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Research Article

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

Ika Purwidyaningrum*, Iswandi, Joseph Billi

Pharmacy Faculty of Setia Budi University

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ABSTRACT

The purpose of this study was to determine diuretic activity of water melon rind extract (C*itrullus 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 (C*itrullus 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, hyponatremia, hypokalemia, upset stomach, nausea, vomiting, diarrhea, fatigue, headache[1].

Previous research by Dyah[2] about Securities diuretic Extract Yellow Watermelon seeding (*Citrullus vulgaris*) in Rats Male (*Rattus norvegicus*) indicates that yellow watermelon seeding 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[3].

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[4-5].

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 grinded 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 hydrochlorotiazide 2.25 mg/kg bw, group III watermelon rind extract 350 mg/kg bw (WR 1), group

*Author for Correspondence: ikafarmasiusb@gmail.com

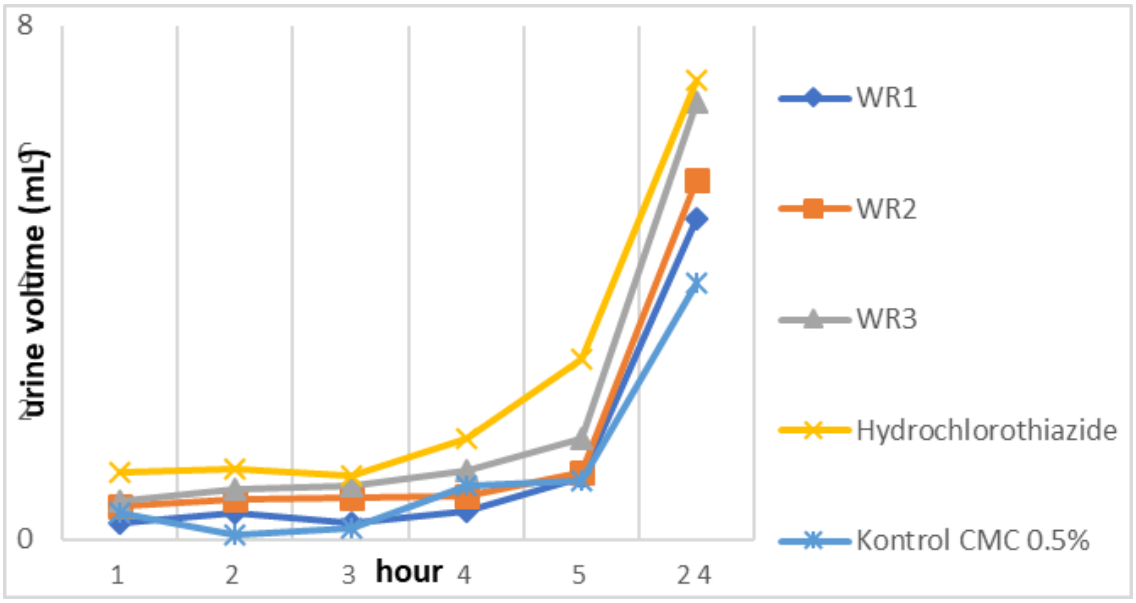

Figure 1: Urinary excretion of different dose extracts of *watermelon* rind.

Table 1: Percent of EUV of watermelon rind extract.

Hour	% excretion urine volume (EUV)				
	Control CMC	Hydrochlorothiazide	WR1	WR2	WR3
1	15.62±23.1	33.82±23.4	9.62±21.5	15.72±19.3	19.86±18.2
2	18.48±22.2[a]	68.6±38.9[b]	23.36±19.8[a]	36.08±19.6	46.6±20.7
3	25.32±22.2[a]	81.6±19.8[b]	32.26±38.8[a]	57.7±35.0	75.96±12.7[b]
4	56.12±29.0[a]	151.7±67.2[b]	47.36±41.6[a]	80.7±56.5[a]	112.78±25.4
5	90.64±50.5[a]	244.1±159.5[b]	80.22±49.3[a]	115.8±81.6[a]	167.26±34.9
24	240.84±174.7[a]	472.9±186.3[b]	253.24±138.4[a]	301.0±103.0	405.14±82.9

a = significantly different compared to hydrochlorothiazide
b = significantly different compared to CMC

Table 2: Average of Potassium total (µg).

No.	Group	Potassium total (µg)
1	WR1	14±7.7[a,b]
2	WR2	10±4.3
3	WR3	22.62±10.1[a,b]
4	Hydrochlorothiazide	4.92±2.4b
5	Control CMC 0.5%	5.02±4.0[a]

a = significantly different compared to hydrochlorothiazide
b = significantly different compared to CMC

IV watermelon rind extract 700 mg/kg bw (WR 2), group V watermelon rind extract 1400 mg/kg bw (WR 3) 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[5-6]. Total concentration of Na^+ and K^+ were measured by Atomic Absorption Spectrophotometry [7].

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

Ethanolic 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 for1- 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 (WR 3) gave the highest sodium levels which was significantly different compared to control CMC ($p<0.05$). Table 3 exposed that potassium levels in water melon rind extracts 1400 mg/kg bw had significant difference with control CMC but not significant different with hydrochlorothiazide.

DISCUSION

The results of urine volume for 1-5 and 24 hours after treated with water melon rind extracts werw given as in Fig1, which demonstrated that water melon rind extract with a dose of 1400 mg/kg bw had the highest urinary

Table 3: Average of sodium total (µg).

No.	Group	Average of sodium total (µg)
1	WR1	4.9±3.49[a]
2	WR2	8.23±3.8[1a]
3	WR3	11.7±3.86[b]
4	Hydrochlorothiazide	13.2±7.34[b]
5	Control CMC 0.5%	3.6±2.88[a]

a = significantly different compared to hydrochlorothiazide

b = significantly different compared to CMC

excretion. 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[8] demonstrated that matoa seed extraxt with dose of 100 mg/kg bw show the highest diuretic effect (urine volume). In the Table 1on 24 hour it can be seen that ethanolic water melon rind extract with dose of 1400 mg/kg bw and 700 mg/kg bw had diuretic activity (%EUV) which was not significantly different to Hydrochlorotiazide ($p>0.05$) almost the same with hydrochlorothiazide but significantly different to control CMC ($p<0.05$). Study by Purwidyaningrum[8] exhibited that ethanolic matoa 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 water melon rind extracts groups were higher than potassium levels in control group. Ethanolic water melon rind extract with dose of 1400 mg/kg bw had the highest potassium levels. Research by Purwidyaningrum [8] reported that ehtanolic matoa leaves extract with dose of 100 mg/kg bw gave the highest sodium levels compare to the other extract and these result was lower than
furosemid 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 hydrochlorotiazide 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[8] 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 water melon rind extract for diuretic effect and gave highest sodium excreation was 1400 mg/kg bw.

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