



## Research Article

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### ANTIOXIDANT AND ANTIDIABETIC ACTIVITY OF 70% ETHANOLIC EXTRACT OF *SYZYGIUM POLYANTHUM* (WIGHT) LEAF FROM INDONESIA

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#### ABSTRACT

Free radicals are a contributing factor to the occurrence of degenerative diseases. Antioxidants are compounds that inhibit the effects of free radicals. This study aims to examine the antioxidant and antidiabetic effects of 70% ethanolic extract of *Syzygium Polyanthum* (Wight) leaf. Antioxidant activity was done by DPPH (Diphenyl picrylhydrazyl) assay method, meanwhile antidiabetic activity was done by in vivo studies using male rats Wistar strain. The results showed that the 70 % ethanolic extract of *Syzygium Polyanthum* (Wight) leaf have scavenging activity with IC<sub>50</sub> of 27.80 µg/mL. The 70% ethanolic extract of *Syzygium Polyanthum* (Wight) leaf at doses of 62.5 mg/kg bw; 125 mg/kg bw and 250mg/kg bw can reduced blood glucose level on P<0.05. It can be concluded that the 70% ethanolic extract of *Syzygium Polyanthum* (Wight) leaf have potencies antioxidant and antidiabetic effect

**Key words:** *Syzygium Polyanthum* (Wight) leaf, antidiabetic, antioxidant, IC<sub>50</sub>

#### INTRODUCTION

One factor causing degenerative disease (diabetes mellitus) is exposure to free radicals for long of time<sup>1</sup>. The free radicals contain free electrons that cause highly reactive of free radicals. These compounds are grouped in reactive oxygen species (ROS). There are many types of ROS include: nitric oxide radicals, hypochlorite radicals, hydroxyl radicals, superoxide anion radical, hydrogen peroxide, singlet oxygen, and lipid peroxides<sup>2,3</sup>. Exposure to oxidative stress plays an important role in the pathogenesis of diabetes and it's complicated<sup>4,5,6</sup>.

In Indonesia, Salam (*Syzygium Polyanthum* (Wight)) was used to as antioxidant. Several studies have shown that the *Syzygium Polyanthum* (Wight) have the effect of lowering glucose, LDL and increasing HDL<sup>7</sup>, anti-fungal, antibacterial, induction of apoptosis<sup>8</sup> and rheumatic, gastritis, hypertension and antioxidant<sup>9,10</sup>.

#### MATERIALS AND METHODS

*Syzygium Polyanthum* (Wight) leaf was harvested in Karanganyar, Jawa Tengah, Indonesia on December 2013, Diphenyl picrylhydrazyl(DPPH) (Sigma), 70% ethanol (Sigma), methanol (Sigma), Butylated hydroxytoluene (BHT) (Sigma). Rats was found Pharmacology laboratory of Faculty of Pharmacy of Universitas Muhammadiyah Surakarta.

#### Preparation of ethanolic extract of *Syzygium Polyanthum* (Wight) leaf

*Syzygium Polyanthum* (Wight) leaves dried in an oven with a temperature of 30-50 ° C, then blundered to be powdered. A total of 500 g of powder and then soaked in 70% ethanol at a

ratio of 1: 7. After 4 days, the filtrate was poured in the cup I. residue was re-soaked by 70% ethanol (ratio 1: 4). The filtrate was mixed with first filtrate. The Filtrate was evaporated by vacuum evaporator for 24 hours

#### Antioxidant test by DPPH method

This method referred previous method<sup>11-14</sup>. Extract was dissolved in methanol and made in a variety of concentrations, namely 10, 30, 50 and 70 ppm respectively 10 ml. Into each solution was added 1 ml solution of 1 mM DPPH and incubated at 37 ° C for 30 minutes, then measured at a wavelength of 515 nm. DPPH and methanol were used as blank 1mM. BHT with concentration of 2, 4, 6, 8 ppm was used as comparator. Calculation of percent inhibition of DPPH use the following formula: (A blank - A sample) / A blank x 100%. The assays of DPPH radical scavenging activity use linear regression with equation Y=a+bx. From this equation the IC<sub>50</sub> can be calculated

#### Antidiabetic test

##### Animal test preparation

Forty rats were divided 5 groups. Each group contains 8 rats. Group I was negative control (water for injection at dose of 10ml/kg bw), group II positive control (Glibenclamide at dose of 0,63mg/kg bw), group III, IV, V were 70% ethanolic extract at doses of 60; 125 and 250 mg/kg bw respectively. On day 0, all rats were injected by alloxan at dose of 150mg/kgbw. On 4<sup>th</sup> day, all rats blood glucose level was measured. All rats were treated by extract or drugs according it's group for 10 days. On 10<sup>th</sup> day, rats blood glucose level was re-measured. This research was approved by Health Research Ethic Committee of Faculty of Medicine of Universitas Muhammadiyah Surakarta with number 062-A/B.1/KEPK-FKUMS/III/2015.

## RESULTS

### Antioxidant effect

The antioxidant effect was measured by DPPH radical scavenging. The result of anti scavenging activity can be seen in Table 1

**Table 1: DPPH radical scavenging activity of 70% ethanolic extract of *Syzygium Polyanthum* (Wight) leaf at different concentrations (%)**

Concentration	Radical scavenging (%)	Mean of Radical scavenging (%)
8	40.57	41.72 ± 1.63
	42.87	
16	43.61	44.13 ± 0.74
	44.65	
24	45.18	45.60 ± 0.60
	46.02	
32	55.35	55.66 ± 0.44
	55.97	
40	54.72	54.51 ± 0.30
	54.30	

Based on from Table 1, the IC<sub>50</sub> is 27.60 µg/mL.

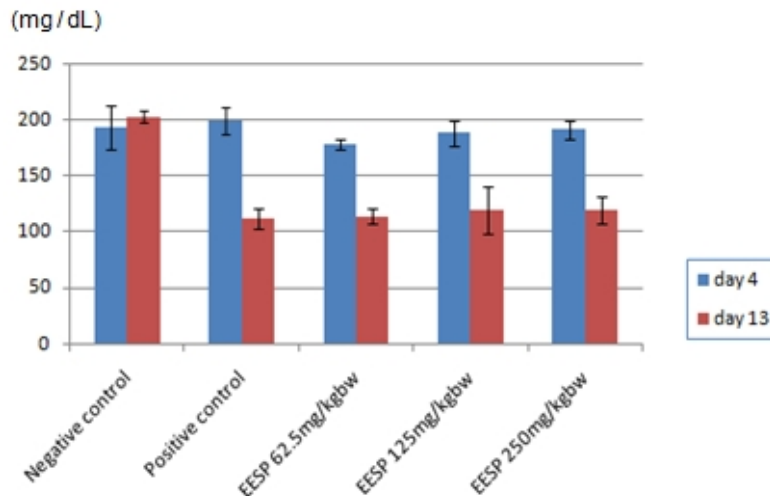
### Anti diabetic

The blood glucose level of each group was measured on 4<sup>th</sup> and 13<sup>th</sup> days. The results can be seen in Table 2 and Figure 1

**Table 2: The mean of blood glucose level on 4<sup>th</sup> and 13<sup>th</sup> days**

Groups	Blood glucose levels (mg/dL)	
	Day 4	Day 13
Negative control(WFI at dose of 10ml/kg bw)	192.6±24.3	203±3.4
Positive control(Glibenclamide at dose of 0.63mg/kg bw)	199.3±12.3	112.6±9.8
EESP 62.5mg/kgbw	179.3±5.3	114.3±9.4
EESP 125mg/kgbw	189.6±12.8	119.3±23.4
EESP 250mg/kgbw	192.3±9.9	119.3±11.3

Notes: WFI: water for injection; EESP :The 70% ethanolic extract of *Syzygium Polyanthum* (Wight).



**Figure 1: The blood glucose level (mg/dL± SD) in day 4 and 13 on various groups**

## DISCUSSION

The previous research by Har & Ismail found that the methanolic extract of *Syzygium Polyanthum* (Wight) Walp) have mild antioxidant effect with IC<sub>50</sub> 98.85 µg/mL<sup>9</sup>. Research by Perumal *et al.*, 2012 stated the methanolic extract of *Syzygium Polyanthum* (Wight) stem bark have antioxidant by DPPH method with IC<sub>50</sub> 20.09±0.19 µg/mL<sup>15</sup>. The IC<sub>50</sub> of this research 27.80 µg/mL.

Oxidative stress causes damage to DNA, proteins and lipids. This oxidant is a big contributor to degenerative diseases such as cancer, cardiovascular disease, brain damage, diabetics and

cataracts. Antioxidants inhibit this damage and reduce the risk of degenerative diseases<sup>16,17</sup>. The compound of *Syzygium Polyanthum* (Wight) are phenolics and polyphenols such as flavonoids and tannins<sup>18</sup>. The research by Othman *et al.*, 2014 found that the chemical constituents in the ethanolic extracts of *Syzygium Polyanthum* (Wight) leaves are phenolic and flavonoid<sup>19</sup>.

The antidiabetic effect of this research in line with Widyawati *et al.* research which found that the methanolic extract of *Syzygium Polyanthum* (Wight) leaf can reduced blood glucose level on diabetic's rats induced by streptozotocin<sup>20</sup>.

This result indicates that the mechanism of antidiabetic of ethanolic extract of *Syzygium Polyanthum* (Wight) leaf due to its antioxidant effect.

## CONCLUSION

The ethanolic extract of *Syzygium Polyanthum* (Wight) leaf have antioxidant & antidiabetic effect.

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