

Effect of *Curcuma xanthorrhiza* Roxb. Decoct on Glucose Absorption Level in Intestine of Male Rat of Wistar Strain

Diah Dhianawaty D.^a, Andreanus A. Soemardji^b, Samsudin Surialaga^a, Anna Martiana S.^a, Ruslin^c

Faculty of Medicine – Universitas Padjadjaran^a, School of Pharmacy – Bandung Institute of Technology^b, Faculty of Mathematic and Natural Science – Haluoleo University^c

Diah DhianawatyD. diahdhianawaty@yahoo.com Hp. 08122366990

ABSTRACT

Almost of Indonesian Jamu consist of *Curcuma xanthorrhiza* Roxb., it contains curcuminoid which has effect in increasing the absorption of glucose on intestine of rat. Therefore the diabetic patient or the peoples who have problem with their blood glucose have to be careful for drink it. To answer the worried about this effect, the effect of the minimal dose of this traditional medicine has been observed.

The effect of decoct was measured at the dose 160 mg/kg BW of rat in the 100 ml of mixture 30 mM glucose in 0,9 % sodium chloride solution. Rat was anaesthetic by urethane. The mixture of 30 mM glucose in 0,9 % sodium chloride solution as a control solution, then decoct, through in intestine for one hour, respectively. Every 15 minutes the glucose solution concentration was measured. The decrease of glucose solution concentration is similar to the absorption level of glucose solution by intestine.

The levels of glucose absorption of control and decoct were 76.98 % and 73,57 %, respectively.

In conclusion, the decoct of *Curcuma xanthorrhiza* Roxb. at 160 mg/kg BW of rat has effect to decrease the glucose absorption level on intestine, although is not significant.

Keyword : *Curcuma xanthorrhiza* Roxb., Decoct of *Curcuma xanthorrhiza* Roxb., Curcuminoid

INTRODUCTION

Curcuma xanthorrhiza Roxb (Zingiberaceae family), is an original medicinal plant from Indonesia (commonly known as temulawak in Indonesia). Almost of Indonesian Jamu consist of it. Traditionally it used for fever, chronic cholecystitis, hypercholesterolemia, anorexia, acne, cholelithiasis (gallstones), cholagogue (promotes bile secretion), healthy promoters as well as to increase the production of breast-milk.^{1,2} Nowadays, *Curcuma xanthorrhiza* Roxb are used in the formal therapy, e.g. in vitamins as appetite stimulant which have been named as Curvit, Curcuma Plus, Vitacur; for digestion upset have been named as Curliv; as acolereticum, colagogum and liver protector called as Curcil, Gramuno, Heparviton, Hepasil, Hepatoflak Planta, Hepa Q, and other names.^{3,4}

Curcuminoid and curcumin are main compounds to be investigated. Some effects of curcuminoid and curcumin were published, e.g., curcuminoid has effect to increase the absorption of glucose

intestine of rat,¹ curcumin in a dose 400 mg/kg bw daily has effect in decreasing total cholesterol level, LDL-cholesterol, number of F2-isoprostanand the formation of foam cell in rats with atherogenic diet,⁵ curcumin that was given in a dose of 400 mg/rats (2 g/KgBW) single dose once a week has effect to reduces atrophy of soleus muscle in rats immobilized.⁶ Not all of the effects are good to human body, one of its reversed effect is the above mentioned, inducing problem for the diabetic patient or the peoples who have problem with their blood glucose.

This research was done to evaluate and answering the worried about this effect. The efect of *Curcuma xanthorrhiza* Roxb on the glucose absorption in intestine of male rat at the minimal dose in traditional medicine used has been observed.¹

MATERIAL AND METHODS

Sample : *Curcuma xanthorrhiza* rhizome from Cicalengka (West Java).

Reagent : sodium chloride (E.Merck), glucose, glucose test reagent (St. Reagensia), trichloroacetic acid precipitation of protein (TCA) 8% (St. Reagensia), urethane (E.Merck).

Equipment : Perfusion was designed by P. Soedigdo and Marsongko Hadi, glass equipment, Decoct equipment, surgery equipment, micro pipette (CAPP), micro tube, syringe with needle (5 ml and 10 ml), balance (Sartorius 2442), spectrophotometer (Spectronic 20 Genesys)

Preparation of *Curcuma xanthorrhiza* rhizome decoct (as test solution).

Decoct of dried *Curcuma xanthorrhiza* rhizome was made with the dose 160 mg/kg bw of rat in the 100 ml of mixture 30 mM glucose in 0.9 % sodium chloride solution.

Preparation of 3×10^{-3} M glucose solution in the 0.9% sodium chloride solution (as control solution)

0.0059 g of glucose was dissolved in 100 ml of 0.9% sodium chloride solution

Urethan solution for a rat (200 g)

0.2800 g of urethan was dissolved in 2 ml water for injection

Procedure

Procedure was divided in 2 steps

Rat was anaesthetized by urethane (IP), abdomen was opened and at the intestine was put in perfusion instrument, two bent pipettes was inserted in the intestine, the first pipette is 10 cm from the pylorus, the second pipette is 25 cm from the first pipette.

The first step : Intestine was cleaned by 0.9% sodium chloride solution, and then both of pipettes were connected with the control solution, the control solution was circulated to intestine between

two pipettes by pump in the perfusion instrument, fourth times circulation per minutes. The glucose levels in the control solution were measured every 15 minutes for one hour.

The second step : the control solution was thrown out from the intestine via both pipettes. The intestine was cleaned by 0.9% sodium chloride solution, and then both of pipettes were connected with the test solution, the test solution was circulated to intestine between two pipettes by pump in the perfusion instrument, fourth times circulation per minutes. The glucose levels in the test solution were measured every 15 minutes for one hour.

The result of the glucose absorption level by intestine of rats

The unabsorpted glucose levels were measured by spectrophotometer at wavelength 505 nm, and the absorpted glucose levels were calculated from the unabsorpted glucose levels by equation :
the absorpted glucose levels = (100 – unabsorpted glucose levels) (%)

Both of the glucose levels from control solution and test solution were statistically analyzed with Student T test.

RESULT

Curcuma xanthorrhiza rhizome:

was harvested in December 2010. It, has diameter 8 – 9 cm; wet weight = 99.77 g, dried weight = 8,94 g.

Dose of fresh *Curcuma xanthorrhiza* rhizome was 2 fingers/day, is 20 – 23 g/day.¹

The minimum traditional dose for people was 20 g of wet *Curcuma xanthorrhiza* rhizome = $\frac{20}{99,77} \times 8,94 \text{ g} = 1,79 \text{ g}$ dried rhizome. Rat dose (BW = 200 g) = $\frac{1}{56} \times 1,79 \text{ g} = 0,032 \text{ g} = 32 \text{ mg}$ dried rhizome or 160 mg/kg bw of rat.

The of decoct⁷ was prepared by boiling :

128 mg dried rhizome was boiled in 400 ml mixture of 30 mM glucose in 0.9 % sodium chloride solution at 90⁰C for 30 minutes, finally add water in decoct until the volume was 400 ml.

Table 1. The absorption of glucose levels by rat intestine from glucose solution (control) and *Curcuma xanthorrhiza* decoct

No. Rat	Body weight (g)	Glucose solution	Time of absorption of glucose	Glucose level (%)			
				Unabsorpted	Absorpted		
1	198	Control	15'	27.91	72.09		
			30'	27.91	72.09		
			45'	18.60	81.40		
			60'	13.95	86.05		
		Average					77.91
		Test	15'	41.86	58.14		
			30'	27.91	72.09		
			45'	18.60	81.40		
			60'	18.60	81.40		
		Average					73.25
2	176	Control	15'	37.21	62.79		
			30'	32.56	67.44		
			45'	23.26	76.74		
			60'	18.60	81.40		
		Average					72.09
		Test	15'	40.17	59.83		
			30'	32.56	67.44		
			45'	27.91	72.09		
			60'	18.60	81.40		
		Average					70.19
3	185	Control	15'	37.21	62.79		
			30'	18.60	81.40		
			45'	13.95	86.05		
			60'	13.95	86.05		
		Average					79.07
		Test	15'	41.86	58.14		
			30'	27.91	72.09		
			45'	18.60	81.40		
			60'	18.60	81.40		
		Average					73.25
4	194	Control	15'	27.91	72.09		
			30'	18.60	81.40		
			45'	13.95	86.05		
			60'	4.65	95.35		
		Average					83.72
		Test	15'	27.91	72.09		
			30'	18.60	81.40		
			45'	18.60	81.40		
			60'	13.95	86.05		
		Average					80.23

continued :

Table 1. The absorption of glucose levels by rat intestine from glucose solution (control) and *Curcuma xanthorrhiza* decoct

No. Rat	Body weight (g)	Glucose solution	Time of absorption of glucose	Glucose level (%)			
				Unabsorpted	Absorpted		
5	183	Control	15'	40.17	59.83		
			30'	38.84	61.16		
			45'	18.60	81.40		
			60'	13.95	86.05		
		Average					72.11
		Test	15'	37.21	62.79		
			30'	32.56	67.44		
			45'	32.56	67.44		
			60'	23.26	76.74		
		Average					68.60

Then make 2 tables of glucose absorption level base on glucose solution (control) (Table 2) and *Curcuma xanthorrhiza* decoct (Table 3)

Table 2. The absorption of glucose levels by rat intestine from glucose solution (control)

No. Rat	Body weight (g)	Glucose solution	Time of absorption of glucose	Glucose level (%)	
				Unabsorpted	Absorpted
1	198	Control	15'	27.91	72.09
			30'	27.91	72.09
			45'	18.60	81.40
			60'	13.95	86.05
		Average			
2	176		15'	37.21	62.79
			30'	32.56	67.44
			45'	23.26	76.74
			60'	18.60	81.40
		Average			
3	185	Control	15'	37.21	62.79
			30'	18.60	81.40
			45'	13.95	86.05
			60'	13.95	86.05
		Average			
4	194		15'	27.91	72.09
			30'	18.60	81.40
			45'	13.95	86.05
			60'	4.65	95.35
		Average			
5	183	Control	15'	40.17	59.83
			30'	38.84	61.16
			45'	18.60	81.40
			60'	13.95	86.05
		Average			

The absorption of glucose levels by rat intestine from glucose solution (control) are : 72.09%; 72.11%; 77.91%; 79.07% and 83.72 %.

Table 3. The absorption of glucose levels by rat intestine from *Curcuma xanthorrhiza* decoct

No. Rat	Body weight (g)	Glucose solution	Time of absorption of glucose	Glucose level (%)	
				Unabsorpted	Absorpted
1	198	Test	15'	41.86	58.14
			30'	27.91	72.09
			45'	18.60	81.40
			60'	18.60	81.40
		Average		73.25	
2	176	Test	15'	40.17	59.83
			30'	32.56	67.44
			45'	27.91	72.09
			60'	18.60	81.40
		Average		70.19	
3	185	Test	15'	41.86	58.14
			30'	27.91	72.09
			45'	18.60	81.40
			60'	18.60	81.40
		Average		73.25	
4	194	Test	15'	27.91	72.09
			30'	18.60	81.40
			45'	18.60	81.40
			60'	13.95	86.05
		Average		80.23	
5	183	Test	15'	37.21	62.79
			30'	32.56	67.44
			45'	32.56	67.44
			60'	23.26	76.74
		Average		68.60	

The absorption of glucose levels by rat intestine from *Curcuma xanthorrhiza* decoct were: 68.60%; 70.19%; 73.25%; 75.58%; and 80.23%.

Student T test between difference of the glucose levels from glucose solution (control) (76.98%) and *Curcuma xanthorrhiza* decoct (73,57%) are not significant ($P > 0.10$)

Base on the observed data, *Curcuma xanthorrhiza* decoct at dose 160 mg/kg bw of rat has not significant effect in increasing the glucose absorption.

This fact showed the minimal dose of *Curcuma xanthorrhiza* in traditional medicine was not proven to increase the absorption of glucose on intestine of rat, therefore the worried of a bad effect for the diabetic patient or the peoples who have problem with their blood glucose can be eliminated.

CONCLUSION

There is no significant effect of *Curcuma xanthorrhiza* decoct with the dose 160 mg/kg bw of rat toward the glucose absorption level in intestine, ($P > 0.10$).

Therefore the diabetic patient or the peoples who have problem with their blood glucose is safe to drink 20 g/day fresh or 1,79 g/day dried rhizome *Curcuma xanthorrhiza*.

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