IDENTIFICATION OF SECONDARY METABOLITES AND ANTIDIARRHEAL ACTIVITY OF PIRDOT LEAVES ETHANOL EXTRACT (Saurauia vulcani Korth.) FROM WEST PAKPAK, NORTH SUMATERA PROVINCE, INDONESIA

K. Gurning1,*, R. Boangmanalu1, H.A. Simanjuntak1, N. Singarimbun2, R. Rahmiati3 and W. Lestari4

1Department of Pharmacy, Sekolah Tinggi Ilmu Kesehatan Senior Medan, Medan-20141, Indonesia
2Departement of Midwifery, Sekolah Tinggi Ilmu Kesehatan Senior Medan, Medan-20141, Indonesia
3Department of Biology, Universitas Medan Area, Medan-20112, Indonesia
4Department of Agrotechnology, Science and Technology Faculty, Universitas Labuhanbatu, Rantauparapat-21415, Indonesia

*E-mail: kastagurning@gmail.com

ABSTRACT

Pirdot (Saurauia vulcani Korth.) is used by the people of West Pakpak in North Sumatera as medicinal ingredients. This study aims to identify secondary metabolite and to know the antidiarrheal activity of ethanol extract of pirdot leaves which tested on mice male which is induced by oleum rincini. The dosage variation of ethanol extract is 50 mg/kg body weight, 100 mg/kg body weight, and 200 mg/kg body weight. Loperamide was used as a positive control with 2 mg/kg body weight dose, and 0.5% CMC Na as a negative control. Determination of antidiarrheal activity from the frequency of diarrhea, duration of diarrhea, and the consistency of the mice’s feces which induced with oleum ricini by comparing the % inhibition from parameters. The results obtained showed that the extract dose 100 mg/kg body weight better than other variation of dose but not better than loperamide 2 mg/kg body weight as an antidiarrheal activity. Based on this research that the extract of pirdot leaves can be used as antidiarrheal with the right dose.

Keywords: Pirdot Leaves, Oleum rincini, Loperamide, and Antidiarrheal.

INTRODUCTION

Diarrhea is closely related to impaired physical development, cognitive, susceptibility to disease and cause of death especially in children under the age of 5 years old. This event generally occurs in developing countries such as Africa and Southeast Asia. Diarrhea is also referred to as gastroenteritis.3 Diarrhea is characterized by an increase in the frequency of bowel movements, soft-liquid stool conditions, and abdominal pain discomfort.1,2 Treatments are generally done by giving synthetic drugs such as loperamide, diphenoxylate, and antibiotics that give some side effects and drug resistance.2,4 The overcoming the side effects caused, it’s important to find potential new drugs that can be obtained from natural ingredients. Traditionally treatment using natural ingredients from plants is considered safer from the side effects caused.5 Therefore, research into the discovery of active compounds from potential plants is considered to be important to study.

The pirdot plant (Saurauia vulcani Korth.) Is a type of plant, that is rich in potential bioactive compounds. Components of bioactive compounds found in pirdot leaves (Saurauia vulcani Korth.) Include alkaloids, flavonoids, saponins, triterpenoids and tannins.6 Empirical information of pirdot leaves have been traditionally used as a diabetes drug from boiled water.7 In vivo through pharmacological tests of extract extracts pirdot leaf ethanol has been proven to be an antidiabetic mellitus-induced antidiabetic mellitus in
mice, and wound healing activity in hyperglycemic mice induced by Streptozotocin (STZ) and as an antioxidant. Other potentials of the bioactive compounds of pirdot leaves (Saurauia vulcani Korth.) as antidiarrheal have not been reported. Based on the description above, researchers are interested in testing the activity of pirdot leaves ethanol extract as an antidiarrheal which is tested on adult white male mice induced by oleum ricini.

EXPERIMENTAL

Preparation of the plant
A fresh sample of Pirdot leaves was taken and collected from the District of Salak (West Pakpak, North Sumatera Province, Indonesia) and authenticated by Herbarium Medanense, Faculty of Mathematics and Natural Science - the University of Sumatera Utara (No. 2380/MEDA/2018). Clean the sample, dried in a drying cabinet at 40 °C, powdered and stored at the Pharmacognosy Laboratory, Sekolah Tinggi Ilmu Kesehatan Medan.

Preparation and Process of the Extract Plant
500 g pirdot leaves powder extracted with ethanol 96% with maceration method 5 days arrow at temperature room and occasionally stirred. After 5 days, filtered with Whatman paper No 1. Macerated the residue with the same way twice. Evaporated the filtrate with evaporator rotary vacuum at 55 °C to get the crude extract. Mixed the sticky extract then dried it in the oven at 40 °C. put the dried powder in a bottle and store it in a desiccator in the laboratory at the temperature room.

Phytochemical Screening
The extract of pirdot leaves that soluble in ethanol analyzed of phytochemical compounds with standard methods.

Preparation the Mice
The animals used for the research are adult male mice and health (± 25 g) from the House of Animal STIKes Senior Medan, Indonesia. Mice are placed in a standard cage at room temperature and fed with standard pellets and free water. This research gets permission and done this according to ethical norms from the National Health Research Ethics Committees (No. 0403/KEPH-FMIPA/2019). The mice are fasted for 18 hours not fed but given free access to water.

Antidiarrheal Activity Testing of Pirdot Leaves Ethanol Extract (PLEE)
The mice grouped into 5 that consists of:
- Group 1: PLEE dose 50 mg/kg body weight
- Group 2: PLEE dose of 100 mg/kg body weight
- Group 3: PLEE dose of 200 mg/kg body weight
- Group 4: Negative Control 0,5% CMC Na
- Group 5: Positive Control Loperamide 2 mg/kg body weight
The mice induced with 0,5 mL oleum ricini to get diarrhea by oral. After 2 hours of induction, then given the preparation test as much as the fit dosage that determined before, then do the observation per 30 minutes. The observation that has done included diarrhea frequently, duration of diarrhea, and consistency of the feces. The percentage of diarrhea determined by:

\[
\% \text{ Inhibision Diarrheal} = \left(1 - \frac{X_{\text{Sample}}}{X_{\text{Control}}} \right) \times 100
\]

Statistic Analysis
Data obtained analyzed with ANOVA and followed by Post hoc Tuckey using SPPS 16 version. All the data is stated as mean ± SEM and n = 5 with a level of trust 95% (α<0,05).

RESULTS AND DISCUSSION
Crude extract ethanol of pirdot leaves that obtained means 136.24±0.05g. The result of phytochemical screening against ethanol extract of pirdot leaves shows the difference phytochemical compounds (Table-1).

PIRDOT LEAVES ETHANOL EXTRACT  
K. Gurning et al.
Table-1: Phytochemical Screening of PLEE

<table>
<thead>
<tr>
<th>Secondary Metabolites</th>
<th>Reagent</th>
<th>Ethanol Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>Mayer</td>
<td>Positive (+)</td>
</tr>
<tr>
<td></td>
<td>Dragendroff</td>
<td>Positive (+)</td>
</tr>
<tr>
<td></td>
<td>Wagner</td>
<td>Positive (+)</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Shinoda test</td>
<td>Positive (+)</td>
</tr>
<tr>
<td>Saponins</td>
<td>Foaming Test</td>
<td>Positive (+)</td>
</tr>
<tr>
<td>Tannins</td>
<td>FeCl₃ 1%</td>
<td>Positive (+)</td>
</tr>
<tr>
<td>Triterpenoids</td>
<td>Liebermann Bouchard</td>
<td>Negative (-)</td>
</tr>
<tr>
<td>Glycosides</td>
<td>Liebermann’s Test</td>
<td>Negative (-)</td>
</tr>
</tbody>
</table>

Antidiarrheal Activity Test

Antidiarrhea parameters testing from the ethanol extract of pirdot leaves which diarrhea frequency, duration of diarrhea, and consistency of diarrhea. The antidiarrheal activity was measured by in vivo method by using mice male (*Mus musculus*) as test animal. *Mus musculus* induced with 0,5 mL oleum ricini by oral so the mice get diarrhea (gastrointestinal).16,17

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Frequency of diarrhea</th>
<th>% inhibition</th>
<th>% inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5% CMC Na</td>
<td>14.0 ± 0.27</td>
<td>0.00</td>
<td>272.4 ± 0.11&quot;&quot;</td>
</tr>
<tr>
<td>PLEE 50 mg/kg bw</td>
<td>11.0 ± 0.38*</td>
<td>21.43</td>
<td>230.2 ± 0.15&quot;&quot;</td>
</tr>
<tr>
<td>PLEE 100 mg/kg bw</td>
<td>9.2 ± 0.46*</td>
<td>34.29</td>
<td>149.1 ± 0.20&quot;&quot;</td>
</tr>
<tr>
<td>PLEE 200 mg/kg bw</td>
<td>10.4 ± 0.38*</td>
<td>25.71</td>
<td>203.2 ± 0.15&quot;&quot;</td>
</tr>
<tr>
<td>Loperamide 2 mg/kg bw</td>
<td>8.4 ± 0.37&quot;&quot;</td>
<td>40.00</td>
<td>120.2 ± 0.22&quot;&quot;</td>
</tr>
</tbody>
</table>

Description: the result is stated as average ± SEM, n = 5; *P< 0.05, **P< 0.01

Based on Table-2 and Fig.-1a, ethanol extract of pirdot leaves shows activity against diarrhea frequency. The variation dose of PLEE showed that activity could significantly inhibit the frequency of diarrhea 21.43-34.29% (P<0.05) and loperamide drugs were able to inhibit diarrhea by 40% with significance (P<0.01). Same as with the old parameters of diarrhea shows the activity as anti diarrheal. The variation dose of PLEE was able to inhibit 15.5-45.3% with significance (P<0.05) and loperamide drugs 55.88%
with significance (P<0.01) (Fig.-1b). Observation of the consistency of diarrhea feces for variations at the dose of PLEE was observed in the form of mice’s feces. Observation of feces form was carried out after 2 hours to induction of oleum ricini per 30 minutes observation. Form of the feces is divided into three categories including liquid feces 3, soft feces 2, and normal feces 1. Diarrhea stool is categorized in the soft and liquid feces form. The observations are shown in Fig-2.

![Fig-2. Antidiarrheal Activity of PLEE of Consistency of Diarrhea Feces](image)

The best dose PLEE as antidiarrheal at 100 mg/kg bw. The effect increasing of extract concentration is not directly proportional to an increase in antidiarrheal activity, it can be seen between the concentration of 100 mg/kg bw with 200 mg/kg bw the concentration of 200 mg/kg bw decreases antidiarrheal activity. This is because of the possibility at a concentration of 100 mg/kg bw has occupied all parts of the receptor. Besides that, the active compound contained in the extract may have an "agonist-antagonist" effect. For example, tannin active compounds with anthraquinone have opposite work effects, tanins effectively inhibit secretion of chloride-induced by forskoli and toxins while anthraquinone acts as a laxansia.18

**CONCLUSION**

Ethanol extract of pirdot leaves (Saurauia vulcani Korth) shows the activity as antidiarrheal that tested to male mice. Increase concentration ethanol extract of pirdot leaves not directly proportional to antidiarrheal activity. The best activity ethanol extract of pirdot leaves at 100 mg/kg body weight.

**ACKNOWLEDGMENT**

Thanks to Sekolah Tinggi Ilmu Kesehatan Senior Medan that support this research by giving support in using the laboratory as a research place.

**REFERENCES**