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## Study of Uric-Acid Level in Obese Students at Health Polytechnic, Ministry of Health, Makassar

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### Abstract

Obesity is a problem in public health, including students. Overweight will increase body's weight so that the higher of uric acid permeation from blood plasma into the inter-joint space as a main trigger of gout. The aim of this research was to determine uric acid levels in blood specimens of obese students. The method used is a laboratory-observation with a *cross-sectional approach*, that is each study sample was examined for uric acid levels in its blood specimen. The number of samples is 30 obese students at the Health Polytechnic of the Ministry of Health in Makassar. It was conducted on 5 - 27 July 2018 at the Department of Health Analyst, the Health Polytechnic of the Ministry of Health in Makassar and at Labuang Baji hospital laboratory of Makassar. Examination of uric acid levels in blood specimens was conducted using a Spectrometer Cobas C311. In 30 obese students who examined uric acid levels in its blood specimens, 18 students (60%) were higher than normal values and 12 students (40%) were in normal category. Based on these result, it can be concluded that obese students have the potential to experience an increase in uric acid levels in their blood which can trigger gout. In this regard, it is recommended that students regulate their diet and increase physical activity including routinely exercise.

**Keywords:** Uric-acid; obese.

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## **1. Introduction**

Recently, obesity is one of the public health problems, including students. In general, the tendency of obesity is closely related to diet, social status, imbalance between body activities and food consumption. It is not only impacted on medical, psychological, and social, but also closely related to the survival of sufferers [1,2]. Obesity describes a state of accumulation of fat in the body as a result of excess calorie input. A person experiences obese if the Body Mass Index (BMI) > 25.0 [3,4].

A way to determine whether someone is obese or not is by using the Body Mass Index (BMI). BMI is a measurement that connects or compares between body weight and height. Even though it is called an index, actually BMI is a ratio that expressed as weight (in kilograms) divided by the square of the height (in meters) [5]

Obesity is often found in people who lack physical-activity and mostly sit. Thus, the lack of utilization of energy will cause energy deposits that are not used and will gradually accumulate and causes obesity [6].

Obesity can cause gout, it because excessive weight will increase the body's load so that the higher of uric acid permeation from the blood plasma into the inter-joints space. Basically, uric acid is a normal substance in blood and urine [7]. Uric-acid is produced from the breakdown and waste residual of certain food ingredients containing purine nucleotides or derived from purine nucleotides produced by the body. The increasing of uric acid levels in serum can increase uric acid or decrease of uric acid excretion. If uric acid production increases, there will be an increase in hypercritical uric acid pool. The increase of uric acid production can be caused by the high consumption of food containing purines or increased synthesis of purines in the body. Consumption of fat or oil and fruits that contain high-fat can interfere with the excretion of uric acid, which increases serum uric acid levels [8,9].

## **2. Research Material and Method**

The study is laboratory observation with a cross sectional approach. The sample is students at Health Polytechnic of Makassar, Ministry of Health with a body mass index (BMI) > 25 and ready to participate in this study. The number of samples is 30 (thirty) students by using purposive sampling. It was conducted at the Department of Health Analyst, Health Polytechnic, Ministry of Health n Makassar and at Labuag Baji Laboratory of Makassar in July 2018.

The tools and materials used in this study include: stature meter, scale, Spectrophotometer Cobas C311, tourniquet, syringe, tube rack, non-anticoagulant vacuum tube, cotton, 70% alcohol, and reagents for determination of uric acid levels. Determination of student's body mass index is done by measuring bodyweight in kilograms (kg) and height in meters (m). The data obtained is entered into the formula:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ .

Examination of uric acid in sample's blood specimens was done using a Spectrophotometer Cobas C311. First of all, ensures Uninterruptible Power Supply (UPS) as an electrical tool in "ON" position and then turned on the tools (power button on the right side of the equipment), turned on the control unit computer and monitor, logged

on by entering ID and password, the tool will initialize and routine maintenance automatically. Checking (with barcodes): by pressing system overview, tracking samples, placed samples on disk, placed stop barcodes after the end and pressing scan sample, while standby pressing the workplace then test selection. Selecting samples and uric-acid parameters then press save then start. The results were analyzed descriptively to determine how many samples experiences increase uric-acid levels in blood specimens.

### 3. Result and Discussion

The examination results of Body Mass Index (BMI) of 30 students sample showed that the average of BMI was 30.19. The lowest BMI is 25.1 and the highest is 40.2. The result of uric-acid examination in student's blood specimens can be shown on the following table (Body Mass Index > 25).

**Table 1:** The results of uric acid examination in blood specimens

Normal		More than normal value		Amount	
n	%	n	%	n	%
12	40	18	60	30	100

From 30 obese students who examined uric-acid levels in their blood specimens, 18 students (60%) were higher than normal values and 12 students (40%) were in the normal category. It indicates that obese students have the potential to experience the increase of uric-acid levels in blood which can causes gout or arthritis.

Until now, in the history of medicine it has never been said that obesity will have a positive impact on the health of the body. On the contrary, almost everyone is aware that obesity will cause various complaints and difficulties. Experts say that obesity has a negative effect on the entire system in the body [10,11].

Actually, the body is able to adapt to various kinds of food. For food ingredients such as protein, water, minerals, and vitamins the amount of input 3 times than minimum requirement will easily be disposed, but for carbohydrate and fat, it all will enter the body, only a small portion will be released as feces. Carbohydrates and fats are the main source of energy for the body. Therefore, if the input exceeds the body's energy requirements, this excess will be stored. Excessive energy will be stored in the form of fat in adipose tissue. Conversely, if the input is less than the body's energy requirement, this deficiency will be solved by breaking the stored energy reserves [12].

Various factors play a role in obesity, it should be noted that the occurrence of obesity is more determined by too much eating, too little activity or physical exercise, or both. Thus, each person needs to pay attention to the amount of food input (adapted to daily energy requirements) and physical activity. This attention is necessary for them with obese families, work sit down a lot, dislike physical activity. People who are obese have more potential for gout attacks, because excessive weight will increase the body's load so that the higher of uric-acid permeation from the blood plasma into the inter-joint space [13].

Actually uric-acid is a normal part of blood and urine. Uric acid is produced from the breakdown and waste residual of certain food ingredients containing purine nucleotides or derived from purine nucleotides produced by the body. The high level of uric-acid in the blood of gout sufferers is caused by many wastes as result of purine metabolism, while urinary-acid excretion is too little. Gout or arthritis is caused by a metabolic disorder which in its development manifests in an increase in the concentration of uric-acid in the serum. A further consequence of increasing uric acid is the formation of tophi around joints and kidney disorders including glomerulus, tubules, interstitial tissue, blood vessels, and uric-acid stone formation [14, 15].

Increased uric-acid levels in serum can be caused by increased production of uric-acid or decreased excretion of uric-acid. If uric acid production increases, there will be an increase in hyperuricemia uric acid pool, and uric-acid excretion increases. Increased uric-acid production can be caused by the high consumption of food containing purines or synthesis of purines in the body. Consumption of high fat or oil (such as fried foods, coconut milk, and margarine) and high-fat fruits (such as durian and avocado) can interfere with the excretion of uric-acid, increase uric-acid levels in serum [16].

If uric-acid experiences super-saturation in the blood and other body fluids, these compounds will crystallize and form deposits of uric salts that accumulate in connective tissue in the whole of the body, these deposits are called *tophus*. The presence of uric-acid crystals will trigger an inflammatory response or when neutrophil cells release their lysosomes. Lysosomes not only damage tissue, but also aggravate inflammation. In asymptomatic gout, serum uric-acid levels increase but do not crystallize or cause disorders and symptoms. With gout progressing, this condition can cause hypertension or urate stone formation in the kidneys.

The first attack of acute gout occurs suddenly and peaks quickly. Although it is often only about one or several joints, this first attack is very painful. The affected joint is felt hot, feels painful when touched, inflammation, and dark red color or looks cyanotic. Metatarsophalangeal joints on the toes usually experience the initial inflammation, and then inflammation occurs on the soles of the feet, wrist joints. Sometimes this condition occurs in mild-fever (subfebric). Mild acute attacks often abate quickly but tend to recur at irregular time intervals. Severe attacks can last for days or weeks [14].

The critical period is an asymptomatic interval found in gout attacks. Most patients experience a second attack within six months to two years but some attacks generally occur in untreated patients tend to last longer and more intense than the first. The attack can affect more than one joint, always attacking the joints in the legs and feet and sometimes accompanied by symptoms of fever. The attacks can occur to various joints if move successively.

Finally, chronic gout will occur. The final stage of gout that does not undergo remission is characterized by painful and persistent polyartysis with large tophus in the cartilage, synovial membrane, tendons and soft tissues. Tophus forms on the fingers, knees, feet, ulnar side of the forearm, helical part ears, achellic tendons and sometimes in internal organs, such as the kidneys and myocardium. The skin in the tophus area can ulcerate and release white exudates such as chalk, which are mainly composed of uric-acid crystals [16].

To prevent or minimize the occurrence of gout, there are several things that should be considered and well-performed including: regulating diet, exercise regularly, and more drinking water because it can help remove uric-acid from the body [13].

#### **4. Conclusion**

Obese students have the potential to experience an increase in uric-acid levels in their blood which can trigger gout. In this regard, it is recommended that students regulate their diet and increase physical activity by perform exercise regularly.

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