SUMMARY

Adi Surya Dirgahayu, research entitled with **"**Effect of Tomato Juice (*Lycopersicum esculentum*) on Spermatogenic Cells and leydig cells in Mice (*Mus musculus*) Induced by Monosodium Glutamate" under the supervision of Prof. Dr. Wurlina, drh., MS. as the first supervisor, and Dr. Soeharsono, drh. M.Si. as the co-supervisor.

This study aimed to determine Effect of Tomato juice (*Lycopersicum esculentum*) on Spermatogenic Cell in Mice (*Mus musculus*) Induced by Monosodium Glutamate. The mice was divided into five group of treatments. Control was only given 1 ml of aquadest. Treatment zero (T0) given Monosodium Glutamate at a dose of 4000 mg/kgBW, treatment one (T1) given Monosodium Glutamate at a dose of 4000 mg/kgBW and tomato juices with a 25% concentration, treatment two (T2) given Monosodium Glutamate at a dose of 4000 mg/kgBW and tomato juices with a 50% concentration, and treatment three (T3) given Monosodium Glutamate at a dose of 4000 mg/kgBW and tomato juices with a 100% concentration.

In this research each treatment with four replications was examined for the amount of spermatogonium cells, spermatocytes, spermatid cells, and leydig cells. Results of spermatogonium cells examination among the five treatments were, C was $29.6500^{b} \pm 2.12525$, T0 was $22.9000^{a} \pm 3.99166$, T1 was $27.6000^{ab} \pm 4.45720$, T2 was $29.1500^{b} \pm 1.41774$, and T3 was $32.2500^{b} \pm 4.04104$. From the result, stated in the Duncan test results that T0 is not significantly different from T1 but has been able to cause an increase in the number of spermatogonium

cells. While T0 is significantly different from Control, T2, and T3.

Results of spermatocytes examination among the five treatments were, C was $37.4000^{b} \pm 0.78316$, T0 was $32.0000^{a} \pm 6.86440$, T1 was $34.8500^{ab} \pm 1.58640$, T2 was $39.9500^{b} \pm 1.24766$, and T3 was $39.6500^{b} \pm 2.10634$. From the result, stated in the Duncan test results that T0 is not significantly different from T1 but has been able to cause an increase in the number of spermatocytes. While T0 is significantly different from Control, T2, and T3.

Results of spermatid cells examination among the five treatments were, C was $134.6500^{b} \pm 16.54277$, T0 was $127.2000^{a} \pm 4.31741$, T1 was $146.9500^{ab} \pm 9.50842$, T2 was $151.9000^{b} \pm 7.09836$, and T3 was $152.9000^{b} \pm 14.73092$. From the result, stated in the Duncan test results that T0 is not significantly different from T1 but has been able to cause an increase in the number of spermatid cells. While T0 is significantly different from Control, T2, and T3.

Results of leydig cells examination among the five treatments were, C was $28.2000^{b} \pm 12.40752$, T0 was $12.3500^{a} \pm 0.66081$, T1 was $23.1000^{ab} \pm 7.46637$, T2 was $31.6000^{b} \pm 6.44153$, and T3 was $34.1000^{b} \pm 14.75895$. From the result, stated in the Duncan test results that T0 is not significantly different from T1 but has been able to cause an increase in the number of leydig cells. While T0 is significantly different from Control, T2, and T3.

Samples were taken with an euthanasia procedure and put into formalin with a concentration of 10% before being made into histological preparations. On the 50^{th} day all the samples were euthanized.

MSG is sodium salt from one of the nonessential amino acids of

glutamic acid which will function as an amplifier and flavoring when added to food. The composition of MSG compounds is 78% glutamate, 12% sodium and 10% water. MSG when dissolved in water or saliva will dissociate into free salt and anion form of glutamic acid (Sukmaningsih *et al*., 2011). Excessive consumption of monosodium glutamate can cause a reproduction disorder such as infertility

Monosodium glutamate acts as a free radical and can cause oxidative stress. Oxidative stress itself can form Reactive Oxygen Species (ROS). Reactive Oxygen Species (ROS) produced can cause cell membranes to undergo lipid peroxidation which results in cell damage, including loss of intracellular adenosine triphosphate (ATP) in energy spermatozoa, morphological defects, DNA fragmentation, decrease in acrosome reactions and fusionogenic abilities (Gunawan *et al*., 2017). Oxidative stress causes damage to deoxyribonucleic acid (DNA), protein, and glucose, causing intracellular adenosine triphosphate (ATP) to disappear rapidly (Taib, 2012).

Tomatoes contain lots of lycopene which is a group of carotenoids such as beta-carotene which cause the red color of tomatoes. In the body, lycopene can protect against diseases such as prostate cancer and several other types of cancer and coronary heart disease. Lycopene has ability to reduce single oxygen is two times better than beta carotene and ten times better than alpha-tocopherol (Sunarmani, 2008).

The mechanism of action of lycopene in tomatoes as antioxidants that fight free radicals from MSG is a free radical chain oxidation reaction or by

reacting with free radicals and turning free radicals into non-radicals (Prayoga, 2015). If the free radical electron is stable, oxidation pressure can be prevented. As a result, the hypothalamic and anterior pituitary feedback mechanism can work well and the production of reproductive hormones such as FSH, LH, and testosterone can return to normal (Hruska, 2000). Lycopene which is widely distributed to several tissues such as the testis can also directly prevent the lipid peroxidation process by breaking up the MSG bonds with unsaturated fatty acids (Unsaturated Fatty Acids) that are present in testicular tissue, especially in the seminiferous tubules (Nugroho, 2007). Based on the results of the research that has been done, it can be concluded that there is an effect of tomato juice (*Lycopersicum esculentum*) on spermatogenic cells and leydig cells in mice (*Mus musculus*) induced by monosodium glutamate.

EFFECT OF TOMATO JUICE (*Lycopersicum esculentum*) ON SPERMATOGENIC CELLS AND LEYDIG CELLS IN MICE (*Mus musculus*) INDUCED BY MONOSODIUM GLUTAMATE

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ABSTRACT

The aim of this research was to discover effect of tomato juice (*Lycopersicum esculentum*) on spermatogenic cells and leydig cells in mice (*Mus musculus*) induced by monosodium glutamate. This research used twenty five male white mice aged 3-5 months with a weight around 20 grams. This research consisted of five groups with each different treatment. Control group was the control treatment, T0, T1, T2, and T3, were given with MSG with dose 4000mg/kgBW and tomato juice with each concentration of 25%, 50%, and 100%. Treatments had been given per oral for 49 days, once a day. At the end of the treatment period, execution was carried out, then the histopathological examination was performed. Microscopic observation on the spermatogenic cells and leydig cells showed that the T0 has not significantly difference with T1. Meanwhile T0 has significantly difference with control, T2, and T3. In additional. It shows that given MSG decrease number of spermatogenic cells and leydig cells. The decreasing number of spermatogenic cells and leydig cells caused by oxidative stress. Meanwhile oxidative stress increased reactive oxygen species. Reactive oxygen species have been implicated in cell damage and necrosis due to their direct oxidizing effects. Tomatoes contain lots of lycopene which is a group of carotenoids such as beta-carotene. Lycopene act as antioxidant that prevent oxidizing effect from MSG.

Keyword: Tomato juice, Spermatogenic cells, Leydig cells, Monosodium glutamate, Lycopene.