Indonesian Journal of Global Health Research
Volume 4 Number 1, February 2022
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

ALKALOIDS, FLAVONOIDS, TANNINS AND SAPONINS CONTENTS IN *Moringa oleifera* LEAVES

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ABSTRACT

Various studies have shown that *Moringa oleifera* leaves have benefits in preventing disease. It also has the potential to solve environmental problems as mosquito larvasides. This is presumably because Moringa leaves contain potentially beneficial compounds. Objective: The aim of this study was to analyze the content of bioactive compounds in *Moringa oleifera* leaf extract qualitatively and quantitatively. This study was an descriptive study. The study was conducted in Kupang East Nusa Tenggara at September 2019. Moringa leaf extraction was carried out using maceration method with 96% ethanol solvent. The identification of compounds was qualitatively carried out using Thin Layer Chromatography (TLC) methods, while quantitative using spectrophotometric methods. Data was analyzed descriptively to describe the content of flavonoid, tannin, alkaloid, saponin. Study results showed that Moringa leaf extract had flavonoid, alkaloid, tannin and saponin components which were measured qualitatively. Quantitative measurement results showed that Moringa leaves have compounds Total alkaloid Equivalent Quinine 0,3% b/b, Total Flavonoid Equivalent Quercetin17,40 % b/b, Tannin Total Equivalent Tannic Acid 14,68 % b/b, Saponin 7,41% b/b. It is concluded that *Moringa oleifera* leaf extract has compounds that are beneficial for many things, both in disease prevention, larvasides and other benefits.

Keywords : alkaloid; flavonoid; *moringa oleifera;* saponin; tannin

First Received	Revised	Accepted
10 January 2022	18 January 2022	20 January 2022
Final Proof Received		**Published**
04 February 2022		12 February 2022

How to cite (in APA style)
Kusmiyati, K., Rahmawati, E., Waangsir, F., & Selasa, P. (2022). Alkaloids, Flavonoids, Tannins and Saponins Contents in Moringa Oleifera Leaves. *Indonesian Journal of Global Health Research*, *4*(1), 139-144. https://doi.org/10.37287/ijghr.v4i1.832.

INTRODUCTION

Moringa oleifera is a miracle plant that has many benefits including anti-inflammatory, antibacterial and antioxidant properties (Masurekar et al., 2015). Moringa is a plant that grows in various regions in Indonesia. Moringa which grows in East Nusa Tenggara has the advantage of being easy to cultivate and resistant to heat. The leaves have a high flavonoid content , contain amino acids, protein, β-carotene, minerals, vitamins,and phenolic compounds (Adaora & Florett, 2014).

In a study conducted by Jaiswal et al. (2013) *Moringa oleifera* leaves had total phenol, flavonoids and flavonols in Moringa leaf extract 120 mg / g GAE, 40.5 mg / g QE and 12.12 mg / g. Valdez-Solana et al. (2015) identified the compound content (µg / g dry matter) of polyphenols in moringa leaves in San Pedro and Lombardia Mexico, which was extracted using 80% methanol. Reviews from various studies also show that Moringa leaves contain

various bioactive components such as polyphenols, phenolic acids, flavonoids (epicatechin, isohamnetin, kaemferol, myricetin, quercetin, routine), glucosinolate, tannin, saponin, oxalate and phitat (Leone et al., 2015).

The content of bioactive compounds in Moringa leaf extract shows its potential as an antioxidant. Quercetin flavonoids are pneumoprotective, increase antioxidant status and reduce the production of inflammatory cytokines (Verma et al., 2013). The mineral content of Moringa leaves also functions as a cofactor for antioxidant enzymes. Moringa oleifera extract also has larvicidal activity against Anopheles gambia (Chinenyenwa & Godson, 2017). Therefore it is necessary to conduct research on the content of compounds in moringa leaves in more depth because many affect the bioctive content in plants, so that seasonal differences may affect the compounds contained in them. This study aims to analyze the content of bioactive compounds in *Moringa oleifera* leaf extract qualitatively and quantitatively.

METHOD

Plant Material

Moringa oleifera leaves were collected from Fatukoa in Kupang, East Nusa Tenggara. This research was conducted at September 2019.

Identification plant

The plants used in this study have been identified at Airlangga University, the Biology Laboratory at the Faculty of Science and Technology.

Extraction of *Moringa oleifera* leaves

Moringa leaf were extracted by maceration method. Weighing 1000 grams of Moringa leaf powder. Put Moringa leaf powder that has been moistened with 96% ethanol solvent into the jar, flattened and 96% ethanol solvent added until the powder is submerged, then the jar is tightly closed. Silent for one night. Filtering was done using filter paper in a Buchner funnel and the filtrate (maserat) is accommodated in erlenmeyer. The remaining pulp is put in a jar and the solvent is added until it is submerged. Inserted ultrasonic for 10 minutes. Filtrate (maserate) was filtered again with filter paper in a Buchner funnel. The remaining pulp is put in a jar and the solvent is added until it is submerged. Inserted ultrasonic for 10 minutes. Filtrate (maserate) was filtered again with filter paper in a buchner funnel, remaseration is carried out until the filtrate / extract was clearer or repeated up to 3 times. The first to the last filtrate (maserate) was put together and evaporated using a rotary evaporator until it thickens, approximately 4 hours.

Identification of compounds

Identification of components in Moringa leaf extract was carried out at a central university laboratory, Gadjah Mada University. Identification of compounds contained in Moringa leaf extract was carried out qualitatively and quantitatively. Determination of flavonoids, alkaloids, tannins, and saponins qualitatively using the Thin Layer Chromatography method. Whereas quantitative compound analysis using spectrophotometric methods includes measurement of total tannic equivalent tannic acid spectrophotometric methods, total alkaloid equivalenquinine, saponin levels, total flavonoid equivalent quercetin spectrophotometer methods.

Ethical approval
This research has been approved by ethic committee of Faculty of Veterinary Medicine, Nusa Cendana University, with Ethical Clearance Number KEH/FKH/NPEH.2019/023

Data and analysis
Data is presented in tabular form and analyzed descriptively to describe the content of compounds in Moringa leaves.

RESULTS

Plant identification
The results of the identification of plants used in this study are:
Kingdom : Plantae
Divisio : Magnoliophyta
Classis : Magnoliopsida
Ordo : Brassicales
Familia : Moringaceae
Genus : Moringa
Species : *Moringa oleifera* Lamk

Bioactive compounds
Identification of compounds contained in Moringa leaf extract was carried out by Thin Layer Chromatography (TLC) method. The results of the identification of compounds in Moringa leaf extract are presented in Table 1.

Table 1
Results of Qualitative Identification of Compounds in Ethanol Extracts of Moringa Oleifera Leaves

Compounds group	Result
Alkaloid	Positive
Flavonoid	Positive
Tannin	Positive
Saponin	Positive

The identification results indicate that the ethanol extract of Moringa leaves found the presence of alkaloid compounds, flavonoids, tannins and saponins. In addition to identifying compounds qualitatively a quantitative test was also carried out using the spectrophotometer method.

Table 2
Results of Quantitative Analysis of Compound Content in Ethanol Extracts of Moringa oleifera Leaves

Compounds	Result
Alkaloid Total Equivalent Quinine	0,3% b/b
Total Flavonoid Equivalent Quercetin	17,40 % b/b
Tannin Total Equivalent Tannic Acid	14,68 % b/b
Saponin	7,41% b/b

DISCUSSION

The identification results showed that the Moringa leaf extract found flavonoids, alkaloids, tannins and saponins. This is consistent with the results of studies that show the same results

as this study. The results of other studies also proved that the Moringa oleifera plant contains saponins, alkaloids, tannins, glycosides, terpenoids, amino acids, flavonoids (Goswami & Singhai, 2016).

Moringa oleifera contains components (total phenols and flavonoids) that have the potential as antioxidants and can be alternatives in medicine (Ayoola et al., 2019). Besides that, *Moringa oleifera* leaves also contains Vitamins A, B, C, D, E and K. Minerals present in this tree include Mg, Ca, Mn, Zn, Cu, and Fe. Various parts of the plant are often used to deal with various diseases. Cultivating these plants is very easy and requires less effort. This plays an important role in conserving water, soil and mitigating climatic change (Singh et al., 2019). The study showed that planting practices affected the quality and growth of Moringa leaves (Murwa et al., 2017).

Moringa leaves also contain flavonoid compounds. Flavonoid is the most polyphenol component. This component is found in fruits, leaves, roots, stems and so on (Brar et al., 2014). Flavonoids have often been used in traditional medicine and several studies have stated that they have anti-inflammatory and antioxidant effects (Lago et al., 2014). Flavonoids also have the potential to be anti-inflammatory and help with capillary artery proliferation. Moringa leaves are also shown to reduce MDA levels due to gamma irradiation. Moringa leaves also contain high vitamin C (Pal et al., 2012). In addition, Moringa leaves also contain micromineral needed by various enzymes. Antioxidant enzymes (SOD, catalase, GPx) require microminerals as cofactors.

The review concluded that leaf of moringa could be important for food, medicine and pharmaceutical industries. Moringa leaf powder was an important ingredient in dealing with malnutrition (Tamilselvi & Arumugam, 2019). This plant can survive the dry season. A study showed that Moringa leaves from a village in Pasean District had high proline content. Observations on quercetin in Moringa leaves in one village in Lenteng District showed high yields. Proline is a free amino acid that is formed and accumulates in a greater number of leaves when the plant experiences drought (Wasonowati et al., 2019). The ethanol extracts of *Moringa oleifera* exhibit higher antibacterial properties than the aqueous extracts (Fouad et al., 2019). The benefits of flavonoid compounds in Moringa leaves as food and medicine in the future are promising but further research in humans and clinical trials is needed (Lin et al., 2018).

The presence of various compounds in the moringa plant indicates its potential in the prevention and treatment of disease. In addition, moringa also has the potential as a larvaside. This was supported by various other studies. At different concentrations, Moringa leaf extract showed antimicroorganism activity against fungi, yeasts and bacteria (Al_husnan & Alkahtani, 2016). Another study found that Moringa oleifera extract can also be used as a larvicide (Al-Barty & Hamza, 2015)(Al-Barty & Hamza, 2015). Its may also have therapeutic potential for reducing metabolic syndrome symptoms (Metwally et al., 2017). Other study has shown that saponins are potential antidiabetic drugs for diabetics who consume alcohol chronically (Ran et al., 2017). It is possible that moringa also has the same potency.

ONCLUSION

Moringa oleifera leaf extract which was extracted using ethanol solvent found alkaloids, flavonoids, tannins and saponins in qualitative and quantitative testing. The content of this

compound is thought to be closely related to its potential in providing benefits both in disease prevention, larvaside and other benefits.

Acknowledgements
We thank the Director of Poltekkes Kemenkes Kupang. This research is funded by DIPA Poltekkes Kemenkes Kupang. We also thank LPPT UGM who has helped to examine the components in Moringa leaves extract.

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