Hypolipidemic of ethanolic extract of Salam bark (Syzygium polyanthum (Wight) Walp.) from Indonesia (Preclinical study)

Em Sutrisna*, Yoga Nuswantoro, Robbi Fatqurahman Said

INTRODUCTION

Cardiovascular disease is the number one cause of death in the world. Cardiovascular disease is caused by impaired heart function and blood vessels.[1] Dyslipidemia (hyperlipidemia) is the strong factor for cardiovascular disease.[2-4] Hyperlipidemia is characterized by increased levels of total cholesterol, triglycerides, decreased high-density lipoprotein (HDL), increased apolipoprotein B, as well as an increase in very low-density lipoprotein (VLDL) and LDL.[5] Statins, a class of drugs used to treat dyslipidemia, have serious side effects such as myotoxicity[6] and hepatotoxicity.[7]

Indonesia is a country with a lot of medicinal plants for traditional medicine. One of the plants used for traditional medicine is Salam bark (Syzygium polyanthum (Wight) Walp.).[8] Indonesian people use this plant to treat hypercholesterolemia. Some compounds in the leaves, such as flavonoids, quercetin, and Vitamin B3 (niacin), were alleged to reduced total cholesterol, LDL cholesterol, HDL, and blood triglyceride.[9]

Aim

This study aims to evaluate the effect of 70% ethanol extract of Salam bark (Syzygium polyanthum (Wight) Walp.) (EESB) from Indonesia toward blood cholesterol, triglyceride, low-density lipoprotein (LDL), and high-density lipoprotein (HDL) levels in male rats Wistar strain.

MATERIALS AND METHODS

This study was preclinical experimental study by pre- and post-test with control group design. This research was conducted in the laboratory of Pharmacology of Faculty of Medicine, Universitas Muhammadiyah Surakarta. This study was done in October 2016. The subject of this research was 25 male rats (Rattus norvegicus), Wistar strain, weighing 190–210 g and 2–3 months old.

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old. *R. norvegicus* Wistar strain was obtained from the Laboratory of Pharmacology, University of Muhammadiyah Surakarta. All rats were fed pellets *ad libitum* and high-fat diet. *Salam* plant was harvested from Sukoharjo, Central Java, on October 2016.

Rats were divided into five groups with simple random sampling. The negative control group was treated by distilled water (Group 1). The positive control group was treated by simvastatin at dose 0.2 mg/200 g bw/day (Group 2). Group 3, 4, and 5 were treated by *Salam* bark extract at dose of 0.36, 0.72, and 1.44 g/200 g bw/day, respectively. All groups were held on 15 days.

On the 1st day, blood cholesterol, triglyceride, LDL, and HDL level of all rats were measured at the initial referral. The next day, all rats were fed by high-fat diet and induced by Triton X-100. 3 days later, the blood cholesterol, triglycerides, LDL, and HDL were remeasured. All groups were treated for 15 days and then the blood cholesterol, triglycerides, LDL, and HDL levels were remeasured on the 5th day.

The difference of blood cholesterol and triglyceride between groups was analyzed by Kruskal–Wallis followed by Mann–Whitney test, meanwhile, the difference of LDL and HDL between groups was analyzed by one-way ANOVA followed least significant difference test. All protocol was approved to Health Research Ethics Committee of Faculty of Medicine of Universitas Muhammadiyah Surakarta, Indonesia, with no: 434/A1/KEPK-FK UMS/XI/2016.

**RESULTS**

On day 0, all rats were weighed. The results of body weight can be seen in Table 1.

The Effects of *Salam* Bark Extract in Blood Cholesterol and Triglycerides Levels

In this study, the treatment was performed for 15 days. The blood cholesterol levels on day 15 can be seen in Table 2.

The effect of EESB toward blood triglyceride, LDL, and HDL levels in rats Wistar strain can be seen in Tables 3-5.

**DISCUSSION**

This study in line with Prahastuti et al. research. They found that *S. polyanthum* (wight) walp decreased blood total cholesterol level in dyslipidemia model wistar rats.[10] The mechanism of action of EESB is not clear. *S. polyantha* was suggested contains flavonoid, tannin,[11-13] quercetin,[14] saponin,[15] triterpenoid, sesquisterpen, laktion, fenol, minyak atsiri,[12] Vitamin A, B3 (niacin), C, and E.[16]

Flavonoid and tannin act as free radical scavenger. Flavonoid inhibits LDL oxidation.[17,18] In preclinical study, tannin reduces cholesterol by inhibiting cholesterol absorption in intestinal.[19,20] Tannin and saponin can increase the synthesis of bile acids. The production of bile acids requires cholesterol as the raw materials. This will decrease the blood

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<th>Table 1: The mean of rats body weight on day 0</th>
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EESB: Ethanolic extract of *Salam* bark. SD: Standard deviation

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<th>Table 2: The blood cholesterol levels on day 4 and 15 (mg/dL)</th>
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*#difference significantly with positive control (P<0.05) by Mann–Whitney test. *difference significantly with negative control (P<0.05) by Mann–Whitney test.

SD: Standard deviation, EESB: Ethanolic extract of *Salam* bark

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<th>Table 3: The blood triglyceride levels on day 4 and 15 (mg/dL)</th>
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SD: Standard deviation, EESB: Ethanolic extract of *Salam* bark
chylomicron cholesterol level. Several research in animal models stated that saponin inhibits cholesterol absorption in intestine resulting in lowering plasma cholesterol level. Quercetin can decrease total cholesterol and LDL cholesterol levels by inhibiting the secretion of Apo-B 100 on cell CaCO₃ and decreasing the activity of microsomal triglyceride transfer protein which is the materials of lipoproteins formation. Quercetin also inhibits HMG CoA reductase activity and oxidation of LDL.

Several research found that saponin can decrease total cholesterol, triglyceride, LDL cholesterol, and increase HDL cholesterol. The suspected mechanism of this effect by lipase inhibition, stimulation activity of superoxide dismutase, and improved lipid peroxidation.

Limitation
To increase the power of statistic, it is needed more sample size.

CONCLUSION
The 70% ethanol extract of Salam bark (S. polyanthum) can decrease blood cholesterol, triglycerides, LDL, and increase HDL levels in male rats Wistar strain.

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REFERENCES


