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# Antimicrobial and Antioxidant Activities from a Combination of *Swietenia mahagoni* seed Extract and Virgin Coconut Oil (VCO)

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**Abstrak.** This study aims to investigation the effect of a combination of *Swietenia mahagoni* seed extracts with virgin coconut oil (VCO) on antimicrobial and antioxidant activity in vitro. The extraction process was carried out using soxhlet with ethyl acetate solvent. Antimicrobial activity were tested for *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis* and *Candida albicans*. The antioxidant activity combination extracts *Swietenia mahagoni* and VCO was evaluated using 1,1-diphenyl -2- picrylhydrazyl (DPPH) radical scavenging assay. The results of the study showed that the combination of *S. mahagoni* seed extract with VCO at the same ratio were found to be active againts the microbial tested. The combination of *S. mahagoni* seed extract and VCO similar ratio also showed high antioxidant activity compared to other formulation.

**Keywords:** Antimicrobial, antioxidant, *Swietenia mahagoni* Jacq, Virgin coconut oil

## 1. Introduction

Herbal medicines have been used since the dawn of civilization to maintain health and to treat disease. There is a tremendous historical legacy in folklore uses of plant preparations in medicines. Scientific studies on plants used in ethnomedicine led to the discovery of many valuable drugs [1]. Antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world [2, 3]. There are indiscriminate use of synthetic antimicrobial drugs for the treatment of infectious diseases and as a result drug resistance developed in human beings as well as in plant also [4,5,6]. Some times antibiotics cause adverse reaction like hypersensitivity, immunosuppression and allergic reactions [7]. Therefore, there is a need to develop alternative antimicrobial drugs for the treatment of infectious diseases from various sources, including medicinal plants [8, 9]. Antioxidants are compounds that can delay or inhibit the oxidation of lipids or other molecules by inhibiting the initiation or propagation of oxidizing chain reactions [10]. The antioxidant activity of phenolic compounds is mainly due to their redox properties, which can play an important role in adsorbing and neutralizing free radicals, quenching singlet and triplet oxygen, or decomposing peroxides [11].



*Swietenia mahagoni* Jacq., locally known as “Mahoni”, belonging to the family Meliaceae, is a medium-sized evergreen to semi-evergreen tree having a height of 30-35 m. The plant is native to USA, Haiti, Antilles, Jamaica and the Bahamas and is cultivated in Bangladesh, India, Sri Lanka, Philippines, Indonesia, China and Malaysia [12,13]. The seed extracts of *S. mahagoni* has also been found to inhibit platelet activating factor (PAF)-induced platelet aggregation [14]. and has activity antibacterial and antioxidant activity [15]. The plant extract has also anti-human immunodeficiency virus activities [16].

This study aims to investigation the effect of a combination of *Swietenia mahagoni* seed extracts with virgin coconut oil (VCO) on antimicrobial and antioxidant activity in vitro.

## 2. Research Method

### 2.1 Sample preparation and Extraction

The *S. mahagoni* seeds were collected from Indonesia. Then, the seeds were rinsed with tap water to remove any foreign particles and dirt prior to drying. Then, the cleaned seeds were cut into small pieces and dried by using oven at temperature of 50°C for one week to remove moisture. The seeds were powdered by using a blender. Powdered seeds were extracted with ethyl acetate with the help of soxhlet apparatus. The resulting extracts were evaporated under vacuum.

### 2.2 Antimicrobial Activity

The agar diffusion method [17] was used to evaluate the antimicrobial activity of the subjected extracts. Inoculum of 100 µl suspension containing 10<sup>8</sup> CFU/ml of bacteria and 10<sup>4</sup> spores/ml of fungi were spread on Mueller Hinton Agar and potato dextrose agar medium respectively. The discs (6 mm in diameter) impregnated with 20 µl of 50 mg/ml (*i.e.* 0.5mg/disc) extracts were placed on seeded agar medium. Streptomycin (10µg/disc) were used as positive control for bacteria and fluconazole (10µg/disc) for fungi. Methanol was used as negative control. The experiments were conducted in triplicate and the test plates were incubated 24 hours at 37° C for bacteria and 28° C for fungi. The diameters of zone of inhibition measured in mm [18]

### 2.3 Antioxidant Activity

The free radical scavenging of the *S. mahagoni* extracts was evaluated using the 1.1-diphenyl-2-picrylhydrazil (DPPH) method, as described [19] with a slight modification. Extract solution were prepared by dissolving 0.025 g of dry extract in 10 ml of methanol to give final concentration at 2.5 mg/ml. Then, 77 µL of the extract solution were mixed with 3 ml of 6 x 10<sup>-5</sup> M methanolic solution of DPPH. After 30 min at room temperature, the absorbance values were measured at 517 nm in spectrophotometer. The DPPH radical concentration was calculated by using the following equation,

$$\text{DPPH radical concentration (\%)} = \frac{A_{\text{control}} - A_{\text{Sample}}}{A_{\text{control}}} \times 100$$

where A Control is the absorbance value of the control reaction and A Sample is the absorbance value with the presence of the tested extracts in the sample.

### 2.4 Statistical Analysis

The data presented were analyzed by using SPSS 16.00 for Windows (SPSS Inc. Chicago, IL). Values were as mean ± standard deviation with three independent experiments. One-way analysis of variance (ANOVA) using Tukey's test at 95% confidence level were used to determine the significance difference between the samples.

### 3. Result and Discussion

#### 3.1 Antimicrobial Activity

The antimicrobial activity from formulation of *S.mahagoni* seed extracts and VCO was studied by using disc diffusion method and the result are summarized in Table 1. This method involved the measurement of the inhibition zone by selected microorganism after 24 hours incubation

**Table 1.** Antimicrobia activity from formulation of *S.mahagoni* extract and VCO

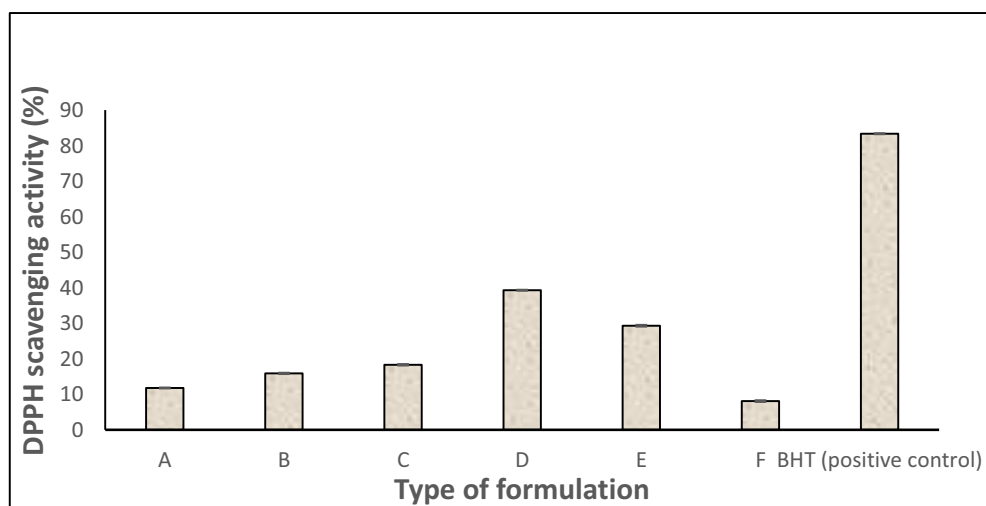
Sample	Diameter inhibition zone (mm)			
	<i>B.subtilis</i>	<i>S.aureus</i>	<i>E.coli</i>	<i>C.albicans</i>
A	6.28 ± 0.28	6.27 ± 0.27	6.00 ± 0.00	6.00 ± 0.00
B	7.22 ± 0.61	6.35 ± 0.35	6.00 ± 0.00	6.00 ± 0.00
C	6.59 ± 0.59	6.48 ± 0.27	6.00 ± 0.00	6.00 ± 0.00
D	7.99 ± 0.11	6.86 ± 0.30	7.49 ± 0.25	6.80 ± 0.40
E	8.18 ± 0.18	7.89 ± 0.11	8.03 ± 0.50	6.00 ± 0.00
F	8.46 ± 0.18	8.49 ± 0.31	8.78 ± 0.13	7.86 ± 0.14
Negative control	6.00 ± 0.00	6.00 ± 0.00	6.00 ± 0.00	6.00 ± 0.00
Positive control	25.10 ± 0.46	35.83 ± 0.57	18.06 ± 0.55	22.79 ± 0.93

A (*S.mahagoni* seed extract 5%), B (*S.mahagoni* seed extract 10%), C (*S.mahagoni* seed extract 15%), D (*S.mahagoni* seed extract : VCO, ratio 2:1), E (*S.mahagoni* seed extract : VCO, ratio 1:1), value are mean ± standard deviation (n=3)

As can be seen from Table 1, sample F was found to be active against the like *B. subtilis*, *S. aureus*, *E.coli* and *C.albicans* than that sample A, B, C, D and E. Although all sampel showed antibacterial activity in *B.subtilis* and *S.aureus* bacteria. The results of the study showed that the combination of *S. mahagoni* seed extract with VCO at the same ratio were found to be active againts the microbial tested. The F formulation contains *S.mahagoni* seed extract and VCO with ratio 2:1. This result indicates that *S.mahagoni* seed extract with a combination of VCO have a better influence against bacteria test.

#### 3.2 Antioxidant Activity

The presented Figure 1 shows the DPPH free radical scavenging assay result of six different formulation. The D formulation (39.29±0.24) gives highest DPPH radical scavenging activity compared to A, B, C, E and F formulation. This indicates the antioxidant ability of D formulation is stronger than the other two oils. The D formulation contains the same amount of *S.mahagoni* seed extract and VCO. The radical scavenging activity of the extracts could be related to the nature of phenolics, thus contributing to their electron transfer/hydrogen donating ability. Methanolic extract of the seed of *S. mahagoni* contain phenol and flavonoid which give antioxidant activity in vitro. The extract has potent antioxidant activity against free radical scavenging activity (DPPH) assays [20].



**Figure 1.** Antioxidant activity from formulation of *S.mahagoni* extract and VCO, A (*S.mahagoni* seed extract 5%), B (*S.mahagoni* seed extract 10%), C (*S.mahagoni* seed extract 15%), D (*S.mahagoni* seed extract : VCO, ratio 2:1), E (*S.mahagoni* seed extract : VCO, ratio 1:1).

#### 4. Conclusion

The combination of *Swietenia mahagoni* seed extract with virgin coconut oil (VCO) gives a higher antimicrobial and antioxidant activity compared to other formulation.

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