Jurnal Jamu Kusuma
Vol. 6, No 1, June-July 2026, pp 53-57

ISSN: 2798-0332 (print)
ISSN: 2798-558 (online)

ANALYSIS OF TOTAL FLAVONOID CONTENT EXTRACT OF JACKFUIT SEED (*Artocarpus heterophyllus)*

Oemeria Shitta Subadra[1*)], Definingsih Yuliastuti[1)], Nur Habibah[1)]
[1]Department of Pharmacy, Health Polytechnic of Surakarta, Klaten, Central Java, Indonesia
*email: oemeriass@gmail.com

ABSTRACT

Jackfruit, known for its sweet taste and attractive color, contains seeds that offer numerous benefits yet are frequently discarded. The starch content and chemical compounds within jackfruit seeds provide various health benefits. The red and yellow hues observed in jackfruit seed extract reflect the chemical compounds present. This study aimed to identify the phytochemical constituents of jackfruit seeds and determine their total flavonoid content. The methodology involved extracting the seeds by boiling them until the water volume was reduced to half of the initial amount, performing phytochemical screening, and quantifying total flavonoids to assess their concentration in the extract. Phytochemical screening revealed the presence of flavonoids, alkaloids, saponins, and tannins. The equation derived for the total flavonoid content analysis was Y = 0.0031x – 0.1618, resulting in a total flavonoid content of 2.60 mgRE/g of jackfruit seed extract.

Keywords: *Artocarpus heterophyllus*, jackfruit seeds, phytochemical screening

INTRODUCTION

ROS caused by oxidative stress can lead to health problems such as anti-aging, UV protection, and skin protection (Haerani et al., 2018). The mechanism of action of antioxidants in the body is by binding to free radicals present in the body, given that free radicals have incomplete chemical structures, making them reactive (Arifin and Ibrahim, 2018). Continuous UV exposure can cause premature aging and the appearance of skin spots due to hyperpigmentation (Winanta et al., 2024).

Jackfruit seeds, which are abundant during the harvest season, are usually only used for the flesh, while the starch content in jackfruit seeds has potential commercial value, but many people still don't understand this (Ballo, et al., 2022). Until now, knowledge of the use of jackfruit seeds has been limited to animal feed. Jackfruit seeds have quite varied activities, including antidiabetic and anti-aging properties (Moke et al., 2017).

According to Zubaydah (2020) jackfruit seed extracts and fractions have strong total phenolic and antioxidant content, warranting further in vivo research. Flavonoid content was found to be 70.1990 µg/100 g, and phenolic content was found to be 49.5971 µg GAE/100 g. The highest antiradical activity was demonstrated by the ethyl acetate fraction, with a value of 5.435 µg/ml.

The quercetin content in jackfruit seeds using the FRAP method analysis showed that the antioxidant content of jackfruit seed extract (*Artocarpus heterophyllus Lam*.) was 4.8819 mgQE/g extract, meaning that each gram of extract contains 4.8819 mgQE which is equivalent to the quercetin standard. This conclusion indicates that jackfruit seed extract has antioxidant activity equivalent to quercetin (Maulana et al., 2019). The total antioxidant capacity of jackfruit seeds was found to be 170.75 ± 0.001 mg/gm ascorbic acid equivalent (Devi et al., 2021).

ISSN: 2798-0332 (print)
ISSN: 2798-558 (online)

Jackfruit seeds have antidiabetic activity. In silico virtual screening studies using molecular docking revealed that a 70% ethanol extract of jackfruit seeds was effective in lowering blood glucose levels in streptozotocin-induced gestational diabetes rats (Dwitiyanti et al., 2019). This means that jackfruit seeds have great potential as a diabetes treatment, but this must certainly undergo in vivo testing. Phytochemical screening can be performed qualitatively and quantitatively to determine the contents of the extract (Larasati et al, 2025).

METHOD

Location and Study Period

The study was conducted at the Technology and Formulation Laboratory, Department of Pharmacy, Campus III, Poltekkes Kemenkes Surakarta. The research took place from September 2025 to June 2026.

Material and Instrument

UV-Vis spectrophotometer, cuvettes, filter paper, volumetric pipettes (1, 2, and 5 mL), 50 mL graduated cylinder, 100 mL volumetric flask, blue and green pipette fillers, test tubes, and a 100–1000 µL micropipette.

Materials prepared for this study included *Artocarpus heterophyllus* (jackfruit seeds), 2N HCl, Mayer's reagent, Wagner's reagent, Dragendorff's reagent, $FeCl_3$, NaOH, distilled water, rutin standard, pro-analysis (p.a.) ethanol, 96% ethanol, 10% NaOH, 1 M CH_3COONa, 10% $AlCl_3$, and H_2SO_4.

Sample Preparation

Weigh 20 grams of jackfruit seeds and place them in a stainless steel pot. Add 200 mL of water and proceed with extraction using the decoction method. Filter the mixture and allow it to cool in a beaker. Once cooled, transfer the extract to a volumetric flask..

Phytochemical Screening

Saponin Test.

The saponin test is performed by observing the formation of foam in water after the reagent is added. Two mL of the sample is added to 2 mL of distilled water, then shaken vigorously, and one drop of 2N HCl is added (Harborne, 1996).

Alkaloid Test.

Mix 50 mg of the extract with several mL of HCl and filter. The solution is then tested by adding one or two drops of a different reagent to a separate tube. The reagents used are Mayer, Wagner, and Dragendorff (Raaman, 2006).

Tannin Test.

Two mL of the extract is added to 2 mL of 1% FeCl3 and shaken (Harborne, 1996).

Flavonoid Test.

A few drops of 10% NaOH reagent were added to the extract sample of (Harborne, 1996).

Measurement Of Flavonoid Content Using Aluminum Chloride Reagent

A routine solution was used as a standard solution in determining the flavonoid content contained in jackfruit seed decoction. The concentration of the routine standard solution used was (100-140) µg/mL. 10% jackfruit seed extract was diluted to 3%. Pipette 0.5 mL of 3% decoction then mix with 0.1 mL of 10% AlCl3 and 0.1 mL of 1M sodium acetate in a test tube lined with aluminum foil. Stir the mixture with a vortex and let it stand for 30 minutes. Perform absorbance measurements at a wavelength of 413 nm. Decoction levels were measured twice,

ISSN: 2798-0332 (print)
ISSN: 2798-558 (online)

and the results were averaged. Flavonoid levels were expressed in mg rutin per gram of jackfruit seed husk powder using the following equation: (Salim et al, 2025)

$$TFC = \frac{c \, x \, V \, x \, f \, x \, 10^{-6}}{m}$$

Note: TFC = total flavonoid concentration, c = equivalence concentration of sample with gallic acid (µg/mL), v = total extract volume, f = dilution factor (volume of the volumetric flask divided by the volume of the initial solution taken), m = sample mass (g).

RESULT AND DISCUSS

Phytochemical Screening

The jackfruit seed extract or filtrate was observed to be clear, yellowish, and had a distinctive jackfruit odor. The filtrate was then cooled for phytochemical screening. The phytochemical screening results are shown in Table 1.

Tabel 1. Phytochemical Screening Results

No	Phytochemical	Reagent	Result
1.	Flavonoid	10% NaOH	+
2.	Tanin	FeCl3 1N	+
3.	Saponin	2 mL distilled water +HCl 2N	+
4.	Alkaloid	HCl + Mayer, Wagner, dan Dragendorff	+

Flavonoid Levels

The flavonoid content of jackfruit seed extract was measured using rutin as a standard solution. The rutin solution used has a maximum wavelength of 415 nm. The measurement of the rutin solution yielded a regression equation of Y = 0.0031x – 0.1618. This equation was used to calculate the equivalent flavonoid concentration of jackfruit seed extract with the rutin standard, followed by the calculation of the Total Flavonoid Content (see the table below). The Total Flavonoid Content obtained was 2.60 mg RE/g jackfruit seed extract.

Table 2. Flavonoid Data for Jackfruit Seed Extract

Extract concentration		Absorbansi y	Calculated concentration x	Avarange calculated concentration ekstract	Volume Filtrate	Factor dilution	Mass of the simplex
Chief (mg/L)	Measured (mg/L)		(mg/L)	(mg/L)	L		(gram)
$5x10^5$	$3x10^5$	0,236 0,235 0,234	78,3226 78,0000 77,6774	78	0,2	16,67	100

Previous research on jackfruit seeds utilized maceration to produce a concentrated extract, thereby preserving heat-sensitive flavonoid compounds; in contrast, the current study employed the decoction method chosen with the hope that the results could be readily applied by the community despite the fact that the heating process involved in decoction can reduce

ISSN: 2798-0332 (print)
ISSN: 2798-558 (online)

flavonoid concentrations due to the compounds' heat sensitivity. Consequently, the total flavonoid content observed in this study was relatively low, measuring 2.60 mg RE/g of jackfruit seed extract.

CONCLUSION

Jackfruit seeds contain a complex array of phytochemicals, such as flavonoids, alkaloids, saponins, and tannins. However, the total flavonoid content in jackfruit seed extract obtained via the decoction method tends to be low specifically 2.60 mgRE/g due to the prolonged heating process, which causes the degradation of a significant portion of the flavonoids.

ACKNOWLEDGMENTS

Gratitude is extended to all parties for their contributions, support and guidance throughout the execution of this final research project and the preparation of this publication manuscript, which have enabled the successful completion of this study.

REFERENCES

Ballo, A., Nge, S. T., Rafael, A., & Bullu, N. I. (2022). Analisis kadar air, kadar protein dan kadar kalium tepung biji nangka (*Artocarpus heterophyllus*). *Bioedukasi*, 13(1), 130–138. https://doi.org/10.24127/bioedukasi.v13i1.5314

Bhat, V., Mutha, A., & Dsouza, M. R. (2017). Pharmacognostic and physiochemical studies of *Artocarpus heterophyllus* seeds. *International Journal of ChemTech Research*, 10(9), 525–536.

Devi, P. S. S., Kumar, N. S., & Sabu, K. K. (2021). Phytochemical profiling and antioxidant activities of different parts of *Artocarpus heterophyllus* Lam. (Moraceae): A review on current status of knowledge. *Future Journal of Pharmaceutical Sciences*, 7(1), 30. https://doi.org/10.1186/s43094-021-00178-7

Dwitiyanti, D., Rachmania, R. A., Efendi, K., Septiani, R., & Jihadudin, P. (2019). In vivo activities and in silico study of jackfruit seeds (*Artocarpus heterophyllus* Lam.) on the reduction of blood sugar levels of gestational diabetes rate induced by streptozotocin. *Open Access Macedonian Journal of Medical Sciences*, 7(22), 3819–3824. https://doi.org/10.3889/oamjms.2019.512

Harborne, J. B. (1987). *Metode fitokimia: Penuntun cara modern menganalisis tumbuhan* (K. Padmawinata & I. Soediro, Trans.). Penerbit ITB.

Larasati, A. R., & Luthfiyanti, N. (2025). Analisis perbandingan kandungan fitokimia ekstrak daun nangka (*Artocarpus heterophyllus* Lam.) dengan variasi konsentrasi pelarut. *Prosiding Seminar Informasi Kesehatan Nasional*, 190–196.

Maheshwaran, L., Nadarajah, L., Senadeera, S. P. N. N., Ranaweera, C. B., Chandana, A. K., & Pathirana, R. N. (2024). Phytochemical testing methodologies and principles for preliminary screening/qualitative testing. *Asian Plant Research Journal*, 12(1), 11–38. https://doi.org/10.9734/APRJ/2024/v12i1121799

Maulana, A. K., Naid, T., Dharmawati, D. T., & Pratama, M. (2019). Analisa aktivitas antioksidan ekstrak biji nangka (*Artocarpus heterophyllus* Lam) dengan metode FRAP

ISSN: 2798-0332 (print)
ISSN: 2798-558 (online)

(Ferric Reducing Antioxidant Power). *Bionature*, 20(1), 1–7. https://doi.org/10.35580/bionature.v20i1.9757

Moke, L. E., Ngbolua, K. N., Bongo, G. N., Messi, L. M., Noté, O. P., Mbing, J. N., & Mpiana, P. T. (2017). *Artocarpus heterophyllus* Lam. (Moraceae): Phytochemistry, pharmacology and future directions, a mini-review. *Journal of Advanced Botany and Zoology*, 5(3), 1–8.

Neelanjana, J., Sharma, S., & Jose, D. (2023). Health benefits of jackfruit (*Artocarpus heterophyllus* Lam.) seeds: A review. *The Pharma Innovation Journal*, 12(3), 879–888.

Salim, T., Taslim, T., Selonni, F., Verawaty, V., & Dewi, I. P. (2025). Decoction of *Cocos nucifera* Linn.: Antioxidant activity, total phenolics, and flavonoids contents. *Pharmaceutical Science and Technology*, 8(2), 129–136.

Winanta, W., Agustin, S. D., Fitri, D. A., & Gumilang, T. S. (2024). Uji aktivitas antioksidan dan anti-aging ekstrak etanol daun kesum (*Polygonum minus* HUDS.) secara in vitro. *Usadha: Journal of Pharmacy*, 5(2), 177–185.

Yadav, D., Singh, S. P., Kanaujiya, N. K., Patel, V., & Saroj, B. K. (2023). A review on pharmacological activity of *Artocarpus heterophyllus*. *International Journal of Research and Analytical Reviews*, 10(4), 1–10.

Zubaydah, W. O., & Fandinata, S. S. (2020). Formulasi sediaan masker gel peel-off dari ekstrak buah tomat (*Solanum lycopersicum* L.) beserta uji aktivitas antioksidan. *Journal Syifa Sciences and Clinical Research*, 2(1), 1–10.