Anti-Hyperlipidemia Effects of Sijukkot Leaf Extract Ethanol *(Lactuca Indica)*

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Abstract

Lactuca indica from Indonesia (Humbang Hasundutan) is a plant used to treat as antihyperlipidemia : Cholesterol, Trigliserida (TG), High Density Lippoprotein (HDL), Low Density Lippoprotein (LDL), on 28 male rats of the wistar strain (Rattus norvegicus) that have been given high-fat diets were given to 3 control groups, namely rats given standard feed, groups of rats given standard and high-fat diets, and groups of rats given simvastatin with treatment for 21 days. The groups with different doses were 100 mg/kg bw, 200 mg/kg bw, 300 mg/kg bw and 400 mg/kg bw. Giving the ethanol extract of the leaves of the sijukkot plant has an effect on reducing total cholesterol levels. With the analysis obtained that the Shapiro-Wilk Normality Test with a sig value > 0.05, the data is normally distributed. The results of the analysis in the Test of Homogeneity of Variances table obtained a Sig value of 0.510. Cholesterol Sig Value 0.510 > 0.05; TG 0.102>0.05; HDL 0.01 <0.05 and LDL 0.257> 0.05. Thus, the ethanolic extract of sijukkot leaves gave a positive effect on cholesterol levels in the serum lipid profile of High Density Lippoprotein (HDL and Low Density Lippoprotein (LDL).

Keywords: *Sijukkot (Lactuca Indica); Cholesterol; TG; LDL and HDL*

Introduction

Cholesterol is one of the lipids that can form cell membranes and the extreme layers of plasma lipoproteins. Increased levels of total cholesterol can cause various diseases such as hyperlipidemia. Cholesterol is a fat needed by the body, namely: triglycerides, low density lipoprotein (LDL) and high density lipoprotein (HDL)[1]. Hyperlipidemia is a major cause of risk of coronary heart disease and atherosclerosis and can cause death. Data from the World Health Organization[2] (WHO) in 2012 showed that 17.5 million people in the world died (31% of the 56.7 million deaths worldwide due to blood circulation diseases) and it is estimated that this number will continue to grow. Coronary heart disease is the third leading cause of death in the world[3]. Hyperlipidemia is caused by high fat food intake and is also a secondary effect of diabetes mellitus[4]. With HMG-CoA reductase inhibitor it has been used in the treatment of hyperlipidemia. Simvastatin inhibitors and one of the most prevalently used HMG-CoA reductase inhibitors, however also had side effects such as[5]. Recently, cholesterol treatment using herbal medicines is very popular because it minimizes the effects of

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using chemical drugs. The compounds contained in several types of plants that have been studied show that their secondary metabolites can be used to reduce cholesterol levels in the body. For example, secondary metabolites contained in garlic extract include: organosulfur allicin, high sulfur content including allicin, diallyl disulfide (DDS), and diallyl trisulfide (DTS), which is an essential oil and S-allyl cysteine (SAC). , water-soluble amino acids[6], The agent of herbal have antioxidant and antidiabetic effect, also showed favorable effect to hyperlipidemia, as in Trigonella foenum graecum[7 – 11]. The lactuca indica form Indonesia (Humbang Hasundutan) is called as sijukkot. There are founded Phytochemicals are Flavonoids, tannins, saponins, steroids and triterpenoids and have high toxicity[12]. In this study, it was found that the leaves of the sijukkot plant (Lactuca Indica) from Humbang Hasundutan Indonesia had the activity of lowering cholesterol levels in rats induced with high fat. Thus the results of this study can add to the inventory of herbal medicinal plants as antihyperlipidemic activity.

Experimental

Material and Method

Plant Material

The plant of lactuca indica leaves was collected from Humbang Hasundutan Indonesia, This plant was authenticated at Pharmacy Herbarium University of North Sumatra.

Extraction

Samples of Sijukkot (Lactuca indica L) leaves in the form of powder were mesarated as much as 500 grams in glass jars with ethanol solvent for 3 x 24 hours. The maceration process was repeated 3 times and then filtered using Buchner to obtain the filtrate and residue. The obtained filtrate was concentrated using a vacuum rotary evaporator to obtain the extract. The extract obtained was stored in a glass bottle and covered with aluminum foil and stored in the refrigerator to avoid clumping of the extract.

Experimental Animals

The test animal used was albino male Wistar ratt (Rattus Novergicus) aged more than 2-3 months with a body weight of 150 - 200 grams taken from the Pharmacy lab. The test animals were kept in experimental animal cages using plastic cages with the top of the cage covered with strimin wire in such a way that the rats did not escape and a place to eat and drink was provided. The room temperature of the experimental animals was 18ºC-26ºC and the room was well ventilated. They were fed with standard pellet diet and water ad libitum. Adaptation is carried out for 7 days, after that, high-fat feed is given consisting of 30 grams of quail egg yolk, fat for 21 days, then the initial blood cholesterol level was measured. The test animals were divided into 7 treatment groups, each treatment consisted of 4 rats. The 7 treatment groups are:

1. Group K0(+): administered with standard pellet and water ad libitum

2. GroupK0(-): administered rats fed high fat diet and standard diet.

3. Group K+: administered simvastatin 4.5 mg/kg bw. High fat and standard feed.

4. Group K1: administered fed standard, high

fat diet and given ethanol extract of the Sijukkot plant at a dose of 100 mg/Kg body weight.

5. Group K2 administered fed standard, high fat diet and given ethanol extract of Sijukkot plant at a dose of 200 mg/Kg body weight.

6. Group K3 administered fed standard, high fat diet and given ethanol extract of Sijukkot plant at a dose of 300 mg/Kg body weight.

7. Group K4 administered fed standard, high fat diet and given ethanol extract of Sijukkot plant at a dose of 400 mg/Kg body weight.

The dose of simvastatin in humans is 50 mg, then the converted dose in white rats is 50 x 0.018 = 4.5 mg/Kg body weight (0.018 is a conversion factor for humans to mice). The dose of simvastatin to be used is calculated based on the average body weight of the test animals. Administration of simvastatin via intraoral[13]. During 21 days of treatment, 7 groups of rats were still given food and drink. On day 21, all rats were measured for cholesterol, TG, HDL and LDL levels. Blood cholesterol levels were measured using a monotest reagent and measured using a UV-VIS spectrophotometer. The mean differences of each group were statistically analyzed using Anova One Way using SPSS For Windows software. Test was used to analyze the effect of different doses of drugs when compared to control, with the help of Graph Pad Instat software, $P<0.05$ is considered as significant. At the end of the experimental period, the animals were fasted overnight, blood was collected by cardiac puncture and serum was analyzed for Cholesterol, TG, HDL dan LDL.

Results

(Table 1) The results of the initial cholesterol level measurements in rats showed normal cholesterol levels in rats, namely the measurement of initial cholesterol levels by taking rat blood from the tail and then using the GCU tool. The results of cholesterol measurements of rats after being given high fat for 21 days showed that wistar rats became hyperlipidemic with levels of 81.5 ± 1,291 this can be seen for normal cholesterol levels of 10 – 54 mg/dl, LDL 2 – 27 mg/dl[13]. The use of simvastatin induction during treatment showed normal cholesterol levels despite being given a high-fat diet. For K1 and K2, K3, and K4 treatments, it was seen that cholesterol levels were decreasing or the administration of ethanol extract from sijukkot leaves had a positive effect.

Table 1. The effect of giving ethanol extract of sijukkot leaves to rats fed high fat.

No	Groups	Cholesterol (mg/dl)	TG (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
1	K0(+)	54.5±1.291	35±0.000	38.5±1.732	9±1.633
2	K0(-)	81.5±1.291	74±0.816	31.25±2.062	35.45±1.159
3	K+	53±2.160	35.5±0.577	39±2.000	6.9±3.368
4	K1	75±4.243	70.75±0.957	39.25±1.708	21.6±2.718
5	K2	62.75±1.708	65.75±0.500	40.25±0.500	9.35±1.370
6	K3	61±1.414	38±4.690	40.25±0.500	13.15±1.692
7	K4	55.25±0.957	36.25±1.258	40.5±1.000	7.5±1.793

(Figure 1)The graph shows that with the administration of high fat, the highest cholesterol level was seen, hyperlipidemia occurred in rats, in rats given high fat and simvastatin it looked normal, and in the treatment given ethanol extract from sijukkot leaves it was seen that the greater the concentration of the extract had a positive effect on cholesterol levels. With the analysis obtained that the Shapiro-Wilk Normality Test with a sig value > 0.05, the data is normally distributed. The results of the analysis in the Test of Homogeneity of Variances table obtained a Sig value of 0.510. Thus cholesterol has a value of Sig = 0.510 > 0.05; HDL 0.01<0.05 and LDL 0.257>0.05. Lactuca indica originating from Sumatra Indonesia also has antioxidant activity as the species lactuca inermis, Lactuca sativa L Extract from Lactuca indica L from Korea which has previously been studied, it was found that the plant has good antioxidant activity[14-17]. As well as the results of this study, lactuca indica from Indonesia (Humbang Hasundutan) has been found to have ethanolic extract from leaves that have antihyperlipidemic activity, thereby increasing the inventory of medicinal plants.

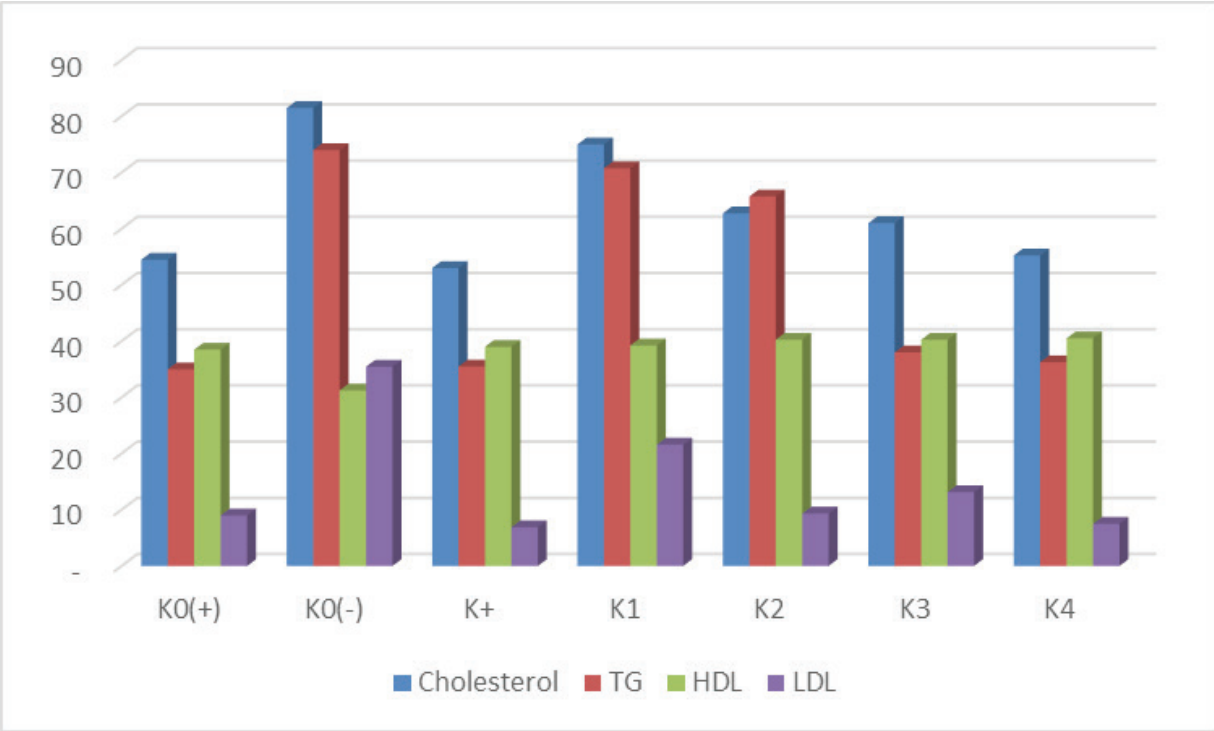

Figure 1. Chart of Cholesterol, TG, HDL and LDL cholesterol in wistar rats (Norvegicus rattus) given ethanol extract of sijukkot leaves (lactuca Indica)

Discussion

Diseases caused by an increase in cholesterol are called hyperlipidemia, the use of lowering cholesterol can be done by using drugs. Utilization of chemical drugs such as simvastatin is very effective to lower cholesterol levels, this can be seen in the K+ group in wistar rats fed standard, high fat and simvastatin diets that have normal cholesterol levels, whereas in rats fed standard and high fat K0(-) diets, they have hyperlipidemia. However,

long-term use of drugs such as simvastatin has side effects such as neurology, tremors, dizziness, vertigo, memory loss, accelerating cataracts, and hypertension[18]. Therefore, the use of plants for the treatment of diseases caused by elevated cholesterol is widely preferred by utilizing herbal plants[19].

Secondary effects of diabetes mellitus have been studied in the presence of cholesterol disease, therefore, the agent having some antioxidant and antidiabetic effect also showed favorable effect to hyperlipidemia. HMG-CoA reductase inhibitors[20]. Various plants that have antioxidant and anti-diabetic activity also have cholesterol-lowering activity[21-24]. Giving ethanol extract to 400 mg/kg BW K4 wistar rats can control cholesterol levels, with HDL being quite good, LDL and TG also normal. While feeding high fat can make cholesterol rise in rats.

Conclusion

Giving high fat to rats fed standard diet can increase cholesterol levels so that they experience hyperlipidemia, administration of ethanol extract of sijukkot leaves (lactuca indica) from Sumatra (Humbang Hasundutan) has a positive effect on cholesterol, TG, HDL and LDL levels. Secondary metabolites that have antioxidant and antidiabetic activity have also been found to have cholesterol-lowering or cholesterol-neutralizing activity[25]. *Lactuca indica* originating from Indonesia (Humbang Hasundutan) was found to have potential as an herbal medicinal ingredient as an antihyperlipidemia

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of head of medan state university research institute with a contract **0020/UN33.8/PL-PNBP/2021.**

Conflict of Interest: Non

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Reference

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