

Subchronic Toxicity Test of *Sonchus arvensis* Leaves Decoction as Herb Medicine for Bladder Stone Disease on Wistar Rat

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ABSTRACT

The decoction of *Sonchus arvensis* leaves has been proved that has anticalculi activity on male rats. The objective of the research is to evaluate the toxic effect of the decoction with repeated dosages during 90 days on female rats.

Female rat divided into four groups, with each group has 10 rats. All of the groups were administered orally with 2 ml solution. The control group received 2% Arabic gum solution, while the treated groups received decoction with the dosages of 0.65; 1.30 and 2.60 mg/kg body weight respectively. The biochemical parameters of the rat's blood and macropathology organs were measured. All data were analyzed statistically.

The average of GOT, GPT, creatinine clearance, total bilirubin, urea nitrogen, hearts, livers, kidneys, spleens, and ovaries of treated rats are different with control group. All of the result are not statistically significant as $P > 10$.

In conclusion, decoction of *Sonchus arvensis* leaves is relative safe to be given orally in the repeated dosages during 90 days.

Keyword: Decoct, *Sonchus arvensis* L., subchronic toxicity, toxicity test

Introduction

Therapy with the traditional medicine is a heritage for Indonesian people. The potency of plants as drugs is supported by government with the Ministry of Health Regulations, No.760/MENKES/PER/IX/1992 about Phytopharmaca, No.661/MENKES/SK/ VII/1994 about Traditional Medicine.

Bladder stone is a relatively common disease, reported in 2010, a bladder stone with inguinal hernia in Yogyakarta.² The disease can be cured with the various methods, e.g. surgery, extracorporeal shock wave lithotripsy (ESWL),³ and traditional medicine.^{4,5}

One of herbs that used as anticalculi is *Sonchus arvensis* leaves,^{4,5} it's anticalculi activity was proved at the dosage 1.30 mg/kg BW of rat.⁶ Some effects of *Sonchus arvensis* were published, ethanolic extract of sonchi folium can inhibit in vitro Glutation S-transferase (GST) activity of rat's lung, small intestinal, and renal. The inhibition concentration 50 (IC₅₀) values of the ethanolic extract of sonchi folium to GST activity isolated from the liver, lung, small intestinal, and renal of Sparague-Dawley *Rattus norvegicus* were: 21.20; 47.69; 69.21; and 85.90 mg/100 mL respectively.⁷ The *Sonchus arvensis* crude extract with concentration at 200 ppm (percentage of inhibition at 10.86) was proven able to reduce enzymatic reaction but not in significant level.⁸

To promote the decoction using, the research was continued with evaluation of the toxic effect in repeated dosages during 90 days.

Material and Methods

Subject: 40 adult female rats Wistar strain, weight 170 – 200 g.

Sample: *Sonchus arvensis* L. leaves. , the size of this leaves harvested varied from 20-30 cm. The leaves were dried and grounded to make fine powder.

Material: aquadest, Arabic gum.

Equipment: glass equipment, decoction equipment, the balance (Sartorius 2442).

Preparation of *Sonchus arvensis* L. leaves decoction (as test solution).

Decoction was prepared by boiling, the dosages are 0.65; 1.30, and 2.60 mg/kg BW of rat.

0.065 g; 0.130 g, and 0.260 g of dried leaves respectively were boiled in 100 ml water at 90⁰C for 30 minutes, and then were added 2 g Arabic gum to each decoction.

Procedure

Female adult Wistar rats were divided into 4 groups, each group has 10 rats, and were housed in the cages with food and drink provided freely. All of the groups were administered orally with 2 ml solution. The control group received 2% Arabic gum solution, while the treated groups received decoction with the dosages of 0.65; 1.30 and 2.60 mg/kg BW respectively every day during 90 days. At the last day, all the rats were terminated, the biochemical parameters (GOT, GPT, creatinine clearance, total bilirubin and urea nitrogen (BUN) of the rat's blood were measured. The macropathology organs: hearts, livers, kidneys, spleens, and ovaries measured by weighing. All data were analyzed statistically.

Result

The bloods biochemical parameters [GOT, GPT, creatinine, bilirubin and urea nitrogen (BUN)] showed in the Table 1 and the macropathology organs showed in the Table 2.

Table 1. The average of biochemical parameters of female rat's blood after administered orally suspension of decoction *Sonchus arvensis* L. every day during 90 days.

Type	Decoction		GOT	GPT	The average of ($\mu\text{g/L}$)		
	Group	Dosage mg/kg BW			Creatinine clearance	Total bilirubin	Urea nitrogen (BUN)
Control solution (Arabic gum 2%)	1	0.00	74.61	22.83	0.49	0.22	15.22
<i>Sonchus arvensis</i> L. decoction	2	0.65	75.38	24.74	0.50	0.22	15.59
	3	1.30	76.26	25.19	0.52	0.23	17.04
	4	2.60	77.09	27.05	0.53	0.25	17.08

The different average of: (1) GOT levels between groups 1 and 2 is 0.77 $\mu\text{g/L}$; between groups 1 and 3 is 1.65 $\mu\text{g/L}$; and between groups 1 and 4 is 2.48 $\mu\text{g/L}$. (2) GPT levels between groups 1 and 2 is 1.91 $\mu\text{g/L}$; between groups 1 and 3 is 2.36 $\mu\text{g/L}$; and between groups 1 and 4 is 4.22 $\mu\text{g/L}$. (3) creatinine clearance levels between groups 1 and 2 is 0.01 $\mu\text{g/L}$; between groups 1 and 3 is 0.03 $\mu\text{g/L}$; and between groups 1 and 4 is 0.04 $\mu\text{g/L}$. (4) total bilirubin levels between groups 1 and 2 is 0.00 $\mu\text{g/L}$; between groups 1 and 3 is 0.01 $\mu\text{g/L}$; and between groups 1 and 4 is 0.03 $\mu\text{g/L}$. (5) Urea nitrogen (BUN) levels between groups 1 and 2 is 0.37 $\mu\text{g/L}$; between groups 1 and 3 is 1.82 $\mu\text{g/L}$; and between groups 1 and 4 is 1.86 $\mu\text{g/L}$.

All of the different averages of GOT, GPT, creatinine clearance, total bilirubin and urea nitrogen (BUN) between group 1 (control) and all treated groups (2, 3, and 4) are not statistically significant as $P > 10$.

Table 2. The average of weight of female rat's organs after administered orally suspension of decoction *Sonchus arvensis* L. every day during 90 days.

Type	Decoction		The average weight of (g/100g BW)				
	Group	Dosage mg/kg BW	Heart	Liver	Spleen	Kidney	Ovary
Control solution (Arabic gum 2%)	1	0.00	0.33	3.48	0.67	0.49	0.56
<i>Sonchus arvensis</i> L. decoction	2	0.65	0.36	3.38	0.64	0.51	0.54
	3	1.30	0.35	3.42	0.65	0.50	0.64
	4	2.60	0.34	3.35	0.60	0.52	0.69

The different average of: (1) The heart levels between groups 1 and 2 is 0.03 g/100g BW; between groups 1 and 3 is 0.02 g/100g BW; and between groups 1 and 4 is 0.01 g/100g BW. (2) The liver levels between groups 1 and 2 is 0.10 g/100g BW; between groups 1 and 3 is 0.06 g/100g BW; and between groups 1 and 4 is 0.13 g/100g BW. (3) The spleen levels between groups 1 and 2 is 0.03 g/100g BW; between groups 1 and 3 is 0.02 g/100g BW; and between groups 1 and 4 is 0.07 g/100g BW. (4) The kidney levels between groups 1 and 2 is 0.02 g/100g BW; between groups 1 and 3 is 0.01 g/100g BW; and between groups 1 and 4 is 0.03 g/100g BW. (5) The ovaries levels between groups 1 and 2 is 0.02 g/100g BW; between groups 1 and 3 is 0.08 g/100g BW; and between groups 1 and 4 is 0.13 g/100g BW.

All of the different averages of hearts, livers, spleens, kidneys and ovaries between group 1 (control) and all treated groups (2, 3, and 4) are not statistically significant as $P > 10$.

Conclusion

Commonly the average of all data is increasing with the dosages, except liver and spleen.

All of the result are not statistically significant as $P > 10$.

Decoction of *Sonchus arvensis* leaves is relative safe to be given orally in the repeated dosages during 90 days.

Reference

1. Departemen Kesehatan RI, Rancangan Pembangunan Jangka Panjang Bidang Kesehatan, Kementerian Kesehatan RI. (Juni 2011). www.depkes.go.id/.../rancangan_RPJPK_2005-2025
2. Farida A., Batu saluran kemih dengan hernia inguinalis, Universitas Muhamadiyah Yogyakarta. (Desember 2011). www.fkumyecase.net/.../index.php
3. Dokter Universitas Gadjah Mada, Batu Kandung Kemih atau Batu Buli atau Vesicolithiasis, UGM (Desember 2011). dokterugm.wordpress.com/
4. Dalimartha S, Atlas Tumbuhan Obat Indonesia, 1st ed., Trubus Agriwidya, 158–159, 2008.
5. Hutapea JR, Djumidi, Sutjipto, Sugiarto S, Soerahso, Sihotang, *dkk.*, Inventaris Tanaman Obat Indonesia, 1st (1), Ministry of Health Republic of Indonesia, 217–218, 2004. .
6. Dhanawaty D.D., Padmawinata K., Soediro I., Soemardji A.A. Comparative antiurolithiatic activities of *Orthosiphon aristatus*, *Sonchus arvensis* and *Phyllanthus niruri* leaf extracts on rats. *Journal of Tropical Medicinal Plants*, 5 (1), 5-10, 2004.
7. Sudibyoy, M¹., F. Andriansyah¹, Budianto¹, C. T. Astari¹ and L. M. Aritonang. Pengaruh ekstrak etanolik daun tempuyung (*Sonchus arvensis* L.) in vitro terhadap aktivitas glutathione-S-transferase beberapa organ *Rattus norvegicus* galur Sprague-Dawley, Faculty of Pharmacy Gadjah Mada University, (21 Desember 2011). www.berkalabiologi.com/index.php,
8. Susanti, Anggi, Pengaruh ekstrak tempuyung (*Sonchus arvensis*) terhadap aktivitas xantin oksidase secara in vitro sebagai dasar uji kinetika, Bogor Agriculture University, (Desember 2011) <http://repository.ipb.ac.id/handle/123456789/47053>