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ANTILITHIASIS EFFECTIVENESS TEST OF ETHANOL EXTRACT OF ALANG-ALANG (*Imperata cylindrica* (L.) Beauv) ON WHITE RATS (*Rattus novergicus)*

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Abstract

The purpose of this study was to determine the antilithiation effectiveness of alang-alang extract in white rats by looking at the histology of the rat kidney. The study design, the treatment group was divided into 5 groups. Control group (P0), ethylene glycol group (P1), Hydrochlorothiazide treatment group (P2), alang-alang extract group at a dose of 100 mg/kgBW (P3), and alang-lang extract group at a dose of 200 mg/kgBW (P4). The results showed that alang-alang extract had activity in repairing the kidneys of white rats with urolithiasis. And the alang-alang extract dose of 200 mg/kgBW has better effectiveness.

Key words: *Imperata cylindrica*, *Reeds, Antilithiasis, White rats*

INTRODUCTION

Kidneys in the body function as filters to clean blood or other fluids. This function is intended so that the chemicals contained in the blood or other body fluids are not carried back by the blood and circulated throughout the body. Some of these filtered impurities will be excreted through the kidneys with urine and some may be left behind and settle into kidney stones. If these deposits are not removed, they will remain in the kidneys or move to the bladder, a fluid resembling plasma which is filtered through the walls of the glomerular capillaries into the renal tubules in the kidneys. The journey of fluid content along the renal tubules, the fluid content of the filtrate will decrease and its composition will change due to the tubular reabsorption process and the tubular secretion process to form urine which will be channeled into the renal pelvis (Ganong W, 1995).

One of the plants that is often used is reeds. The existence of the reeds, which are considered as a nuisance, causes the existence of the reeds to be unwanted by the community, so that the reeds are always exterminated. In fact, after doing a lot of research, it turns out that reeds have many benefits. Reeds are often used to treat internal heat. Based on research, reeds contain chemicals that can provide health benefits such as giving a diuretic effect (smoothing urine disposal), antipyretic (fever reducing and

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containing antioxidants that can ward off free radicals (Dalimartha, 2006). that the roots of alang-alang contain mannitol, glucose, malic acid, citric acid, coixol, arundoin, cylindrin, fernerol, simiarenol, anemonin, esin, alkali, saponins, tannins, and polyphenols (Mursito, 2000). Until now, kidney stones have not been widely carried out.Therefore, it is necessary to conduct research on the effectiveness of Imperata as antilithiasis using white rats (*Rattus norvegicus*).

MATERIALS AND METHODS

Research Time and Place

This research will be conducted at Trinita University Pharmacy Laboratory . This research will be carried out for 4 months

Model animal

This study used animal models of white rats (*Rattus norvegicus*) with a weight of approximately 150-200 g, as many as 20 individuals. Feeding and drinking water is provided ad libitum. The rats were kept in plastic cages measuring 25 X 40 cm with individual wire covers. Before the treatment was carried out, the rats were adapted for 7 days.

Medicinal plants: Medicinal plants used as antilithiasis are reeds.

Research design

The rats were divided into 4 treatment groups in which each treatment consisted of 5 tails as follows:

Group I : Control Group (P0)

Group II : Treatment group (inducer lithiasis) with ethylene glycol (P1)

Group III : Hydrochlorothiazide (P2) kidney drug treatment group

Group IV : Treatment group with ethylene glycol + ethanol extract of alang-alang 100 mg/kg BW (P3)

Group V : Treatment group with ethylene glycol (14 days) + ethanol extract of alang-alang 200 mg/kg BW (P4)

Research procedure

Making simplicia: The samples of reeds obtained were dried by aerating then blended into powder and stored in a clean and tightly closed container.

Preparation of ethanol extract: Extraction of reeds is done by adding ethanol into alang-alang powder with a ratio of the amount of solvent to powder 1: 5. The result of maceration in the form of alang-alang extract is then evaporated using a rotary evaporator, to evaporate the solvent so that the extract is obtained. thick from reeds.

Kidney histopathology test: The abdomen was opened and the kidneys were removed, cleaned from the surrounding tissue and then fixed with Bouin's solution. Subsequently, they were embedded in paraffin, cut with a thickness of 5 m and stained with hematoxylin-eosin (H-E) to see the histopathological changes (Humason, 1967; Raiyan K and Modi , 2011)

Data analysis. To see the histopathological changes, the histological changes were observed through. Parameters observed were: Renal histopathology.

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RESULTS AND DISCUSSION

The histopathological results of the antilithiasis activity of the ethanolic extract of *Imperata cylindrica* (L.) Beauv) in male white rats are presented in Figures 1, 2, 3, 4 and 5. In the control group of mice. and renal tubules were normal. Podocyte cells in the renal corpuscle were seen in normal condition with clearly visible nuclei. The renal capsular space is clearly visible as well as the capillaries found in the glomerulus. In the tubules visible lumen with cells and nuclei intact and clearly visible.

Histopathological picture of rat kidney given 0.75% ethylene glycol induction (Figure 2) showed damage to the renal corpus and renal tubules. The podocyte cells in the renal corpuscle experience atrophy and even lose their nucleus, which is characterized by the cells starting to shrink with a darker color. The same thing was seen in the renal capsule (Bouman) where the capsular epithelial cells atrophied and desquamated. In the renal tubules, in addition to experiencing atrophy, pygnotis and disquamation of epithelial cells, the infiltration of inflammatory cells into the tubular lumen was also seen. The results also showed that the glomerulus and renal tubules contained microcrystal deposits.

Administration of Hydrochlorothiazide in urolithiasis rats (Figure 3) showed an improvement in the glomerulus and tubules towards normal. There was no visible damage to the glomerulus and tubules such as inflammation, infiltration, squamation of epithelial cells and also no crystal deposition as seen in ethylene glycol-induced rat kidney. Administration of ethanolic extract of alang-alang 100 mg/kg BW to urolithiasis rats (Figure 4) has not shown any significant improvement in the renal corpus and renal tubules. There was still visible damage to the glomerulus and tubules such as inflammation, infiltration, squamation of epithelial cells, but no crystal deposits as seen in ethylene glycol-induced rat kidney.

Administration of ethanolic extract of alang-alang 200 mg/kg BW to urolithiasis rats (Figure 5) showed an improvement in the glomerulus and tubules towards normal. There was no visible damage to the glomerulus and tubules such as inflammation, infiltration, squamation of epithelial cells and also no crystal deposition as seen in ethylene glycol-induced rat kidney.

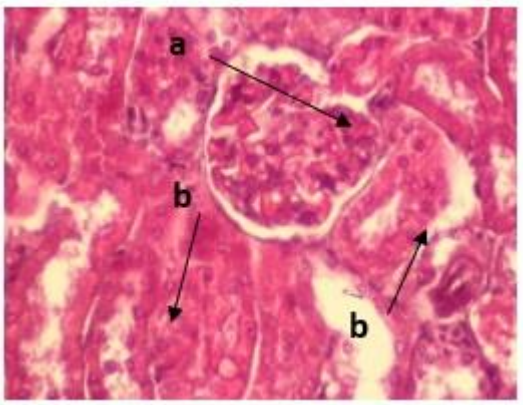

Figure 1. Histology of the control rat kidney with a microscope magnification of 400x, (a) Glomerulus, (b) Tubules

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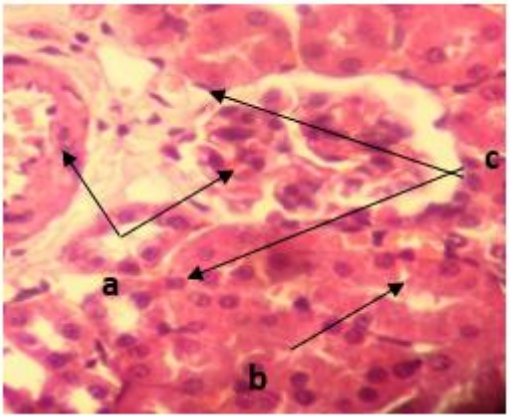

Figure 2. Histology of urolithiasis mice with a microscope magnification of 400x; (a). Glomerulus; (b) Tubules; (c) Microcrystal

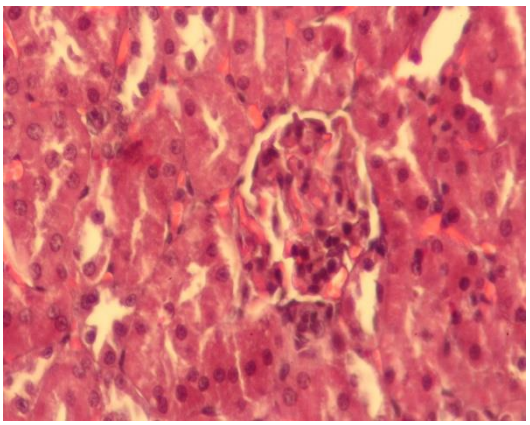

Figure 3. Histology of rat kidney with Hydrochlorothiazide kidney drug with 400x . microscope magnification; (a) Glomerulus; (b) Tubules

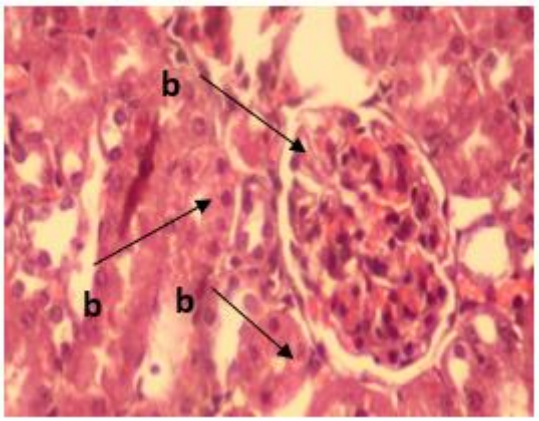

Figure 4. Histology of rat kidney with ethanol extract of alang-alang 100mg/kg BW with a microscope magnification of 400x. (a) Glomerulus; (b) Tubules

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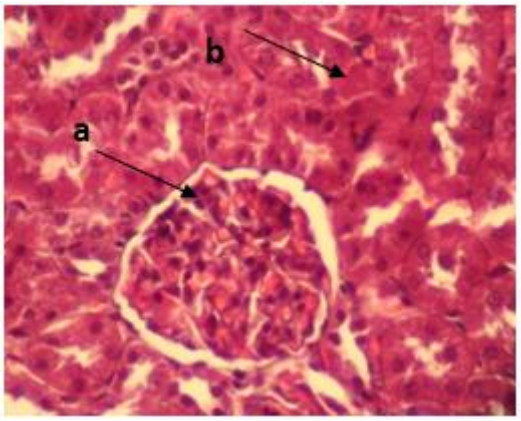

Figure 5. Histology of rat kidney with ethanol extract of alang-alang 200mg/kg BW with a microscope magnification of 400x; (a) Glomerulus; (b) Tubules

In this study, administration of ethylene glycol for 14 days actually caused damage to the glomerulus and renal tubules, which was characterized by the infiltration of inflammatory cells into the tubular lumen. Epithelial cells undergo squamation and even loss of cell nuclei and the presence of microcrystal deposits in the renal tubules. Histological picture of lithiasis rat kidney with ethylene glycol showed atrophy of the glomerulus and crystal deposition (Mekap, SK, *et al* 2011; Schaldt, L, *et al* 1998). The tubules undergo dilatation, degeneration of the epithelial layer and infiltration of inflammatory cells into the interstitial space (Sathish, R. *et al* 2010). Administration of ethylene glycol can cause acute tubular necrosis so that urea levels in blood plasma become higher. The formation of kidney stones in ethylene glycol-treated rats was caused by hyperoxaluria which in turn led to an increase in oxalate retention and excretion (Umesh, 2011).

The administration of ethanolic extract of alang-alang 100 mg/kgBW to urolithiasis rats due to the previous administration of ethylene glycol did not show any improvement towards normal. Histopathological observation showed that there was damage to the glomerulus and tubules even though at this dose there were no longer visible microcrystals. Administration of alang-alang ethanol extract at a dose of 300 mg/kg BW showed a more significant improvement towards normal. There was no visible damage to the glomerulus and tubules such as inflammation, infiltration, squamation of epithelial cells and also no crystal deposition as seen in ethylene glycol-induced rat kidney.

The flavonoid compounds contained in the Imperata plant are thought to play a role in dissolving calcium kidney stones. Imperata contains secondary metabolites of alkaloids, flavonoids, tannins, steroids and triterpenoids. The content of flavonoids can dissolve calcium kidney stones, this is because the hydroxy group (OH) of flavonoid compounds will react with calcium kidney stones to form complex compounds of calcium flavonoids. These compounds are more soluble in water, so the water in the urine will help dissolve and remove calcium through the urination process (Nessa, H.A., *et al* 2013).

The effect of flavonoids as antioxidants indirectly also supports the anti-inflammatory effect of flavonoids. The presence of free radicals can attract various inflammatory mediators (Nijveldt, R. J., *et al*

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2001). Flavonoid compounds that can function as anti-inflammatory are toxifolin, biazilin, phaematoxylin, gossypin, procyanidin, and nepritin. administration of flavonoids can increase the glomerular filtration rate (GFR) (Jouad, H., *et al* 2001). The increase in the glomerular filtration rate in the kidneys will result in the excretion of urea and creatinine also increasing so that the levels of urea and creatinine in the blood decrease. Decreased levels of uric acid in blood serum after treatment with plant extracts showed inhibition of xanthine oxidase activity (Susendi, 2011). That some groups of alkaloids and flavonoids can work as xanthine oxidase inhibitors (Mudrikah, F.2006)

CONCLUSION

The results showed that alang-alang extract had activity in repairing the kidneys of white rats with urolithiasis. And the effective dose is extract with a dose of 200 mg/kgBB.

REFFERENCES

Dalimartha, S. 2006. Atlas tumbuhan obat Indonesia Jilid 4. Puspa swara. Anggota IKAPI Jakarta

Ganong WF. 1995. Buku Ajar Fisiologi Kedokteran. Ed ke-14. Jakarta : Penerbit Buku Kedokteran EGC

Humason, G.L. 1967. Animal tissue technique. W. H. Freeman and Company. San Fransisco

Jouad, H., M.A. Lacaille-Dubois, B.Lyoussi ,M. Eddouks. 2001. Effects of The Flavonoids Extracted from Spergularia purpurea Pers. on Arterial Blood Pressure and Renal Function in Normal and Hypertensive Rats. Journal of Ethnopharmacology. 72 (2) : 159-163

Mekap, S.K., S. Mishra, S. Sahoo and P.K. Panda. 2011. Antiurolithiatic activity of Crataeva magna Lour.bark. Indian J Natural Products and Resourses 2:18-33.

Mudrikah, F.2006. Potensi ekstrak jahe merah (*Zingiberofficinale Rosc*) dan campurannya dengan herba suruhan (*Peperomiapellucida L*) sebagai antihiperurisemia pada tikus.Skripsi. IPB

Mursito, B. 2000. Ramuan Tradisional Untuk Kesehatan Anak. Jakarta: Penebar Swadaya

Nessa Helmi Arifin., dan Husni Muchtar. 2013. Efek Diuretik dan Daya Larut Batu Ginjal dari Ekstrak Etanol Rambut Jagung (*Zea mays*). Prosiding Seminar Nasional Perkembangan Terkini Sains Farmasi dan Klinik III

Sathish, R., K. Natarajan., M.M Nikhad. 2010. Effect of Hygrophila spinosa T. anders on Ethylene Glycol Induced Urolithiasis in Rats. Asian J of Pharmacentical and Clinical Researce. 3:0974-2441

Schaldt, L., Ivens,K.E., Rivhl-Fehlert, E. Bomhard.1998. Subacute oral toxicity of tetraathylele glycol and ethylene glycol administration in winstar rat. J. Experiment Toxicol. Pathol. 50:257-265

Shah, B.N., K.D. Raiyani and D.C. Modi.2011. Antiurolithiasis Activity study of Momordica charantia Linn. Fruits.Int. J. of Pharmacy Res. And Tech. 1:6-11

Susendi. 2011. Aktivitas Antihiperurisemia ekstrak air jinten hitam (Coleusambonicus Lour) pada mencit jantan galur balb-c dan standardisasinya. Majalah Farmasi Indonesia, 22(2), 77 – 84.