Phytochemical Screening Of Ethanol Extract Of Temu Kunci (*Boesenbergia Rotunda* (L.) Mansf) Rhizome Extract And Testing Of Bilirubin Levels In Male White Mice

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Abstract.

Liver Disease Is A Deadly Disease That Has Attacked Many People. Liver Disease Is A Disease That Occurs As A Result Of An Unhealthy Lifestyle. Usually, The Patient Will Consume Drugs With Chemical Compounds To Overcome The Problem Of This Disease. The Long-Term Use Of Chemical Drugs Will Certainly Cause Side Effects Or, Even Worse, Cause New Diseases. Therefore, The Latest Treatment Methods Must Be Developed To Minimize Side Effects, Namely The Use Of Traditional Medicines. The Purpose Of This Study Was To Determine The Use Of Temu Kunci Rhizome As An Alternative To Reduce Total Bilirubin Levels In Rats As Experimental Animals. This Study Used Rats As Experimental Animals, Which Were Divided Into 6 Test Groups, Namely Group 1 Without Treatment, Group 2 With 0.5% CMC Suspension, Group 3 With 200 Mg Acetylcysteine, Group 4 With 250 Mg/Kg BW Ethanol Extract Of Temukunci, Group 5 Treated With A 500 Mg/Kg BW Dose Of Ethanol Extract Of Temukunci, And Group 6 With A 750 Mg/Kg BW Ethanol Extract Of Temukunci. From The Results Of The Research Conducted, The Ethanol Extract Of Temu Kunci At A Dose Of 750 Mg/Kg BW Was The Best Treatment For Reducing Total Bilirubin Levels In Rats As Experimental Animals.

Keywords: *Extract Of Temukunci, Total Bilirubin And N-Acetyl-P-Aminophenol.*

I. INTRODUCTION

One of the leading causes of death in Indonesia is liver disease. Due to peoples' poor lifestyles, disorganized, irregular eating habits, and excessive fast food intake, this disease is among the most prevalent [1]. Chemical medications, which typically have negative effects if used for a prolonged period of time, are typically utilized to treat this disorder [2]. Excessive drug use raises the body's free radical concentration, which in turn causes oxidative stress in various organs, particularly the liver [3]. Traditional medicine is still being used more frequently and is advancing quickly in society. This is backed by a number of elements and problems that are currently emerging in the shape of a return to nature mindset [4].

Based on experience, empirical data, and further scientific information from preclinical and clinical research, the usage of traditional medicine varies by location and is typically passed down through the family [5]. The rhizome of Temu Kunci is one of the plants that is frequently utilized as a treatment. The essential oils and flavonoid chemicals found in B. rotunda's rhizome have demonstrated a range of intriguing pharmacological activities, including antifungal, antibacterial, antioxidant, and more [6]. he ethanol-based extract of Temu Kunci's rhizome demonstrated hepatoprotective efficacy in a test that prevented the progression of thioacetamide-induced liver cirrhosis in rats. The capacity of this natural extract to protect the liver in particular by halting the cycle of harmful [7].Based on the background above, the development of traditional medicine for cirrhosis of the liver needs further research on the value of bilirubin levels in rats as experimental animals.

II. METHODS

Tools and Materials

Tools

The tools used in this study were laboratory glassware, knife (Cutter), blender (Miyako), rotary evaporator (Sigma-Aldrich, USA), evaporating cup, oven (Memmert), desiccator, coarse balance (Home

Line).), electric balance (Boeco), microplate reader, oral sonde, surgical instruments, microtube, centrifuge set, mortar and stamper, 1 mL syringe, 3 mL syringe, volumetric flask (iwaki), beaker glass (pyrex).

Material

The materials used in this study were the rhizome of the key root, 96% ethanol, CMC-Na, N-acetyl-p-aminophenol (APAP) (Sigma-Aldrich, USA), acetylcysteine, chloroform, normal saline, xylol, alcohol 96 %, aquadest, hematoxylin, alcohol acid 1%, eosin 1%, chloroform, N - hexan.

Sampel Processing

Fresh Temu kunci rhizome samples were cleaned of impurities, rinsed, and then drained. Additionally, the rhizomes were separated, and the moist weight was calculated. They were then weighed again as dry weight after being dried in a drying closet until they were dry (as seen by the readily broken rhizomes). The simplicia powder was then mixed and its weight was calculated. The simplicia powder is placed in a labeled plastic bag and kept at room temperature [5]

Extract Manufacturing

Using the maceration technique, which involves submerging simplicia in a suitable solvent, extracts are created. Simplicia from the rhizome of temu kunci was macerated for two days in 96% ethanol after being immersed in the solvent for five days. Using a rotary evaporator, the combined filtrates 1 and 2 are concentrated until they are thick [8].

2.4 Phytochemical Screening

Phytochemical screening was carried out on simplicia and ethanol extracts of temu kunci leaves, including alkaloids examination, glycoside examination, saponin examination, flavonoida examination, tannin examination, and steroid/triterpenoid examination [9].

Alkaloid Identification

Simplicia powder was combined with 2N HCL and distilled water, boiled over a water bath, and filtered. The filtrate was then taken three times and placed in a test tube with equal amounts of each of the reactants Mayer, Dragendroff, and Bouchardat. If a precipitate forms in two of the three reagents, the presence of alkaloids is deemed positive [10].

Saponnin Identification

The simplicia powder was put in a test tube with hot water added, shaken vigorously for 10 seconds, and then good foam was formed for not less than 10 minutes as high as 1–10 cm and was not lost by the addition of 2N HCl [11].

Tannin Identification

For 15 minutes, distilled water was macerated with the simplicia powder before being filtered. Two drops of a 10% FeCl3 solution were added after the filtrate had been diluted until it was colorless. If the filtrate included blue and green hues, it was considered to be tannin-positiveb [12].

Flavonoid Identification

Hot water is used to dissolve simplisia powder before it is cooked and immediately filtered. Magnesium powder, concentrated HCl solution, and mil alcohol are combined with the filtrate. If the amyl alcohol layer is red or orange-yellow in hue, it is thought to contain flavonoids [13].

Steroid/triterpenoid Identification

Simplicia powder was filtered after being macerated with an N-hexane solution. The filter is evaporated, and the remaining amount is added through the cup wall with Liebermann-Burchad reagent. If a red color changes to a blue-green hue, it is said to be positive for triterpenoids or steroids. [14], [15].

Glycoside Identification

The simplicia powder was dissolved in ethanol solvent, evaporated in anhydrous acetic acid, and then introduced slowly through the test tube wall along with a small quantity of concentrated H_2SO_4. When the filtrate turns blue or green, it is said to be positive for glycosides. [16].

Preparation of Experimental Animals

24 healthy male white rats weighing between 200 until 240 g were used in this study. Based on the Frederer formula, the number of test animals employed in this investigation was determined. The test

animals were acclimated for a week (7 days) prior to the experiment while still getting pelleted food and enough water [17]

Preparation of Temu Kunci Rhizome Extract Suspension

The Temu Kunci rhizome's ethanol extract was suspended in the following manner: up to 250 mg of the ethanol extract was placed in the mortar and dripped with a small amount of tween-20. Then, after grinding it until it was homogeneous and adding a 0.5% CMC-Na suspension little by bit, I transferred it to a 10 mL volumetric flask. 0.5% CMC-Na was used to add volume up to the mark line. The 500 and 750 mg/KgBB BW and 500 and 750 mg/KgBB ethanol extract suspensions were made using the same method [18].

Preparation of N-acetyl-p-aminophenol Suspension (APAP)

Suspensi APAP dibuat dengan cara 800 mg serbuk murni parasetamol yang telah ditimbang kemudian disuspensikan CMC-Na 0,5% sedikit demi sedikit, kemudian masukkan dalam labu ukur 10 mL, cukupkan volume CMC-Na 0,5% hingga 10 mL. Kemudian dihomogenkan [19]

Test Group Design

A total of 24 male white rats were divided into six treatment groups, each consisting of four male white rats.

Group 1: normal control, no treatment

Group 2: negative control, given 0.5% CMC-Na suspension

Group 3: positive control, given a human dose of 200 mg of acetylcysteine equivalent suspension

Group 4: test treatment 1 ethanol extract of 250 mg/kg BB dose of temu kunci rhizome

Group 5: test treatment 2 ethanol extracts of 500 mg/kg BB dose of temu kunci rhizome

Group 6: test treatment of 3 ethanol extracts of the rhizome of temu kunci with a dose of 750 mg/kg BW

Each therapy was administered once daily for ten days straight, and on the tenth day, it was initiated orally with APAP at 800 mg/kg BB one hour after the suspension of the preparation was administered. Animals used in experiments are still fed and watered. On the eleventh day, 16 hours following APAP treatment, the rats were anesthetized with chloroform before being killed. After that, the rat was operated on, and blood was drawn from its heart using a syringe. The liver was also removed and placed in a pot with formalin buffer after the blood was placed into a microtube and the serum was separated by centrifugation at 1500 rpm for 15 minutes.

III. RESULT AND DISCUSSION

3.1 Results of Ethanol Extract and Phytochemical Screening of Temu Kunci

In this investigation, the solvent was 96% ethanol and the extraction method was maceration. The main root's rhizome is extracted using ethanol, creating a thick extract that is weighed to quantify the yield percentage and subjected to an organoleptic evaluation to ascertain its physical characteristics [17].

Table 1 provides information on the findings of the organoleptic examination, and Table 2 provides information on the percent yield of the ethanol extract produced.

Table 1. Characteristics of ethanol extract of temu Kunci

Bentuk	Warna	Bau	Rasa
ethanol extract of temu Kunci	Brick Red	Khas	Bitter

Table 2. Yield of ethanol extract of temu kunci rhizome extract

Simplicia Powder Weight	Ethanol Extract Weight	% Yield
500 g	52 g	10,4%

With a yield percentage of 10.4%, the viscous extract made from 500 g of simplicia powder is 52 g. The operation is carried out more effectively the higher the percentage yield of 78. This is due to the fact that the sample's high yield value explains the presence of numerous components of the bioactive chemicals [20].

3.1 Results of Phytochemical Screening of Temu Kunci Rhizome Ethanol Extract

The initial step in detecting chemical compounds in plants is phytochemical screening, which aims to give a general overview of the chemical component groups present in the analyzed plants [3]. Table 3 displays the findings of the phytochemical analysis performed on the fingerroot rhizome ethanol extract.

Table 3. Results of phytochemical screening of ethanol extract of temu Kunci

Metabolic compounds	Result
Alkaloids	Positive
Flavonoids	Positive
Tannins	Positive
Saponins	Positive
Steroids/ Triterpenoids	Positive
Glycosides	Positive

The type of chemical components found in the ethanol extract of the rhizome of the rhizome can be identified based on the findings of the phytochemical screening shown in Table 3. These findings indicate that a group of alkaloid chemicals included in the ethanol extract of the rhizome of the rhizome have been tested and found to be positive using the Meyer, Bouchardat, and Dragendorf reagents. On the other hand, as shown by positive reactions in each reagent, 80% of the ethanol extract of the Temu Kunci rhizome was also positive for the classes of flavonoids, triterpenoids, tannins, glycosides, and saponins. Flavonoids, saponins, and tannins are only a few of the polyphenolic substances found in Temu Kunci's rhizome [21]. These compounds have properties as antioxidants [5], [22]. So that these secondary metabolites can be used to prevent oxidative stress and as a hepatoprotective agent [23].

3.2 Measurement of Total Bilirubin in Rat Serum

The results of the one-way ANOVA analysis of rat blood serum total bilirubin obtained a significance value = 0.001 (p <0.05) between the treatment groups, these results indicated that there was an average difference in total bilirubin levels in rat blood serum between treatment groups. The average measurement of total bilirubin levels in rat blood serum can be seen in Table 4.

Table 4. The results of measuring the average TB in rat blood serum

Treatment group	Result
Normal Control (P1)	0,1425 ± 0,02630 [a]
APAP (P2)	0,2450 ± 0,01291 [b]
Asetilsistein + APAP (P3)	0,1675 ± 0,02754 [a]
Ethanol extract dose 250 mg/KgBW + APAP (P4)	0,1675 ± 0,02754 [a]
Ethanol extract dose 500 mg/KgBW + APAP (P5)	0,1500 ± 0,0182 [a]
Ethanol extract dose 750 mg/KgBW + APAP (P6)	0,1825 ± 0,01708[a]

Information :

a = significantly different from the negative control group ($p < 0,05$)

b = significantly different from the normal control group ($p < 0,05$)

The average level of total bilirubin in the healthy (normal) control group was 0.1425 ± 0.02630 mol/L. This number represents the level of total bilirubin in healthy (normal) rats. The findings of the statistical tests revealed that the normal control group's total bilirubin levels were lower than those of other treatment groups that had received APAP 800 mg/kg BW. The average total bilirubin level in the positive control group (acetylcysteine 200 mg) was 0.1675 0.02754 mol/L, while the average total bilirubin level in the negative control group (APAP 800 mg/kg BW) was the highest at 0.2450 ± 0.01291 mol/L. This demonstrates that APAP administration can cause liver damage and increase total bilirubin levels. High total bilirubin levels in the blood serum can cause indicate the occurrence of cell damage in the liver. Increased bilirubin activity in blood serum is a sensitive sign of liver damage since the severity of the liver damage itself might influence the elevated level of total bilirubin in serum. Due to alterations in membrane permeability brought on by oxidative stress and inflammation in the liver, total bilirubin that escapes from the liver cells will then reach the circulatory system [24].Based on the advanced statistical analysis of Turkey Post-Hoc, it can be seen that the differences are more specific between the treatment groups; the normal control group and the negative control (APAP 800 mg/kg BW) are significantly different with a significance value of 0.001 (p > 0.05), and the negative control group Compared to the positive control group (200 mg acetylcysteine) and the ethanol extract treatment group of 250 mg/kg BW and 500 mg/kg BW, there was a significant difference in the decrease in total bilirubin levels when compared to the negative control, with a significance value of each = 0.001 (p > 0.05).

Whereas at the dose of ethanol extract of the rhizome of temu Kunci, 750 mg/kg BW, significance = 0.010 (p >0.05), there was still a significant difference in the decrease in total bilirubin levels when compared to the negative control. The normal control group when compared to the positive control group (acetylcysteine 200 mg) obtained a significance value of 0.620 (p> 0.05), and if the normal group was compared to the treatment group, the ethanol extract of the rhizome temu kunci at doses of 250, 500, and 750 mg/kg BB obtained significance values of 0.620, 0.997, and 0.167 (p > 0.05). A significance value (p> 0.05) explained that there was no significant difference in the average total bilirubin level. The positive control group (200 mg acetylcysteine) when compared to the treatment group of 250, 500, and 750 mg/kg BW of the ethanol extract of fingerroot rhizome extract had respective significance values of 1.000, 0.872, and 0.928 (p > 0.05). The results of the analysis showed that there was no significant difference in mean total bilirubin levels. Administration of ethanol extract of the rhizome for 10 days prior to induction with APAP was shown to reduce the average total bilirubin level in the ethanol extract group of the rhizome rhizome extract at a dose of 250 mg/kg BW (0.1675 ± 0.02754 mol/L), the 500 mg/kg BW dose of ethanol rhizome of fingerroot rhizome (0.1500 ± 0.01826 mol/L), and the ethanol extract of the rhizome temu kunci dose of 750 mg/kg BW (0.1825 ± 0.01708 mol/L) compared to the control group negative (AP 800 mg/kg BW) which has the highest average value of total bilirubin.This shows that the ethanol extract of the rhizome of temu Kunci can stabilize cell permeability and increase the capacity of endogenous antioxidants in the body so that, in the end, it can reduce total bilirubin levels in rat blood serum, although it has not reached the average levels as in the normal control group [25]. The graph of the effect of the treatment group on total bilirubin levels can be seen in Figure 1.

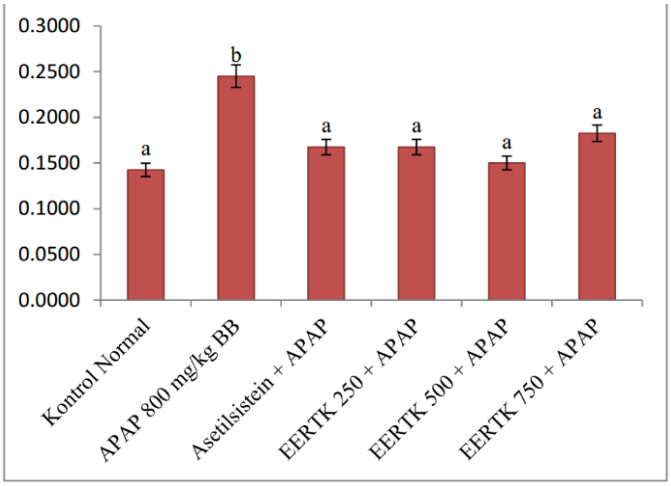

Fig 1.Graph of measurement of total bilirubin values

Based on the graphical images, the statistical results also revealed that the dose of 250 mg/BW of the ethanol extract of the rhizome of Intersection could reduce the average total bilirubin level. 500 mg/kg BW. Meanwhile, at a dose of 750 mg/kgBW, the decrease in total bilirubin levels was almost equivalent to the dose of 250 mg/kgBW of the ethanol extract of temu kunci. The use of 200 mg of acetylcysteine as a positive control was shown to reduce the average total bilirubin level to almost the same value as the ethanol extract of 250 and 750 mg/kgBW of the rhizome of the temu Kunci dose 500 mg/kgBW, the ethanol extract of the rhizome of Temu Kunci at a dose of 500 mg/kgBW still resulted in a better average decrease in total bilirubin levels. Serum bilirubin is one of the most common biomarkers and the most sensitive for diagnosing liver disorders [26]. Hemoglobin is chemically broken down into bilirubin, which combines with glucuronic acid in hepatocytes to make it more water soluble. Chemical liver injury has been assessed using total bilirubin [1]. In addition to performing other routine tasks, the liver secretes bilirubin, a byproduct of hemoglobin breakdown, into bile [27]. The release of bilirubin from the liver cytosol into the circulation as a result of alterations in the permeability of the liver cell membrane as a result of injury to the hepatocytes was the primary cause of the rise in total blood serum bilirubin levels in rats given APAP [28].

IV. CONCLUSION

Oral administration of the ethanol extract of the rhizome of the keynote rhizome can reduce total bilirubin (TB) levels in male white rats induced by APAP.

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