

Laxative effect of green gedi leaves infuses (*Abelmoschus manihot* (L.) medik) on male white mice (*Mus musculus*)

Birgitta Vania Rarasati

Medical faculty of University of Airlangga

Abstract. Background: Gedi plant (*Abelmoschus manihot* (L.) Medik) of the *Malvaceae* family is a plant which leaf is used by peoples for the treatment of several illnesses such as constipation.

Purpose: To investigate the laxative activity of green gedi leaves infuses (*Abelmoschus manihot* (L.) Medik) on male white mice.

Method: This study is an experimental study. Mice were divided in 5 groups of 6 animals each, first group as negative control (CMC Na 0.5%) while group 2, 3 and 4 were treated with green gedi leaves infuses (*Abelmoschus manihot* (L.) Medik) at doses of 130, 260 and 520 mg/kgBW, per as respectively and group 5 as positive control (bisacodyl). The laxative activity was determined based on the frequency of defecation, weight of feces and consistency of feces.

Results: It is found that 520 mg/kgBW dose has the highest mean of defecating frequency (7.17) and 260 mg/kgBW dose has the highest mean of feces weight (0.20). Statically however, there is no significant difference between the groups overall with p value of 0.132 and 0.246 for defecating frequency and feces weight respectively. There is no difference between the groups in term of feces consistency with both not defecating and hard feces.

Conclusion: The research concludes that there is no significant laxative activity between each groups after administration of several dosages in 6 hours on mice thus the use of green gedi leaves as laxative in society can not be proven empirically in the laboratory.

Keywords: gedi leaf, *Abelmoschus manihot* (L.) Medik, laxative effect, constipation

Introduction

Constipation is a chronic problem in many patients all over the world. In some groups of patients such as the elderly, constipation is a significant health-care problem, but in the majority of cases chronic constipation is an aggravating, but not life-threatening or debilitating, complaint that can be managed in primary care with cost-effective control of symptoms (WGO, 2010)

Constipation is a syndrome that is defined by bowel symptoms (difficult or infrequent passage of stool, hardness of stool, or a feeling of incomplete evacuation) that may occur either in isolation or secondary to another underlying disorder (eg, Parkinson's disease). Although many physicians regard constipation as synonymous with reduced stool frequency, others also consider straining to defecate, hard stools, and the inability to defecate at will as constipation (Bharucha A. E., 2013)

It is reported that the mean constipation rates in Europe and Oceania are 17.1% and 15.3%

respectively. This prevalence seems to be majorly affected by female gender, age and socioeconomic and educational class (Peppas, et.al, 2008). It is mentioned that constipation makes 3% of patient visits to a general pediatrician and 15-25% visits to pediatric gastroenterologist (Kadim, M., 2015). For geriatric patients in Indonesia, the constipation prevalence is 3.8% for the elderly aged 60-69 years and 6.3% for the elderly over 70 year old (Kemenkes RI, 2013). Despite the high prevalence rate, constipation is usually temporary and harmless. Although in some severe cases it can indicates a serious underlying gastrointestinal lesions such as colorectal cancer (Longgo, D. et. al., 2015) Majority of the patients suffering from constipation will do their own treatment to improve the complaint, such as buying over the counter (OTC) laxatives.

Given the high prevalence of constipation, it is necessary to research about traditional medicine that can be used in constipation. Indonesia is the world's biodiversity mega-center. Among the 30.000 plant species living in the Indonesian

archipelago, it is known that at least 9.600 species are efficacious as medicine, and approximately 300 species have been used as traditional medicinal materials by the traditional medicine industry (Depkes RI, 2007)

Green gedi plant (*Abelmoschus manihot* (L.) Medik) is one of the many plant species that grows flourishly in Indonesia, especially in North Sulawesi. The local people of North Sulawesi commonly use its leaves as an ingredient for a traditional dish called "tinutuan" or Manado porridge. Green gedi leaves are not only used for cooking but also said to have efficacy in traditional medicine. As traditional medicine, it is said to be able treat many illness, starting from mild illness to severe illness, such as kidney disease, ulcers and high cholesterol. (Mamahit, L. 2010)

Based on the description above, then conducted a research on laxative effect of green gedi leaves infuses (*Abelmoschus manihot* (L.) Medik) on male white mice.

Materials and method

1. Test material

The material tested is green gedi leaves (*Abelmoschus manihot* (L.) Medik) obtained from a yard of a house in Surabaya. Gedi leaves then dried and powdered at UPT Materia Medica Batu. Infuses are made by boiling the powder and aquades for 15 minutes and then filtered with flannel for the water to be taken.

2. Experimental Animal

White male mice (*Mus musculus*) balb/c with age around 3 months old, weight around 30 gram, and in a healthy physical condition, are obtained from Pharmacology Laboratory of

Medical Faculty of Airlangga University Surabaya. Mice are acclimatized for a week.

3. Method

The mice that are used have normal feces characterization and fasted for 1 hour prior to the treatment. After the mice being weighed, categorized randomly into 5 groups with 6 mice in each group. Every group is given treatment as follow:

Group I : administered with CMC Na 0.5 % only

Group II : administered with infuses 130 mg/kgBW dose (half normal dose)

Group III : administered with infuses 260 mg/kgBW dose (normal dose)

Group IV : administered with infuses 520 mg/kgBW dose (twice normal dose)

Group V : administered with bisacodyl

All infuses are given orally. The observed variables are : frequency of defecation, weight and consistency of feces. Observation is done in 6 hours with 60 minutes interval. The frequency of defecation is observed within 6 hours with 60 minutes interval on how often the mice defecate. Consistency of feces is determined by the seepage diameter of the feces on the filter paper. Observation starts from after the administration of the treatments until the mice defecate, assessment of feces consistency is divided into:

- 0 = not defecating
- 1 = hard feces (H) with diameter on filter paper < 0.5 cm
- 2 = mushy feces (M) with diameter on filter paper 0.5 - 1 cm
- 3 = liquid mushy (LM) with diameter on filter paper > 1 cm

The weight of the feces is measured by collecting the feces on the filter paper that comes out within 6 hours with 60 minutes interval.

Result

Table 1. Frequency of defecation in 6 hours with 60 minutes interval ANOVA; p. value = 0.132

Treatment Group	Mean	Std. Deviation	Minimum	Maximum
CMC Na 0.5%	3.17	2.79	0	8
130 mg/kgBW dose	4.17	3.55	1	10
260 mg/kgBW dose	6.83	4.26	1	13
520 mg/kgBW dose	7.17	1.94	5	10
Bisacodyl	6.67	2.81	4	12

According to table 1, administration of 520 mg/kgBW dose has the highest mean defecating frequency with a value of 7.17. There is a significant difference between the groups with administration of CMC Na 0.5% and 520 mg/kgBW dose as the p value is lesser than the

alpha value (0.05). However, the ANOVA p value (0.132) in this table is greater than the alpha value (0.05), therefore there is no significant difference between the groups overall.

Table 5.2 Weight of feces in 6 hours with 60 minutes interval ANOVA; p. value = 0.246

Treatment Groups	Mean	Std. Deviation	Minimum	Maximum
CMC Na 0.5%	0.11	0.14	0.00	0.36
130 mg/kgBW dose	0.07	0.05	0.02	0.15
260 mg/kgBW dose	0.20	0.15	0.04	0.47
520 mg/kgBW dose	0.14	0.07	0.05	0.25
Bisacodyl	0.16	0.08	0.06	0.29

According to table 2, administration of 260 mg/kgBW dose has the highest mean weight of feces with value of 0.202117. There is a significant difference between the groups with administration of 130 mg/kgBW and 260

mg/kgBW dose as the p value is lesser than the alpha value (0.05). However, the ANOVA p value (0.246) in this table is greater than the alpha value (0.05), therefore there is no significant difference between the groups overall

Table 5.3 Consistency of feces in 6 hours with 60 minutes interval

Treatment Groups	N	Not Defecating	Hard Feces	Mushy Feces	Liquid Mushy
CMC Na 0.5%	36	27 (75%)	9 (25%)	0 (0%)	0 (0%)
130 mg/kgBW dose	36	23 (64%)	13 (36%)	0 (0%)	0 (0%)
260 mg/kgBW dose	36	14 (39%)	22 (61%)	0 (0%)	0 (0%)
520 mg/kgBW dose	36	17 (47%)	19 (53%)	0 (0%)	0 (0%)
Bisacodyl	36	16 (44%)	20 (56%)	0 (0%)	0 (0%)

According to table 3, there is no difference in the consistency of feces between each group. The result showed that the administration of each treatment is the same, which are not defecating and hard feces.

Discussion

Green gedi leaves infuses is expected to have a laxative effect on the experimental animals. To see the effect strength of green gedi leaves infuses, then bisacodyl is used as a comparison. Bisacodyl stimulates myoelectrical and motor activity in the colon and stimulates intestinal secretion. (Manabe, N., 2009)

Variance doses are used in this research; 130, 260, 520 mg/kgBW and comparison (bisacodyl). The variation selection of dose is based on empirical. People usually use around 3-4 leaves and boiled them with water. For this research, the dosage is derived from the use of 4 leaves,

then calculated and conversed into dosage for mice. The research then conducted by using defecation pattern method where the highest mean frequency of defecation is shown by 520 mg/kgBW dose as much as 7.17 times, the highest mean weight of feces is shown by 260 mg/kgBW with 0.20 gram and no difference between each group in term of consistency which are not defecating and hard feces.

The ANOVA test showed that the significance value of the frequency of defecation was 0.132, where $0.132 > 0.05$ so that statistically stated there is no significant difference between the treatments because the deviation in frequency result is not much different between all treatments. This interpretation is also applied on the weight of feces which ANOVA test showed a p. value of 0.246, where $0.246 > 0.05$, thus

statistically there is no significant difference between the treatments.

In LSD test however, there is significant difference in the frequency of feces between Na CMC 0.5% and 520 mg/kgBW dose with p. value of 0.038 and another significant difference in the weight of feces between 130 mg/kgBW and 260 mg/kgBW.dose with p. value of 0.034. Thus, pharmaceutically there is a difference because there is an increased of frequency of defecation for infuses compared to negative control.

However, it is shown that in term of frequency of defecation, the result for green gedi leaves infuses 540 mg/kgBW dose is higher than 130, 260 mg/kgBW dose, negative control and even the positive comparative control (bisacodyl). This suggests that the higher the dosage of green gedi leaves infuses the higher the frequency of defecation in animal experiments.

Based on the literature gathered, green gedi leaves contains polyphenol compounds, free steroids, saponins, flavonoids, essential oils, phenolic compound, steroid compound and gum mucilage. It has been widely known that mucilage is a type of soluble fiber with thick gluey characteristic and often used as colon cleanser because of its ability to absorb excess intestinal fluids, which softens stools and promotes regular bowel movement (Zliving, 2014). It is possible that these compounds contained in green gedi leaves are responsible for the laxative activity. According to Méité, S., et al. (2010), phytoconstituents like flavonoids, alkaloids, terpenoids, sterols, phenolic compounds, and tannins are responsible for laxative activities in plants.

Since there is no significant difference between the highest dose of infuses and bisacodyl, especially on the frequency of defecation, it might suggest that the laxative activity in green gedi infuses work similarly like bisacodyl by stimulating fluid secretion and promoting colon contraction to empty out the colon and excrete the feces thus giving a laxative effect on mice

Conclusion

From the results of research that has been done can be concluded as follows:

1. Green gedi leaves infuses (*Abelmoschus manihot* (L.) Medik) doesn't have a significant laxative effect on male white mice (*Mus musculus*)
2. The use of green gedi leaves as laxative by society cannot be proven empirically in the laboratory.

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