Diuretic Activity of Water Melon Rind Extract (*Citrullus vulgaris*) and Its Influence on Sodium and Potassium Levels

Ika Purwidyaningrum*, Iswandi, Joseph Billi

Pharmacy Faculty of Setia Budi University

Received: 10th Mar 18; Revised 1st Apr, 18, Accepted: 8th May, 18; Available Online:25th May, 18

**ABSTRACT**

The purpose of this study was to determine diuretic activity of water melon rind extract (*Citrullus vulgaris*) and its influence on potassium and sodium levels. Crude drug was extracted by maceration method followed by evaporation using rotary evaporator. Male Wistar rats were divided into 5 groups i.e. control group CMC 0.5%, Hydrochlorothiazide (2.25mg/kg bw) and water melon rind extracts with doses of 350 mg/kg bw, 700 mg/kg bw, 1400 mg/kg bw. Rats were placed in metabolic cages. Urine volume was measured for 1 until 5 and to 24 hours. Potassium and sodium levels in urine were determined by using Atomic Absorption Spectrophotometry.

The effective dose of ethanolic water melon rind extract for diuretic activity was 1400 mg/kg bw which could increase the excretion of sodium and potassium in the urine of the male Wistar rats.

**Keywords:** water melon rind (*Citrullus vulgaris*), diuretic, urine volume, potassium total, sodium total.

**INTRODUCTION**

A lot of natural resources as a row material of drug have been increasingly found for safe and fewer side effects. When used appropriately, the use of traditional medicine is considered more secure than synthetic drugs. Recently many developing hypertension treatment from traditional medicine due to side effect of diuretic drug as a hypertension treatment such as hyperuricemia, hyperglycemia, hyperlipidemia, hypokalemia, upset stomach, nausea, vomiting, diarrhea, fatigue, headache. Previous research by Dyah about Securities diuretic Extract Yellow Watermelon seedling (*Citrullus vulgaris*) in Rats Male (*Rattus norvegicus*) indicates that yellow watermelon seedling has the effect of diuretic related to the flavonoid and potassium in all its parts, leather good, fruit and seeds with dose variation extract of 35 mg / 200 g body weight and 70 mg / 200 g body weight and 140 mg / 200 g BW research results, the average total urine volume rats for 16 hours showed a test dose of 140 mg / 200 g BW higher than the test dose of 70 mg / 200 g body weight and test dose of 70 mg / 200 g BW higher than the test dose of 35 mg / 200 g BB, so it can be assumed the greater the dose of extract of yellow watermelon seeds that given the stronger of diuretic activity.

Laboratory tests to determine the levels of sodium (Na+) and potassium (K+) in the urine can be done by AAS method (Atomic Absorption Spectrophotometry). Atomic absorption spectrophotometry high sensitivity (lower detection limit of less than 1ppm), the determination limit of the content area (from ppm to%), the implementation is relatively simple, and little interference.

Diuretics reduced the amount of fluid in the bloodstream therefore some diuretics are used to treat high blood pressure. Urine is a mixture of water with polar compounds that must be removed from the body. If urinary excretion is not smooth from the bladder or kidneys can cause crystallization of substances that should be discarded.

**MATERIALS AND METHOD**

**Materials**

Watermelon rind, nitric acid, potassium, sodium standard, furosemide standard, carboxy methyl cellulose and distilled water.

**Preparation of sample**

Samples, watermelon rind were collected from Surakarta, Center of Java, Indonesia. Samples were thoroughly washed with tap water, sorted while wet, cut, dried at 50°C for five days and ground into powder (40 Mesh).

**Extraction**

Sample was extracted by maceration using 70% ethanol for 5 days and shaking out every day. Liquid extract was filtered and then evaporated using rotary evaporator at 40°C and speed of 20 rpm. So there were watermelon rind extract. The concentrated extracts were used for diuretic activity test, potassium and sodium levels.

**Diuretic activity**

This study used 25 male rats weighing between 130-180 g. The rats were weighed and marked respectively, were randomly divided into 5 groups, each group consisted of 5 rats. Previously rats were fasted for 10 hours. Prior to treatment the rat were given NaCl 0.9%: 5 ml/100 g body weight (bw) (loading dose). Group I was Control CMC 0.5%, group II hydrochlorothiazide 2.25 mg/kg bw, group III watermelon rind extract 350 mg/kg bw (WR 1), group

*Author for Correspondence: ikafarmasiusb@gmail.com*
Immediately after administration sample or standard and vehicle, animals were placed in metabolic cages individually. During this period no water and feed was available to animals. Urine was taken for 1 up to 5 hours and 24 hours. Total concentration of Na\(^+\) and K\(^+\) were measured by Atomic Absorption Spectrophotometry. 

**Statistical analysis**

Data were expressed as mean ± SD (Standard Deviation). Statistical analysis was performed by using one-way analysis of variance (ANOVA) followed by post hoc LSD. Significant differences were set at values less than 0.05.

**RESULT**

**Urinary excretion**

Ethanoic extract of watermelon rind which was given by orally could increase urinary excretion (Fig 1). Study regarding relationship between observation time (hours) against the average volume of urine for 1-5 and 24 hours, revealed that all of extracts sample showed diuretic effect. Watermelon rind extract with dose of 1400 mg/kg bw (WR3) showed the highest diuretic effect, which was comparable with furosemide as control. In Table 1 it could be seen that diuretic activity of all of treated had no significant difference with hydrocholothiazide. Watermelon rind extract with dose of 1400 mg/kg bw (WR3) gave the highest sodium levels which was significantly different compared to control CMC (p<0.05). Table 3 exposed that potassium levels in watermelon rind extracts 1400 mg/kg bw had significant difference with control CMC but not significant different with hydrochlorothiazide.

**DISCUSSION**

The results of urine volume for 1-5 and 24 hours after treated with watermelon rind extracts wer gave as in Fig1, which demonstrated that watermelon rind extract with a dose of 1400 mg/kg bw had the highest urinary
The average volume of urine of rat in control group was 4 ± 3.3 ml and in hydrochlorothiazide group was 7.16 ± 1.3 ml. The extracts expressed higher urine volume than control but less than hydrochlorothiazide. In previous study which was conducted by Purwidyaningrum demonstrated that matoa seed extract with dose of 100 mg/kg bw show the highest diuretic effect (urine volume). In the Table 1 on 24 hour it can be seen that ethanolic watermelon rind extract with dose of 1400 mg/kg bw had diuretic activity (%EUV) which was not significantly different with hydrochlorothiazide (p>0.05) almost the same with hydrochlorothiazide but significantly different to control CMC (p<0.05). Study by Purwidyaningrum exhibited that ethanolic matoa leaves extract from different organs (leaves, peel and seed) had the higher diuretic activity than control, but lower activity than furosemide on 4 hour and it can be concluded that all of organs extract of matoa (leaves, peel and seed) had diuretic activity (except MSE 1).

Table 2 demonstrated the results of potassium levels in urinary excretion. Potassium levels of all of watermelon rind extracts groups were higher than potassium levels in control group. Ethanolic watermelon rind extract with dose of 1400 mg/kg bw had the highest potassium levels. Research by Purwidyaningrum reported that ethanolic matoa leaves extract with dose of 100 mg/kg bw gave the highest sodium levels compared to the other extract and this result was lower than furosemide group.

The results of measurements of sodium levels can be seen in table 3. The lowest potassium level was given by control group and the highest levels for hydrochlorothiazide group. Statistically sodium levels of all of watermelon extract with dose 1400 mg/kg bw was significant different with control group (p<0.05) and not significantly different with hydrochlorothiazide. Previous research of ethanolic matoa leaves extract with dose of 100 mg/kg bw gave the highest sodium levels compared to the other extracts, and this result was lower than furosemide group.

CONCLUSION

The effective dose of ethanolic watermelon rind extract for diuretic effect and gave highest sodium excretion was 1400 mg/kg bw.

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