

The Effect of Binahong (*Anredera Cordifolia*) Leaf Extract Intranasal Administration on the Safety of Olfactorius Nerves Wistar Rats

Ichsanul Muhammad Farhan¹, Asti Widuri², Rifki Febriansah³

¹ Medical student, Faculty of Medicine and Health Sciences, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia, 55183

² Otorhinolaryngology Department, Faculty of Medicine and Health Sciences, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia, 55183

³ Pharmacy Department, Faculty of Medicine and Health Sciences, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia, 55183

Email: ichsanul18@gmail.com; astiwiduri@gmail.com¹; rifki.febriansah@umy.ac.id³

ABSTRACT

Introduction – Binahong plant (*Anredera cordifolia*) is reported to contain bioactive compounds that are useful for treating several diseases. One of the effects that can be used is anti-inflammatory, so it has potential as an alternative to treat chronic inflammation of the nose, but which has not yet been done researched of safety against the olfactory nerve.

Purpose – This study aims to determine the toxic effect of the ethanolic extract of Binahong (*Anredera cordifolia*) leaves on the safety of the olfactory nerves of Wistar rats.

Methodology/Approach – This research is an experimental research using pre and post control group design. The samples used were 30 female Wistar rats aged 3 months which were divided into 6 groups. Group 1 was used as a normal control without treatment. Groups 2, 3, 4, 5 and 6 were treated with a nasal spray of Binahong leaf extract with concentrations of 5%, 10%, 25%, 50% and 75%, respectively. Before and after treatment, the rats were tested for smell by putting them in an empty cage that was fed under the bed and assessing the length of time the rats found food. The data obtained were tested using the t-test (t-test) to see the difference in the mean.

Findings – This study showed that there was an effect of Binahong leaf extract (*Anredera cordifolia*) in reducing the average olfactory time of Wistar rats (241 seconds vs 316 seconds) but it was not statistically significant and no anosmia was found.

Originality/ Value/ Implication – The results of this study provide new insights into the use of intranasal Binahong.

Keywords: *Anredera cordifolia*, anti-inflammatory, smell, security

INTRODUCTION

Inflammation is a normal protective response to tissue injury caused by physical trauma, damaging chemical substances or microbiological substances. (Andriyono, 2019). Rhinitis is an inflammatory disease or chronic inflammation of the nasal mucosa (Hutagaol & Adriztina, 2022; Vitta & Magdi, 2020).

Indonesia is known as one of the countries that has the largest biodiversity in the world with the nickname mega diversity, this biodiversity can be seen in various kinds of plants that can traditionally be used to cure various diseases. Leaves are parts that are often used as herbal medicines, one of which is Binahong (*Anredera cordifolia*) leaves. (Eriadi et al., 2015).

Binahong leaves (*Anredera cordifolia*) have various properties, including healing various internal wounds, external wounds, accelerating health recovery after surgery, improving blood circulation, preventing stroke, ulcer disease, gout, diabetes, maintaining body resistance, and facilitate urination. Bioactive substances in the Binahong plant can help the healing process of degenerative diseases such as kidney damage, diabetes, heart swelling, stroke, hemorrhoids and gout. (Erwiyani, 2017)

Binahong (*Anredera cordifolia*) has the potential to be developed because it has quite a number of uses for health, including anti-bacterial, anti-fungal, anti-aging, anti-diabetic, wound healing, anti-inflammatory and anti-oxidant. (Santosa, 2021). This anti-inflammatory effect has been investigated for its usefulness in accelerating the healing of postpartum wounds, diabetic ulcers and wounds after tooth extraction (Astuti & Handajani, 2019; Uzmayana, 2019)

Based on this description, Binahong (*Anredera cordifolia*) leaves have the potential as an alternative to treat chronic inflammation of the nose and in the procedure for using drugs, Binahong needs to be researched for its safety against the olfactory nerve.

LITERATURE REVIEW

Research conducted by (Zulfa et al., 2018) about the safety of Binahong topically on the skin, by applying a cream preparation extract with a vanishing cream base with variations in extract concentration, namely F I (5%), F II (10%), and F III (20%), F 0 (control base). The results of the study concluded that increasing the concentration of the extract had an effect on increasing the viscosity and adhesion, but decreasing the spreadability and all preparations had the same irritation index in the category of only slightly irritating (score <2).

The anti-inflammatory effect of topical Binahong (*Anredera cordifolia* (Ten.) Steenis) leaf extract on the number of PMN Neutrophils in Sprague-Dawley Male Rats was reported by (Susanti, 2017) with 5 groups of rats, where group 1 was given ointment base, group 2 was given povidone iodine ointment, group 3 was given 10% extract ointment, group 4 was given 30% extract ointment and group 5 was given 40% ointment extract. Rats were given ketamine injection (20 mg/kgBW) intramuscularly and an

incision was made on the back. After 4 hours, blood was drawn from the tail and microscopic neutrophil levels were measured using Wright's stain. Then, the rat were given topical treatment twice a day for 3 days. The results of this study showed that the Binahong leaf extract ointment macroscopically suppressed the inflammatory process of new cuts in rats.

METHOD

This research is an quasi-experimental study using the pre-and post-control group design method. It was carried out at the Laboratorium Pene;itian dan Pengujian Terpadu (LPPT) Unit 4, Universitas Gadjah Mada in April 2022. This study used female Wistar (*Rattus norvegicus*) rat, aged 2 months and weighing 120-200 mg which were divided into 6 groups. Group 1 as a control without treatment, groups 2, 3, 4, 5 and 6 were given Binahong extract solution with successive concentrations of 5%, 10%, 25% 50% and 75%. The equipment needed is a glass jar, stirrer, filter paper, 40 mesh sieve, water bath, test tubes, scales, rat cage, bedding, test tubes, vortex, Binahong leaves (*Anredera cordifolia*), white Wistar rat (*Rattus norvegicus*), 96% ethanol, aquades.

Sample preparation by preparing and cleaning fresh Binahong leaves and then dried in the oven at 600 C for 5 hours. After that, the dried leaves were crushed and ground using a grinder, filtered using a 40 mesh sieve. After the sample became smooth, extraction was carried out by maceration with 96% ethanol until all parts were submerged in a ratio of 1 part powder to 10 parts ethanol for 5 days in a jar. glass. Stir every day for at least 5 minutes. After 5 days, filter paper was carried out 3 times. Then the concentration is carried out with a water bath until a thick extract is obtained (Santosa, 2021). The viscous extract was diluted with distilled water and made in series with the concentration of (% w/v) 5%, 10%, 25%, 50%, and 75%. Then it was sprayed into the nose of the Wistar Rat (*Rattus norvegicus*) experimental animal after the initial test of the olfactory test using buried food test.

For the initial test of the smell test using the Buried Food Test method. The experimental animals were removed from the group cages and put into new cages with the condition that they were already filled with food buried by the bedding of the experimental animals. Next, a stopwatch is counted from the animals entering the new cage until the animals find their food.(Machado et al., 2018)

After the initial test of the olfactory test was carried out, the experimental animals were nasal sprayed using various concentrations depending on the division of the group. Group 1 as control, group 2, 3, 4, 5 and 6 were sprayed according to the order of concentration, namely 5%, 10%, 25%, 50% and 75%. After treatment, the experimental animals were left for 1 day and then the smell test was carried out again.

After the data is taken, the data is processed using Paired Test t-test to find out the difference of time between before and after intervention.

This research has been declared ethically feasible by the Research Ethics Commission of The Faculty of Medicine

and Health Science, University of Muhammadiyah Yogyakarta (FKIK UMY) with Number 071/EC-KEPK FKIK. UMY/XII/2021.

RESULT AND DISCUSSION

After the treatment, the results of the treatment were obtained in minutes and converted into seconds. The results of the treatment can be seen in Table 1.0.

Table 1. Treatment Data

		Before treatment (seconds)	After treatment (seconds)
Group 1	1	280.05	44.78
	2	316.83	48.11
Group 2	1	148.16	207.97
	2	187.77	809.98
Group 3	1	269.52	759.18
	2	176.28	573.94
Group 4	1	105.54	64.87
	2	273.49	41.95
Group 5	1	629.93	358.7
	2	76.57	104.42
Group 6	1	281.02	54.37
	2	152.75	734.71

The data obtained were tested using Paired Test t-test because the data used were 12 samples (<30).

Table 2. Results of Paired Test t-test

		Before trial – After trial
Paired Differences	mean	-75.42250
	Std. Deviation	352.59770
Std. Error Mean		101.78619
95% Confidence Interval of The DIFFERENCE	Lo	-299.45239
	Up	148.60739
t		-0.741
df		11
Significance	One-Sided p	0.237
	Two-Sided p	0.474

Based on the results obtained from the study, it showed that there was no significant difference in the rat's olfactory ability before and after treatment, with the result p 0.237 (> 0.05). Thus, there was no toxic effect of the treatment on the rat's olfactory ability and and no anosmia was found in experimental animals.

Acute toxicity test is part of a preclinical test designed to measure the toxic effect of a compound. Acute toxicity refers to the toxic effects that occur after oral

administration of a single dose within 24 hours.(Donatus, 2017). Meanwhile, according to BPOM RI (2020), toxicity test is a test to detect the toxic effect of a substance on a biological system and to obtain typical dose-response data from the test preparation. The data obtained can be used to provide information about the degree of danger of the test preparation in the event of exposure to humans, so that the dosage can be determined for human safety. One of the applications of the acute toxicity test is in the nasal mucosa. The results of this study indicate that there is no disability or oddity and even death of the experimental animals.

However, from the results of research that has been done also found a decrease in olfactory function. This is evidenced by the decrease in the average time from before and after treatment which can be caused by other actions during the study, namely taking blood samples that cause pain and decreased activity in general, including the ability to smell. This blood sampling method is used to test routine blood from experimental animals and is carried out in separate studies. However, with a decrease in olfactory function, it did not cause anosmia in experimental animals so that it did not eliminate the olfactory function of experimental animals that supported by research from (Fitriyah et al., 2013; Samirana et al., 2018) said that medicines derived from herbs have few side effects.

CONCLUSION AND RECOMMENDATION

Conclusion

Intranasal administration of Binahong extract was not toxic to the olfactory function of Wistar rats (no incidence of anosmia was found). There was a decrease in the speed of smell after nasal washing with Binahong extract but statistically not significant. Intranasal administration of Binahong leaf extract (*Anredera cordifolia*) was considered safe for olfactory function Wistar rat (*Rattus norvegicus*) experimental animal.

Recommendation

Researchers suggest further research on the most effective concentration of Binahong leaf extract test (*Anredera cordifolia*).

REFERENCE

- Andriyono, R. . (2019). Kaempferia Galanga L. sebagai anti-inflamasi dan analgetik. *Jurnal Kesehatan*. Volume 10, Nomor 3, November 2019. ISSN 2086-7751 (Print), ISSN 2548-5695 (Online). <http://ejurnal.poltekkes-tjk.ac.id/index.php/JK>. 10(3), 495.
- Astuti, K. E. W., & Handajani, S. R. (2019). Efektifitas Anti Inflamasi Formulasi Kunyit (*Curcuma Longa*), Daun Binahong (*Anredera Cordifolia*) Dan Daun Sambiloto (*Andrographis Paniculata*) Terhadap Luka Sayat Pada Kelinci. *Interest : Jurnal Ilmu Kesehatan*, 8(1), 211–221. <https://doi.org/10.37341/interest.v8i1.124>
- BPOM RI. (2020). Peraturan Badan Pengawas Obat Dan Makanan Tentang Pedoman Uji Toksisitas Praktikal Secara in Vivo. *Journal of Chemical Information and Modeling*, 53(9), 21–25. <http://www.elsevier.com/locate/scp>
- Donatus, I. . (2017). *Toxicology, Essential Toksikologi Dasar Edisi 2*. Rasmidia Grafika. Fakultas Farmasi, Universitas Gadjah Mada: Yogyakarta.
- Eriadi, A., Arifin, H., Rizal, Z., & Barmitoni. (2015). Pengaruh Ekstrak Etanol Daun Binahong (*Anredera cordifolia* (Tenore) Steen) Terhadap Penyembuhan Luka Sayat pada Tikus Jantan. *Jurnal Farmasi Higea*, 7(2), 162–163. <https://ejurnalunsam.id/index.php/jempa/article/view/1188>
- Erwiyani, A. F. L.-C. (2017). Cendekia *Journal of Pharmacy*. In Sekolah Tinggi Ilmu Kesehatan Cendekia Utama Kudus (Vol. 1). <https://doi.org/10.1128/AAC.03728-14>
- Fitriyah, N., Purwa, M. K., Alfiyanto, M. A., Wahuningsih, N., & Kismanto, J. (2013). Obat herbal antibakteri ala tanaman binahong. *Jurnal KesMaDaSka*, 116–122.
- Hutagaol, A. B., & Adriztina, I. (2022). The Differences In The Quality of Life of Allergic Rhinitis and Non-Symptomatic Individuals. *Oto Rhino Laryngologica Indonesiana*, 51(2), 103–108. <https://doi.org/10.32637/orli.v51i2.428>
- Machado, C., Reis-Silva, T., Lyra, C., Felicio, L., & Malnic, B. (2018). Buried Food-seeking Test for the Assessment of Olfactory Detection in Rat. *Bio-Protocol*, 8(12), 1–8. <https://doi.org/10.21769/bioprotoc.2897>
- Samirana, P. O., Pratiwi, D. M. N., Musdwiyuni, N. W., Andhini, D. A. A., Mahendra, A. N., & Yadnya-Putra, A. G. R. (2018). Uji Pendahuluan Toksisitas Akut Dermal Sediaan Salep Ekstrak Etanol 70% Daun Binahong (*Anredera Scandens* (L.) Moq.) Terstandar. *Jurnal Kimia*, 180. <https://doi.org/10.24843/jchem.2018.v12.i02.p14>
- Santosa, O. B. (2021). Standarisasi Eksternal Daun Binahong (*Anredera cordifolia* (Ten.) Steenis) Terstandar Vitexin Serta Aplikasinya Dalam Sediaan Kapsul Dengan Sodium Starch Glycolate Sebagai Penghancur.
- Susanti, G. (2017). Efek Anti Inflamasi Ekstrak Daun Binahong [*Anredera cordifolia* (Ten.) Steenis] Topikal terhadap Jumlah PMN Neutrofil pada Tikus Jantan Sprague Dawley. *Jurnal Kesehatan*, 8(3), 351. <https://doi.org/10.26630/jk.v8i3.644>
- Uzmayana, S. R. D. S. A. D. (2019). Potensi Kombinasi Saffron Dan Binahong Sebagai Wound Healing Stimulator Pasca Ekstraksi Gigi. *Prosiding Dental Seminar Universitas Muhammadiyah Surakarta*, 125–140.
- Vitta, K., & Magdi, Y. L. (2020). Terapi Maksimal Medikamenta pada Rinosinusitis Kronis. *Conferences of Medical Sciences Dies Natalis Faculty of Medicine Universitas Sriwijaya*, 1(1), 238–268. <https://doi.org/10.32539/dies.v1i1.28>
- Zulfa, E., Lailatunnida, L., & Murukmihadi, M. (2018). Formulasi Sediaan Krim Daun Binahong (*Anredera cordifolia* (Ten.) Steenis): Kajian Karakteristik Fisika Kimia Dan Uji Iritasi Kulit. *Jurnal Inovasi Teknik Kimia*, 3(1). <https://doi.org/10.31942/inteka.v3i1.21251>