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Narrative Review: Optimation of Ethanol as a Solvent for Flavonoid Compounds in Papaya Leaf Extraction.

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ABSTRACT

Ethanol is widely used as a distiller of secondary metabolite compounds. Ethanol very well dissolves secondary metabolite compounds including flavonoids group compounds including for papaya (*Carica papaya* L.) leaf extraction. This review was conducted to examine solvent optimization that has been used in various original studies. The method of searching scientific journal article using PubMed and MDPI using keyword "*extraction and ethanol and flavonoid and carica papaya leaf*" with the inclusion criteria of 2018 – 2023 article, *free full text* and *not review articles*, the number of article obtained was 3 articles. The optimal concentration of ethanol as a flavonoid extract solven is 70 % ethanol at temperatures from 30 °C – 50°C with a time range of 10 – 48 hours of immersion.

Keywords : *Extraction, Ethanol, flavonoids, carica papaya leaf*

INTRODUCTION

Plant have long been used ass medicines to treat various diseases, either used directly or with simple processing accordiing to the times. Lately, the *back to nature* trend is incresingly trendy and almost fulfills all aspects of life, icluding the tendency to use traditional medicines sourced from nature, especially plants. In the field of pharmacy, along with the development of pharmaceutical science, the mindset of utilizing natural resources has also changed. Researchers especially in the field of pharmacy began to think about a subtance contained in the natural material itself, so the need for extraction continues to be the spotlight and aim of researchers to be developed. One of the thoughts is how to take or extract active substances from natural materials using appropriate solvent, so on such a basis solvent optimization absolutely must be done to obtain optimal levels of active substances.

Substance derived from plants that widely used as drug are secondary metabolite compounds that do not play a role in the growth of the plant itself but rather as compounds for other needs such as for self-defense and others. Among the compounds secondary metabolite cpmpound including flavonoid class compounds.

Flavonoids are obtained by extraction, which is way of extracting directly from the source using water or organic solvents. Flavonoids extraction is done by soaking the simplisia with 96% ethanol for 5 days (Indriastuti et al. 2023). Another journal article states that 70% ethanol extract is best in getting flavonoid levels in iler leaves (Plectranthus scutellarioides) (Utami et al. 2020).

There are differences in optimum flavonoid levels using ethanol solvents of different concentrations, so it is necessary to optimize ethanol to obtain extracts with optimum flavonoid levels, thus a review to see the optimization of ethanol as a solvent in extracting flavonoids in various flavonoid sources must be carried out.

To determine and analyze the composition of ethanol as a solvent in the extraction of flavonoid compounds in Carica papaya leaves. L.

METHODS

The source of journal articles is done by searching PubMed by entering the keywords extraction and ethanol and flavonoids and carica papaya leaf, with the inclusion criteria of articles published from 2018 to 2023 (5 years), not a review article and is a free full text article.

RESULTS

NO	Solvent	Time (Hours)	Temperature (Centrigrade)	Flavonoid Content	Literature
1.	70% Ethanol	-	-	2,23 ± 0,24%	(Usmani et al. 2023)
2.	70% Ethanol	48	50°	-	(Ilham 2019)
3.	70% Ethanol and water	10-11 hours	30°	9,95 ± 0,05 mg	(Nguyen et al. 2015)

Efforts to obtain optimal falavonoid content in the extraction process using ethanol solvents depend on the concentration of ethanol, temperature and the length of contact between the solvent and the sample until the saturation point. Referring to table 1, it can be seen that the optimal use of ethanol ranges from 70% ethanol concentration, at a temperature range of 30 ° C - 50 ° C with a time range between 10 hours – 48 hours. The optimum peak point based on the table above is extraction using a mixture of 70% ethanol and water, however, the flavonoid content in each plant is different and this is due to differences in the relationship of synthesis or transport in each plant is different (Rojsanga, Bunsupa, and Sithisarn 2020).

DISCUSSION

Ethanol is a common organic solvent used for extraction including extraction of flavonoid substances. The reason for using ethanol in the extraction process is because it has relatively no toxic effects, is easily available and does not damage the environment and has a very high extraction rate so that it can be used for extracts that will be used as medicines and food (Chen, Xiao, and Pang 2020).

The concentration of ethanol used in the extraction process greatly affects the results of the extraction. The combination of ethanol and water is also often done to get more optimal results, this will cause differences in polarity so that it is expected to attract flavonoid compounds to be more optimal, considering that the initial flavonoid compounds are glycoside compounds where there are polar glycones and aglycones that are less polar to reach non-polar. The more similar the polarity between the solvent and the flavonoid compound, the more flavonoid compounds will be attracted (Fan et al. 2020).

CONCLUSION

Ethanol is very good to be used as an extraction solvent to obtain flavonoids, the optimal

ethanol concentration as a solvent for flavonoid extracts is 70% ethanol at temperatures ranging from 30 ° C - 50 ° C with a range of 10 - 48 hours of immersion.

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