THE EFFECTS OF THE ADDUCTION OF EFFERVESCENT POWDER OF BASTARD CEDAR LEAF (GUAZUMA ULMIFOLIA LAM.) EXTRACT TOWARD WEIGHT REDUCTION OF MALE MICE

SUMAIYAH1*, RIZKY TRIANDINI2, AMINAH DALIMUNTHE2

1Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Sumatera Utara, Medan, Indonesia; 2Department of Pharmacology, Faculty of Pharmacy, University of Sumatera Utara, Medan, Indonesia. Email: sumaiyah@usu.ac.id

Received: 07 March 2018, Revised and Accepted: 25 March 2018

ABSTRACT

Objective: The objective of this study was to discover the effect of the adduction of Bastard cedar leaf extract that was formulated in the form of effervescent powder toward weight loss.

Methods: The study design was an experimental study with pretest–posttest one group control design. The sample was divided into 3 treatment groups which were dosage 1 g/Kg body weight (BW), 2 g/Kg BW, and 3 g/Kg BW of Bastard cedar leaf effervescent powder and one control group. The research was conducted for 28 days.

Result: The result of the research exhibited the 1st day of the adduction of Bastard cedar leaf effervescent powder that the dosage 3 g/Kg BW contributed to the largest reduction compared with the others. On the last day of adduction, dosage 1 g/Kg BW contributed almost the similar weight reduction effect to the mouse with the dosage 3 g/Kg BW; however, when both were compared, the dosage 3 g/Kg BW remained giving the most significant effect (p<0.05).

Conclusion: The adduction of bastard cedar leaf effervescent powder could reduce the weight of the mouse in all dosage treatment which was dosage 1 g/Kg BW, 2 g/Kg BW, and 3 g/Kg BW.

Keywords: Effervescent powder, Guazuma ulmifolia Lam., Extract, Weight reduction.

INTRODUCTION

Bastard cedar leaf (Guazuma ulmifolia Lamk.) is a tree plant with height of 10 m–20 m. This plant is slim-branched dicotyle plant. Bastard cedar is renowned as medicinal plant that has the property to reduce weight. The bean can be utilized as the medicine for stomachache and bloating. The fruit can be used as medicine for cough. The stem bark of the plant can cure swollen on foot. The plant can also function to treat influenza, dysentery, wound, and fracture. The leaf can be used as antihypercholesterolemic, antidiabetic, and antiobesity. The leaf is the part of the plant that is commonly used as the ingredient for slimming potion [1-3].

The Bastard cedar leaf is expected to degrade the fat with the chemical contents of alkaloids, flavonoids, saponins, tannins, mucilage, carotenoids, phenolic acids, and resins. The alkaloid content of the leaf has similar chemical structure to orlistat, synthetic medicine that can suppress appetite by inhibiting the performance of lipase enzyme so that the absorption of fat is reduced [4].

Obesity is the clinical condition that could be a public health problem. This happens due to the faulty shifting of people's lifestyle and becomes risk factors of several ailments, such as hypertension, diabetes mellitus Type 2, stroke, and osteoarthritis. Obesity occurs due to the imbalance of energy for a long time, and the total energy expenditure (energy expenditure) is smaller than energy intake (energy input), resulting in the accumulation of energy reserves stored in subcutaneous and visceral fat [5].

As the Bastard cedar leaf was never produced in the form of effervescent powder, researchers are interested to make effervescent powder from Bastard cedar leaf extract as a weight loss ingredient. In this research, Bastard cedar leaf was processed to be a form of effervescent powder with concentration of acid source using Hydroxypropyl methyl cellulose binder. The acid source used was the combination of citric acid and tartaric acid. To produce an effervescent reaction, it requires 3 citric acid molecules and 2 sodium bicarbonate molecules to neutralize one tartaric acid molecule [6].

Based on the above explanation, therefore, the author is interested to do research on the effect of effervescent powder from Bastard cedar leaf (G. ulmifolia Lamk.) toward weight loss of mice, which can be used as alternative therapy to lose weight and as reference for the following research to support the development of knowledge.

MATERIALS AND METHODS

Animal grouping

The population of the research was the male mice aged 2–3 months with ±25 g weight and healthy characterized by active movement. There were 4 groups that were used in this study. The number of samples in each group were 6 mice. The animals were divided into 3 treated groups and 1 controlled group, with the following details:

1. Group A was given dosage 1 g/Kg BW of Bastard cedar leaf extract.
2. Group B was given dosage 2 g/Kg BW of Bastard cedar leaf extract.
3. Group C was given dosage 3 g/Kg BW of Bastard cedar leaf extract.
4. Group D was given distilled water (control).

Materials

The materials used were Bastard cedar leaf extract, 96% ethanol (E-Merck), lactose, citric acid, tartaric acid, sodium carbonate, Mg steante, aspartame, and hydroxypmryl methyl cellulose. All other chemicals used were of analytical grade.
Methods

Preparation of dry extract
The viscous Bastard cedar leaf extract was dried with lactose at a ratio of 1:8 until the powdered extract was formed, then sieved with a 40 mesh sieve, and then dried in dryer cup for 18 h.

Formula of effervescent powder
Effervescent powder was made by wet granulation method. The composition of Na bicarbonate with citric acid and tartaric acid was based on the balance of acid-base reaction, in which to neutralize 1 citric acid molecule, 3 molecules of Na bicarbonate are required, and to neutralize 1 molecule of tartaric acid, 2 molecules of Na Bicarbonate are required [6].

The effervescent powder formulation used in this study can be seen in Table 1.

Phases in formulation of Bastard cedar leaves effervescent powder

Base phase
Half of the total dried extract and lactose crushed in mortar until it was homogeneous. Natrium bicarbonate was added, half aspartame and half HPMC mixed in mortar until it was homogeneous, 96% ethanol was added to form a compact mass and sifted through a 14 mesh sieve and dried in an oven at 40°C. The granules obtained was sieved with a 16 mesh sieve to get the smaller granules [7].

Acid phase
Half of the total dried extract and half of the total lactose were crushed in mortar until it was homogeneous. Citric acid was added little by little while being crushed homogenous and tartaric acid was added, and aspartame and half parts of HPMC crushed until it was homogeneous. 96% ethanol was added to form a compact mass and sifted through a sieve of 14 mesh and dried in an oven at 40°C. Then the granules obtained was sifted through a sieve of 16 mesh to get the smaller granules [7].

Outer phase of effervescent powder formulation of Bastard cedar leaves
The outer phase comprises of Mg stearate as the lubricant which was mixed in parts of acid and base that have been dried and ready to be compressed.

Induction of obesity
The induction of obesity was held using monosodium glutamate (MSG). Two grams of MSG was dissolved in 10 ml of distilled water, and then 1% of the BW solution was injected subcutaneously for each mouse and was performed for 2 consecutive weeks to increase the weight of the mice.

Dosage determination
The effective dose of Bastard cedar leaf extract was 1 g/kg BW. The dose of Bastard cedar leaf extract for mice was 1, 2, and 3 g/kg BW [8].

The effervescent powder of Bastard cedar leaves was done after 14 days of obesity induction, and the mice were given effervescent doses of

Table 1: Effervescent powder formula of Bastard cedar leaves [7]

<table>
<thead>
<tr>
<th>Material (mg)</th>
<th>F1 (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry extract of Bastard cedar leaf</td>
<td>500</td>
</tr>
<tr>
<td>Citric acid</td>
<td>150</td>
</tr>
<tr>
<td>Tartaric acid</td>
<td>250</td>
</tr>
<tr>
<td>Natrium bicarbonate</td>
<td>460</td>
</tr>
<tr>
<td>Aspartame</td>
<td>40</td>
</tr>
<tr>
<td>HPMC</td>
<td>60</td>
</tr>
<tr>
<td>Mg stearate</td>
<td>30</td>
</tr>
<tr>
<td>Lactose</td>
<td>510</td>
</tr>
<tr>
<td>Total</td>
<td>2000</td>
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HPMC: Hydroxypropyl methylcellulose
Table 2: Mice’s BW data after adduction of 2 g MSG

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 4</th>
<th>Day 7</th>
<th>Day 10</th>
<th>Day 14</th>
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<tr>
<td></td>
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<td>BWI</td>
<td>BW</td>
<td>BWI</td>
<td>BW</td>
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<tr>
<td>T1</td>
<td>25.9</td>
<td>103.1</td>
<td>26.6</td>
<td>106.1</td>
<td>28.5</td>
</tr>
<tr>
<td>T2</td>
<td>24.8</td>
<td>100.2</td>
<td>26.5</td>
<td>107.2</td>
<td>27.8</td>
</tr>
<tr>
<td>T3</td>
<td>25.7</td>
<td>100.6</td>
<td>27.2</td>
<td>106.8</td>
<td>29.1</td>
</tr>
<tr>
<td>T4</td>
<td>24.6</td>
<td>101.2</td>
<td>26.2</td>
<td>107.1</td>
<td>23.7</td>
</tr>
</tbody>
</table>

Table 3: Average mouse BW data after adduction of effervescent powder of Bastard cedar leaves during day 14 to day 28

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>BW</td>
<td>BWI</td>
<td>BW</td>
<td>BWI</td>
<td>BW</td>
<td>BW</td>
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<td>T1</td>
<td>31.6</td>
<td>126.1</td>
<td>30.8</td>
<td>97.2</td>
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<td>32.9</td>
<td>105.2</td>
<td>32.9</td>
<td>105.3</td>
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**T**: Treatment, **BW**: Body weight, **BWI**: Body weight index, T1: EPBCL with dose 1 g/kg BW, T2: EPBCL with dose 2 g/kg BW, T3: EPBCL with dose 3 g/kg BW, T4: Distilled water (control), MSG: Monosodium glutamate

**Fig. 1**: Graph of mice’s body weight after adduction of 2 g monosodium glutamate

**Fig. 2**: Graph of average mouse body weight after adduction of effervescent powder of bastard cedar leaves during day 14 to day 28
There was a difference of weight loss of male mice between the treated group and the controlled group, the treatment with 1 g/Kg BW dose almost gave the same effect as the 3 g/Kg B dose, but when compared to the other two doses, the 3 g/Kg B dose gave the most significant impact to weight loss.

Mice weight loss in treatment group was suspected because of the content of bioactive compound in effervescent powder of Bastard cedar leaf. The content of bioactive compound of effervescent powder of Bastard cedar leaves that allegedly give effect to lose weight is tannin, mucilage, and alkaloid. Tannin compounds have the effect of precipitating proteins present in the small intestine surface because it is easy to bind to proteins, thereby reducing the absorption of food, and thus, the process of obesity can be inhibited. Mucilage compound contained in Bastard cedar leaf is polysaccharide in the form of mucus and characterized as a lubricant so that in the presence of mucilage, the absorption of food in the intestine can be reduced [9].

In addition to the influence of tannin and mucilage compounds, the weight loss of mice can also be caused by the alkaloid content in the effervescent powder. The alkaloid compound in effervescent powder of Bastard cedar leaves allegedly can inhibit pancreatic lipase enzyme activity [10]. Lipase enzyme is the enzyme that hydrolyzes the fatty ester bonds into alcohol and fatty acids. The activity of lipase enzyme will increase the absorption of fatty acid. Conversely, if lipase enzyme activity is inhibited, then what happens is that absorption of fat is reduced so that much fat is wasted through the feces. The increase of the BW of the mouse on the controlled group was suspected because of physiology of the mouse that allows mouse to be stressed during straining. Stress could cause the blood glucose rate decreased which caused higher consuming activity of mouse to obtain sufficient glucose supply in the body [11].

CONCLUSION

Effervescent powder of Bastard cedar leaf gives weight loss effect to male mice in all three doses, i.e., 1 g, 2 g, and 3 g/Kg BW.

ACKNOWLEDGMENT

The authors are grateful for the Faculty of Pharmacy University of Sumatera Utara that has provided the Bastard cedar leaves and facilitated this research.

REFERENCES