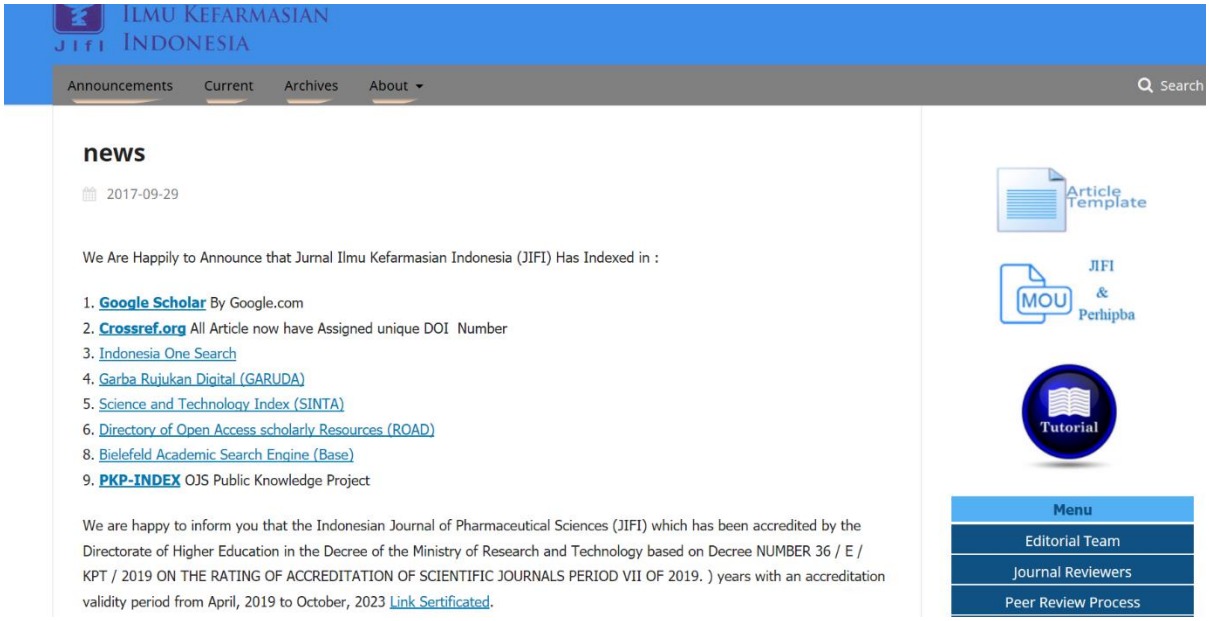
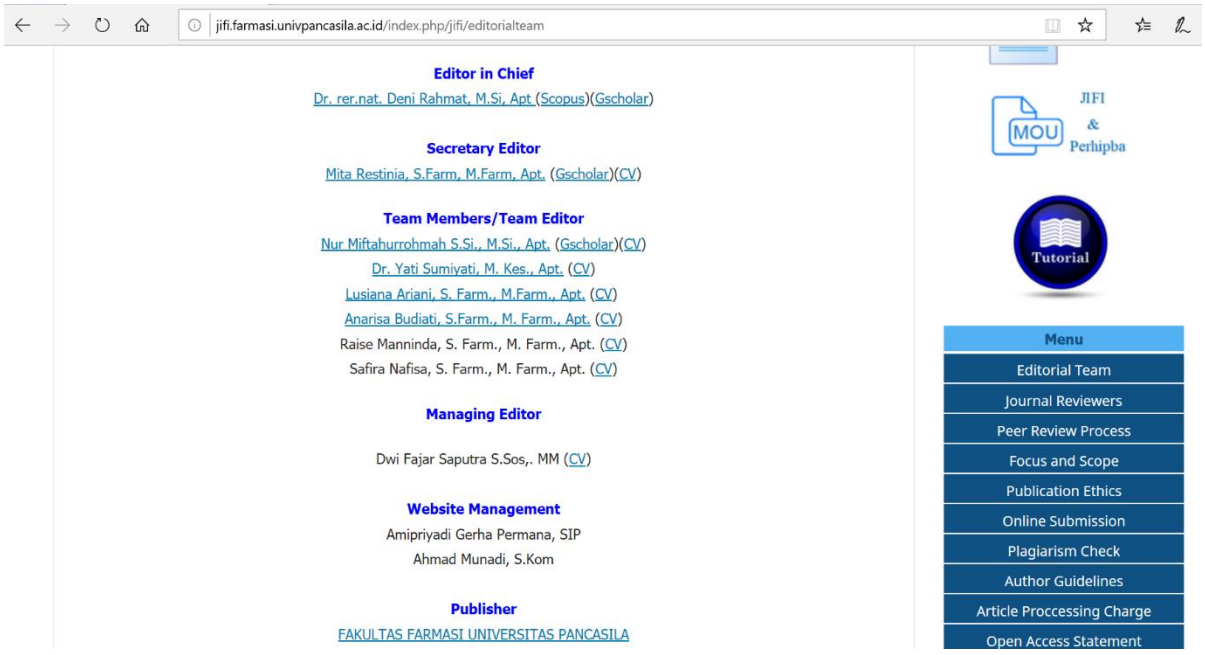

ILMU KEFARMASIAN INDONESIA
JIFI
Announcements
Current
Archives
About
Search
news
2017-09-29
We Are Happily to Announce that Jurnal Ilmu Kefarmasian Indonesia (JIFI) Has Indexed in :
1. Google Scholar By Google.com
2. Crossref.org All Article now have Assigned unique DOI Number
3. Indonesia One Search
4. Garba Rujukan Digital (GARUDA)
5. Science and Technology Index (SINTA)
6. Directory of Open Access scholarly Resources (ROAD)
8. Bielefeld Academic Search Engine (Base)
9. PKP-INDEX OJS Public Knowledge Project
We are happy to inform you that the Indonesian Journal of Pharmaceutical Sciences (JIFI) which has been accredited by the Directorate of Higher Education in the Decree of the Ministry of Research and Technology based on Decree NUMBER 36 / E / KPT / 2019 ON THE RATING OF ACCREDITATION OF SCIENTIFIC JOURNALS PERIOD VII OF 2019.) years with an accreditation validity period from April, 2019 to October, 2023 Link Sertificated.
Article Template
JIFI & Perhipba
MOU
Tutorial
Menu
Editorial Team
Journal Reviewers
Peer Review Process


jifi.farmasi.univpancasila.ac.id/index.php/jifi/editorialteam
Editor in Chief
Dr. rer.nat. Deni Rahmat, M.Si, Apt (Scopus)(Gscholar)
Secretary Editor
Mita Restinia, S.Farm, M.Farm, Apt. (Gscholar)(CV)
Team Members/Team Editor
Nur Miftahurrohmah S.Si., M.Si., Apt. (Gscholar)(CV)
Dr. Yati Sumiyati, M. Kes., Apt. (CV)
Lusiana Ariani, S. Farm., M.Farm., Apt. (CV)
Anarisa Budiati, S.Farm., M. Farm., Apt. (CV)
Raise Manninda, S. Farm., M. Farm., Apt. (CV)
Safira Nafisa, S. Farm., M. Farm., Apt. (CV)
Managing Editor
Dwi Fajar Saputra S.Sos,. MM (CV)
Website Management
Amipriyadi Gerha Permana, SIP
Ahmad Munadi, S.Kom
Publisher
FAKULTAS FARMASI UNIVERSITAS PANCASILA
JIFI & Perhipba
MOU
Tutorial
Menu
Editorial Team
Journal Reviewers
Peer Review Process
Focus and Scope
Publication Ethics
Online Submission
Plagiarism Check
Author Guidelines
Article Proccessing Charge
Open Access Statement

Antihypertensive and Diuretic Effects of The Ethanol Extract of Colocasia esculenta (L.) Schott. Leaves

RINI PRASTIWI
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

SISKA SISKA
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

ERVINA BHAKTI UTAMI
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

GIGIH PANGESTU WITJI
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

Abstract

JURNAL ILMU KEFARMASIAN INDONESIA, April 2016, hlm. 99-102 Vol. 14, No. 1
ISSN 1693-1831

Antihypertensive and Diuretic Effects of The Ethanol Extract of *Colocasia esculenta* (L.) Schott. Leaves

(Efek Antihipertensi dan Diuretik dari Ekstrak Etanol Daun Talas (*Colocasia esculenta* (L.) Schott.))

RINI PRASTIWI*, SISKA, ERVINA BHAKTI UTAMI, GIGIH PANGESTU WITJI

Pharmacy and Science Faculty, Muhammadiyah Prof. Dr. Hamka University, Islamic Center, Jalan Delima II/IV, Perumnas Klender, East Jakarta, Indonesia.

Submitted18 Desember 2015, Accepted 5 Februari 2016

Abstract: *Colocasia esculenta* (L.) Schott (CE) is traditionally used for the treatment of various ailments such as high blood pressure, diarrhea, rheumatic pain, pulmonary congestion, etc. Hence in present study, the effect of ethanol extract of CE leaves (EECE) was evaluated for antihypertensive and diuretic activity in rats. Male Sprague dawley rats were randomly divided into five groups (n=5), and treated as follow: positive control group (hydrochlortiazide 0.2569 mg/ 200 g bw), negative control (NaCl 8%) and EECE (20, 40 and 80 mg/ 200 g bw) was given 14 days. The parameters systole blood pressure (SBP) and diastole blood pressure (DBP) was estimate by Kent Scientific's CODA Non-invasive Blood Pressure on the days 0, 15 and 29. Diuretic activity of EECE was studied based on the volume of urine for 6 hours and measuring the levels of sodium in urine 24 hours. The result of the study showed that EECE 40 mg/ 200 g bw/ day significant ($p<0.05$) decreased in SBP 16.07% and in DBP 13.67%. EECE 40 mg/ 200 g bw/day showed positive diuretic activity and significantly ($p < 0.05$) increased sodium levels in urine. Preliminary phytochemical evaluation revealed the presence of saponins, tannin, triterpenoid and flavonoids in EECE.

Keywords : *Colocasia esculenta*, antihypertensive, diuretic activity, NaCl induced, flavonoids.

Abstrak: Talas (*Colocasia esculenta* (L.) Schott) (CE) secara tradisional digunakan untuk berbagai penyakit seperti tekanan darah tinggi, diare, rematik, gangguan paru-paru dan lain sebagainya. Dalam penelitian ini diteliti aktivitas ekstrak etanol daun talas sebagai antihipertensi dan diuretik pada tikus. Tikus jantan *Sprague dawley* secara acak dibagi menjadi lima kelompok (n=5) dan diberi perlakuan sebagai berikut: kelompok kontrol positif (diberi hidroklorotiazida 0,2569 mg/200 g bb), kontrol negatif (diberi NaCl 8%), 3 kelompok perlakuan masing-masing diberi ekstrak etanol daun talas dengan konsentrasi 20, 40 dan 80 mg/200 g bb selama 14 hari. Parameter berupa tekanan darah sistol dan diastol diukur dengan *Kent Scientific's CODA non-invasive blood pressure* pada hari ke-0, 15 dan 29. Aktivitas diuretik ekstrak etanol daun talas dianalisis berdasarkan volume urin dalam waktu 6 jam dan pengukuran jumlah natrium urin dalam waktu 24 jam. Hasil penelitian menunjukkan bahwa ekstrak etanol daun talas dengan konsentrasi 40 mg/200 g bb/ hari secara signifikan ($p<0,05$) menurunkan tekanan darah sistol sebesar 16,07% dan menurunkan tekanan darah diastol sebesar 13,67%. Ekstrak etanol daun talas 40 mg/ 200 g bb/ hari positif menunjukkan aktivitas diuretik dan secara signifikan meningkatkan kadar natrium dalam urin ($p <0,05$). Evaluasi kandungan fitokimia yang telah dilakukan membuktikan bahwa ekstrak etanol daun talas mengandung saponin, tanin, triterpenoid dan flavonoid.

Keywords : *Colocasia esculenta*, antihipertensi, aktivitas diuretik, induksi NaCl, flavonoid.

* Penulis korespondensi, Hp. 081329223326
e-mail: khanzapras@gmail.com

INTRODUCTION

Hypertension is an increase in blood pressure (BP) above normal and permanent, or when systole blood pressure (SBP) is above 140 mmHg and diastole blood pressure (DBP) is above 90 mmHg[1]. Pharmacological therapy for hypertension is using synthetic drugs. Hypertension drugs are use in long term lead to increase cost and side effects.

Medicinal plant which is owned by Indonesia has enough potential to be utilized and developed as raw materials for herbal medicines. Herbal medicines for therapy is also no longer something new to the community. In line with the trend of 'back to nature' that developed among the public at this time, the use of herbal as alternative medicine continues to grow bigger. One of the them which is used as an alternative medicine is taro leaves (*Colocasia esculenta* (L.) Schott.) (CE)[2].

Taro is known as the tuber which can be used as food substitute. All parts of this plant can be used for treatment, including the petiole and leaf. The content of the active compounds in CE is polyphenols. Taro leaves have medicinal properties as diarrhea, arthritis, pulmonary edema[3]. And based on previous research was showed that taro leaf aqueous extract at a dose of 400 mg/ kg bw has efficacy as an antihypertensive and diuretic activity[4].

MATERIALS AND METHOD

MATERIALS. The leaves of *Colocasia esculenta* (CE) were collected from Badan Penelitian Tanaman Rempah dan Obat (BALITRO), Bogor, Indonesia. The plant specimen was authenticated and herbarium was deposited at Indonesian Institute of Science, Cibinong, Bogor, West Java, Indonesia.

METHOD. Preparation of Ethanol extract of CE leaves (EECE). The leaves were dried under the shade and powdered using a grinder mixer. The powdered material (25 g) was filled in soxhlet apparatus containing 250 mL of ethanol 70%. The obtain filtrate was concentrated and stored in a desiccators till use[5].

Drug and Chemical. Hydrochlorthiazide (HCT) and sodium chloride were obtained from PT. Kimia Farma (Bandung, Indonesia),sodium estimation kit (Research Lab, Indonesia), polysorbat 80, ethanol 70% and other reagents used were purchased from local vendor from Jakarta, Indonesia.

Preparation of Drug Solution. EECE and HCT were powdered and suspended in 1% of polysorbat 80 in distillled water. Sodium Chloride (NaCl) was powdered and dissolved in distillated water. All solutions were prepared freshly and stored in glass bottles.

Preliminary Phytochemical Evaluation of EECE. EECE was subjected for the qualitative analysis by using the standard phytochemical test to evaluate the presence of various phytoconstituens.

Effect of EECE on NaCl 8% induced hypertension in rats. Male *Sprague dawley* rats (3-4 months old, weight between 150 and 200 g) were randomly divided into five groups (n=5) and treated as follows: negative control (NaCl 8% induced); positive control (HCT 0.2569 mg/ 200 g BW); EECE 20, 40, 80 mg/ 200 g bw. NaCl 8% induced given orally 3 mL/ day in rats every day for 28 days to obtain the condition of hypertension. EECE and HCT provided during the last 14 days orally once daily according to the group. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) was estimated for each animal on day 0 (zero), 15 and 29. Blood pressure measurements made by the indirect method using a Kent Scientific's CODA non-invasive blood pressure.

Diuretic Activity of EECE in Rats. Diuretic activity was determinate by following methods of Depkes RI[6], with minor modification. Male *Sprague dawley* rats (2-4 month old, weight between 150 and 250 g) were randomly divided into five groups (n=5) and treated as follows: negative control (NaCl 4.5% and tween 80 1%); positive control (HCT 0.514 mg/ 200 g bw); EECE 20, 40, 80 mg/ 200 g bw. The rats were fasted overnight (18 hr) prior to the test. After that, the rats were given an oral loading NaCl 4.5% of 2 mL/ 200 g bw and the treatment according to each group. Immediately after administration, the rats were placed in metabolism cages. Urine volume was collected and calculated at 6 hr and sodium level was estimated using urine 24 hr.

Statistical Analysis. The results were expressed as mean ± S.E.M (n=5). The statistical comparison was carried out by one way ANOVA followed by LSD test. The result were considered statistically significant when $p < 0.05$.

RESULTS AND DISCUSSION

Preliminary Phytochemical Evaluation of EECE. Preliminary phytochemical evaluation revealed the presence of saponins, tannin, triterpenoid and flavonoids in EECE.

Effect of EECE on NaCl 8% Induced Hypertension in Rats. The administration of NaCl 8% in rats for 28 days showed the increasing effect

in SBP and DBP (Figure 1 and 2). The treatment with EECE and HCT showed significantly ($p < 0.05$) decrease in SBP and DBP as compared with negative control. EECE (40 mg/ 200 g bw) showed the greatest reduction in SBP of 16.07% and DBP of 13.65% but the effect is still smaller as compared with HCT.

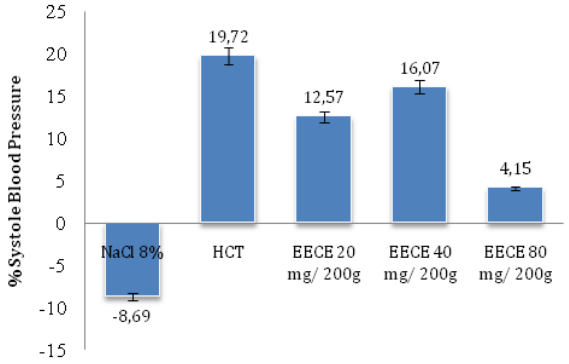


Figure 1. Effect of EECE on systole blood pressure (SBP) in NaCl 8% induced hypertension. Value are expressed as mean ± S.E.M (n=5).

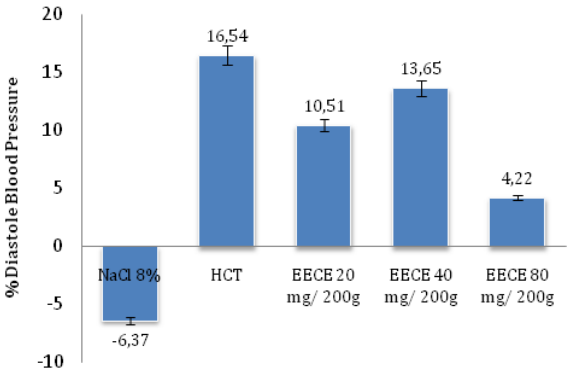


Figure 2. Effect of EECE on diastole blood pressure (DBP) in NaCl 8% induced hypertension. Value are expressed as mean ± S.E.M (n=5).

The administration NaCl 8% for 28 days has been managed to increase blood pressure[7]. NaCl shows hypertensive action through increasing plasma volume, cardiac output and ultimately increase in BP[8]. BP measurements by the indirect method using a Kent Scientific's CODA non-invasive blood pressure. This device is worksby recording systolic and diastolic blood pressure simultaneously through a transducer that is in the tail-cuff[9]. In the present study, the administration of NaCl 8% for 28 day showed increase in SBP and DBP.BP was significantly decreased after the treatment with EECE 20 and 40 mg/ 200 g.

Diuretic Activity of EECE in Rats. The administration of EECE and HCT showed a significant ($p<0.05$) increase in urine volume as compared with negative control group at 6 h (Table 1). Analysis of sodium levels with clinical photometer showed that EECE and HCT significantly ($p<0.05$) increased sodium content in urine 24 h. EECE 40 mg/ 200 g bw showed the greatest diuretic effect 142.50% and sodium levels but the effect is smaller than HCT.

Herbal plants used as diuretic in traditional medicinal system might be useful in the treatment of hypertension. In the present study, EECE at a dose of 40 mg/ 200 g bw showed positive diuretic activity at 6 h, as evident from the diuretic percentage. Furthermore, EECE showed significant increase in sodium content of urine at 24 h but the result revealed the weak diuretic activity of EECE.

The results showed that there was an increase in the activity of the first dose to the second dose. But at the third dose of the extract decreased the activity of diuretics when compared with the second dose. This is possible because the levels of the compounds that are too high, causing a decrease in affinity so that the effects produced are not in accordance with the increasing in dose[10].

The preliminary phytochemical investigations in the present study revealed the presence of flavonoid, saponins, tannins and triterpenoid. The flavonoids isoquercitrin showed inhibition of ACE activity[11]. Flavonoids suspected to have efficacy as a diuretic to stimulate blood flow to the kidneys and lead to the inhibition of tubular reabsorption of water and ions that cause diuretic effect[12]. The result of the present study were suggested that the flavonoids presence in EECE may be responsible for the antihypertensive and weak diuretic effect.

Table1. Effect of EECE on percentage urine volume 6 h and sodium levels in 24 h urine volume. Value are expressed as mean ± S.E.M (n=5).

Treatment	Urine volume 6 h (mL)	Diuretic percentage (%)	Sodium levels (meq/L)
Negative control	1.4±0.32	74.70±11.65	98.48±2.45
HCT	6.1±0.76	240.68±9.56	268.92±7.87
EECE 20mg/ 200g bw	2.44±0.34	91.24±8.06	138.18±3.53
EECE 40mg/ 200g bw	3.94±0.19	142.50±10.88	161.12±3.87
EECE 80 mg/ 200g bw	2.56±0.51	90.21±9.73	133.23±3.59

CONCLUSION

From this research, it can be conluded that the ethanolic extract of taro leaves (*Colocasia esculenta* (L.) Schott.) (EECE) showed anti hypertensive and diuretic effect. The greatest effect of antihypertensive and diuretic of EECE is 40 mg/ 200g bw, but the effect still lower than HCT. Futher studies are necessary to be performed for the purification, isolation and characterization of the pyhtoconstituens responsible for the anthypertensive and diuretic effect and to explore the exact mechanism of the action.

REFERENCES

1. Priyanto. Farmakoterapi & terminologi medis. Depok: LESKONFI; 2008. 183.
2. Wasito H. Obat kekayaan Indonesia. Yogyakarta: Graha Ilmu; 2011. 5-7.
3. Departemen Kesehatan RI. Inventaris tanaman obat Indonesia (II). Jakarta: Departemen Kesehatan Republik Indonesia; 1993. 145
4. Vasant OK, *et al*. Antihypertensive and diuretic effect of the aqueous extract of *Colocasia esculenta* Linn. Leaves in experimental paradigms. Iranian Journal of Pharmacutical Research. 2012. 11(2): 621-34.
5. Voight R. Buku pelajaran teknologi farmasi. Terjemahan : Soendani NS. Yogyakarta: Gadjah Mada University Press; 1995. 561-77.
6. Depkes RI. Penapisan farmakologi, Pengujian fitokimia dan pengujian klinik. Jakarta: Depkes RI Pusat Pemeriksaan Obat dan Makanan; 1993. 49-51.
7. Lailani M, Zulkarnain E, Rahmatina BH. Gambaran Tekanan darah tikus wistar jantan dan betina setelah pemberian diet tinggi garam. Jurnal Kesehatan Andalas. 2013: 146-9.
8. Dipiro JT, *et al*. Pharmacotherapy principles & practice. United Stated of America: McGraw-Hill; 2008. 143: 148-54.
9. Kent Scientific Corporation. Buku panduan CODA™ non-invasive blood pressure. Kent Scientific Corporation. 2011: 6.
10. Bourne HR, Mark VZ. Basic and clinical pharmacology. Editor: Bertram GK. San Francisco: Department of Pharmacology University of California; 2012. 12-6.
11. Junior AG, *et al*. Antihypertensive effect of isoquercitrin and extract from *Tropaeolum maju*s L.: Evidence for the inhibition of angiotensin converting enzym. Journal of Ethnopharmacology. 2011. 134: 363-72.
12. Patel U, Mukul K, *et al*. Evaluation of diuretic activity of aqueos and methanol extracts of *Lepidium sativum* Garden Cress in rats. Tropical Journal of Pharmaceutical Research. 2009. 8(3): 215-9.