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EFFICACY OF SOLVENT TYPE ON ANTIOXIDANT ACTIVITY OF ARTOCARPUS HETEROPHYLLUS LEAVES EXTRACT: A SCOPING REVIEW

Ida Bagus Ideyogiswara[1]*, Bagus Komang Satriyasa[1], Agung Nova Mahendra[1], Agung Wiwiek Indrayani[1], Ketut Agus Adrianta[2]
[1]Universitas Udayana, Jl. P.B. Sudirman, Dauh Puri Klod, Denpasar Barat, Denpasar, Bali 80232, Indonesia
[2]Universitas Mahasaraswati Denpasar, Jl. Kamboja No.11A, Dangin Puri Kangin, Denpasar Utara, Denpasar, Bali 80233, Indonesia
*idabagusyogi6@gmail.com

ABSTRACT
Jackfruit leaves (Artocarpus heterophyllus) contain various bioactive compounds that have the potential as natural antioxidants. The antioxidant activity of jackfruit leaf extract is influenced by the type of solvent used during the extraction process. Objective to identify the effectiveness of various types of solvents on the antioxidant activity of jackfruit leaf extract. This study used a scoping review method by reviewing articles from PubMed, ScienceDirect, and Google Scholar in 2020–2025 Searching strategy using the keywords "Artocarpus heterophyllus" OR "jackfruit leaves" AND "antioxidant activity" OR "antioxidant capacity" AND solvent OR "solvent type" OR "extraction solvent" . Included articles were English-language primary studies published between 2020 and 2025. A total of 11 articles that met the inclusion criteria were analyzed descriptively. The data were analyzed descriptively and presented in tabular form to identify patterns of findings related to the effectiveness of various solvent types on the antioxidant activity of Artocarpus heterophyllus leaf extrac. Ethanol and hydroethanol solvents showed higher antioxidant activity than other solvents. Strong antioxidant activity is related to the high content of phenolic and flavonoid compounds that were successfully extracted. The type of solvent affects the antioxidant activity of jackfruit leaf extract, with ethanol and hydroethanol being the most effective solvents in extracting bioactive antioxidant compounds.

Keywords: antioxidant activity; artocarpus heterophyllus; extraction solvent; jackfruit leaves; phytochemicals

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INTRODUCTION

Oxidative stress is a condition that occurs due to an imbalance between free radical production and the capacity of the body's antioxidant system (Ayudiah et al., 2023) . Free radicals are atoms or molecules that have one or more unpaired electrons in their outermost orbital, making them unstable and highly reactive (AI Maharani et al., 2021) . To achieve stability, free radicals tend to react with other molecules around them, which can ultimately trigger a chain reaction and cause cellular damage (Aryanti et al., 2021) . Excessive accumulation of free radicals can result in damage to lipids, proteins, and DNA, thus contributing to the development of various chronic diseases, such as cardiovascular disease, diabetes mellitus, cancer, and neurodegenerative disorders (Aisy et al., 2021; AD Maharani et al., 2025) . The body naturally has an antioxidant defense system to counteract the detrimental effects of free radicals (Andarina & Djauhari, 2017) . However, when the number of free radicals produced exceeds the capacity of the defense system, oxidative stress can occur and increase the risk of biological damage (Jomova et al., 2023) . Therefore, antioxidants play a crucial role in protecting cells from oxidative damage through their ability to donate electrons or hydrogen atoms to stabilize free radicals without them becoming reactive compounds (Riskianto et al., 2021) . In addition to endogenous antioxidants produced by the body, exogenous sources of antioxidants are also needed to help maintain redox balance and support body health.

In recent decades, attention has increased on the use of natural antioxidants, such as sekamin, along with growing public awareness of the safety and benefits of natural ingredients. Plants are one of the most widely studied natural antioxidants because they contain various bioactive compounds, such as phenolics, flavonoids, tannins, and alkaloids, which are known to have the ability to ward off free radicals (Yu et al., 2021) . One plant that has potential as a source of natural antioxidants is *Artocarpus heterophyllus* , or jackfruit. This plant, which grows widely in tropical regions, is used not only for its fruit as a food ingredient but also for various other plants with pharmacological value, including its leaves. Various studies have shown that *Artocarpus heterophyllus leaves* contain various secondary metabolites, such as flavonoids, phenolics, tannins, saponins, and alkaloids, which are known to have biological activities, including as antioxidants (Sulasmi et al., 2024) . The presence of these compounds allows jackfruit leaves to be used as a source of natural antioxidants that have the potential to inhibit oxidative damage caused by free radicals (Sinaga et al., 2023) . Various studies have evaluated the antioxidant activity of jackfruit leaf extract using different assays and generally indicate that this plant has quite good free radical scavenging ability. For example, a FRAP study conducted by Sulasmi et al. (2024) showed a significant IC50 value of 74.6 ppm, which is considered a strong antioxidant.

The antioxidant activity of a plant can be influenced by various factors, one of which is the extraction process used to obtain bioactive compounds from plant materials (Arifin et al., 2025) . Extraction is a process carried out with the aim of separating the active compound content from certain natural materials by using the right solvent (Dwiyanti & Ferdinand, 2025) . In general, the success of extraction can be influenced by four factors, namely particle size, operating temperature, stirring, and solvent type (Bahri, 2019) . Among these factors, the type of solvent plays an important role because it determines the solvent's ability to dissolve and extract bioactive compounds from plant materials. Each solvent has different physicochemical characteristics and levels of polarity, so that the extracted compounds can also vary both in terms of type and quantity (Mas'odah et al., 2026). Based on their polarity, extraction solvents are divided into polar, semipolar, and nonpolar solvents (Yani et al., 2023) . Each solvent has a different ability to extract bioactive compounds from natural materials. Polar solvents are generally used to extract phenolic compounds, flavonoids, tannins, and glycosides, while semipolar solvents are more effective for obtaining compounds such as phenols, terpenoids, and certain alkaloids. Meanwhile, nonpolar solvents tend to be used to extract hydrophobic compounds, including several groups of terpenoids (Agusman et al., 2022) . The ability of a solvent to dissolve a compound is based on the principle of " *like dissolves like* ," namely a compound tends to be more easily dissolved in solvents that have similar chemical characteristics (Alfauzi et al., 2022) . The suitability of the properties between the solvent and the target compound allows for more effective intermolecular interactions, thereby improving the dissolution process and the transfer of plant matrix compounds into the solvent (Syafira et al., 2025) . Therefore, the selection of the type of solvent is a very important factor in determining the success of extraction because it can affect the resulting phytochemical composition.

Several studies have evaluated the effect of various solvents on the antioxidant activity of *Artocarpus heterophyllus leaf extract* . However, the reported results still show considerable variation due to differences in solvent types, extraction methods, antioxidant activity testing methods, and the resultant parameters used. Furthermore, information on the effectiveness of each solvent is scattered across various publications, making it difficult for researchers to obtain a comprehensive picture of the most effective solvent in producing high antioxidant activity in jackfruit leaf extract. Therefore, this scoping review was conducted to synthesize published research results related to the effectiveness of solvent types on the antioxidant activity of Artocarpus heterophyllus leaf extract. The results of this study are expected to provide a more comprehensive picture of the trend in solvent use, the resulting antioxidant activity, and serve as a basis for further research in the development of natural antioxidant sources based on jackfruit leaves.

METHOD

This study used a *scoping review method* to map and synthesize scientific evidence regarding the effect of solvent type on the antioxidant activity of *Artocarpus heterophyllus leaf extract.* A systematic literature search was conducted in the PubMed, ScienceDirect, and Google Scholar databases using the keywords *"Artocarpus heterophyllus" OR "jackfruit leaves" AND "antioxidant activity" OR "antioxidant capacity" AND solvent OR "solvent type" OR "extraction solvent"* . Included articles were English-language primary studies or original research published between 2020 and 2025, using *Artocarpus heterophyllus leaves* as the research object, and reporting antioxidant activity based on the use of one or more extraction solvents. Literature reviews, systematic reviews, meta-analyses, conference proceedings, editorials, and articles that did not present antioxidant activity data were excluded from the study. All articles obtained were then selected through review of titles, abstracts, and full texts according to established criteria. The process of identification and selection of articles is presented using the PRISMA-ScR flow diagram, and 11 articles were obtained that met the criteria for further analysis. Data from each article will be extracted into a spreadsheet that includes the author (year and country), extraction method, solvent type, antioxidant test method, antioxidant activity results, key phytochemical content, and research conclusions. The data will then be analyzed descriptively and presented in tabular form to identify patterns of findings related to the effectiveness of various solvent types on the antioxidant activity of *Artocarpus heterophyllus leaf extract.*

RESULT

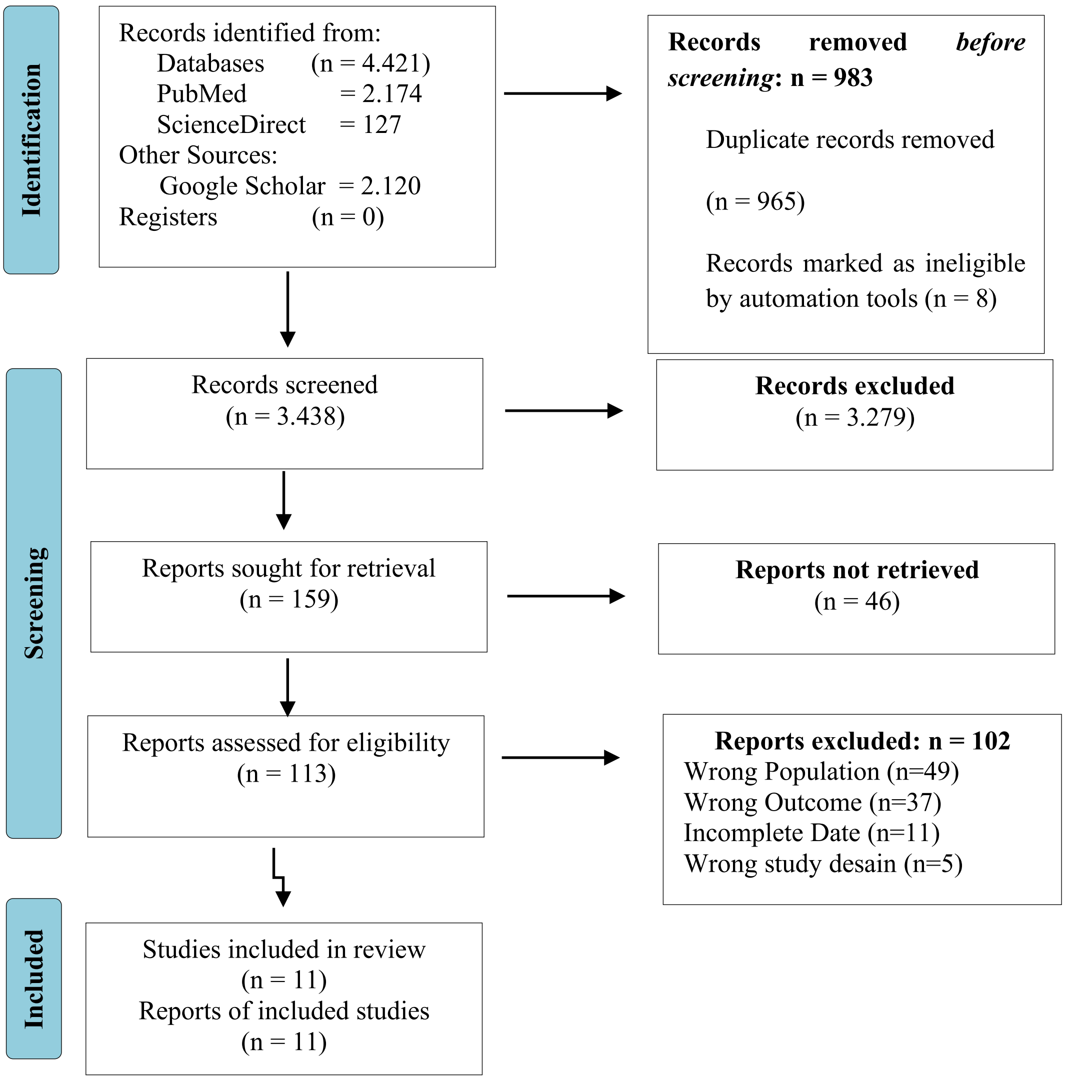

Figure 1. PISMA *flowchart*

Table 1.
Summary of Research Articles

No	Author (Year, Country)	Extraction Method	Types of Solvents	Antioxidant Test Method	Antioxidant Activity Results	Main Phytochemical Content	Main Conclusion
1	Noor et al. (2024, Malaysia)	Maceration	Ethanol 50% and Ethanol 100%	DPPH	% Highest inhibition at a concentration of 0.6 mg/mL: Ethanol 50% (89.17 ± 0.26%) and Ethanol 100% (66.29 ± 0.37%)	Total chlorophyll, Caffeic acid, Coumarin (+), Alkaloids (-)	The 50% ethanol extract showed higher radical scavenging activity than the 100% ethanol extract.
2	Aguilar-Veloz et al. (2021, Mexico)	Microwave-Assisted Extraction (MAE)	Ethanol:Water (4:1 v/v)	ABTS and DPPH	% Inhibition (at optimal conditions 840 W, 2 min): ABTS (97 ± 2%) and DPPH (93 ± 3%)	Flavonoids (Artocarpin, Licoflavone C), Chlorogenic acid	MAE at 840 W for 2 minutes maximizes polyphenols with very high antioxidant capacity (DPPH and ABTS).
3	Sayuti et al. (2020, Malaysia)	Hot aqueous extraction	Deionized water	ABTS and DPPH	Optimal conditions (81°C, 100 m, 40 mL/g): ABTS (90.88% ± 0.09) and DPPH (87.22% ± 0.62)	Quercetin, Rutin, Kaempferol, Chlorogenic Acid	Optimization of water extraction increased phenolic yield and antioxidant activity, proving the potential of jackfruit leaves as a natural antioxidant.
4	Sinaga et al. (2023, Indonesia)	Maceration	Ethanol 98%	DPPH	IC_{50} = 25.867 ± 0.055 ppm	Phenolics (27.654 mg GAE/g), Flavonoids (2.978 mg QE/g), Tannins (0.46 mg TAE/g)	Ethanol extract of jackfruit leaves has antioxidant activity that is categorized as very strong.
5	Subekti et al. (2025, Indonesia)	Maceration and Fractionation (VLC)	Ethanol 70% (extract), Polar, Semi Polar, Non Polar fractions	DPPH, ABTS, FRAP	The best IC_{50} in crude extract: 31.93 ± 5.011 µg/mL (DPPH) and 29.592 ± 4.920 µg/mL (ABTS)	Flavonoids and Phenolics	Whole extract and polar fractions had the highest antioxidant activity because polar compounds are more soluble in ethanol.
6	Mustafa et al. (2020, Malaysia)	Maceration	Ethanol/Water (0%, 50%, 80%, 100%)	DPPH and FRAP	Best results (OV80): DPPH (90.1%) and FRAP (1043.84 ± 5.28 µM TE/g EW)	Artocarpin, Squalene, β-sitosterol, Phenolics, Flavonoids	Extraction with 80% ethanol (OV80) produced the highest phenolic, flavonoid and antioxidant activity content.
7	Yuniarti et al. (2025, Indonesia)	Maceration	Ethyl Acetate and Ethanol	DPPH	IC_{50}: Ethanol (56.50 ppm) and Ethyl Acetate (117.64 ppm)	Flavonoids (Artocarpin, Licoflavone C) and Terpenoids/Steroids (Sitosterol)	Ethyl acetate extract showed superior antioxidant activity compared to ethanol extract.
8	Basir et al. (2025, Malaysia)	Ultrasound-Assisted Extraction (UAE)	Methanol 70%	DPPH	Antioxidant capacity (40 kHz): 65.04 ± 0.26%	Coumarin, Saponin, Tannin, Phenol, n-hexadecanoic acid, Phytol	High UAE amplitude (40 kHz) significantly increased the antioxidant capacity and phenolic content.

No	Author (Year, Country)	Extraction Method	Types of Solvents	Antioxidant Test Method	Antioxidant Activity Results	Main Phytochemical Content	Main Conclusion
9	Sayuti et al. (2020, Malaysia)	Hot aqueous extraction	Deionized water	ABTS and DPPH	Optimal conditions: ABTS (90.88% ± 0.09) and DPPH (87.22% ± 0.62)	Quercetin, Rutin, Kaempferol, Chlorogenic Acid	The use of water as a solvent is more efficient in producing phenolic compounds than methanol extraction.
10	Pujiawati et al. (2023, Indonesia)	Soaking	Ethanol 70%	DPPH	IC_{50} = 41.19 ppm; % Inhibition (100 ppm) = 80.48 ± 22.20%	Total Phenolics (9.19 ± 0.30%), Flavonoids (0.34 ± 0.05%), Tannins (0.36 ± 0.03%)	Jackfruit leaves have the highest total phenolic content and are included in the category of very strong antioxidants.
11	Yuniarti et al. (2025, Indonesia)	Maceration	Ethyl Acetate and Ethanol	DPPH	IC_{50}: Ethanol (56.50 ppm) and Ethyl Acetate (117.64 ppm)	Artocarpin and Sitosterol	Artocarpin and Sitosterol compounds from jackfruit leaf extract show strong antioxidant and enzyme inhibitory potential.

Article Selection Results

Based on the keywords used , 2,174 articles were obtained from PubMed, 2,120 articles from Google Scholar, and 127 articles from ScienceDirect, resulting in a total of 4,421 articles identified in the initial stage. Article selection was conducted using predetermined inclusion and exclusion criteria, resulting in 11 suitable articles.

Extraction Characteristics and Solvent Types

The most frequently used extraction method in these articles is conventional maceration (Mustafa et al., 2020; Noor et al., 2024; Sinaga et al., 2023; Subekti et al., 2025; Yuniarti et al., 2025) . In addition, modern extraction methods such as *Microwave-Assisted Extraction* (MAE) (Aguilar-Veloz et al., 2021) , *Ultrasound-Assisted Extraction* (UAE) (Basir et al., 2025), hot *aqueous* extraction (Sayuti et al., 2020) , and *soaking* techniques (Pujiawati et al., 2023) are also used. The types of solvents used show a tendency to use ethanol in various concentrations, including 50% and 100% ethanol (Noor et al., 2024) , 70% ethanol (Pujiawati et al., 2023; Subekti et al., 2025) , 80% ethanol (Mustafa et al., 2020) , 98% ethanol (Sinaga et al., 2023) , and a mixture of ethanol:water (4:1 v/v) (Aguilar-Veloz et al., 2021) . Other reported solvents include deionized water (Sayuti et al., 2020) , 70% methanol (Basir et al., 2025) , and ethyl acetate (Yuniarti et al., 2025) . The use of ethanol or a hydroethanol mixture is the most frequent solvent due to its ability to extract polar and semi-polar compounds (Mustafa et al., 2020; Subekti et al., 2025) .

Antioxidant Test Method

The most widely used test method to evaluate antioxidant activity is the 2,2- *diphenyl-1-picrylhydrazyl* (DPPH) free radical scavenging assay, which is reported by all articles (Aguilar-Veloz et al., 2021; Basir et al., 2025; Mustafa et al., 2020; Noor et al., 2024; Pujiawati et al., 2023; Sayuti et al., 2020; Sinaga et al., 2023; Subekti et al., 2025; Yuniarti et al., 2025) . Other complementary methods include the *2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)* (ABTS) test (Aguilar-Veloz et al., 2021; Sayuti et al., 2020; Subekti et al., 2025) and *the Ferric Reducing Antioxidant Power* (FRAP) test (Mustafa et al., 2020; Subekti et al., 2025) . A small number of articles also report results in *Ascorbic Acid Equivalent Antioxidant Capacity* (AEAC) units (Subekti et al., 2025) or *Trolox Equivalent* (TE) units (Mustafa et al., 2020).

Antioxidant Activity Based on Solvent Type

The antioxidant activity of jackfruit leaf extract is strongly influenced by the type and concentration of solvent used. Extraction with 50% ethanol was reported to provide DPPH radical scavenging activity of 89.17 ± 0.26% at a concentration of 0.6 mg/mL, which is higher than that of 100% ethanol which only reached 66.29 ± 0.37% (Noor et al., 2024) . In line with these findings, the use of 80% ethanol (OV80) produced the highest antioxidant activity with DPPH inhibition of 90.1% and a FRAP value of 1043.84 ± 5.28 µM TE/g EW (Mustafa et al., 2020). In terms of the 50% inhibitory concentration (IC_{50}) value, 98% ethanol extract showed an IC_{50} value of 25.867 ± 0.055 ppm, which is categorized as a very strong antioxidant (Sinaga et al., 2023) . Another study using 70% ethanol reported an IC_{50} value of 31.93 ± 5.011 µg/mL for the DPPH test and 29.592 ± 4.920 µg/mL for the ABTS test (Subekti et al., 2025) . An IC_{50} value of 41.19 ppm was also reported in extraction with 70% ethanol (Pujiawati et al., 2023) . Meanwhile, the use of ethyl acetate was reported to produce antioxidant activity with an IC_{50} value of 117.64 ppm, while the ethanol extract produced an IC_{50} value of 56.50 ppm (Yuniarti et al., 2025) .

The hot water extraction method under optimal conditions (81°C, 100 min, 40 mL/g) resulted in ABTS inhibition of 90.88% ± 0.09 and DPPH inhibition of 87.22% ± 0.62 (Sayuti et al., 2020) . On the other hand, the MAE technique with hydroethanol solvent resulted in very high inhibition, namely 97 ± 2% for ABTS and 93 ± 3% for DPPH (Aguilar-Veloz et al., 2021) . The use of UAE with 70% methanol solvent at an amplitude of 40 kHz showed an antioxidant capacity of 65.04 ± 0.26% (Basir et al., 2025) . Tests on various fractions showed that the polar fraction had higher antioxidant activity (IC_{50} DPPH: 137.95 ± 7.189 µg/mL) compared to the semi-polar and non-polar fractions (Subekti et al., 2025) .

Phytochemical Content and Synthesis of Key Findings

Jackfruit leaves are rich in phytochemical compounds, especially phenolic and flavonoid groups (Aguilar-Veloz et al., 2021; Basir et al., 2025; Mustafa et al., 2020; Noor et al., 2024; Pujiawati et al., 2023; Sinaga et al., 2023; Subekti et al., 2025; Yuniarti et al., 2025) . Specific compounds identified include artocarpin, sitosterol, licoflavone C, chlorogenic acid, quercetin, rutin, and kaempferol (Aguilar-Veloz et al., 2021; Mustafa et al., 2020; Sayuti et al., 2020; Yuniarti et al., 2025) . HPLC analysis also detected the presence of caffeic acid at a concentration of 0.15 ± 0.06 mg/mL in a 50% ethanol extract (Noor et al., 2024) . Other reported phytochemical contents include tannins, saponins, quinones, glycosides, and coumarins (Basir et al., 2025; Sinaga et al., 2023). The authors stated that there is a close relationship between total phenolic content (TPC) and flavonoid (TFC) with antioxidant activity, where increasing polyphenol concentration is directly proportional to increasing free radical inhibition capacity (Mustafa et al., 2020; Sayuti et al., 2020; Subekti et al., 2025) . The high antioxidant activity of the crude extract is thought to occur due to the synergistic effect between various polar bioactive compounds found in jackfruit leaves (Sayuti et al., 2020; Subekti et al., 2025) . In addition, the stability of the interaction of artocarpin and sitosterol compounds with oxidative stress-related enzymes has been validated through molecular dynamics simulations (Yuniarti et al., 2025) .

DISCUSSION

***Artocarpus heterophyllus* Leaf Extract**

The type of solvent is one of the most important factors in the extraction process of bioactive compounds from natural materials. According to the principle *of like dissolves like,* a compound will dissolve more easily in a solvent that has similar chemical characteristics, so the compatibility between the properties of the solvent and the target compound greatly affects extraction efficiency (Syafira et al., 2025) . In the extraction of natural materials, the solvent not only functions as a dissolving medium but also plays a role in facilitating the transfer of active compounds from the plant matrix into the solution (Dhaiffullah et al., 2025) . Therefore, different types of solvents can produce different phytochemical compositions even though they come from the same plant material.

The results of this review article indicate that ethanol and hydroethanol-based solvents consistently produce higher antioxidant activity than other solvents (Aguilar-Veloz et al., 2021; Mustafa et al., 2020; Noor et al., 2024) . This phenomenon can be explained by the characteristics of ethanol, which is widely used as a solvent in the extraction of natural materials due to its broad extraction capacity, relative safety, easy availability, and good solubility of various bioactive compounds. In addition, ethanol has good penetration ability into the plant tissue matrix, thereby increasing the release of active compounds during the extraction process (Wendersteyt et al., 2021) . These characteristics allow ethanol to extract various groups of secondary metabolites more effectively, which ultimately can contribute to the high antioxidant activity of the resulting extract (Hakim & Saputri, 2020) .

In addition to solvent type, ethanol concentration also plays a role in determining extraction efficiency. Several reviewed articles indicate that ethanol at certain concentrations produces higher antioxidant activity than absolute ethanol (Mustafa et al., 2020; Noor et al., 2024; Subekti et al., 2025) . This condition is likely related to the ability of the ethanol and water mixture to regulate the polarity characteristics of the solvent, thereby increasing the interaction between the solvent and the bioactive components in the plant matrix. The combination of the two solvents can improve the diffusion process and mass transfer of active compounds from plant tissue into the solvent phase, thereby increasing the extraction efficiency of phenolic and flavonoid compounds that contribute to antioxidant activity (Barba et al., 2020) . Thus, the use of an ethanol-water combination at an appropriate concentration can create more optimal extraction conditions in obtaining bioactive antioxidant compounds from *Artocarpus heterophyllus leaves* compared to less suitable solvent conditions.

Another finding supporting the influence of solvent type on antioxidant activity is the higher activity in polar fractions compared to semi-polar and non-polar fractions (Subekti et al., 2025) . These results indicate that most of the compounds contributing to the antioxidant activity of *Artocarpus heterophyllus leaves* tend to be in the group of compounds that are more easily extracted by solvents with appropriate characteristics. Therefore, the effectiveness of the solvent in this study appears to be closely related to its ability to extract the main antioxidant compounds found in jackfruit leaves, resulting in a higher free radical inhibition capacity.

The Role of Phytochemical Content in Antioxidant Activity

The antioxidant activity of plants is generally closely related to their secondary metabolite content, especially the phenolic and flavonoid groups (Herawati et al., 2025) . Phenolic compounds are known to inhibit oxidation processes through electron and hydrogen atom transfer mechanisms, while flavonoids act as free radical scavengers and metal ion chelators that can trigger the formation of reactive oxygen species (Nainggolan et al., 2024) . Therefore, phenolic and flavonoid content are often used as indicators of the antioxidant potential of a plant extract. Various studies have also shown that an increase in total phenolic and flavonoid content is often followed by an increase in antioxidant activity (Sukma et al., 2022). These findings are in line with the results of the synthesis of articles which show a positive relationship between total *phenolic content* (TPC), total *flavonoid content* (TFC), and antioxidant activity of *Artocarpus heterophyllus leaf extract.* (Mustafa et al., 2020; Sayuti et al., 2020; Subekti et al., 2025) . In addition, several studies have successfully identified specific compounds such as artocarpin, quercetin, kaempferol, rutin, chlorogenic acid, and caffeic acid, which are known to have high antioxidant activity (Aguilar-Veloz et al., 2021; Noor et al., 2024; Yuniarti et al., 2025) . The presence of these compounds indicates that jackfruit leaves have a phytochemical profile that has the potential to support antioxidant activity through various different biological mechanisms.

However, the activity of plant extracts is not only influenced by the presence of individual bioactive compounds, but can also be influenced by interactions between phytochemical components contained in the extract. The synthesis of articles in this review also supports this concept, where several authors suggest that high antioxidant activity likely comes from a combination of phenolics, flavonoids, tannins, and other secondary metabolites working together (Sayuti et al., 2020; Subekti et al., 2025) . This synergistic effect allows for a more complex protection mechanism against free radicals than if these compounds worked individually (Suryani et al., 2023) . Therefore, the ability of the solvent to maintain the diversity of phytochemical components is one of the important factors determining the antioxidant activity of Artocarpus heterophyllus leaf extract.

Implications and Recommendations for Further Research

The results of this scoping review indicate that solvent type is an important factor influencing the antioxidant activity of *Artocarpus heterophyllus leaf extract* , with ethanol-based solvents showing a tendency for better results compared to other solvents. This finding implies that solvent selection should be a primary consideration in developing jackfruit leaf extract as a natural antioxidant source for food, nutraceutical, and pharmaceutical applications. However, variations in extraction methods, solvent concentrations, and antioxidant testing methods exist between studies, which can affect the interpretation of results. Therefore, further research needs to use more standardized methods and conduct direct comparisons between solvent types under the same extraction conditions. In addition, further research focusing on identifying the dominant active compounds and testing their biological activity in *vivo is needed* to strengthen the potential use of *Artocarpus heterophyllus leaves* as a natural antioxidant source.

CONCLUSION

Based on the results of a scoping review of 11 articles, it can be concluded that the type of solvent significantly influences the antioxidant activity of jackfruit (Artocarpus heterophyllus) leaf extract. Ethanol and hydroethanol-based solvents showed the highest effectiveness in producing antioxidant activity compared to other solvents because they were able to extract polar and semi-polar bioactive compounds, especially phenolics and flavonoids, more optimally. Certain ethanol concentrations, such as 50%, 70%, and 80% ethanol, produced better antioxidant activity than absolute ethanol. In addition, phytochemical contents such as flavonoids, phenolics, artocarpin, quercetin, kaempferol, rutin, and chlorogenic acid contributed significantly to the free radical scavenging ability. Overall, jackfruit leaves have excellent potential as a source of natural antioxidants, and choosing the right solvent is a key factor in maximizing the antioxidant activity of the resulting extract.

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