

# Profile of Clinical Chemistry and Hematology of Long-tailed Macaques (*Macacafascicularis*) During Adaptation after Administration of Methanol Extract of Bitter Melon Seed (*Momordicacharantia*) and DMPA

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**Keywords:** Macacafascicularis, Hematology, Momordica Charantia, DMPA.

**Abstract:** For the use of non-human primate animals (*Macacafascicularis*) as an advanced test of a drug substance, it is necessary to measure the clinical chemistry content [blood sugar levels, SGOT (*Serum Glutamic Oxaloacetic Transaminase*), SGP (*Serum Glutamate Pyruvate Transaminase*), and creatinine] and hematology, especially white blood cells such as; Neutrophils, Lymphocytes, Monocytes, Eusinophils and Basophils. Giving of bitter melon seed extract for six days and injection of DMPA (*Depot medroxyprogesterone acetate*) at the beginning of the study gives a profile of daily blood sugar level, SGOT/SGPT, creatinine, and Neutrophil, Lymphocyte, Monocyte, Eusinophil and Basophil did not show any significant difference ( $p>0.05$ ). It was concluded that pare seed extract can be continued in the next experiment to increase the day of extracting methanol extract of pare seed and DMPA on long-tailed macaque.

## 1 INTRODUCTION

Indonesia is a part of Southeast Asia which has a large variety of primate animals, for example, long-tailed monkeys (*Macacafascicularis*). As a resident monkey native to southeast Asia, it has now spread to almost all of the Asian continent. The superiority of this monkey is known for its good adaptability to its new environment and its great ability to keep up with changes in human civilization. Monkeys are often kept and used as performance animals, and for the development of knowledge based on drug trials that will be applied to humans (Jatna, 2000)

Long-tailed monkeys belong to Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Family: Cercopithecidae, Genus: *Macaca* and Species: *M. fascicularis*. As the name implies, the long-tailed monkey is a type of monkey with a long tail almost equal to the length of the body, when measured from head to tip of the body. Male body length is longer than female. Young male body weight ranges from 0.5-3 kg. His body color varies, ranging from gray to brown, with white ventral parts. Newborn child with black hair. Pregnancy ranges

from 153-179 days and generally gives birth to only one child. Long-tailed monkeys are most commonly used in biomedical experiments. In the body antibodies are often found for certain types of viruses. Living in primary and secondary forests ranging from the lowlands to the highlands about 1,000 meters above sea level. In the highlands, these types of monkeys are usually found in secondary growth areas or in the plantation areas of the population. Often also found in mangroves to the forest near the village (Jatna, 2000).

Long-tailed monkeys are also called long-tailed macaque, monkey-eating crabs, and cinomoligus monkey. *Macacafascicularis* is one of the primate animals that use the front and back legs in various variations for walking and running (quadrupedalism), having a tail that is longer than the length of the head and body. The long-tailed monkey also has a sitting cushion (ischialsallocality) attached to the sitting bone (ischial) and has a food sac on the cheek (Sinaga, 2010).

Long-tailed monkeys according to Suwarno (2014) are non-human primates which have high adaptation success so that they are spread in various habitat types. Long-tailed monkeys are a type of

primate that lives in groups so that they cannot be separated from social interaction with other individuals in the group. The social interaction carried out by the long-tailed monkey gives rise to a variety of different activities between individuals in a population.

These monkeys eat all types of food (omnivores), but the composition contains more fruits (60%), the rest are flowers, young leaves, seeds, tubers. Monkeys that live in swamps sometimes descend to the ground at low tide and walk along the river looking for insects. Monkeys that live in mangrove or coastal areas, often found eating crabs or other types of mollusks. So often this monkey is called "Crabs eating macaque" (Jatna, 2010). The results of (Sari, 2015) showed that the activity of long-tailed macaques (*Macacafascicularis*) was observed namely sleep, inactivity, grooming, mating, moving, eating, parenting, playing, excretion, voicing, and agonistic (fighting). The average percentage of activity of long-tailed monkeys observed was sleep (2.27%), inactive (20.76%), grooming (16.78%), mating (1.99%), moving (32.85%), eating (13.37%), parenting (4.97%), play (5.26%), excretion (0.71%), voice (0.42%), and agonistic (0.56%).

In order to be used as a experimental animal treated in a study, the long tailed monkey must be analyzed for its adaptability to the tried material, namely methanol extract of bitter melon seeds and DMPA. Likewise, an analysis of the clinical chemical profile and white blood content of long-tailed monkeys

## 2 METHODS

### 2.1 Experimental Animal

Five male monkeys, aged around 1 year, weighed 1.2 kg, maintained in the Biology Laboratory, Faculty of Mathematics and Natural Sciences under guarding and extra observation in the animal cage within a month. The monkeys are fed fresh fruit throughout the trial period. The three animals were fed by bitter melon seed extract. The dose of bitter melon seed extract: 92 mg / kg BW (every day for 8 weeks) and DMPA 4.01 mg / kg BW (only once at the beginning of treatment) (Ilyas, 2018), while two monkeys again as control. Histopathological observation using H & E staining and thickness of 5 µm Chowdhury, 2014). The handling of monkeys is in accordance with the animal code of ethics (Ethical clearance from the Animal Research Ethics Committee –Faculty of

Mathematics and Natural Sciences, Universitas Sumatera Utara, Medan).

### 2.2 Chemistry of Blood

#### 2.2.1 Blood Sugar Levels

Measuring blood sugar levels using the Autochek automatic tool. Enter the battery and turn on the engine. Set the time, date and year on the machine. Take the yellow chip into the machine to check the machine. If the screen appears "error" means the machine is damaged. If the screen appears "OK" means the machine is ready for use. On the existing strip bottles for blood sugar. To check sugar, put sugar chips and sugar strips first. On the screen the corresponding numbers / codes appear on the bottle strip. After that a picture of blood drops and blinking will appear. Put the needle in the lancing / firing tool in a pen shape and adjust the needle depth. Use alcohol wipes to clean up blood sources in animals. Shoot the needle on the finger and press it so that the blood comes out. Blood is touched on the strip and not drops on the strip. Touch on the line with an arrow. Blood will immediately absorb to the end of the strip and the sound of beeps. Wait a moment, the results will appear a few seconds on the screen. Unplug the needle from the lancing strip as well and remove it. The sugar chip is stored in a bottle again. Close the bottle strip tightly when not in use. Pay attention to the expiration period on each strip (Kusuma, 2018).

#### 2.2.2 SGOT

Measurement of SGOT levels with the minetic method - IFCC (without pyridoxal-5-phosphate). Work principle; Aminotransferation (AST) catalyzes transamination of L aspartate and α-kataglutarate forms L-glutamate and oxaloacetate. Oxaloacetate is reduced to malate by enzyme malate by enzyme malate dehydrogenase (MDH) and niconamide adenine dinucleotide (NADH) oxidized to NAD. The amount of NADH is oxidized, directly proportional to AST activity and measured photometrically with a spectrophotometer with a wavelength of 340 nm (Sadeq, 2014).

#### 2.2.3 SGPT

Measurement of SGPT levels using kinetic methods - IFCC (without pyridoxal-5-phosphate). The principle of Alanine aminotransferase (ALT) catalyzes the transamination of L - alanine and a -

kataglutarate forms l - glutamate and pyruvate, the pyruvate formed is reduced to lactate by lactate dehydrogenase (LDH) and nicotinamide adenine dinucleotide (NADH) enzymes oxidized to NAD. The amount of oxidized NADH resulting from the reduction in absorbance is directly proportional to ALT activity and measured photometrically with a wavelength of 340 nm (Sadeq, 2014).

### 2.2.4 Creatinine

Test parameters method: colorimetric, kinetic, "mod." jaffe, increasing reaction wavelength : hg 510 nm (500 nm - 520 nm) temperature : 37°C sample : serum, heparinized plasma, urine linearity : up to 20 mg/dl. Test principle, creatinine reacts with picric acid in alkaline environment to form a color complex. Developing of this red color may be follow photometrically at 500- 520 nm. The association on surfactant and sodium tetraborate keeps interferences at minimum (Sadeq, 2014).

### 2.3 Analysis of the Content of Leucocyte Types

Determination of the types of blood leukocytes is done automatically with the equipment Hematology Analyzer, Mindray BC-2800. The content of Neutrophils, Lymphocytes, Monocytes, Eusinophils and Basophils was recorded automatically after being put into a hematology analyzer (Briggs, 2014).

### 2.4 Blood Sugar Levels

The results of measurements of long tail monkey blood sugar levels can be seen in Figure 1 below.

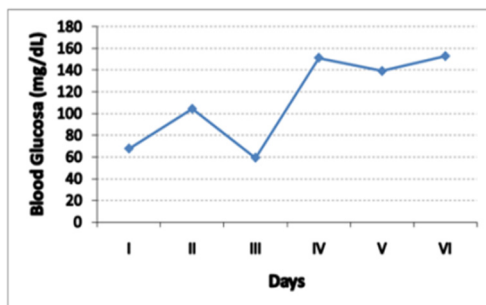


Figure 1. Blood sugar content of long-tailed monkeys (*Macaca fascicularis*) on the first day to the sixth day after the administration of *Momordica charantia* and DMPA methanol extracts.

### 2.5 Blood Chemistry (SGOT, SGPT and Creatinine)

Equations should be placed on a separate line, numbered and centered. An extra line space should be added above and below the equation. The numbers accorded to equations must appear in consecutive order inside each section or within the contribution, with number enclosed in brackets and set on the right margin, starting with the number 1.

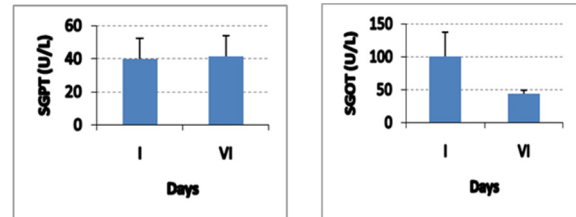


Figure 2. The content of SGPT/SGOT (mean ± SD) long-tailed macaque (*Macaca fascicularis*) in the first and sixth day after the administration of seed methanol extract of bitter melon (*Momordica charantia*) and DMPA.

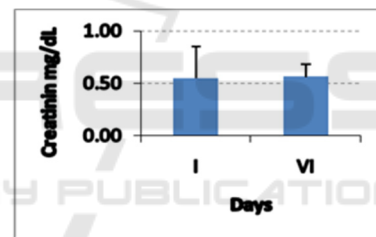


Figure 3. The content of creatinine (mean ± SD) long-tailed macaque (*Macaca fascicularis*) in the first and sixth day after the administration of seed methanol extract of bitter melon (*Momordica charantia*) and DMPA.

### 2.6 Content of Leucocyte Types

The contents of various types of leukocytes such as Neutrophils, Lymphocytes, Monocytes, Eusinophils and Basophils were calculated from the blood of long-tailed monkeys (*Macaca fascicularis*) in the first and sixth weeks.

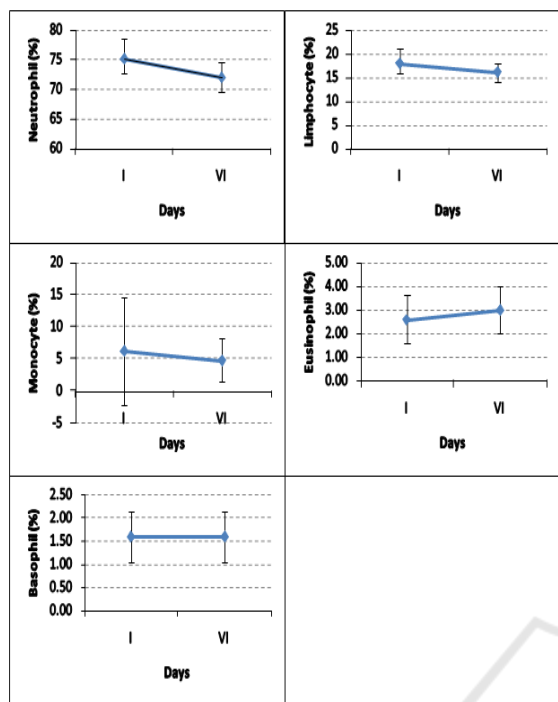


Figure 4. Content of white blood species of long-tailed monkeys (*Macacafasciculatus*) on days I and VI after giving methanol extract of bitter melon (*Momordicacharantia*) and DMPA.

### 3 DISCUSSION

In Figure 1, it can be seen that the blood sugar content of long tailed monkeys (*Macacafascicularis*) on the first day to the sixth day after giving the methanol extract of *Momordicacharantia* and DMPA increased, especially on day III towards day IV. On the fourth day until the fourth day, blood sugar levels stabilized. This shows the effort of physiological adaptation of monkeys to the condition of the cage and the new atmosphere. The initial state shows a physiological state that is still unstable and changes in days show physiological stability seen from blood sugar levels. This shows that the current adaptation is starting to appear.

A cross-sectional study has found out the blood glucose levels of long-tailed monkeys (*Macacafascicularis*) obesity at LuhurUluwatu Temple, Badung, Bali ranged from 44-208 mg/dL with an average of  $120.58 \pm 46.94$  mg / dL. Long-tailed monkeys with the highest BMI (61.51 kg/m<sup>2</sup>) had blood glucose levels of 124 mg/dL while the highest glucose level was 208 mg/dL owned by long-tailed monkeys with a BMI of 52.00 kg /m<sup>2</sup>. It can be

concluded that not all obese long-tailed monkeys at LuhurUluwatu Temple have high blood glucose levels (Aryana, 2016)

SGPT and SGOT content (mean  $\pm$  SD) of long-tailed monkeys (*Macacafascicularis*) on days I and VI after giving methanol extract of bitter melon seeds (*Momordicacharantia*) and DMPA (Figure 2) showed normal conditions and no indication of liver disorders. According to (Yoshime, 2016), the content of good quality bitter melon is  $\alpha$ -eleostearate which is high in acid and phytosterol with the potential of health benefits making it an attractive plant by-product.

The content of white blood types of long-tailed monkeys (*Macacafascicularis*) at the time of giving methanol extract of bitter seeds (*Momordicacharantia*) and DMPA did not provide a real determination ( $p > 0.05$ ). According to Takemoto (Takemoto, 1982), there was no effect of coarse bitter seed extract on white blood cells such as lymphocytes.

### 4 CONCLUSION

Administration of bitter melon seed extract for six days and injection of DMPA (Depot medroxyprogesterone acetate) at the beginning of the study gives a profile of daily blood sugar levels, SGOT/SGPT, creatinine, and Neutrophil, Lymphocyte, Monocyte, Eusinoiphil and Basophil did not show any significant difference ( $p > 0.05$ ). Methanol extracts from bitter melon seed and DMPA can be continued in the next day on long-tailed macaque *Macacafascicularis*.

### ACKNOWLEDGEMENTS

We are grateful for the financial support from the Directorate of Research and Community Service (DRPM) of the Ministry of Research, Technology and Higher Education, a Competency-Based Research Scheme for 2018 Fiscal Year Number: 3/UN5.2.3.1/PPM/KP-DRPM/2018.

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