gram-negative bacteria such as Salmonella typhi, which is a

pathogenic bacterium that often contaminates food ingredients and causes poisoning (Johannes & Litaay, 2016). Also, as antioxidants, anti-inflammatories and phytosterols effectively reduce the risk of cardiovascular disease (Kartina et al., 2019).

9-Octadecanoic acid (Z)-, methyl ester (CAS) with the chemical formula C19H36O2 and BM 296 are also known as methyl oleate. Methyl oleate is a fatty acid methyl ester resulting from the formal condensation of the carboxy group of oleic acid with methanol. It is functionally related to oleic acid. In health, 9-Octadecanoic acid (Z)-, methyl ester (CAS) is a fatty acid that functions as an antidiabetic according to (Hadi et al., 2015; Sediarso et al., 2011).

9-Octadecanoic acid (Z) with the chemical formula C18H34O2 and BM 282, another name is Elaidic acid. Elaidic acid is known as an acid in a class of organic compounds known as long-chain fatty acids. Elaidic acid is a highly hydrophobic, practically insoluble (in water), and relatively neutral molecule. Elaidic acid is the main trans-fat found in vegetable oils. trans-oleic acid. The name elaidinization reaction comes from elaidic acid. 9-Octadecanoic acid (Z) has a biological role and potential as an antibacterial and antifungal (Abubakar & Majinda, 2016). Besides that, it also has potential as an antioxidant and anti-inflammatory (Kartina et al., 2019). According to research (Sediarso et al., 2011), it is a saturated fatty acid that functions as an antidiabetic.

Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester (CAS), chemical formula C19H38O4, and BM 330, which has another name 3-Palmitoyl-sn-glycerol, known as alpha-monopalmitin or glycerol 1-palmitic acid, belongs to a class of organic compounds known as 1-monoacylglycerols. Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester (CAS) has potential and benefits in the health sector as an antioxidant and anti-inflammatory agent (Ali et al., 2015).

Oleic acid, 3-hydroxypropyl ester (CAS) with the chemical formula C21H34O3, and BM 340. Known by other names, namely oleic acid or Glycidyl Stearate, oleic acid is the most widely distributed and abundant fatty acid in nature. It is used commercially in the manufacture of lotions, and as a pharmaceutical solvent. Oleic acid is a major constituent of vegetable oils, e.g., olive oil (about 80%), almond oil (about 80%), and many others, mainly as a glyceride. It is also a high-oil constituent and is present in fruits. Oleic acid is a food additive and is used in the manufacture of surfactants, soaps, and plasticizers. It is also an emulsifying agent in food and medicine. Oleic acid has better skin penetration than other chemical enhancers (Rahayu & Mita, 2016). In addition, in the field of health, oleic acid has the potential to prevent heart disease and cholesterol.

CONCLUSION

Identification of metabolites using GC-MS showed the presence of 6 metabolites, namely Hexadecanoic acid, methyl ester (CAS), Hexadecanoic acid (CAS), 9-Octadecanoic acid (Z)-, methyl ester (CAS), 9-Octadecanoic acid (Z)- (CAS), Hexadecanoic acid, 2-hydroxy-1- (hydroxymethyl) ethyl ester (CAS), and Oleic acid, 3-hydroxypropyl esters (CAS) which have potential in the health sector.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

REFERENCES

Abubakar, M., & Majinda, R. (2016). GC-MS Analysis and Preliminary Antimicrobial Activity of Albizia adianthifolia (Schumach) and Pterocarpus angolensis (DC). *Medicines*, *3*(1), 3. https://doi.org/10.3390/medicines3010003

Ali, H. A. M., Imad, H. H., & Salah, A. I. (2015). Analysis of bioactive chemical components of two medicinal plants (Coriandrum sativum and Melia azedarach) leaves using gas chromatography-mass spectrometry (GC-MS). *African Journal of Biotechnology*, *14*(40), 2812–2830. https://doi.org/10.5897/ajb2015.14956

Arsih, M. S. (2014). *Analisis Profil Protein Dan Asam Amino Sarang Burung Walet Putih (Collocalia fuciphago) Dengan Menggunakan SDS-PAGE Dan KCKT*. UIN Syarif Hidayatullah.

Elfita, L. (2014). Analisis profil protein dan asam amino sarang burung walet (Collocalia fuchiphaga) asal Painan. *Jurnal Sains Farmasi & Klinis*, *1*(1), 27-37.

Hadi, S., Hamdiani, S., & Hilwana. (2015). *Analisis Konsistensi Senyawa Antidiabetes Pada Kulit Kacang Tanah (Arachis Hypogaea L.) Menggunakan Teknik GC-MS*. 1–9.

Ibrahim, R. M., Nadiah, N., Nasiro, M., Bakar, Z. A., Mahmud, R., & Ab, A. (2021). The Authentication and Grading of Edible Bird's Nest by Metabolite, Nutritional, and Mineral Profiling. *MDPI FOODS*, *10*, 1574.

Johannes, E., & Litaay, M. (2016). The bioactivity of hexadecanoic acid compound isolated from hydriod Aglaophenia ccupressinaLarmoureoux as antibacterialagentagainst Salmonella typhi. *International Journal of Biological & Medical Research*, *6*(2), 5469–5472.

Kartina, Agang, M. W., & Adiwena, M. (2019). Karakterisasi Kandungan Fitokimia Estrak Daun Karamunting (Melastoma malabatchricum L.) Menggunakan Metode Gas Chromatography Mass Spectrometry (GC-MS). *Biota : Jurnal Ilmiah Ilmu-Ilmu Hayati*, *4*(1), 16–23. https://doi.org/10.24002/biota.v4i1.2363

Marcone, M. F. (2005). Characterization of the edible bird's nest the "Caviar of the East". *Food research international*, *38*(10), 1125-1134.

Rahayu, N., & Mita, S. R. (2016). Article Review: Efek Penggunaan Tunggal Dan Kombinasi Asam Oleat Sebagai Peningkat Penetrasi Pada Sediaan Transdermal. *Farmaka*, *14*, 82–92.

Sediarso, S., Amalia, N., Antidiabetes, E., Identifikasi, D. A. N., Dominan, Y., & Kloroformherba, F. (2011). Efek Antidiabetes dan Identifikasi Senyawa Dominan Fraksi Kloroform Herba Ciplukan (Physalis angulata L.). *Pharmaceutical Sciences and Research*, *8*(1). https://doi.org/10.7454/psr.v8i1.3469