Influence of Cempaka Yellow Flower Extract (Michelia Champaca L.) on Lipid Profile on The Menopause Age Rate

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Abstract: The number of women aged 50 years and over can be estimated to increase from 500 million at present to more than 1 billion in prediction during 2030. After entering menopause, the hormone estrogen in the body of women is decreased drastically. Decreased estrogen hormone makes LDL cholesterol difficult to control, high levels of LDL one of the factors causing coronary heart disease. Estrogen is a female hormone that has many functions, one of which is an antioxidant which controls of levels of cholesterol. The Cempaka Yellow Flower (Michelia champaca L) or known as the Flower Jeumpa in Aceh Province, one of the herbs which are useful as antioxidants, antimicrobials, anti-inflammatory, antidiabetic, and antifungal. The several components contain as: flavonoids, polyphenols, phenols, tannins, anthocyanins, glutathione and Vitamin C. The general objectives of this study were: To prove the effect of giving of Cempaka Yellow Flower extract (Michelia champaca L) has lipid profile in mouse age of menopause. The design of this study is true experimental design with the randomized posttest-only control group design approach. Measurements of HDL, LDL, triglyceride, and total cholesterol levels were performed only after the treatment of young flower extract was performed. The subjects of this study were female winstar rats age of menopause as many as 28 tail. The Cempaka Yellow Flower extract can lower LDL and cholesterol levels and can increase HDL levels. Yellow Cempaka able to decrease LDL and Cholesterol level and increase HDL level at optimum dose 300mg/KgWB/day .

Index Terms: Cempaka Yellow Flower Exrtract, HDL, LDL, cholseterol total, menopause, age rate, winstar rats.

1. INTRODUCTION

Each year about 25 million women worldwide are estimated to have menopause. The number of women aged 50 years and over can be estimated to increase from 500 million at present to more than 1 billion by 2030. According to World Health Organization (WHO) data in 2025 the number of elderly women in estimate will jump from 107 million to 373 million. Menopause phase is a natural phase caused by changes in hormone levels of the female body. Towards the end of the age of 30 years, the performance of the ovaries will decrease and eventually stop producing reproductive hormone at the age of about 50 years. After entering menopause, the hormone estrogen in the body of women is decreased drastic. Decreased estrogen hormone makes LDL cholesterol difficult to control, high levels of LDL one of the factors that cause coronary heart disease [1,2]. According to [3] and [4] the American Heart Association's in 2016, 1 in 10 American menopause women experience CHD. In developing countries including Indonesia the number is relatively the same, heart disease attacks men more often than women with a ratio of 7: 1 before menopause, to 1: 1 after menopause. Estrogen is a female hormone that has many functions, one of which is as an antioxidant that helps control cholesterol levels. LDL cholesterol is easier to penetrate plaque inside the blood vessel wall if it is oxidized.

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process of oxidation of LDL so that the ability of LDL to penetrate plaque will be reduced. Another role of estrogen is to dilate the blood vessels of the heart so that the blood flow becomes smooth and the heart gets enough oxygen supply [2]. According to [5], Cholesterol problems not only caused by eating foods high in cholesterol, but can also be caused by metabolic disorders that occur in the liver. One of the causes is exposure to free radicals that affect the liver. The impact of free radicals, especially lipid peroxides that expose the liver is much more dangerous than foods that contain lots of cholesterol that we consume. The accumulation of free radicals in the body will trigger oxidative stress that will oxidize LDL. Oxidative stress is defined as a condition where there is an imbalance between pro oxidants and antioxidants in the body where the oxidation process goes beyond the antioxidant defense system in the body resulting in an imbalance in the system. Adequacy of primary and secondary antioxidants can prevent the formation of free radicals in the liver that interfere with lipid metabolism (one of which is cholesterol) and supports natural antioxidant activity generated by the body. Antioxidant enzymes protect cells and tissues from oxidative damage. Perfection work of antioxidant enzyme system fully played by enzyme SOD, Catalase (CAT) and GPx. However, cellular antioxidants can not work individually, so a secondary antioxidant intake of food is required [6]. One of the substances often used as an antioxidant is Flavonoids. The mechanism of action of flavonoids as antioxidants is to capture free radicals and bind to metal ions. Flavonoids also work indirectly as antioxidants through other mechanisms such as inhibiting prooxidant enzymes and inducing antioxidant enzymes. According to [7] said Cempaka Yellow Flower (Michelia champaca L) or known by the name of Cempaka in Province Aceh, one of the herbs that are useful as antioxidants, antimicrobials, anti-inflammatory, antidiabetic, antifungal. The Cempaka Yellow Flower contain several components that act as antioxidants, including: flavonoid class of polyphenols, phenols, tannins, anthocyanins, glutathione and Vitamin C. Based on the description, minimal utilization of Cempaka Yellow Flower extract by Aceh society to make interested of researcher to determine any influence of

Cempaka Yellow Flower extract (Michelia champaca L, local name Cempaka Kuning) on lipid (LDL and HDL) profiles in menopausal age rats in preventing oxidative stress and how to prevent it through exogenous antioxidants.

2.LITERATURE REVIEW

According to [8], Menopause is a normal change in every woman. But some women may experience premature menopause, either because of the results of surgery (removal of the ovaries for medical reasons), such as hysterectomy, or damage to the ovaries, as a result of chemotherapy treatment. Menopause that occurs before age 40, regardless of the cause, is called premature menopause. At the time of menopause, the ovaries no longer produce estradiol (E2) or inhibin and progesterone in significant amounts, and estrogen is formed only in small amounts. Therefore, FSH (Folicle Stimulating Hormone) and LH (Luteinizing Hormone) are no longer inhibited by negative feedback mechanisms of decreased estrogen and progesterone and the secretion of FSH and LH increases and plasma FSH and LH increases to elevated levels. FSH and LH fluctuations and decreased estrogen levels cause signs and symptoms of menopause, including hot flashes, sleep disturbances, night sweats, urogenital changes, osteopeni/low bone density. Estradiol hormone levels in menopause range from 30-100 pmol/L [9]. The estrogen hormone can increase α-lippoprotein or HDL, decrease β-lippoprotein or LDL and lower serum cholesterol in the blood. As is known, HDL serves to transport back unused cholesterol to the liver to be destroyed and LDL serves to circulate cholesterol throughout the body tissues. Low levels of LDL and high levels of HDL will reduce the risk of blockage of arterial blood vessels due to cholesterol that accumulate. The role of estrogen in increasing HDL and lowering LDL is almost 15% of the production and transport of cholesterol. Estrogen will lower LDL and lipoprotein levels by increasing regulation, LDL and Lipoprotein catabolism. This is due to a decrease in the absorption of cholesterol by plasma cells [10]. At the time of menopause, the resulting estrogen hormone decreased, so the risk of accumulation of cholesterol in the arteries will increase. Post-menopause, increased hormone FSH and LH will decrease the function of the ovaries to produce estrogen, so that increased production and intake of body fat control will be imminent [2]. Flower yellow cempaka tree has a height of 15-25 m. End of haired twig. Leaf round egg shape lanceolate, with tip and base pointed, 10-28 times 4.5-11 cm, thin as skin. The former leaf rest on the petiole is longer than half of the petiole. Flowers stand alone, orange, fragrant sanget smell. Flower leaves are 3-5 cm long, the deeper is narrower and more pointed than the outermost. At the base of the flower in the shape of a pole, the fruits and stamens are clearly separated by a space. The fruit will be more than 20, stuffed, flat, hairy, each with a lot of seeds. Fruit shape elongated ball, slightly crooked, first green, then pale gray, covered with pimples. The deep red ripe seeds hung out on the longitudinal bundle. From India, in Java it is grown for its flowers [11].

Figure 1. *Morphology of Cempaka Yellow Flower*

Acording to [12] and [13], Cempaka Yellow Flower, M. champaca is used as a scent of hair care. The leaves have the efficacy of treating stomach heartburn, kidney stones and bad breath. Wood bark is used to treat fever and irregular menstruation. Phytochemical screening was performed on extracts to detect chemicals of essential oils, alkaloids, sterols and terpenoids, saponins, polyphenols, flavonoids, and glycosides. The test results showed that 80% ethanol extract of M. champaca L. stem bark contains essential oils, triterpenoids, polyphenols, and flavonoids. Natural antioxidants can be obtained from fruits, leaves, roots and seeds. Metabolic compounds that act as antioxidants such as coumarin, flavonoids, saponins, tannins, alkaloids, and triterpenoids. Flavonoids can inhibit the development of heart disease, through its potential as an antioxidant. The work of flavonoids is similar to estrogen that is as cardioprotective. It works through a lipid profile repair mechanism that lowers total cholesterol, LDL and triglycerides and increases HDL. The decrease of cholesterol by flavonoids can also be through other mechanisms namely increased bile acid secretion and decreased cholesterol metabolism. Flavonoids are the most effective antioxidants for inactivation of hydroxyl radicals and lipid peroxyl, and forming complex bonds with metal ions, thus preventing the formation of reactive oxygen species (ROS) [14,15]. ROS compounds give a damaging effect when the balance between oxygen and antioxidants is impaired. In addition to flavonoids that contribute to a reduced risk of heart disease is saponins. Saponins play a role in inhibiting cholesterol absorption in the intestines. The consequence of inhibition of cholesterol absorption is the cholesterol secreted from the body along with the feces which is the main path to remove cholesterol. Saponin will bind to bile acids and increase bile acid excretion in the stool and neutral sterols (such as coprostanol and cholestanol). This results in the conversion of cholesterol to bile acid greatly increased for the maintenance of bile acid depots [16].

3. METHODOLOGY

A.Place and Methods

The research was conducted in the Laboratory of Physiology and Anatomy, Laboratory of Pathology, Faculty of Medical, University Brawijaya. The design of this study is true experimental design with the randomized posttest only control group design approach. Measurements of HDL, LDL and total cholesterol were performed only after the treatment of Cempaka Yellow Flower extract was done. This study used Rattus novergicus Wistar strain mice. The selection is done randomly with the following criteria:

Inclusion criteria:
1. Sex of female rats
2. Menopausal age mice aged 7-8 months
3. The weight of mice between 300-350 grams
4. Healthy rat (active, clean white fur, bright eyes and no defects.

The number of research subjects in each research group was calculated based on 19:
(t-1) (r-1) ≥ 15
t: Number of treatment groups
r: Number of replay
(t-1) (r-1) ≥ 15
(4-1) (r-1) ≥ 15
3 (r-1) ≥ 15
3 r- 3 ≥ 15
3r ≥ 18
r ≥ 18/3
r ≥ 6

The number of animal subjects tested for each treatment is 6 rats. To anticipate if any animal try to die during adaptation and treatment then each group plus 10% of the number of experimental animals is 1 tails as reserve, so the number of experimental animals in each experimental group is 7 tails. The Figure 2 described variable measurements. Variable

independent Variable dependent

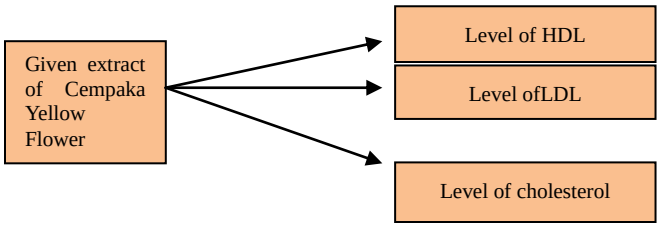

Figure 2. *Conceptual Framework of Researchers*

Independent variable: Giving of Cempaka Yellow Flowerextract and Dependent variables: HDL, LDL and total cholesterol levels.

B. Measurement and Procedure
The tools used in the research are:
1. Spectrophotometer
2. Lipid profile check kit

Table 1 showed procedures of parametres measurements.

Table 1. *Procedures of parametres measurements.*

Variable	Operational Definition	Way measurement	Scale Measurement
Operational Definition Means of Measure	Giving of Cempaka Yellow Flower extract orally administered cempaka yellow flower extract in treatment group 1 (100 mg / Kg of body weight), treatment 2 (200 mg /Kg of body weight) and 3 (300 mg/ Kg of body weight) treatment for 15 days in menopausal age rats made with injection of intra peritoneal 4 vinyl cyclo hexane diepoxide (VCD) with a dose of 160 mg/ Kg of body weight.	Digital scales	Ordinal
HDL Level	Measurement of protein levels in blood plasma that repair damage and reduce cholesterol from the body. Normal levels in mice 20 - 40 mg/dl.	Spectro photometer	Ratio
LDL levels	Bad cholesterol can blend with fat and othersubstances that then accumulate in the inner walls of the arteries. The limit of normal LDL threshold in mice was 7 - 27.2 mg/dl.	Spectro photometer	Ratio
Total of Cholesterol	Measurements of soft-textured compounds are found between the fat in the bloodstream and all the cells of the body. Total cholesterol level in mice 27,89 - 29,44 mg/dl.	Spectro photometer	ratio

C. Data Collection
Technique of collecting data in this research is by observation (observation). Measurements of HDL, LDL and total cholesterol were performed by spectrophotometric method.

D. Data Analysis
Analysis of data used are:
a. Normality test
b. If eligible, then proceed with parametric test
c. Anova One Way Test
d. Testing with Anova One Way (F test) was used to compare the mean of measured variables between the control group and the treatment group. Conclusion Ho is denied bear meaning conclusion there is a significant difference (significant).
e. Test Kruskall-walis
f. This test was performed to compare the mean levels of LDL and HDL
g. d. Man-Whitney Test
h. This test was performed as a non-parametric post-hoc test for LDL and HDL levels
i. e. Test LSD
j. For post hoc test on variable cholesterol level.

4.RESULTS

4.1. Parametric Prerequisite Test Results
In this research, the result of data analysis on normality test is done by using Shapiro-Wilk test. The decision criteria, ie if the value of Sig or p-value greater than the significance level p=0.05 then the data is normally distributed and vice versa if the value of Sig or p-value smaller than the significance level = 0.05 then the data is not normally distributed. In the Shapiro-Wilk test analysis obtained and explained in detail appear in the table 2 below.

Table 2. *Normality Test Result with Shapiro-Wilk Test*

No	Variable	P-value	Data Distribution
1	LDL	0,002	Abnormal
2	HDL	0,000	Abnormal
3	Cholesterol	0,350	Normal

Based on Table 2 above, on normality test data of LDL and HDL levels obtained p-value smaller than α = 0,05 (p>0,05) indicating that assumption of normality not fulfilled. Therefore, on variable LDL and HDL levels performed data transformation. In this research, the process of transforming the data of LDL and HDL variable is done by using natural logarithm transformation (ln(y)). The following assumptions test the assumption of normality of LDL and HDL variables that have been transformed into Table 3:

Table 3. *Normality Test Result with Shapiro-Wilk Test*

No	Variable	P-value	Data Distribution
1	LOG_LDL	0,02	Abnormal
2	LOG_HDL	0,00	Abnormal

Based on Table 3 above shows after transformation of data with log, then data of variable of LDL and HDL still have p value ≤ 0.05 and because of parametric test requirement not fulfilled, hence for variable of LDL and HDL level followed by Kruskal-Wallis non parametrik test.

4.2. Comparative Test Result of LDL Levels

Based on the assumption of normality test with Shapiro-Wilk for variable LDL level not fulfilled. Further testing conducted to determine the effect of extract of Cempaka Yellow Flower on LDL levels non parametric by using Kruskal-Wallis test. The following test results of the effect of the extract of Cempaka Yellow Flower with several levels of dosage to LDL levels using Kruskal-Wallis described into Table 4 below.

Table 4. *Average Comparison of LDL Levels*

No	Observation Group	Mean ± SD (ng/mL)	P-value
1	Control	377,41 ± 25,03[a]	0.000 < α
2	Treatment with dose 100mg/Kg of Weight Body	376,62 ± 29,78 [a]	
3	Treatment with dose 200mg/Kg of Weight Body	206,61 ± 60,60 [b]	
4	Treatment with dose 300mg/Kg of Weight Body	79,35 ± 8,38 [c]	

Description: On average ± sd if loading different letters means there is a meaningful difference (p-value <0.05) and if loading the same letter means there is no significant difference (p-value> 0.05). Table 4 shows the results of post-hoc test for non parametric ie mann-whitney test, ie no significant difference mean of LDL level in menopausal age rats between control group (377.41 ± 25.03 a) compared with treatment group of extract of Cempaka Yellow Flower dose 100mg/Kg WB/day (376.62 ± 29.78 a). The average value of LDL level in the treatment group of Cempaka Yellow Flowerextract at 100mg /Kg WB/day was smaller than the control group, meaning that there was a decrease of LDL level due to the treatment of Cempaka Yellow Flowerextract at 100mg/Kg WB/day although this decrease is not statistically significant. However, there was a significant difference in mean LDL levels in menopausal age rats between controls (377.41 ± 25.03 a) compared with the treatment group of Cempaka Kuning extract at 200mg/Kg WB/day (206.61 ± 60.60 b), also different with treatment group of extract of Cempaka Yellow Flowerdose 300mg/Kg WB/day (79.35 ± 8.38 c). The average value of LDL level in the treatment group of Cempaka Yellow Flowerextract at 200mg/Kg WB/day and also dose 300mg/Kg WB/day was smaller in value compared to the control group, meaning that there was effect of the treatment of the extract of Flower Cempaka Kuning dose 200mg/KgWB/day and also dose of 300mg/Kg WB/day to decrease levels of LDL in menopausal age rats. Furthermore, there was a significant difference mean of LDL level in rats between treatment group of Cempaka Yellow Flowerextract dose 200mg/Kg WB/day (206.61 ± 60.60 b) with treatment group of extract of Cempaka Yellow Flowerdose 300mg/Kg WB/day (79.35 ± 8.38 c). The average value of LDL level in the treatment group of Cempaka Yellow Flowerextract at 300mg/Kg WB/day was smaller than the 200 mg/ Kg WB/day dose, meaning that the extract of Cempaka Yellow Flowerat 300mg/Kg WB/day has the ability to rapidly decrease SOD levels in menopausal age rats. Based on the above description it is evident that the treatment of extract of Yellow Flower Cempaka showed a decrease in LDL levels. In other words proved to provide extract of Cempaka Yellow Flower able to lower LDL levels in mice. So the first hypothesis has been proven, that the extract of Cempaka Yellow Flower lowers LDL levels in menopausal age rats. Table 4 also shows the lowest average LDL level in the treatment group of Cempaka Yellow Flowerextract at 300mg/Kg WB/day when compared with the control group and other dosage groups. While the highest mean LDL level was the control group when compared with the other dose groups. However, the most optimum dose that can increase the fastest LDL level is a dose of 300mg/Kg WB/day. Furthermore, the average difference of LDL levels in the four groups of samples is presented in the histogram picture 3 below.

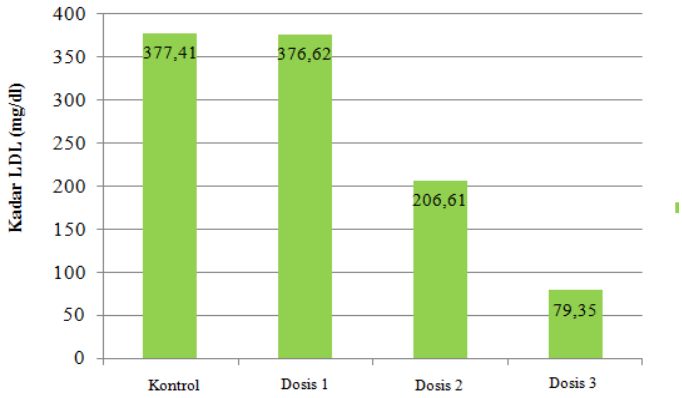

Figure 3. *Average Histogram LDL. The average LDL level was observed in the control group, dose 1 (Cempaka Yellow Flower extract dose 100mg/ Kg WB /day), dose 2 (Cempaka Yellow Flower extract 200mg/KgWB), and dose 3 (Cempaka Yellow Flower extract dose of 300mg/KgWB).*

Figure 3 above shows the average histogram of LDL levels in menopausal age rats in the control group (without Yellow Cempaka Yellow Flower extract), Cempaka Yellow Flower extract dose 100m/Kg WB/day, dose 200mg/Kg WB/day and

dose 200mg/Kg WB/day. The average LDL level decreased with the addition of dose of Cempaka Yellow Flower extract. The average value of the lowest LDL level was in the treatment group of extract of Cempaka YEllow Flower dose 300mg/Kg WB/day. It can be said that in this study the dose of Cempaka Yellow Flower extract which is considered the fastest decrease LDL level is dose 300mg/ Kg WB. The optimum dosage of Cempaka Yellow Flower extract 300mg/Kg WB can decrease the most effective LDL level which is very meaningful. The trend of decreasing LDL level from control group to treatment group of Cempaka Yellow Flower extract along with dose increase. Because the average value of the lowest LDL level lies in the group of extract of Cempaka Yellow Flower doses of 300mg/Kg WB/day, the extract of Cempaka Yellow Flower dose of 300mg/Kg WB is the dose considered the fastest decrease LDL levels in menopausal age when compared to other doses.

4.3. Comparative Tests Results HDL

Based on Kruskal-Wallis test result on HDL level data, there was a significant difference mean of HDL levels in the four groups of observation samples, this is indicated by p-value = 0.001 <α. Furthermore, the post hoc test with mann-whitney test is presented in the Table 5 below.

Table 5 *Average Comparison of HDL Levels*

No	Observation Group	Mean ± SD (ng/mL)	P-value
1	Control	44,11 ± 4,53 [a]	0.001 < α
2	Treatment dose 100mg/KgWB	56,35 ± 15,54 [a]	
3	Treatment dose 200mg/KgWB	120,58 ± 37,65 [b]	
4	Treatment dose 300mg/KgWB	140,62 ± 4,63 [b]	

Description: On average ± sd if loading different letters means there is a significant difference (p-value <0.05) and if loading the same letter means no significant difference (p-value> 0.05). Table 5 shows the results of multiple comparison test with Mann-Whitney that there is no significant difference mean of HDL level between control group (44,11 ± 4,53 a) compared with treatment group of extract of Cempaka Yellow Flower 100mg/KgWB/ day (56.35 ± 15.54 a). The average value of HDL level in the treatment group of Cempaka Yellow Flowerextract at 100mg/ KgWB/day was greater in value compared to the control group (without Cempaka Yellow Flower extract), meaning that there was an increase in HDL levels due to the treatment of Cempaka Yellow Flower extract dose of 100mg/KgWB/day although not significant. However, there was a significant difference in mean HDL levels between treatment groups of Cempaka Yellow FlowerExtract at 100m/KgWB/day (56.35 ± 15.54 a) with a dose of 200mg/KgWB/day (120.58 ± 37.65 b) was also different with treatment group of Cempaka Yellow Flower Extract dose 300mg/ KgWB day (140.62 ± 4.63 b). The average value of HDL level in the treatment group of Cempaka Yellow Flower extract at 200mg/KgWB/day and also the dose of 300mg/KgWB/day was greater in value compared to the control group, meaning that the effect of the treatment of flower extract Cempaka Yellow Flower dose 200 mg / Kg.BB / day and a dose of 300 mg/KgWB/day to increase HDL levels in menopausal age rats. Based on the above description it is evident that the treatment of Cempaka Yellow extract in menopause age rats showed an increase in HDL levels. So the hypothesis proved, that the Cempaka Yellow Flowerextract increased HDL levels in menopausal age rats. Furthermore, there was a significant difference mean of HDL level in rats between treatment group of Cempaka Yellow Flower extract dose 100mg/KgWB / day (56,35 ± 15,54 a) with treatment group of Cempaka Yellow Flower extract dose 200mg/Kg WB/day (120.58 ± 37.65 b). However, there was no difference of average HDL level in treatment group of 200 mg/ kgWB/day with treatment group of Cempaka Yellow Flower extract dose 300mg/KgWB/day (140.62 ± 4.63 b). This means that the treatment of Cempaka Yellow Flower extract dose 100mg/ kgWB/day, dose 200mg/kgWB/day and dose of 300 mg/KgWB/ day has the same ability to increase HDL levels in menopausal age rats. Cempaka Yellow Flower extract able to influence the increase of HDL level along with the added dose given. The average value of HDL level in the treatment group of Cempaka Yellow Flower extract at 300mg/KgWB /day was higher when compared with the mean HDL levels with other groups of 100mg/KgWB/day and 200mg/kg WB/day. This means that in this study the dose of Cempaka Yellow Flower which is considered the most optimum to increase HDL levels in menopausal age rats is a dose of 300mg/KgWB/day.

4.4. Comparison Test Result Cholesterol Total Cholesterol

Based on one way Anova test results on cholesterol content data obtained there is a significant difference mean cholesterol levels in the four groups of sample observations, this is indicated by the value of p-value = 0.000 <α. Furthermore, in the test of multiple comparison (post hoc) with the test of Least Significant Difference (LSD) is presented in the Table 6 below.

Table 6.*Average Cholesterol Levels*

No	Observation Group	Mean ± SD (ng/mL)	P-value
1	Control	305,43 ± 33,47 [a]	0.000 < α
2	Treatment dose 100mg/KgWB	204,37 ± 28,17 [b]	
3	Treatment dose 200mg/KgWB	135,35 ± 37,29 [c]	
4	Treatment dose 300mg/KgWB	91,13 ± 31,26 [d]	

Description: On average ± sd if loading different letters means there is a meaningful difference (p-value <0.05) and if loading the same letter means there is no significant difference (p-value> 0.05). Table 6 shows the result of multiple comparison test with LSD test that there is significant difference mean of cholesterol level between control group (305,43 ± 33,47 a) with treatment group of extract of Cempaka Yellow Flower dose 100mg/KgWB/ day (204.37 ± 28.17 b). If based on the average value then the average cholesterol levels in the control group is higher in value compared with the average value of cholesterol levels in the treatment group extract of Cempaka Kuning Flower dose 100mg/ KgWB/day. This means that there is a decrease in cholesterol levels in the extract of Cempaka Yellow Flower dose 100mg/ KgWB day. Table 6 also shows that there is a significant difference mean of cholesterol level in rats between group of Cempaka Yellow Flower extract dose 100mg/KgWB/day (204,37 ± 28,17 b) compared with treatment group of extract of Cempaka Yellow Flower dose 200mg/KgWB/day (135.35 ± 37.29 c). The average value of cholesterol level in the treatment group of Cempaka Yellow

Flower extract at 200mg / KgWB/day and dose 300mg/ KgWB/day was lower in value compared to the control group. Means there is effect of treatment of extract of Cempaka Yellow Flower dose 200mg/KgWB/day and dose 300mg/KgWB/day to decrease cholesterol levels in menopausal age rats. Furthermore, the average value of cholesterol level in the treatment group of Cempaka Kuning Flower extract at 300mg/KgWB/day was lower in value when compared with the group of Cempaka Yellow Flower extract at 200mg/KgWB/day. This means that there is a significant difference mean of cholesterol level in rats between treatment group of Cempaka Kuning Flower extract dose 200mg/ KgWB/day (135.35 ± 37.29 c) compared with treatment group of extract of Cempaka Kuning Flower dose 300mg/KgWB/day (91.13 ± 31.26 d).This means that the treatment of Cempaka Yellow Flower extract dose 200mg/KgWB/day and dose of 300mg/ KgWB/day has the same ability to cholesterol levels in menopausal age rats, which is able to influence the decrease in cholesterol levels. The average value of cholesterol level in the treatment group of Cempaka Kuning flower extract at 300mg/ KgWB day was lower in value than the average cholesterol level with other groups. This means that in this study the dose of Cempaka Yellow extract which is considered the fastest to lower cholesterol levels in menopausal age rats is a dose of 300mg/ KgWB/day. Based on the description of the paragraph above it is proven that the treatment of extract of Cempaka Yellow Flower in menopausal age rats showed a decrease in cholesterol levels. In other words proved giving yellow Cempaka Yellow extract able to increases cholesterol levels. So the hypothesis proved, that the extract of Cempaka Yellow Flower mneurunkan cholesterol levels in menopausal age rats.

5. DISCUSSION

5.1. Effect of Cempaka Yellow Flower Extract on LDL Level

This study proves that Cempaka Yellow Flowers can lower LDL levels in menopausal age blood. This is presumably because of the antioxidant compounds contained in the Cempaka Yellow Flower. The same results were also presented by [17] suggested that there is a relationship between antioxidant consumption and blood lipid profile. Antioxidants tested were beta-carotene, vitamin C, flavonoids. Research from [18] proved that in vitro, flavonoids prevent LDL oxidation. Natural antioxidants such as flavonoids are known to have contributed to inhibiting the oxidation of LDL (low density lipoprotein) by ex-vivo. Oxidative products of LDL can cause narrowing of coronary arteries. Other studies have also shown that flavonol compounds are a powerful antioxidant. Results from a study conducted by Ravishankar showed that natural flavonoid compounds such as kaempferol, morin, myricetin, and quercetin had varying protective activity against LDL [19] decline. Flavonoid is a class of phenolic compounds that are polar and soluble in water and have functions such as free-radical capture and damper formation oxygen singlet (O-). As an antioxidant, flavonoids will protect LDL cholesterol until it is not oxidized by free radicals. The antioxidant work mechanism has two functions. The first function is a major function of antioxidants as a giver of hydrogen atoms. Antioxidants (AH) that have these primary functions are often referred to as primary antioxidants. This compound can give the hydrogen atom rapidly to the lipid radical (R *, ROO *) or change it to a more stable form, while the antioxidant radical derivative (A *) has a more stable state than the lipid radical. The second function is a secondary function of antioxidants, which slows down the rate of autocesidation by various mechanisms outside the autocesidation chain breaking mechanism by altering the lipid radicals to a more stable form[20]. LDL is a lipoprotein that carries the largest cholesterol to spread throughout the body tissues and blood vessels. LDL is often called bad cholesterol because its effect is atherogenic (easily attached to blood vessel walls), so it can cause fat accumulation and constriction of blood vessels (atherosclerosis). LDL levels in the blood depends on the fat consumed, the more fat consumed, the more accumulate also LDL, because LDL is a saturated fat that is not easily soluble. Vitamin C, a water-soluble antioxidant, is the body's defense system of reactive oxygen compounds in plasma and cells. Vitamin C is white crystalline with molecular weight 176,13 and molecular formula C6H6O6. As an antioxidant and vitamin C works by transferring one electron to a Cu compound, it contributes electrons into intracellular and extracellular biochemical reactions, removing the reactive oxygen compound within the neutrophils, monocytes, lens proteins and retinas, interacting with Fe-ferritin, preventing LDL oxidation, transfer electrons into oxidized tocopherols, and absorb metals in the gastrointestinal tract [21].

5.2. Effect of Cempaka Yellow Flower Extract on HDL Level

The results of this study prove that Cempaka Yellow Flower can increase levels of HDL. HDL is a lipo-protein that contains Apo-A, which has anti-atherogenic effects, so-called good cholesterol. Its main function is to bring free cholesterol from the endothelium and send it to the blood vessels to then be esterified into ester cholesterol. Cholesterol ester undergoes transfer from HDL to VLDL so that cholesterol is thrown into the gallbladder as bile acid [22]. Cempaka Yellow Flower as it is known contain antioxidant, where one of them is anthocyanin. Antosianin is one type of flavonoids that can inhibit the absorption of cholesterol in the gastrointestinal tract or can inhibit cholesterol synthesis in the liver. This study in accordance with anthocyanin extract research can improve lipid profile, because it can decrease triglyceride and total cholesterol significantly and can increase HDL, decrease of serum cholesterol caused by anthocyanin proved through barrier to absorption of cholesterol and bile acid in intestine. This is evidenced by studies in mice given nasunin an anthocyanin from eggplant, it can reduce total serum cholesterol and increase HDL [23]. The same study, which examined the effect of flavonoids on cholesterol levels in patients with obesity, showed that there was a decrease in LDL levels and elevated HDL levels in these patients after consuming flavonoids for 3 months. Increased levels of HDL cholesterol are potentially atheroprotective. HDL is involved in the process of transporting back cholesterol in the body such as transferring cholesterol from tissues to the arteries and back to the liver. In the process of increasing HDL levels and increasing activation of factors involved in the transfer of cholesterol to the liver such as cells, tissues and arteries [24].

5.3. Effect of Cempaka Yellow Flower Extract on Cholesterol Level

This study proves that Cempaka Yellow Flower can reduce cholesterol levels in the blood. This is because the compounds Flavonoids, saponins, vitamin C and other antioxidants contained in the Cempaka Yellow Flower. The results showed

the extract of flavonoids showed hypolipidemic effects that reduce cholesterol levels of 86.45% vitamin C which plays an important role in preventing cholesterol. Vitamin C deficiency leads to an increase in cholesterol synthesis. The role of Vitamin C in cholesterol metabolism is through increased cholesterol exposure in the form of bile acids, and increases HDL levels. High HDL levels will lower the risk of atherosclerosis [25]. The results prove that the above natural ingredients that influence to lower blood cholesterol levels such as flavanoid, allisin, sulfonylurea, linoleat, vitamin C, vitamin E, pectin, diosgenin and fiber. The content of this content varies according to each mechanism can lower blood cholesterol levels [26]. Flavanoid is a compound containing C15 which is widely present in plants in the form of flavones, isoflavones, anthocyanins, aurons, leukocyanins and kalkon. Flavanoids can lower blood cholesterol levels by lowering the absorption of cholesterol and bile acids in the small intestine, causing increased excretion through feces, causing liver cells to increase bile acid formation from cholesterol to lower fat as it is converted into energy [27]. Vitamin C and vitamin E are known to lower body cholesterol levels, vitamin C will break down cholesterol into bile acids and bile acids so easy to remove in the digestive tract in feces. Vitamin E decreases cholesterol levels by inhibiting the formation of 2,3 ocides by turning oxygen into alpha stabilized quinone to formferers which in turn inhibits the formation of cholesterol [28].

6.CONCLUSIONS AND SUGGESTIONS

6.1. Conclusions

Cempaka Yellow Flower extract able to increase levels of HDL rat age of menopause. The Cempaka Yellow Flower extract can reduce LDL levels and total cholesterol levels in menopausal age rats.

6.2.Suggestions

Based on the results of the study, it is advisable:

1. Cempaka Yellow Flowers can be consumed by menopausal age women as antioxidants, especially in maintaining lipid profile balance.
2. Cempaka Yellow Flowers can be used as an alternative herb in preventing degenerative diseases at the age of menopause.

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