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Comparison of total phenolic content in seed, flesh fruit and peel of *Pometia pinnata* from Indonesia

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Abstract

Fruit of *Pometia pinnata* which is widely used in traditional medicine has been extracted. Extraction used solvent of methanol, ethyl acetate, and n-hexane to extract seed, peel and flesh fruit. The highest yield was 54.15% of hexane extract in peel, and the lowest yield was 0.91% of hexane extract in flesh fruit. Analysis for total phenolic showed flesh fruit which was extracted with methanol had the highest total phenolic content (393.12 mg gallic acid equivalent (GAE)/g) and flesh fruit with extracted with n-hexane had the lowest total phenolic content (27.15 mg GAE/g), hence medicinal potential of methanol extract of flesh fruit higher than the others parts of *Pometia pinnata* fruit.

Keywords: *Pometia pinnata*, total phenolic content, medicinal potential

Introduction

Plant based traditional medicine system continues to play a vital role in the health care system with about 60% of world inhabitants relying mainly traditional medicines for their primary health care. The medicinal plant product, which are derived from plant part such as peel of fruit, seed and flesh fruit have been part of phytomedicine that produce a definite physiological action in human body. The most important of these natural bioactive constituents of plant was phenolic compounds which were used as antioxidants compounds^[1].

Among various medicinal plants, *Pometia pinnata*, a member of Sapindaceae family, is widely distributed in Asia Pacific included Papua, Indonesia^[2-3]. The parts of *Pometia pinnata*, such as leaves, seed, or fruit are used in traditionally medicine to hypertensi, abdominal ailments including stomach complaints, diarrhea, dysentery, obstetric, and gynaecological complaints. The chemical compounds from the seed, peel fruit and flesh fruit of *Pometia pinnata* were different, so they could be extracted using different solvent,

The basic aim of research was to compare yield of extract in various extracts and to determine the total phenolic content in various extract of seed, peel and flesh fruit from *Pometia pinnata*.

Material and Methods

General experimental procedures

Pometia pinnata was obtained from local market in Pontianak, West Kalimantan. The flesh of *Pometia pinnata* was drying in room temperature, and then made into powder. All chemicals used were analytical grade. Folin-Ciocalteu reagent, galic acid, sodium carbonate solution, reagent, methanol, ethyl acetate, n-hexane, ferric chloride hexahydrate ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) were purchased from Merck.

Sample extraction

Sample preparation was conducted by maceration using several organic solvents. About 150 g of powdered peel, seed, and flesh of fruit of *Pometia pinnata* were immersed in 100 mL of n-hexane for 3 days, and then filtered. Filtration was evaporated until dry sample was obtained, and this step resulted in raw extract of n-hexane. The residue from first immersion was entirely immersed back in 100 mL ethyl acetate for 3 days to obtain raw extract of ethyl acetate. The solution was then filtered and evaporated, and the residue from this step was immersed in 100 mL methanol for 3 days, resulted in raw methanolic extract. The maceration process was repeated several times to obtain clear extract containing all of expected chemical species.

Total phenolic content

The total phenolic content of the extract was determined by the Folin–Ciocalteu method [4]. Briefly 200 µL of crude extract (1 mg/mL) that were made up to 3 mL with distilled water, mixed thoroughly with 0.5 mL of Folin–Ciocalteu reagent for 3 min, followed by the addition of 2 mL of 20% (w/v) sodium carbonate. The mixture was allowed to stand for a further 60 min in the dark, and absorbance was measured at 650 nm. The total phenolic content was calculated from the calibration curve, and the results were expressed as mg of gallic acid equivalent per g dry weight.

Result and Discussion

Sample Extraction

The results showed that different extracting agent resulted in different percentage of yield. Extract yield from seed, peel and flesh fruit of *Pometia pinnata* are shown in Table 1. From 150 g dry peel, seed, and flesh of fruit of *Pometia pinnata*, its

yielded 81.22 g (54.16%), 71.50 g (47.66%), and 1.36 g (0.90%) of raw n-hexane extract; 10.67 g (7.12%), 18.03 g (12.00%), and 4.37 g (2.91%) of raw ethyl acetate extract; and 21.44g (14.30%), 20.96.g (13.97%), and 32.39 g (21.59%) of raw methanolic extract. The percentage of yield of extract indicated the extracting capacity of extracting agent was different. Yield of n-hexane extract was the highest yield in peel and seed and methanol extract was the highest yield in flesh fruit. The highest of extract indicated that extract has the highest extracting capacity for secondary metabolite in the fruit of *Pometia pinnata*. Azmir *et al.* [5] states that the efficiencies of extraction methods mostly depend on the understanding the nature of plant matrix and chemistry of bioactive compounds. This explanation must be supported by the further phytochemical assay. The physical appearance of the extract solution also provided supporting information that different kinds of the secondary metabolites were extracted from different solvent.

Table 1: Extract Yield (g/100g) of n-Hexane, Ethyl acetate and Methanol Extract of *Pometia pinnata* organ

The Parts of <i>Pometia pinnata</i> Fruit	Extract Yield (g/100g)			
	n-Hexane	Ethyl Acetate	Methanol	Mean
Peel	54.15 ± 0.07	7.12 ± 0.05	14.29 ± 0.07	25.19
Seed	47.66 ± 0.09	12.00 ± 0.06	13.98 ± 0.06	24.54
Flesh Fruit	0.90 ± 0.05	2.90 ± 0.06	21.59 ± 0.08	8.46
Mean	34.23	7.34	16.62	-

Total phenolic contents

The total phenolic contents in the examined seed, peel, and flesh of fruit of *Pometia pinnata* which are extracted by using the Folin–Ciocalteu's reagent is expressed in terms of gallic acid equivalent (the calibration curve equation: $y = 0.1229x + 0.0516$, $R^2 = 0.9978$). The values obtained for the concentration of total phenols are expressed as mg of GAE/g of extracts (Table 2).

The total phenolic contents in the examined seed, peel, and flesh of fruit of *Pometia pinnata* extracts ranged from 27.15 to 393.12 mg GAE/g. Total phenolic content in n-hexane extracts ranged from 27.15 to 263.19 mg GAE/g and peel of *Pometia pinnata* fruit extract has highest total phenolic content (mg GAE/g), i.e. 263.19, followed by seed of fruit *Pometia pinnata* extract (177.2), and flesh of fruit of *Pometia pinnata* extract (27.15). In ethyl acetate extracts, total phenolics content ranged from 82.98 to 234.62 mg GAE/g and peel of fruit extract has highest total phenolic content (mg GAE/g) i.e. 234.62, followed by seed of fruit *Pometia pinnata* extract (118.8), and flesh of fruit extract (82.98). In methanol extracts, total phenolics content ranged from 122.18 to 393.12 mg GAE/g and flesh of fruit *Pometia pinnata* extract has highest total phenolic content (mg GAE/g) i.e. 393.12, followed by peel of fruit extract (288.85), and seed of fruit extract (122.18).

Among the parts of fruit of *Pometia pinnata* the mean value of total phenolics content (mg GAE/g) in peel of fruit extracts (262.22) was higher than flesh of fruit extracts (167.75) and

seed of fruit extracts (139.39). Moreover, among solvents the mean value of total phenolic content (mg GAE/g) in methanol extracts (268.05) was higher than n-hexane (155.85) and ethyl acetate (145.47). High solubility of phenols in polar solvent provides high concentration of these compounds in the extracts obtained using polar solvents for the extraction [6, 7]. The total phenolic concentration could be used as a basis for rapid screening of antioxidant activity. The phenolics are composed of one or more aromatic rings bearing one or more hydroxyl groups and are therefore potentially able to quench free radicals by forming stabilized phenoxyl radicals [8].

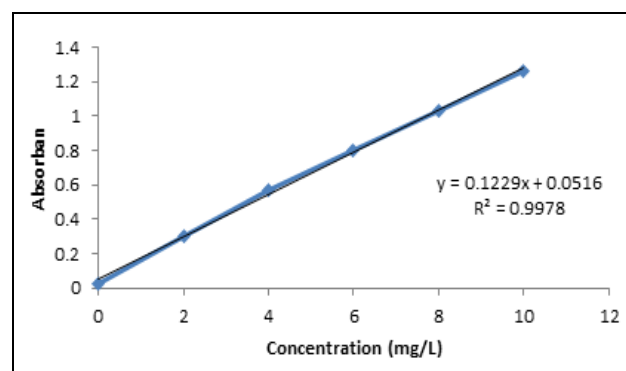


Fig 1: Calibration Curve of Gallic Acid

Table 2: Total phenolics content from parts of *Pometia pinnata* fruit

Parts of <i>Pometia pinnata</i>	Total Phenolics (mg GAE/g)			
	n-Hexane	Ethyl Acetate	Methanol	Mean
Peel	263.19	234.62	288.85	262.22
Seed	177.2	118.80	122.18	139.39
Flesh of Fruit	27.15	82.98	393.12	167.75
Mean	155.85	145.47	268.05	-

Conclusion

The study resulted yield extract and total phenolic content of seed, peel and flesh fruit from *Pometia pinnata*. The highest yield was 54.15% of hexane extract in peel and the lowest yield was 0.91% of hexane extract in flesh fruit. Analysis for total phenolic showed that flesh fruit which was extracted with methanol was the highest total phenolic content (393.12 mg gallic acid equivalent (GAE)/g) and flesh fruit with extracted with n-hexane was the lowest total phenolic content (27.15 mg GAE/g). Medicinal potential of methanol extract of flesh fruit was higher compared to others.

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