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# Sub chronic diagnosis of administration with *Scurrula atropurpurea* to blood biochemical analysis

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**Abstract.** This research is to evaluate whether *Scurrula atropurpurea* has a protective effect on the liver caused by its sub-chronic treatment. The rats consist of four groups: normotensive group and three groups administered methanolic extract of *S. atropurpurea* (MESA) at a dosage of 250; 500; and 1000 mg/kg BW. Serum liver and kidney function were assayed. Serum cholesterol was checked. Histopathology of the brain, liver, cardiac, lung, and kidney was identified using hematoxylin-eosin staining. The administration of MESA250, MESA500 and MESA1000 caused no differences among the groups compared with the control group. Structural evaluations on the brain and lungs showed that the MESA administration carried no changes. In liver and heart, MESA1000 led to repair tissue damage. But for the kidney, MESA250 was safe for the tissue. The results of this study revealed that the methanolic extract of *S. atropurpurea* at *antihypertension* dose is safe even when taken for a more extended period. At a higher dose, the extract may have the potential to increase some hematological indices but may induce tissue repair in the liver and heart. The lowest dose is safe for kidney tissue.

## 1. Introduction

The mistletoe of *Scurrula atropurpurea* (BL.) Dans is a hemiparasitic tea plant, especially on the island of Java. The leaves and stems of *Scurrula atropurpurea* (BL.) Dans has been empirically and potential used for therapeutic treatment. Previous studies showed that this plant has a function in blood pressure lowering [1][2]. Furthermore, the pathway in which this plant can reduce blood pressure is in oxidative stress inhibition and endothelial cell protection.

*Scurrula atropurpurea* (BL.) Dans is a growing determination that comprehension of conventional medicine is potential not only for its essential as curative herbs but also for its socioeconomic status and cultural ingredients [3]. Although many health issues have been investigated by using medicinal herbs, acute, sub chronic, and chronic tests of some plants are also reported [4].

Nevertheless, there is no scientific report on the safety of using *Scurrula atropurpurea* (BL.) Dans as a herbal cure. The present study is, consequently, pointed to evaluate the security of *Scurrula atropurpurea* (BL.) Dans by exploring the chronic toxicity of this herb extract.

## 2. Methods

### 2.1 Preparation tea parasite crude extract

Determination and identification of the crude extract characteristic of botanical determination were performed at the Indonesian Scientific Institute (LIPI) at Purwodadi, Pasuruan, East Java. "One hundred



milligrams of dry leaf powder was steeped in methanol in a 1000 ml-erlenmeyer flask. The mixture was shaken for 30 min to distribute the powder homogenously in methanol. Subsequently, the mixture was left to stand overnight to precipitate. The supernatant, a combination of methanol and the active constituents, was subjected to evaporation. The extract was labeled and stored in a freezer. The methanolic extract of *S. atropurpurea* (MESA) was administered daily by the oral gavage (2 ml) using a catheter for 90 days” [1] [2] [5].

The procedure of the experimental animal model was done by the guidelines of Indonesia legislations on the ethical clearance of laboratory animals. The research protocol was approved by the Animal Review Board of the Brawijaya University, Malang, Indonesia. The number of rats, which is 40 tail, aged 8-10 weeks and weighing 180-200 g. The treatment groups were divided into the normotensive group, the MESA treatment at dosages of 250, 500, and 1000 mg/kgBW. The rats were assigned randomly into the groups; each group contained ten rats. After 90 days of treatment, the blood and tissue were determined [5].

### 2.2 Analysis of liver function and lipid profiles

After sacrifice, blood samples were collected by left ventricular blood. The liver function of the animal model was recognized based on changes in plasma levels of glutamic-oxaloacetic transaminase (GOT) and glutamic-pyruvic transaminase (GPT). Plasma levels of albumin, total protein, alkaline phosphatase (ALP), total cholesterol, triglyceride, low-density lipoprotein cholesterol (LDL- C), high-density lipoprotein cholesterol (HDL-C) were measured using Spotchem EZ SP 4430 (ARKRAY Inc, Kyoto, Japan).

### 2.3 Histological examination

The brain, liver, heart, and kidney were placed in 25 mM KCl & Phosphate-buffered saline (PBS) to relaxing buffer, then will keep in neutral-buffered formaldehyde 40% at room temperature. Hematoxylin and eosin (H&E) stained sections (~5 µm) were prepared to measure histopathology [6]. The sections were photographed at 400x magnification using an Olympus (Tokyo, Japan). Microscope lighting, focus, and field selection were optimized for the distinction of cell boundaries. Images were opened in Image J and after setting the threshold, analyzed. Data from all the fields were combined and then analyzed.

### 2.4 Data Analysis

Data are performed as mean ± SEM. The research data analyzed by one-way analysis of variance (ANOVA), and continued with a post hoc analysis was evaluated using Fisher’s least significant difference (LSD) test. A *P*-value of less than 0.05 was considered to be statistically significant.

**Table 1.** Effect of subchronic administration of MESA in blood serum levels of rats.

Group	Protein	Albu min	Globu lin	SGOT	SGPT	Choles terol	Triglyc erida	BUN	Creatin ine	Biliru bin	Urea
C	7.34	3.84	3.51	239.67	147.67	75.00	66.00	22.50	0.45	0.02	48.10
G1	7.81	3.44	4.37	198.56	90.33	51.67	44.78	24.40	0.54	0.07	51.69
G2	8.37	3.38	4.93	216.50	88.00	59.83	63.67	26.52	0.62	0.03	56.88
G3	8.59	3.64	4.93	210.22	104.00	54.00	43.78	24.20	0.58	0.03	51.78

## 3. Results

### 3.1 Effect of subchronic administration of MESA on blood serum measurement

Oral administrations of MESA at 250, 500, and 1000 mg/kg BW did not cause any mortality in rats during the observation period. Furthermore, there were no unconcealed signs and symptoms of

indication of toxicity in study groups. Base on table 1, the subchronic administration of MESA in all groups did not significantly influence of the examined blood serum indicator to the control. Previous studies revealed that the administration of MESA caused no toxic effect in the biochemical indices [5][7][8][9][10]. Figure 1 (a-k) reveals that MESA did not cause dysfunction in liver and kidney function. Furthermore, lipid profile was standard in comparison with the control.,Cholesterol profiles are found no differences in female rats with subchronic administration of MESA [11]. Furthermore, treatment with MESA subchronically did not affect cell necrosis in the liver because MESA contains many active substances such as quercetin that inhibit tissue damage-induced by free radical [12].

### *3.2 Effect of subchronic administration of MESA to wet organ weights*

Necropsy macroscopic observation of the research studied visceral organs, such as the brain, pulmo, cor, hepar, and kidneys for any feasible changes in position, size, shape, and color, did not disclose any obvious abnormality. Wet weight (in g) and respective organ weight (in g per 100 g body weight) of brain, hepar, lung, heart, and kidney of both extract-treated and normotensive groups. No significant difference was investigated in absolute and relative organ weights of MESA and normotensive groups [6]. No significant differences between absolute and relative organ weights of the kidneys were investigated in normotensive and MESA.

### *3.3 Effect of subchronic administration of MESA on histopathology of brain and lung*

Histological examinations of liver sections of rats treated with 250, 500, and 1000 mg/kg b.w MESA showed a standard architecture of the brain and lung in comparison with the control group.

### *3.4 Effect of subchronic administration of MESA on histopathology of the hepar*

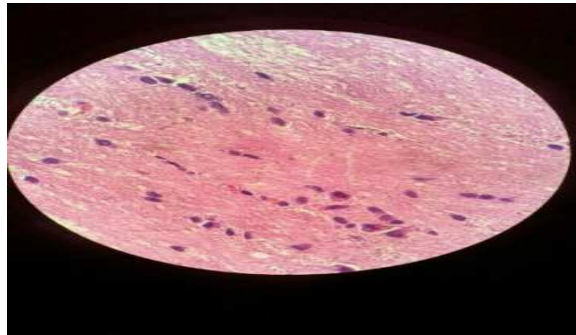
Histological observation of hepar frontal sections of rats used with 250 and 500 mg/kg b.w MESA appeared a normal features with normal appearance of the central vein and hepatic sinusoids lined with endothelial and *Kupffer* cells similar to the normotensive groups. The hepatocytes showed normal in shape and size, and no available of vacuoles were prominent in the cytoplasm. In the rats' group used with 1000 mg/kg b.w MESA, however, there was cellular damage of hepatocytes. Furthermore, central veins and portal triads were infiltrated and enlarge by mononuclear leukocytic cells, indicating mild hepatitis [6].

### *3.5 Effect of subchronic administration of MESA on histopathology of the heart*

Histological observations of hepar frontal sections of rats treated with 500 and 1000 mg/kg b.w MESA appeared a normal features with normal appearance of the cardiomyocytes compared to the control group. There were a few cardiomyocytes damage showed in rats administered with 250 mg/kg b.w MESA.

### *3.6 Effect of subchronic administration of MESA on histopathology of the kidney*

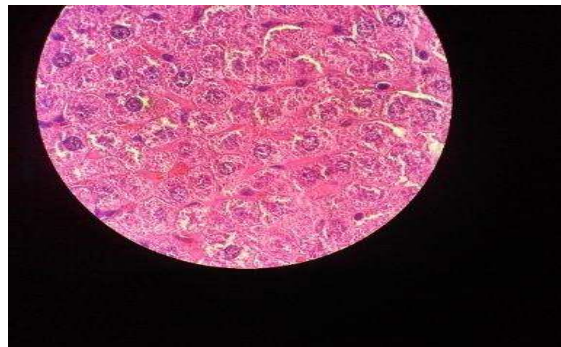
Histological study of kidney frontal sections of rats administered with 250 mg/kg b.w MESA revealed normal features with normal appearance of the nephrons compared to the control group. Moreover, this normal architecture was found both in the right and left kidney. There was damage in glomerular structure showed in rats treated with 500 and 1000 mg/kg b.w MESA. These mean that the subchronic administration of MESA should be less than 500 mg/kg b.w MESA to protect structural damage of the kidney.



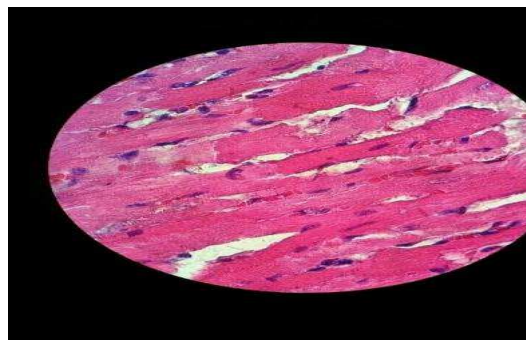
**Figure 1.** Histopathology of the brain after administration of MESA (Olympus CX21, 40x10).



**Figure 2.** Histopathology of the lung after administration of MESA (Olympus CX21, 40x10).



**Figure 3.** Histopathology of heart after administration of MESA (Olympus CX21, 40x10).



**Figure 4.** Histopathology of the kidney after administration of MESA (Olympus CX21, 40x10).

#### 4. Discussion

Study in female rat with subchronic administration of MESA cause no tissue damage in the heart [13], lung [14]. Therefore, a subchronic experiment in this research also showed that the MESA was well tolerated by all animal models, as there were mortality and MESA-correlated marker and symptoms of toxicity test were examined all round the study phase. The MESA had a non-toxic or damaging effect on the body growth marking of all treatment groups. The function of whole blood as an indicator of physiological and pathological category in animals and humans is well recorded [6] [15]. In acute study tests and sub chronic tests, changes in biochemistry analysis, in addition, biochemical indicators, are usually treated as the lead of harmful or toxicities test. In the current study, MESA treatment of 250, 500 or 1000 mg/kg b.w of MESA for 90 days did not appear the standar of blood serum indicator. The non-clinical security study guidance for herb products that have better cause for a treat or calculated for a long time of use. In accordance with these principles, levels of serum total protein, ALP, ALT, and AST were measured in the present study and used as liver function tests, while creatinine and urea standar were used as kidney function study [16].

The biological characteristics; the correlation between body weight and organ weight is that in the major part of the study, except for the brain. Besides, all of the organs are commonly observed to decide whether the measurements of the organ has changed, especially concerning the weight of the all animal as an indicator. It is for this reason that this study investigated the effect of the subchronic experiment of MESA on absolute and relative organ weights. Histopathological indicator of brain, lung, heart, liver, and kidneys. The current study, no scientific confirmation, has ever specified the effects of MESA on organ weights of rats [6].

The major target organ is hepar. Toxicity of the hepar organ, damage to the hepar cause-effect of hepatocytes causing to release the membrane-bound enzymes (e.g., ALT and AST), injury to the hepatobiliary system thereby leading to release the essential enzymes (e.g., ALP), and/or harmful the catabolic capacity and biosynthetic of the liver function. Thus appear histopathological damage [17].

The concentration level of the kidney function measured such as serum of urea creatinine, and BUN levels were significantly different in the normotensive and MESA group. Other than, histological investigation contrast of the kidney frontal sections of the investigated rat and normotensive rat. There are no significant differences in the MESA experiment. In all treatment, groups showed that the tubular renal and glomerular were the intact and normal features. Consequently, not found glomerulonephritis [18] after exposure with the MESA. Thus MESA was not causing toxic in the kidney function.

Therefore, this study suggests that the subchronic administration of *S. atropurpurea* is safe for adjuvant with the treatment of herbal medicine. On further research, there needs to be a clinical trial in humans — however, nonappearance of any mortality in the animal model. In the long term, MESA as a remedy antihypertensive herbs.

#### 5. Conclusion

The results of this study indicated that the methanolic extract of *S. atropurpurea* at antihypertension dose is safe for a long term period. In high doses, MESA will trigger damage to organ tissue and increase levels of blood biochemistry. Another hand, the lowest dose is safe for organ tissue.

#### 6. Acknowledgment

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#### 7. References

[1] Athiroh N, Permatasari N, Sargowo D, and Widodo MA 2014 Antioxidative and blood pressure-

- lowering effects of *Scurrula atropurpurea* on deoxycorticosterone acetate-salt hypertensive rats *Biomarkers Genomic Med.* **6** 32–36
- [2] Athiroh N, Permatasari N, Sargowo D, and Widodo A 2014 Effect of *Scurrula atropurpurea* on nitric oxide, endothelial damage, and endothelial progenitor cells of DOCA-salt hypertensive rats *Iran J Basic Med Sci.* **17** 622–625
- [3] Alves RRN, Rosa IML 2007 Biodiversity, traditional medicine and public health: where do they meet? *Journal of Ethnobiology and Ethnomedicine* **3** 1746-4269
- [4] Steenkamp V. and Gouws M. C. 2006 Cytotoxicity of six South African medicinal plant extracts used in the treatment of cancer. *South African Journal of Botany* **72** 630-633
- [5] Athiroh, N and Sulistyowati E 2013 *Scurrula atropurpurea* Increases Nitric Oxide and Decreases Malondialdehyde in Hipertensive Rats *J. Nas. Terakreditasi J. Universa Med* **32** 44–50
- [6] Nigatu, TA, 2017 Toxicological investigation of acute and chronic treatment with *Gnidia stenophylla* Gilg root extract on some blood parameters and histopathology of spleen, liver and kidney in mice. *BMC research notes* **10** 625
- [7] Mahyan A, Athiroh N, Santoso H 2016 Paparan 28 Hari Ekstrak Metanolik Benalu Tehm (*Scurrula atropurpurea* Bl. Dans) terhadap Kadar SGPT Tikus Betina. *Jurnal Ilmiah Biosaintropis* **2** 53-58
- [8] Hikmah U, Athiroh N, and Santoso H 2017 Kajian Subkronik Ekstrak Metanolik *Scurrula atropurpurea* (Bl.) Dans terhadap Serum Glutamic Oxaloacetic Transaminase Tikus Wistar Betina Sub-Chronic Study of *Scurrula atropurpurea* (Bl.) Dans Methanolic Extract toward SGOT Level in Female Wistar Rats, *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **2** 30-35
- [9] Prastika NI, Athiroh N, and Santoso H 2017 Pengaruh Pemberian Subkronik Ekstrak Metanolik *Scurrula atropurpurea* (Bl) Dans Terhadap Kadar Kreatinin Tikus Wistar Sub-Chronic Present Effect of *Scurrula atropurpurea* (Bl) Dans Methanolic Extract toward Creatinine Levels in Wistar rats *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **2** 42-48
- [10] Sammad FHA, Athiroh N, and Santoso H 2017 Pemberian Ekstrak Metanolik *Scurrula atropurpurea* (Bl) Dans Secara Subkronik Terhadap Protein Total Dan Albumin Tikus Betina Injection of *Scurrula atropurpurea* (Bl) Dans Methanolic Extract in Sub-chronic to Total Protein and Albumin of Female Mice *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **2** 49-54
- [11] Zakia JF, Athiroh N 2017 Studi Sub-Kronik 90 Hari: Pengaruh Ekstrak *Scurrula atropurpurea* Terhadap Kadar Kolesterol Tikus (*Rattus norvegicus*) Betina Galur Wistar Study of Sub Chronic during 90 Days: Effect of *Scurrula atropurpurea* Extract toward Cholesterol Level in Rat (*Rattus norvegicus*),” *BIOSCIENCE-TROPIC*, vol. **3** 37-43
- [12] Mihmidati L, Athiroh N 2016 Pengaruh Ekstrak Metanolik (*Scurrula atropurpurea* (Bl.) Dans) Yang Diberikan Secara Subkronik 90 Hari Pada Tikus Betina (*Rattus norvegicus*) Terhadap Necrosis Otak The Effect of Extraction of Metanolik (*Scurrula atropurpurea* (Bl.) Dans) Which Is Given Sub-chronic 90 Days on Female Rats (*Rattus norvegicus*) toward Necrosis of Brain *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **1** 16-23
- [13] Mareta D, Hidayati N, Athiroh N 2017 Profil Histopatologi pada Jaringan Jantung Tikus Subkronik 90 Hari Menggunakan Ekstrak Metanolik *Scurrula atropurpurea* (Bl.) Dans Histopathologic Profile in the Heart Tissue of 90-Days Sub-Chronic Rats Using Methanolic Extract of *Scurrula atropurpurea* (Bl.) Dans *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **3** 30-36
- [14] Fahmiy R, Athiroh N 2017 Studi Sub-Kronik 90 Hari: Profil Histopatologi Pada Jaringan Pulmo Tikus (*Rattus norvegicus*) Akibat Paparan Ekstrak *Scurrula atropurpurea* (Bl.) Dans. Study of 90 Days Sub Chronic: The Histopathology Profile in The Pulmo Tissue Rats Exposed *Scurrula atropurpurea* (Bl.) Dans. Extraction *J. Ilm. BIOSAINTROPIS (BIOSCIENCE-TROPIC* **3** 39-45
- [15] Adedapo AA 2007 Effects of some plants of the spurge family on haematological and biochemical parameters in rats. *Veterinarski arhiV* **77** 29-38

- [16] Gaskill C, Miller LM, Mattoon JS 2005 Liver histopathology and liver and serum alanine aminotransferase and alkaline phosphatase activities in epileptic dogs receiving phenobarbital *Veterinary Pathology* **42** 147-160
- [17] Kumar RS, Gupta M, Mazumdar UK 2005 Effects of methanol extracts of *Caesalpinia bonducella* and *Bauhinia racemosa* on hematology and hepatorenal function in mice *The Journal of toxicological sciences* **30** 265-274
- [18] Ebaid H, Dkhil MA, Danfour MA, Tohamy A 2007 Piroxicam-induced hepatic and renal histopathological changes in mice *Libyan Journal of Medicine* **2** 82-89





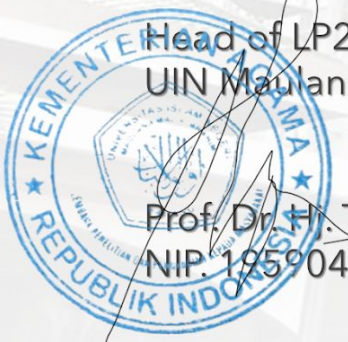
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