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Evaluation of antidiabetes activity of matoa seed extract (*Pometia pinnata*) using enzym α-glucosidase

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Abstract
The Parts of Fruit of *Pometia pinnata* from Papua, Indonesia is widely used as a traditional medicine, such as matoa seed extract. Extraction of matoa seed extract has used the solvent of methanol, ethyl acetate, n-hexane and analysed its antidiabetes activity has done. The research revealed Antidiabetes activity of *Pometia pinnata* seed with various extract solution increased with increase of concentration level. *Pometia pinnata* seed extract with methanol, ethyl acetate, and n-hexanee had antidiabetic activity (IC_{50}) respectively 169.81 µg/mL, 505.55 µg/mL and 263.18 µg/mL.

Keywords: Antidiabetes activity, Pometia pinnata, α-glucosidase

Introduction
The *Pometia pinnata* J.R. Forst & G. Forst. Fruit from Papua, Indonesia is widely used in traditional medicine. Phytochemical constituents in fruit flesh of methanol extract were tannins, phenolic and sterol triterpenoid [1]. Among parts of *Pometia pinnata* fruit, its peel had higher antioxidant activities compared to its seed and flesh fruit [2]. Analysis for total phenolic showed flesh fruit which was extracted with methanol had the highest total phenolic content and flesh fruit with extracted with n-hexane had the lowest total phenolic content [3].
Polyphenolic compound in plants have long been recognized to inhibit the activities of digestive enzymes due to their ability to bind with protein [4].
Diabetes is a well-known metabolic disorder, which is characterisized by an abnormal postprandial increase of blood glucose level. The control of postprandial hyperglycemia is believed to be important in the treatment of diabetes. α-glucosidase secreted from intestinal chorionic epithelium is responsible for the degradation of carbohydrates. α-Glucosidase inhibitors slow down the process of digestion and absorption of carbohydrates by competitively blocking the activity of α-glucosidase. Consequently, the peak concentration of postprandial glucose is reduced and the blood sugar level comes under control [5].
The basic aim of research was to determine and to compare antidiabetic activity in various extract of Pometia pinnata seed.

Materials and Methods
General experimental procedures
Pometia pinnata were harvested from local market in Pontianak, West Kalimantan at Juny 2017. The flesh of seed of Pometia pinnata to the drying process in room temperature, and then were powdered reagent, methanol, ethyl acetate, n-hexane, p-nitrofenil α-glukopiranosida, were purchased from Merck. All chemicals used were of analytical grade

Sample Extraction
Sample preparation was conducted by maceration using several organic solvents. A 50 g of powdered seed of *Pometia pinnata* were immersed in 100 mL of n-hexane for 3 days, and then filtered. Filtrate 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 [6].

α-Glucosidase Inhibition Test [7, 8]

250 µL solution of p-nitrofenil α-D-glukopiranoside 5 mM and 495 µL phosphate buffer 0.1 M pH 7 was added to the reaction tube containing 5 µL of the sample solution in DMSO with a concentrations variation of 100, 50, 25, and 10 µg/mL. After homogeneous, the solution was pre incubated at 37 ^{0}C for 5 min, the reaction was initiated by the addition of 250 µL α-glukosidase solution (0.062 units), incubation was continued for 15 min. The reaction was stopped by the addition of 1 ml of Na_2CO_3 0.2 M.. The activity of the enzyme was measured, based on the reading of p-nitrophenol absorbance at λ 400 nm. Quersetin was used as a reference standard with concentration of 10, 7.5, 5, 2.5, and 1 µg/mL. Blank solution was made the same as an α-glucosidase test without the addition of extracts from each solvent, either using enzyme solution or without addition of enzyme solution. % Inhibition of α-glucosidase enzyme activity was determined by using the equation:

$$\% \ Inhibisi = \frac{(A_{blank} - A_{sampel})}{A_{blank}} \times 100\%$$

A_{blank} = Absorbance of blank
A_{sampel} = Absorbance of sample

Results and Discussion

Sample Extraction

Pometia pinnata seed has been extracted in the other research [4]. The results research *Pometia pinnata* seed extracts used methanol, ethyl acetae and n-hexane solvent had yield respectively 47.66 ± 0.09 g/100 g; 12.00 ± 0.06g/100g and 13.98 ± 0.06 g/100 g. The methanol extract was the highest of yield among the solvent

α-Glucosidase Inhibition Test

Based on the antidiabetic test used α-Glucosidase inhibition test, quercetin standrad at concentration of 10, 7.5, 5, 2.5, and 1 µg/mL had % inhibition of 77.59%, 61.06%, 45.22%, 27.01% and 7.42% respectively. The methanol extracts of *Pometia pinnata* seed at concentration of 100, 50, 25, dan 10 µg/mL had a % inhibition of 32.10%, 13.46%, 12.71%, and 12.04% respectively. Ethyl acetate extracts of *Pometia pinnata seed* at the same concentration had a % inhibition of 18.80%, 13.95%, 12.97%, 11.71% respectively. Hexane extracts of *Pometia pinnata seed* at the same concentration had a % inhibition of 25.89%, 14.64, 14.42%, 11.54% respectively. Based on the result of antidiabetic test in Table-1, it can be seen that the methanol extracts of *Pometia pinnata seed* had high antidiabetic activity with IC_{50} compared to another extracts.

Table 1: Results of antidiabetic test

Standard/ Sample name	Concentration (µg/mL)	% Inhibition	IC_{50} (µg/mL)
Quercetin	1	7.42	6.04
	2.5	27.01	
	5	45.22	
	7.5	61.06	
	10	77.59	
Methanol extracts	10	12.04	169.81
	25	12.71	
	50	13.46	
	100	32.10	
Ethyl Acetat extracts	10	11.71	509.55
	25	12.97	
	50	13.95	
	100	18.80	
Hexane extracts	10	11.54	263.18
	25	14.42	
	50	14.64	
	100	25.89	

Percent α-glucosidase inhibition by methanol, ethyl acetate and n-hexane extracts of *Pometia pinnata seed* as shown in Figure 1, 2, and 3.

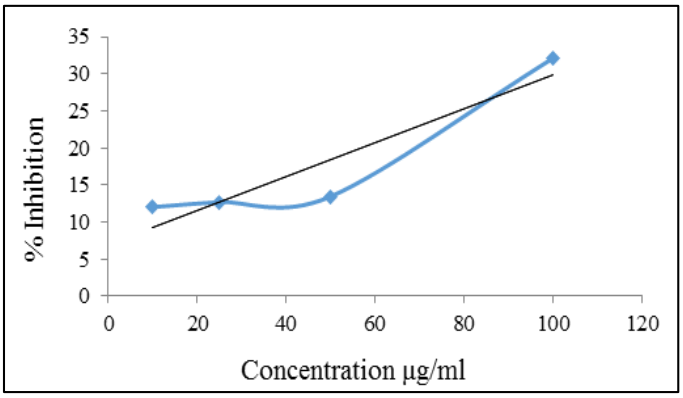

Fig 1: % Inhibition of α-glucosidase enzyme by methanol extracts of *Pometia pinnata seed*

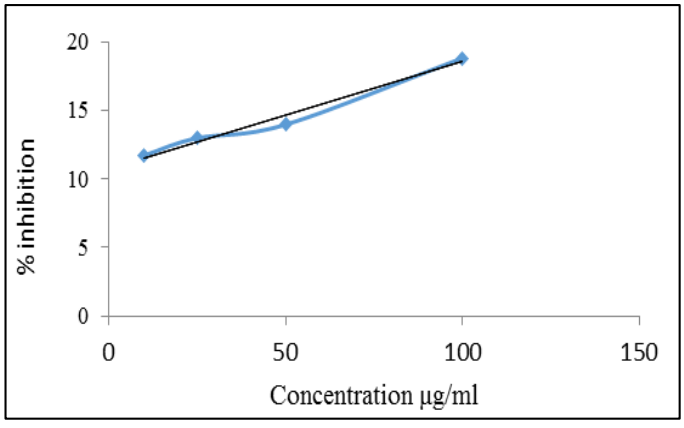

Fig 2: % Inhibition of α-glucosidase enzyme by ethyll acetate extracts of *Pometia pinnata seed*

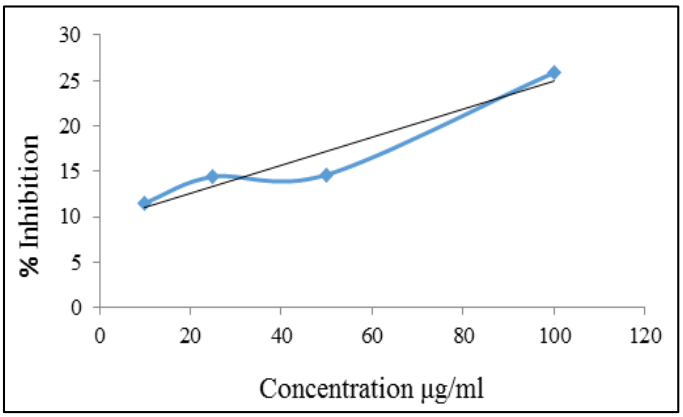

Fig 3: % Inhibition of α-glucosidase enzyme by n-hexane extracts of *Pometia pinnata seed*

Conclusions

Conclusion Based

The research revealed Antidiabetes activity of *Pometia pinnata* seed with various extract solution increased with increase of concentration level. *Pometia pinnata* seed extract with methanol, ethyl acetate, and n-hexanee had antidiabetic activity (IC_{50}) respectively 169.81 µg/mL, 505.55 µg/mL and 263.18 µg/mL. These results, it can be concluded that extracts of *Pometia pinnata* seed had potential as biomedicine for diabetes diseases.

Acknowledgments

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