International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR |Volume 11 | Issue 1 | Jan - Mar - 2023
www.ijamscr.com

Research article **Medical research**

Effect of kenop flower extract *(Gomphrena globosa)* on blood pressure reduction in hypertension female rats

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Published on: 10.03.2023

ABSTRACT

Background: Hypertension experienced, especially women of childbearing age are more susceptible to complications from cardiovascular disease as well as having an impact on pregnancy. One of the medicinal plants used by the community is the kenop flower (Gomphrena globosa) but there has been no research or clinical trial on humans. Thus, a strong preclinical basis is needed through animal testing to establish dosage and quality before conducting large-scale clinical trials in humans.
Objective: The researcher analyzed the kenop flower extract as an alternative to decreasing systolic and diastolic blood pressure in hypertensive female white rats.
Methods: The research design is a true experimental laboratory experiment using experimental animals by giving treatment to white rats (Rattus norvegicus) with a pretest-posttest control group design. This study used 3 groups of white rats, namely: 2 experimental groups with doses of 2.76mg/kgBW and 252mg/kgBW given once a day for ten days, and 1 control group without extract. Statistical test using Anova Repeated Measure, Paired T-test, and Independent t-test
Research Results: Experimental group 1 has shown a significant difference in the pretest and 2nd posttest observations with a p-value of 0.001. Experimental group 2 had a significant difference since the time of comparison of the pretest and 1st posttest observations with a p - value of 0.000. The comparison between the pretest and 2nd posttest observations shows a p - value of 0.000 < 0,05.
Conclusion: Kenop flower extract can reduce blood pressure in rats with hypertension and this study was conducted in vivo, so further testing is needed.

Keywords: Kenop Flower Extract, Gomphrena globosa, hypertension.

INTRODUCTION

High blood pressure or hypertension is a disorder of the hemodynamic balance of the cardiovascular system that occurs when blood pressure is above normal or >140/90 mmHg. Hypertension is the main cause of death in the world as well as being an independent risk factor because it is involved in the process of increasing morbidity and mortality from cardiovascular disease [1,2]. The Institute for Health Metrics and Evaluation (IHME) explains that hypertension can lead to complications such as heart disease, stroke, kidney disorders, and various other diseases that result in weakening of vital organ functions, causing disability and even death[3].

Hypertension not only attacks the elderly, but also young people who are classified as essential hypertension or primary hypertension. Hypertension experienced especially women of childbearing age are more susceptible to complications from cardiovascular disease as well as having an impact on pregnancy. Women of childbearing age (WUS) who experience hypertension before pregnancy are 4 times at risk of experiencing pre-eclampsia and bleeding

which can endanger the mother's life[4].Risk factors for hypertension in women of childbearing age are increased blood sugar levels, obesity, high stress levels, excessive salt consumption, use of hormonal contraception, and pregnancy problems [5,6].

The World Health Organization (WHO) stated that there were 1.14 billion people with hypertension in the world in 2018 and every year around 9.5 million people die from hypertension. The results of the 2018 Basic Health Research (Riskesdas) show that the prevalence of hypertension sufferers when viewed from a gender perspective shows that the female group has a greater number of hypertension sufferers, namely 36.85% compared to men as much as 31.34%. [7]

Women of childbearing age who experience uncontrolled hypertension are at higher risk of experiencing pre-eclampsia and bleeding which can threaten the mother's life during future pregnancies. The number of cases of maternal death in Indonesia in 2019 was caused by bleeding as many as 1,280 cases, and as many as 1,066 cases due to hypertension. The high number of cases of death of pregnant women caused by hypertension, it is necessary to manage safe pregnancy preparations through efforts to control blood pressure during the reproductive age so as to reduce the risk of preeclampsia during pregnancy.[8]

One of the medicinal plants that has been used by the community is Gomphrena globosa or flower knob which besides being cultivated as an ornamental plant is also believed to have benefits in diuretic treatment. [9,10]

Gomphrena globosa ethanol extract has strong antioxidant activity at a concentration of 49µg/ml and is non-toxic [11]. Knob flower also contains flavonoid compounds of 380 mg/100gr and macro-minerals in the form of potassium of 1904 mg/100gr which play an important role in lowering blood pressure.

METHODS

This type of research is a true experimental laboratory experiment using experimental animals by giving treatment to white rats (Rattus norvegicus) with a pretest-posttest control group design. This research has been registered with the Research Bioethics Commission of Sultan Agung Islamic University Semarang with ethical clearance number No.161NI/2021/Bioethics Commission.

The sample in this study were female Wistar rats made hypertension by giving MSG 100 mg/kgBW for 14 days so that they experience hypertension. This study used 30 rats which were divided into 3 groups, including: 1) experimental group 1, rats with hypertension who were given kenop flower extract at a dose of 2.76 mg/KgBW/day for 10 days; 2) experimental group 2, namely rats with hypertension who were given knob flower extract at a dose of 252 mg/KgBW/day for 10 days: 3) control group, namely rats with hypertension but without being given knob flower extract and only given food and drink for 10 days. On the 5th day, blood pressure was measured as the first post-test, and the last blood pressure measurement was taken on the 10th day as the second post-test. Analysis used the Anova Repeated Measure test, Paired T-test and Independent T-test.

RESULTS AND IMPROVEMENTS

Results of systolic blood pressure in all groups

The table 1 shows the mean systolic blood pressure in each group and at each observation time. The mean systolic blood pressure of the experimental group 1 which was given a knob flower extract at a dose of 2.76 mg/kgBW during the pretest observation was 152.6mmHg and decreased in the 2nd posttest observation to 131.6mmHg with the difference in the decrease in the mean systolic value of 21mmHg with percentage decrease of 13.8%. The average systolic blood pressure in the experimental group 2 which was given a knob flower extract at a dose of 252 mg/kgBW at the pretest observation was 144.3mmHg, and it decreased in the 2nd posttest observation to 119.7mmHg with a difference of 24.6mmHg reduction with a percentage decrease of 17%.

Table 1: The mean systolic blood pressure

Time	*mean* (mmHg)		
	exl	**Ex 2**	**Control**
Pre-test	152.6	144.3	144.7
Post-test (Day 5)	145.9	125.0	150.1
Post-test (Day 10)	131.6	119.7	148.3
A *pre post* 2	21	24.6	-3.60
Q	5,438	9,462	-1,423
*p-value**	0.000	0.000	0.189

****Paired T-test***

2) Results of diastolic blood pressure in all groups

The table 2 shows the *mean* diastolic blood pressure in each group and at each observation time. The average diastolic blood pressure of the experimental group 1 which was given a knob flower extract at a dose of 2.76 mg/kg BW at the time of the pretest was 108.6mmHg, and decreased gradually until the second posttest observation was 87.9mmHg with a large decrease in the mean diastolic pretest to posttest the second was 20.7mmHg with a decrease percentage of 19.1%. The average reduction in diastolic blood pressure in the experimental group 2 which was given a knob flower extract at a dose of 252mg/kg BW at the pretest, namely 108.3mmHg, decreased in the 2nd posttest observation, namely to 80.6mmHg with a difference of 27.7mmHg with a decrease percentage of 25.6%.

Table 2: The mean diastolic blood pressure in each group

Time	*mean* (mmHg)		
	ex 1	ex2	Control
Pre-test	108.6	108.3	106.1
Post-test (Day 5)	98.9	89.2	99.7
Post-test (Day10)	87.9	80.6	95.5
A *pre post* 2	20.7	27.7	10.6
Q	7,411	10,536	3,246
*p-value**	0.000	0.000	0.010

Paired T-test

In contrast to the experimental group 1 and experimental group 2 which experienced a decrease in blood pressure with a normal diastolic classification, the control group's average diastolic blood pressure at the pretest observation was 106.1mmHg then decreased to 95.5mmHg, but the difference in the decrease was only 10.6 and was not included in the classification. normal diastolic. The results of the paired test analysis of systolic and diastolic blood pressure before and after treatment in the intervention group showed that there were significant differences before and after treatment. This shows that there are differences in systolic and diastolic blood pressure before and after administration of kenop flower extract at doses of 2.76 mg/kg and 252 mg/kg given once a day for 10 days on a decrease in systolic and diastolic blood pressure in hypertensive female white rats. Kenop flower extract is categorized as having strong antioxidant activity. This is supported by research observing the in vitro antioxidant effectiveness of the ethanol extract of kenop flowers which has the ability to inhibit free radicals because it has strong antioxidant activity due to the presence of flavonoid compounds[12]. Flavonoid compounds in kenop flower extract act as antioxidants which play a role in preventing the formation of free radicals and breaking chain radical reactions so as to reduce the risk of hypertension[13,14] This is supported by studies using the same amount of flavonoids, which have been shown to reduce systolic and diastolic blood pressure[15]

CONCLUSION

1) Kenop flower extract (Gomphrena globosa*)* dose of 2.76 mg/kg/day for 10 days can reduce systolic blood pressure by 21mmHg or 13.7% and diastolic by 20.7mmHg or 19.1%.
2) Kenop flower extract (Gomphrena globosa) dose of 252 mg/kg/day for 10 days can reduce systolic blood pressure by 24.6mmHg or 17% and diastolic by 27.7mmHg or 25.6%.
3) There was no significant difference in blood pressure reduction between systolic blood pressure given kenop flower extract at a dose of 2.76 mg/kgBW and a dose of 252 mg/kgBW with p=0.413 and diastolic blood pressure p=0.078.

SUGGESTION

The results of this study can be used as a basis for the development of further research by conducting further research, namely applying kenop flower extract to humans and adding variables of NO levels and antihypertensive drugs.

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