THE EFFECT OF HONEY WATER ON BLOOD PRESSURE IN HYPERTENSION ELDERLY

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DEPARTMENT OF NUTRITION
FACULTY OF HEALTH SCIENCE
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THE EFFECT OF HONEY WATER ON BLOOD PRESSURE IN HYPERTENSION ELDERLY

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I sincerely declare that this thesis originally belongs to my own work and not belong to another researcher for a different degree. Furthermore, this thesis is never published before, except for some parts with their original references.

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J.Akhir 11\textsuperscript{th} 1440 H

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2. Al-Ustadzah drg. Ruskiah Octavia, M.M., as Dean the Faculty of Health, University of Darussalam Gontor.
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With the compilation of this thesis, the author is fully aware were far from perfection. Therefore the author apologizes if there is a typing error or a series of words in this thesis.

Ngawi, February 2019

Author
ABSTRACT

PENGARUH LARUTAN MADU TERHADAP TEKANAN DARAH LANJUT USIA

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Hipertensi adalah salah satu faktor risiko utama penyakit kardiovaskular dan umumnya merupakan penyebab utama gagal jantung, kematian mendadak, stroke, penyakit jantung koroner, dan insufisiensi ginjal. Perawatan non-farmakologis untuk hipertensi perlu dikembangkan seperti mengkonsumsi madu. Tujuan penelitian ini untuk mengetahui pengaruh intervensi larutan madu terhadap tekanan darah sistolik dan diastole lanjut usia di Aisyiyah Nursing Home di Surakarta. Jenis penelitian ini adalah kuantitatif dengan menggunakan pendekatan eksperimen semu dengan desain kelompok kontrol pre-posttest dengan 24 responden yang dipilih secara purposive sampling dan dibagi menjadi 4 kelompok yaitu O1 (70 gr madu), O2 (35 gr madu), K- (kontrol dengan hipertensi) dan K+ (kontrol dengan normotensif). Tekanan darah sistolik dalam uji statistik menunjukkan bahwa ada pengaruh larutan madu terhadap tekanan darah sistolik sebelum dan sesudah intervensi dengan p = 0,000 (p <0,05), serta tekanan darah diastolik dalam uji statistik, menunjukkan bahwa ada adalah efek dari larutan madu pada tekanan darah diastole sebelum dan sesudah intervensi dengan p = 0,001 (p <0,05). Sehingga, terdapat pengaruh yang signifikan terhadap intervensi larutan madu dengan dosis madu 35 dan 70 gr terhadap tekanan darah sistolik dan diastolik pada lansia.

Kata Kunci: Madu, Tekanan Darah, Lanjut Usia
ABSTRACT
THE EFFECT OF HONEY WATER ON BLOOD PRESSURE IN HYPERTENSION ELDERLY

Siti Aulia Musyayyadah
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Background: Hypertension is one of the main risk factors for cardiovascular disease and generally a major cause of heart failure, sudden death, stroke, coronary heart disease, and renal insufficiency. Non-pharmacological treatment for hypertension needs to be developed such as consuming honey. Objective: This study aims to determine the effect of honey water on systolic and diastolic blood pressure in elderly at the Aisyiyah Nursing Home Surakarta. Method: This type of research is quantitative using a quasi-experimental approach with a pre-posttest control group design with 24 selected respondents by purposive sampling which were divided into 4 groups, namely O1 (70 gr honey), O2 (35 gr honey), K- (control with hypertension) and K + (control with normotensive). Results: There is a difference in average systolic blood pressure before and after giving honey for O1 with p-value 0.026 and O2 with p-value 0.010, and diastole blood pressure for O1 with p-value 0.030 and O2 with p-value 0.004. Systolic blood pressure in the statistical test showed that there was an effect of honey water on systolic blood pressure before and after intervention with p = 0.000 (p <0.05) as well as an effect of honey water on blood pressure diastole before and after intervention with p = 0.001 (p <0.05). Conclusion: There was a significant effect on the intervention of honey water with 35 and 70 gr honey dosage on systolic and diastolic blood pressure in the elderly.

Keywords: Blood Pressure, Elderly, Honey.
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CHAPTER 1
INTRODUCTION

1.1 Background of The Research

Cardiovascular disease is the number one causes of death of non-communicable diseases (PTM) in which more than 36 million people died because of it (WHO, 2018). Hypertension is one of main risk factors of cardiovascular disease and cause of heart failure, sudden death, stroke, coronary heart disease, and renal insufficiency. Hypertension has a risk to lead a stroke and heart failure (Raihan and Dewi, 2009). Based on WHO data (WHO, 2013), 45% of death is due to heart disease which was caused by hypertension as well as 51% of death is due to stroke. It proves that ignoring hypertension will increase the possibility of life-threatening complications.

Hypertension causes the heart to work beyond reasonable limits in pumping blood to circulate oxygen and nutrients from the body through blood vessels so that blood pressure increases. By increase blood pressure, dangerous consequences of the heart and blood vessels in major organs such as the brain and kidneys will also increase (Susilo et al., 2011). In addition to damaging the primary organs, hypertension affects eyes disfunction and end in blindness if it’s untreated. Blood pressure increased in hypertensive people because of many factors, such as gender, age, genetics, diet, exercise habits, stress levels and others (WHO, 2018). So, the prevalence of hypertension is strongly influenced by the description of these factors in a community.

According to the Indonesian Ministry of Health (WHO, 2018), the prevalence of hypertension in Indonesia obtained through measurements in which it is ≥ 18 years old increased to 34.1% compared to the previous year. Based on data from the Health Office (Ministry of Health, 2016), the proportion of hypertension in the province of Central Java is 60%. Meanwhile the second highest after hypertension is Diabetes Mellitus
which is 16.42%. In this case, Surakarta City included in the ten highest hypertension in Central Java which is 23.12% covering 21.91% men and 23.98% women. At the Aisyiyah Nursing home in Surakarta, data was obtained from 30 elderly and half of them suffering hypertension in which the average elderly had high blood pressure before entering the nursing home. According to Sustrani (2006), diet is a way to regulate a balanced nutritional intake in which it is needed by the body. Food can be a way to cure hypertension without giving a severe indication and does not cause dependence on people with hypertension.

In the Qur’an and Hadith, it has mentioned that some food is beneficial for health even had function as drugs, such as fruit, olive oil, pomegranate, milk, meat, dates (ruthab, balah, and tamer), grapes, bananas, ginger and honey (As-Sayyid, 2006). One of the common dietary patterns by the Prophet Muhammad is a glass of water mixed by honey taken before meals to maintain health. Ibn Qayyim Al-Jauziyyah in his Book Zad Al-Ma’ad (Shalih, 2012) describes the hadith of Imam Bukhari about treating with honey in which honey as nutritious food, medicine, sweet food, and liquid relieves among other foods and there was not some exceed substances than honey compound.

قَالَ رَسُولُ الله: الشِّفَاءُ فِي ثَلاَثٍ: شَرْبَةِ عَسَلٍ وَشَرْطَةِ مِحْجَمٍ وَكَيَّةِ نَارٍ وَأَنْهَى أُمَّتِى عَنِ الْكَيِّ (رواه البخاري)

“Indeed, the drug is in three cases, namely drinking honey, sticking and kayy with fire, then it is forbidden for my people to have a kayy with that fire.” (Hadith narrated by al-Bukhari)

Honey has a useful role in regulating blood pressure in which honey can reduce the effectiveness of salt in food. Honey can attract water and reduce amount of water in the blood so it would lower blood pressure (Shalih, 2012). A previous study revealed the effect of honey in lowering blood pressure at a dose of 20 ml given daily for one year. The antioxidants found in honey reduce blood pressure through a mechanism of coronary
artery vasodilation which has a hypotensive effect (Aluko et al., 2014). The same research about honey have been done by Nurhaedar (Jafar, 2013) that showed honey water can reduce blood glucose and blood pressure (Jafar, Hamid and Najamuddin, 2017) in diabetic type 2 with a dose of 35 ml in the morning and evening. Hasan Alzahrani proved in his research that three types of honey from different geographical places have high phenol content correlated with antioxidant effectiveness (Alzahrani et al., 2012). Following research conducted by Erejuwa Omotayo proved that the antioxidants contained in honey affect blood pressure in diabetic rats (Erejuwa et al., 2012) In addition to natural antioxidants, some vitamins have antioxidant effects such as vitamin D, E, C and some micronutrients (magnesium, potassium, calcium) have a positive influence on reducing blood pressure (Sorriento et al., 2018).

Among previous studies, there is no studies which has linked to Islamization of consumption of honey as the Sunnah of Rasulullah SAW to elderly blood pressure. Based on the description above, then it becomes an important thing to study about the influence of honey water as one of sunnah, mainly if it associated with blood pressure in the elderly.

1.2 Formulation of The Research Problem

Does honey water affect on blood pressure in elderly with hypertension?

1.3 Objective of The Research

1.3.1 General Objective

Knowing the effect of honey water on blood pressure in elderly with hypertension

1.3.2 Specific Objective

1. Knowing blood pressure before and after giving of honey water in elderly with hypertension
2. Knowing the effect of honey water with a dose of 35 gr
honey on blood pressure in elderly with hypertension
3. Knowing the effect of honey water with a dose of 70 gr
   honey on blood pressure in elderly with hypertension

1.4 Benefit of The Research

1.4.1 For Respondents
1. Being considered in the management of hypertension so that it can
   be used as an effort to prevent hypertension
2. Being one of the alternative treatments for people with hypertension
   to gradually reduce blood pressure and control blood pressure as
   a form of natural preventive action which has relatively few side
   effects

1.4.2 For Institution
   It is expected giving contribution ideas to the center of
   Islamization of knowledge about the benefits of honey as one of the
   circumcised foods of Rasulullah SAW that can affect health

1.4.3 For Researchers
   This study is expected giving a reference for the development of
   Islamization in further studies of the effect of honey water in improving
   health

1.5. Authenticity and Previous Research

The study about the effect of drinking honey water on blood pressure
in patients with hypertension is based on a preliminary study about the effect
of giving honey on blood pressure status. The differences in this research
compared to previous studies are as follows:
<table>
<thead>
<tr>
<th>Researcher/year</th>
<th>Title</th>
<th>Methods</th>
<th>Result</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emilia Puspitasari/2016</td>
<td>The Effect of Giving Green and Honey Tea on Decreasing Blood Pressure in Hypertensive Patients in RW 24 Pringgokusuman Village Yogyakarta.</td>
<td>Quasi-Experiment, pre-post-test nonequivalent control group design</td>
<td>Giving green tea affects the decrease in blood pressure in patients with hypertension in RW 24 Pringgokusuman Village Yogyakarta.</td>
<td>The independent variables used were green tea and honey. The sampling technique was simple random sampling (lottery technique) which was 20 people divided into two groups during January 2016.</td>
</tr>
<tr>
<td>Rahmatul Aini/2018</td>
<td>The Effect of Giving Honey on Changing of Blood Pressure in Hypertensive Patients at the Equatorial Health Center UPK North Pontianak District.</td>
<td>Quasi-Experiment, pre-post-test nonequivalent control group design</td>
<td>There was a significant effect of giving honey on reducing blood pressure in hypertension patients at the Equatorial Health Center UPK North Pontianak District.</td>
<td>The number of samples is 40 people aged 45-60 years and over employing the sampling technique in form of the accidental sampling method. Research time was 14 days. There is dietary hypertension counselling in each treatment.</td>
</tr>
<tr>
<td>Author</td>
<td>Title</td>
<td>Designation</td>
<td>Description</td>
<td>Sample Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Aluko, Olusola et al/2014</td>
<td>Honey’s Ability to Reduce Blood Pressure and Heart Rate in Healthy Male Subject. Frontiers in Science Journal Vol. 4 No.1</td>
<td>Pre-Experimental, one group pre-posttest design</td>
<td>In a short period, giving of honey can reduce blood pressure in healthy male students.</td>
<td>The study use sample of 50 healthy male students aged 18-25 years. The study was taken in 3 different times, namely 15 minutes, 30 minutes and 60 minutes after giving of 35 ml honey.</td>
</tr>
<tr>
<td>Dwi Tias Fitriani/2013</td>
<td>The effectiveness of Curcuma in Reducing Blood Pressure in the Elderly at UPT Social Nursing home Tresna Werdha Mulia Dharma Kubu Raya District</td>
<td>Pre-Experimental, one group pre-posttest design</td>
<td>There is an alteration in the value of systole and diastole before and after giving ginger at the UPT Social Nursing home Tresna Werdha Mulia Dharma, Kubu Raya District.</td>
<td>Independent variable used was Curcuma. The total sample were 12 respondents consisted of 7 men and five women aged 65-75 years.</td>
</tr>
</tbody>
</table>
2.1 Theoretical Basis

2.1.1 Honey in The Qur’an and Hadith

Hadiths related to honey as medicine from Bukhari’s history (As-Sayyid, 2006) are as follows:

«Indeed, the drug is in three cases, namely drinking honey, sticking and kayy with fire, then it is forbidden for my people to have a dream with that fire.» (Hadith narrated by al-Bukhari)

Imam Bukhari’s Hadist in the Book of “Ath-Thibb” about taking medication with honey (dawaau bi al-‘asl) cited by (Abdul Baqi, 2013) stated that:

Abu Sa’id has narrated the hadith that a man came to the Prophet and said, “Truly my brother’s stomach is painful.” The Prophet replied, “Give him some honey.” So, the man’s illness went away. Again, he came, and said, “I have given him honey to eat but he did not get any better.” (He gave the same advice). The same thing happened twice. On
the third and fourth occasions, the Prophet said, “Allah is the truth-and the belly of your brother has lied!” So, he gave him honey to eat again, and then he was cured. Al-Bukhari has also narrated this story (Baqi, 2013).

The hadith explains that honey has excellent benefits for health as the studies in which honey was used to cure infections in stomach and skin as well as cure diarrhea, insomnia, sunburn and sore throat (Shaikh, 2015). The hadith was clarified by Shalih’s statement (2012) that the purpose of the Prophet Muhammad orders to do the repetition in drinking honey was to adjust the severity of the disease that complained. The Prophet Muhammad mentioned the dosage of the drug which was adjusted to the severity of the suffered illness.

Allah SWT says in Al-Qur’an Karim:

وَأَوْحَى رَبُّكَ إِلَى النَّحْلِ أَنِ اتَّخِذِي مِنَ الجِبَالِ بـُيُوْتًا وَمِنَ الشَّجَرِ وَمِمَّا يُعْرِشُونَ فَثُمَّ كُلِي مِنْ كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلاً يَخْرُجُ يَتَفَكَّرُونَ { النحل: 68-69}

“And your Lord was inspired by the bee. “Make nests in the mountains, in the trees also in the structures which men erect. Then eat from every kind of fruit and take the path of your Lord which made easy for you to follow.” “From inside them comes a drink (honey) of varying colours, containing healing for humanity. There is certainly a sign in that for people who reflect.” (An-Nahl: 68-69).

The sentence in verse “... containing healing for humanity ....” indicates that honey in the Qur’an has a great nature (Shalih, 2012). Rasulullah SAW has taught his people about the benefits of honey for health. Meanwhile the Qur’an in several verses prove that Allah SWT created bees and gave them ability to produce honey. Modern science also proves that honey can eliminate harmful substances that may
accumulated in blood vessels and intestines. Honey can also be useful for maintaining stamina and increasing body immunity (Gray, 2010).

2.1.2 The Content of Honey

Honey contains vitamins and antioxidants which consist of several phenolic components such as pinocembrin, pinobaxin, chrysin, luteolin, quercetin (Chayati, 2014). It also consisted of sugar (glucose and fructose), minerals (magnesium, potassium, calcium, sodium, sulfur, iron and phosphate). There are several vitamins contained in honey, such as vitamins B1, B2, B3, B5, B6, vitamin C and vitamin D according to the quality of nectar and pollen, the content of copper, iodine and zinc yet in small amounts (Shaikh, 2015) Honey was formed from a variety of plant nectar with different soil conditions, pollination, and air. Meanwhile the composition of honey was set from the following elements:

<table>
<thead>
<tr>
<th>Elements</th>
<th>Level</th>
<th>Elements</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>17.1 gr</td>
<td>Vitamin C</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>82.4 gr</td>
<td>Niacin Acid</td>
<td>0.12 mg</td>
</tr>
<tr>
<td>Protein</td>
<td>0.3 gr</td>
<td>Vitamin B2</td>
<td>0.38 mg</td>
</tr>
<tr>
<td>Fructose</td>
<td>40.9 gr</td>
<td>Vitamin B6</td>
<td>0.02 mg</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>4 mg</td>
<td>Iron</td>
<td>0.42 mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>6 mg</td>
<td>Zinc</td>
<td>0.22 mg</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>50 mg</td>
<td>Potassium</td>
<td>52 mg</td>
</tr>
</tbody>
</table>

Source: USDA (2018)

In honey, some antioxidants can repair oxidative stress or reduce blood pressure. Oxidative pressure plays an important role in balancing the vasoconstriction and vasodilation mechanisms. Nitric Oxide (NO) in honey can trigger insulin secretion to absorb magnesium ions and causes vascular dilatation which lower blood sugar levels and can freely lead to coronary artery vasodilation in humans thus providing a hypotension effect (Aluko et al., 2014). It is similar to the research
of Noviyanti Choirunnisa, related to magnesium which acts as a blood vessel vasodilator by producing prostacyclin and NO (Nitric Oxide) (Ramadhian et al., 2013).

The other substance from honey that can reduce blood pressure is potassium (potassium). Potassium dominates in the intracellular fluid around 145 mEq/L and five mEq/L in extracellular fluid. Meanwhile sodium predominates in the extracellular fluid which reaches 60 mEq/L and 14 mEq/L in intracellular fluid (Yaswir et al., 2012). One of the causes of hypertension is concentration of sodium that increased in extracellular fluid resulting in an imbalance of it. Potassium has an antihypertensive effect because it can balance extracellular fluid by inhibiting sodium reabsorption in the renal tubule and suppressing renin secretion so the excretion of sodium and water increased (Ramadhian et al., 2013).

Vitamin D in honey has a relationship with a reduction in blood pressure in which vitamin D deficiency can be a risk for cardiovascular disease. Vitamin D can reduce renin-angiotensin-aldosterone activity, modulate endothelial function and regulate oxidative stress in blood vessels. In a clinical study, there was a relationship between consumption of vitamin D3 and a decrease in blood pressure. It was caused by antioxidant activity in vitamin D (Sorriento et al., 2018).

Study conducted by Hiwatashi on the effects of honey containing Gamma-aminobutyric acid (GABA) was able to reduce blood pressure in hypertension experimental mice by flexing the stiff heart nerve cells due to cholesterol and blood sugar. The phenolic components, especially the types of flavonoids act as other antioxidants such as flavone, pinocembrin, pinobaxin, and chrysin. So, honey can be beneficial for health and prevent degenerative diseases such as hypertension (Ramadhian et al., 2013)
2.1.3 The Rasulullah’s Diet

The lifestyle provides an influence on health in which activities need to be scheduled or arranged in such a way that the body needs time to rest so that the body’s work system returns to optimal. In addition to rest, even the right and nutritious food intake become an important point in managing a healthy lifestyle. In Islam, it has been mentioned some things that need to be considered in regulating eating patterns, such as not excessive as QS. Al-Araf verse 31 which said foods that are halal and nutritious are appropriate as stated in QS. Al-Maidah verse 5. The verses of the Qur’an explain that having physically health means having a health and strong body which can be realized by diet management. It is according to research conducted by Muhammad (Wahyudi, 2015) regarding to the diet management to support a healthy lifestyle based on the perspective of the Qur’an in which one of them performed by the Prophet Muhammad. Rasulullah SAW said it was related to the importance of managing diet:

ما مَلََ آدمٌ وِعَاءً شَراً مِنْ بَطْنِ حَسْبُ الآدمٍ لُقِيمَاتٌ يُقِمْنَ صُلْبَهُ فَإِنْ
 غَلَبَتْ الآدمٍ نفْسُهُ فَثُلُثٌ لِلطَّعَامِ وَثُلُثٌ لِلشَّرَابِ وَثُلُثٌ لِلنَّفَسِ

“There is no vessel filled with humans that is worse than the stomach. It is enough for humans to take several bribes (food) to straighten their spine. If he does not have power, then it is enough for one third for food, one third for drinks, and one third for breathing.”(Narrated by Ibn Majah: 3340, and validated by al-Albani in ash-Shahihah: 2265)

The hadith explained that the function of food is to fulfill the body’s needs, especially for activities with appropriate portions and not excessive. It was because eating with an excessive portion without considering to health conditions will be a trigger factor of degenerative diseases (As-Sayyid, 2006). This hadith also related to an appropriate diet which takes into account the number, type, schedule, and processing
arrangements. So, food that enters the body must be under the rules of diet as recommended by the Prophet Muhammad (Rahayu, 2017). Ibn Majah narrated from Abu Hurairah r.a *marfu’* that the Messenger of Allah said:

من لعَقَ العسل ثلاث عدوات كل شهر: لم يصبَه عظم البناء

“Whoever drinks three spoons of honey in three mornings every month, surely he will not get a serious illness.”

In addition to honey, other foods that are commonly consumed by the Messenger of Allāh and mentioned their priority in the Qur’ān are:

1. Fruit Tin and olives.

   At-Tin verse 1-2 and the hadith of Abu Darda ra. which states that Tin can cure haemorrhoids and gout. The Messenger of Allāh said that olives are also a good fruit as narrated from at-Tirmidhi and Ibn Majah from Abu Hurairah from the Prophet in which he said, “Eat olives and make them lubricants because in fact they are blessed trees” (As-Sayyid, 2006).

2. Meat

   The Messenger of Allāh had said in an authentic hadith, “The virtue of Aisyah from other women was like the primacy of the tsarid than all food.” Tsarid itself is meat bread which was usually consumed in the days of the Prophet Muhammad. Ali r.a said, “Eat meat because it can cleanse colour, stomach and can improve appearance.” (As-Sayyid, 2006).

3. Dates

   Maryam verse 25-26 mentioned “Shake the base of the date tree toward you, surely (the tree) will abort the ripe dates to you. Then eat, drink and have mercy on you.” Besides, the hadith of the Prophet states “Ajwa dates come from heaven, and there are drugs (antidotes) for poisons.” (As-Sayyid, 2006).
Even though these foods contain useful elements to the body, all foods which recommended as well as their priorities were mentioned by the Prophet Muhammad as stated in the Qur’an in which they are still consumed properly according to what Allah SWT said in Al-Araf verse 31.

وَكُلُوْا وَاشْرَبُوْا وَلَ تُسْرِفُوْا إِنَّه' لَ يُحِبُّ الْمُسْرِفِينَ

“Eat and drink, but don’t overdo it. God does not like excessive people.”

This verse explained Islamic perspective in various aspects, primarily related to food which has a purpose to maintaining soul and mind. Islamic Shari’a also recommends eating various foods according to body’s need. So Muslim can grow healthy because Allah SWT likes firm believers.

2.1.4 Hypertension

According to WHO (2013), hypertension is defined as systolic and diastolic blood pressure which reaches 140/90 mmHg or more. Hypertension is a condition of chronic blood pressure which increase in the long term and will result several degenerative diseases such as stroke, atherosclerosis to death (Hardinsyah, 2015).

Table 3. Classification of Blood Pressure According to JNC-7

<table>
<thead>
<tr>
<th>JNC Category</th>
<th>WHO Category</th>
<th>Systolic (mmHg)</th>
<th>Diastolic (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>Optimal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Normal</td>
<td>Normal</td>
<td>&lt;130</td>
<td>&lt;85</td>
</tr>
<tr>
<td>High-normal</td>
<td>High-normal</td>
<td>130-139</td>
<td>85-89</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Grade 1</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>stage 1 (mild)</td>
<td>Hypertension (mild)</td>
<td>140-149</td>
<td>90-94</td>
</tr>
<tr>
<td></td>
<td>Subgroup:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Borderline</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Most people with hypertension did not get a particular symptoms such as headache, bleeding in the nose, migraine, reddish face, dizzy eyes, neck pain, and fatigue. These symptoms can occur in hypertension people or someone with normal blood pressure. Unlike the severe hypertension without any treatment, these symptoms need to be treated well to avoid complications of the disease such as brain damage, eyes, heart, and kidneys. The types of hypertension divided into two (Susilo, 2011)

1. Primary hypertension (primary hypertension)

   The primary hypertension is caused by combination various factors of hypertension such as diet, alcohol consumption, smoking habits, excessive salt consumption or even unknown causes. Primary hypertension also affects the regulation of the heart and blood vessels (Saputra and Indrawanto, 2013). Genetic factors supposed to be a main factor of hypertension.

2. Secondary hypertension (secondary hypertension).

   The secondary hypertension is caused by abnormality of specific organ or system in the body. Abnormality of specific organ in secondary hypertension occur in some organ or blood vessel such as the kidneys, adrenal glands or aortic blood vessels in which the
blood vessels that supply blood to the kidneys narrowed (Susilo, 2011). In the elderly, blood vessels narrowed because of hardened fat deposits which tend to atherosclerosis (Lionakis et al., 2012). Based on the study of (Sartik, 2017), hypertension increases with age so that measuring blood pressure early would be the importance one to prevent hypertension. Some risk factors of hypertension are:

1. age
2. family history
3. smoking habit
4. physical activity

Among all these risk factors, the most dominant factors affected the incidence of hypertension are age and family history. The diagnosis for the hypertension elderly was recommended by JNC and WHO which most of them are primary hypertension and isolated systolic hypertension in which only the systolic pressure is high, but the diastolic pressure remains normal (Seke, 2016).

2.1.5 Hypertension in The Elderly

Blood pressure increases in line with age. In the elderly, peripheral arterial resistance is caused by a change in the consistency of arterial vessels so that the elasticity of the vessel walls decreases and becomes stiff (Lionakis et al., 2012). It is also supported by (Kenia, 2013) that hypertension in the elderly is caused by the heart valves which thickened and stiff, the elasticity of the aortic wall decreases, cardiac output decreases, the heart’s performance is more susceptible leading to bleeding and blood pressure increases. Hypertension in the elderly is also caused by changing in lifestyle, stress levels, excessive salt consumption, less of health awareness, decreasing baroreceptor sensitivity and sodium retention (Kuswardhani, 2016). Blood pressure increases in line with the age factor is higher than those who consume excess salt (Kenia, 2013).
Blood pressure increases in the elderly pathophysiologically caused by some factors (Martono, 2014):

1. The stiffness of large arterial walls
2. Elevated renin concentration
3. Sodium intake is too high
4. Endothelial cell dysfunction and increased peripheral resistance

The type of hypertension in the elderly is different from hypertension patients in general. The symptom of hypertension in the elderly is that only systolic blood pressure has increased above 140 mmHg while the diastolic blood pressure remains normal, which is below 90 mmHg. This type of hypertension is called *Isolated Systolic Hypertension* (ISH) (Seke, 2016). Isolated systolic hypertension generally occurs at the age of 60 years and over with 2-4 time more risks of myocardial infarction, impaired kidney function, stroke and cardiovascular system death (Martono, 2014).

Management of hypertension in the elderly usually includes lifestyle modification accompanied by giving of antihypertensive drugs such as calcium dosage of diuretics and phase in antagonists (Dilianti et al., 2017). The target of blood pressure in the elderly is about 140/90 mmHg, except those with Diabetes Mellitus in which blood pressure 130/80 mmHg (Martono, 2014).

2.1.6 Pathophysiology of Hypertension

Blood pressure is a result of cardiac output and total vascular resistance. Some factors that influence the regulation of blood pressure in short and long term are cardiac output, blood volume, blood vessel elasticity, humoral mediators and nerve stimulation. Several mediators affect the dilation and narrowing the blood vessels, such as vasoconstrictors (endothelin [ET], angiotensin II [Ang II], catecholamines) or vasodilators (nitric oxide [NO], prostaglandin, clinical) (Hamrahlan, 2017).
The mechanism of hypertension is through renin produced by the kidneys which converts angiotensinogen to angiotensin I. *Angiotensin Converting Enzyme* (ACE) generated by the lungs and converts angiotensin I to an amino-8 acid peptide or angiotensin II. Angiotensin II is a potent vasoconstrictor that causes narrowing of the arteries. It will ultimately increase blood pressure and resistance toward blood flow (Dilianti et al., 2017). Blood pressure which is increased by Angiotensin II occur through 2 pathways.

1. The first route is to increase the secretion of *Antidiuretic Hormone* (ADH) and thirst. ADH is produced by the pituitary gland in the brain and cooperates with the kidneys in the regulation of osmolality and urine volume so that the increase in ADH will cause little urine secretion (antidiuresis). The volume of intracellular fluid is pulled out to dilute the concentrated urine condition and its high osmolality then increasing the volume of extracellular fluid. This condition causes the increase of blood volume and blood pressure (Dilianti et al., 2017).

2. In the second pathway, ADH stimulates aldosterone secretion from the adrenal cortex. Aldosterone is a steroid hormone that plays a role in the kidneys to regulate extracellular fluid volume by increasing NaCl reabsorption in the kidney tubules, so that extracellular fluid volume increases and blood pressure does too. (Hamrahlan, 2017).

That process is called autoregulation of the body for increasing and decreasing blood pressure. Some complex factors of hypertension (such as age, lack of physical activity, smoking habits, alcohol consumption) will affect blood pressure regulation. In addition to these complex factors, there were oxidative stress factors in the pathophysiology of hypertension that affect the blood vessel system (endothelial cells, smooth muscle cells, etc.). Oxidative stress is an imbalance in the number of radicals (such as ROS and RNS) with antioxidants present in the body (Sorriento et al., 2018). Oxidative stress
caused by a decrease in the amount of oxygen and nutrients resulted to microvascular damage. Free radicals which increase under oxidative stress conditions will trigger the production of atherosclerosis factors, such as Angiotensin II.

2.1.7 Nitric Oxide (NO) As a Blood Pressure Regulator

The balance of oxidants and antioxidants will protect cells from the adverse effects of free radicals (Sorriento et al., 2018). In the body, the freest radicals are oxygen-derived free radicals (Reactive Oxygen Species /ROS) and nitrogen-derived free radicals (Reactive Nitrogen Species / RNS) (Parwata, 2015). The imbalance between the production of ROS / RNS and the number of antioxidants in the body lead to oxidative stress and cause hypertension.

Nitric Oxide is produced by endothelial cells and diffused into vascular smooth muscle cells, activates cGMP as a NO intermediary to effect smooth muscle relaxation and inhibit platelet aggregation (Grassi et al., 2010). Nitric Oxide (NO) is a form of free unreactive radicals and one of regulators of blood pressure (Ogun and Ozcan, 2015). When superoxide (one type of free radicals) increases in the body, NO will degrade rapidly and causes damage on blood vessel endothelial cells so that flexibility of muscle decreases and blood pressure increases.

2.1.8 Effect of Antioxidants on Blood Pressure

Antioxidants are compound that absorb or neutralize free radicals and prevent degenerative diseases such as cardiovascular, carcinogenesis and others. Antioxidants are found in food or beverages in the form of natural antioxidants such as vitamins A, C, D, E, folic acid, anthocyanin, phenol components, and flavonoids commonly found in food and beverages. The synthetic antioxidant are compounds such as Butyl Hydroxy Anisol (BHA), Butyl Hydroxy Toluene (BHT),
Propyl Galat (PG) and tert-butyl Hydroxy Quinn (TBHQ). Besides, using synthetic antioxidants for a long time will have side effects on health (Parwata, 2015).

Figure 1. The effect of flavonoids to protect the cardiovascular system (Grassi, et al., 2010)

Antioxidants have a function to break or even stop the chain of free radicals in the body to prevent cells of the body from damage. Antioxidants can prevent free radicals that cause oxidative stress that then trigger the production of nitric oxide (NO) in endothelial cells of arteries so that increasing vascular function and decreasing blood pressure (Ramadhian et al., 2013). Nitric oxide which is contained in endothelial cells of arterial blood vessels plays a role in regulating the flexibility of blood vessels (Grassi et al., 2010), keeping the muscle structure in balance and preventing blood clots from avoiding inflammation and oxidative stress (Parwata, 2015).
Giving honey contain by natural antioxidants such as flavonoids can increase the bioavailability of nitric oxide (NO) through superoxide capture in the body which causes a decrease in blood pressure and inhibit peroxynitrite formation (Parwata, 2015). Peroxynitrite (OONO-) is cytotoxic which inhibits mitochondrial function (Sorriento et al., 2018). Flavonoids capture peroxynitrite which damages vasorelaxation endothelium and disrupts the endothelium so that blood circulation in the coronary arteries becomes better. Endothelial cells synthesize several bioactive substances that regulate the structure of blood vessel function (Ramadhian et al., 2013). It is consistent with the statement of Davide (Grassi et al., 2010) that flavonoids as a type of natural antioxidant in honey can increase the bioavailability of nitric oxide (NO) and reduce oxidative stress. By that way, the role of natural honey antioxidants in improving vascular function can reduce blood pressure in hypertension.
2.2 Theoretical Framework

The theoretical framework of the research is general points include the background of the research. Based on literature review, some points which related to blood pressure would be discuss by the researcher in form of diagram.

**Figure 2. Theoretical Framework of research**

Modification framework by:

2.3 Conceptual Framework

There is an effect of honey water on blood pressure in the elderly with hypertension.

2.4 Hypothesis

There is an effect of honey water on blood pressure in the elderly with hypertension.
3.1 Research Design

This research is a quantitative research employing Experimental research design challenges (Quasi alphabets experiment) and Control Group pre-posttest design. The study used the intervention group and the control group. The intervention group that is hypertension elderly are given honey water one time/day as much as 35 and 70 gr. While the control group the elderly who have not given honey water. The design of the study is follows:

![Research Design Diagram]

**Figure 3. The research design with control group pre-posttest**

Description:

- **O1** = Pre-test for intervention group with hypertension before given intervention honey water (35 gr of honey)
- **O2** = Post-test for intervention group with hypertension after given intervention honey water (35 gr of honey)
- **O3** = Pre-test for intervention group with hypertension before given intervention honey water (70 gr of honey)
- **O4** = Post-test for intervention group with hypertension after given intervention honey water (70 gr of honey)
X1 = The intervention in the form of honey water given one time/day as much as 35 gr of honey
X2 = The intervention in the form of honey water given one time/day as much as 70 gr of honey
K1 = Pre-test for negative control group with hypertension
K2 = Post-test for negative control group with hypertension
K3 = Pre-test for positive control group with normal tension
K4 = Post-test for positive control group with normal tension

3.2 Research Flow Diagram

![Research Flow Diagram](image)

Figure 4. Research flow diagram
3.3 **Time and Place Implementation**

The researcher conducted this study at the Aisyiyah Nursing home. The time of the study was carried out from the beginning of the proposal process until the writing process of the thesis report in November 2018 – February 2019 and seven days for giving the honey water once/day. The criteria of place that used are Islamic Institutions that have not given honey water’s therapy and self-food management.

3.4 **Subject of Research**

3.4.1 Population

The Population in this study were all Elderly in the Aisyiyah Nursing home in Surakarta

3.4.2 Number of The Sample and Research Sampling Techniques

The sampling technique in this study used Purposive Sampling by taking samples from the population according to the researcher is need based on the purpose or problem of the research and the characteristics of the desired subject (Rachmat, 2015). The samples in this study are elderly in the Aisyiyah Nursing home in Surakarta having the inclusion criteria:

1. Systolic Blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg in hypertension level 1 and level 2
2. Age above 50 years old
3. Not taking antihypertensive medication
4. Being in the scope of the hostel and getting an intake from the same source.

The Exclusion criteria for this research is patients with diabetic and chronic kidney disease. To know a minimal sample of this experimental, the research used Federer formula (Supranto, 2000):

\[(t - 1) (n - 1) \geq 15\]

Information:
t = amount of intervention group
r = amount of sample

So, the calculation is:

\[
(4 - 1)(n - 1) \geq 15
\]
\[
3(n - 1) \geq 15
\]
\[
(n - 1) \geq 3
\]
\[
n \geq 5 + 1 = 6
\]

So, the sample of this research for every group is 6 samples.

### 3.5 Research Variables

- **Dependent variable**: Blood Pressure
- **Independent variable**: Honey water with a dose of 35 gr of pure honey + 200 ml of water and 70 gr of pure honey + 200 ml of water.

### 3.6 Operational Definition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Method</th>
<th>Unit</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honey water</td>
<td>Water + pure honey 35 gr and 70 gr</td>
<td>Mixing</td>
<td>ml</td>
<td>Ratio</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>The status of systolic and diastolic blood pressure obtained from the measurement results at the beginning and end of the observation</td>
<td>Measurements with a digital Sphygmomanometer</td>
<td>mmHg</td>
<td>Interval</td>
</tr>
</tbody>
</table>
3.7 Research Tools and Materials

3.7.1 Tools

The tools used in this study were plastic cups with lids, plastic spoons, flasks, trays, digital food scales, measuring cups, Omron’s Sphygmomanometer digital and labels.

3.7.2 Materials

The materials used in this study is pure honey, mineral water, teabag and non-calorie sugar

3.8 Data Analysis Method

All data obtained were analyzed statistically based on the following steps:

a. Before analyzing the data, the data is encoded and entered into computer files
b. The stages of data analyzing were blood pressure variables in all groups

c. Test the normality of blood pressure measurement data, both in the intervention group and the control group. The normality test used the Shapiro-Wilk test for samples of less than 50. If it was normally distributed, it would use mean and standard deviations. Meanwhile data abnormally distributed, it would use the median

d. The difference between groups before and after the intervention of honey water must be proved with a statistical test. If the distribution of data normally is > 0.05, then the parametric statistical test was used with Paired sample t-test using the One Way ANOVA Test followed by a different test for each group using the LSD Post Hoc test. But if the distribution of data abnormally is < 0.05, then non-parametric statistical tests was used with the Wilcoxon test (Sujarweni, 2015).
3.9 Ethical Research

*Ethical Clearance* was obtained from the Health Research Ethics commission of The Medical Faculty of the University of Muhammadiyah Surakarta No. 1792/B.1/KEPK-FKUMS/I/2019. The respondents of this research were 24 Elderly at Aisyiyah Nursing Home Surakarta that given honey water and blood pressure measurement for intervention group and blood pressure measurement for the control group which have done for seven days.

3.10 Research Planning

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nov</td>
</tr>
<tr>
<td>1</td>
<td>Preparation of Proposal</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Proposal Seminar</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Preparation of <em>Ethical Clearance</em></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Data Analysis</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Trial Result</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER IV
RESULT AND DISCUSSION

4.1 Result

4.1.1 Overview of Research

The research was conducted from 6 to 12 January 2019 at Aisyiyah Nursing Home in Solo Surakarta. Respondents in the study were 24 elderly divided into 2 intervention groups and 2 control groups. The intervention group was given 35 gr and 70 gr honey water. Meanwhile the control group was given a placebo in the form of tea with non-calorie sugar. Honey water was given after blood pressure measurement around 10 a.m. The second of blood pressure measurement was done at 30 minutes after the intervention of honey water. The researcher used the Omron Sphygmomanometer to get blood pressure measurements.

![Figure 1. Consolidated report of trial](image-url)
Table 4. Characteristic distribution of respondents

<table>
<thead>
<tr>
<th>Characteristic of Subject</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>60-64</td>
<td>24</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
</tr>
<tr>
<td>70-74</td>
<td>20</td>
</tr>
<tr>
<td>75-79</td>
<td>36</td>
</tr>
<tr>
<td>&gt;80</td>
<td>16</td>
</tr>
<tr>
<td>Tension</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>25</td>
</tr>
<tr>
<td>Hypertension 1</td>
<td>58</td>
</tr>
<tr>
<td>Hypertension 2</td>
<td>12.5</td>
</tr>
<tr>
<td>Hypertension 3</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Based on data above, there are five age groups which most of them are elderly aged 75-79 years. Ministry of Health stated that the highest prevalence of hypertension is in the aged was above 75 years with a percentage of 69.3% (WHO, 2018). Blood pressure data collection conducted on respondents before the study found three groups of Hypertension. Most of the respondents were hypertension stage 1 with a percentage of 58% where blood pressure was in the range of 140/90–159/99 mm Hg.

4.1.2 The Differences in Blood Pressure Before and After Intervention

Based on the graph 1, the O1 group with the intervention of honey water (70 g of honey) had a decrease in systolic blood pressure up to the fourth day and an increase on the fifth and sixth day. The O2 group with the intervention of honey water (35 g of honey) had a decrease of the blood pressure until the third day and an increase on the 4th day. Systolic blood pressure that occurred in the K- (control group with hypertensive) tended to be stable until the last day. However, the systolic blood pressure in the K + (control group with normotensive) showed improvement on 2nd days to 7th days.
Diastolic blood pressure in the O1 group decreased on the third day and increased on the fourth day. The same condition happened in the O2 group in which diastolic blood pressure decreased on the third day and stabilized until the seventh day. An increasing in diastole also occurred in the K-group on the second day and a decrease on the third day and tended to be stable until the seventh day.
Table 5. Distribution of mean systolic and diastolic blood pressure measurements before and after intervention

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SD</th>
<th>Δ ± SD</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Systole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Pre</td>
<td>Post</td>
<td></td>
</tr>
<tr>
<td>O1</td>
<td>162.00 ± 20.50</td>
<td>132.00 ± 13.93</td>
<td>30.00 ± 23.46</td>
</tr>
<tr>
<td>O2</td>
<td>154.83 ± 9.30</td>
<td>131.50 ± 16.37</td>
<td>23.33 ± 14.07</td>
</tr>
<tr>
<td>K-</td>
<td>148.83 ± 4.91</td>
<td>150.17 ± 5.27</td>
<td>-1.33 ± 1.03</td>
</tr>
<tr>
<td>K+</td>
<td>111.67 ± 7.53</td>
<td>122.33 ± 8.31</td>
<td>-10.67 ± 5.92</td>
</tr>
<tr>
<td></td>
<td>Diastole</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Δ ± SD</td>
<td>p-Value</td>
</tr>
<tr>
<td>Group</td>
<td>Pre</td>
<td>Post</td>
<td></td>
</tr>
<tr>
<td>O1</td>
<td>96.83 ± 11.27</td>
<td>83.50 ± 3.62</td>
<td>13.33 ± 10.83</td>
</tr>
<tr>
<td>O2</td>
<td>90.33 ± 12.36</td>
<td>81.17 ± 9.17</td>
<td>9.17 ± 4.58</td>
</tr>
<tr>
<td>K-</td>
<td>83.67 ± 9.85</td>
<td>84.67 ± 9.65</td>
<td>-1.00 ± 1.41</td>
</tr>
<tr>
<td>K+</td>
<td>71.33 ± 5.99</td>
<td>73.83 ± 3.43</td>
<td>-2.50 ± 5.32</td>
</tr>
</tbody>
</table>

The results of the normality test using *Shapiro-Wilk* found the data which were normally distributed so that finding out the difference in averages was continued with the Paired T-Test. Based on table 4.2, there were differences in the average systolic blood pressure before and after the intervention with p-value <0.05. The average difference showed that systolic blood pressure in all groups with intervention of honey water (O1 and O2) decreased. The difference between the average blood pressure in the table showed the difference before and after intervention. A group with a 70 g of honey has a decrease in systolic blood pressure higher than the group with 35 g of honey.

Based on table 5, there were mean differences in diastolic blood pressure before and after intervention with p-value <0.05. The decreasing in diastolic blood pressure occurred in the group with the intervention of honey water (O1 and O2). The blood pressure in intervention group that given 70 g of honey decreased lower than the intervention group that given 35 g of honey. Whereas in the control group, there was no difference in mean of diastolic blood pressure.
before and after the intervention with a p-Value > 0.05.

4.1.3 The Effects of Interventions on Blood Pressure Between Groups

The results of statistical tests using One Way ANOVA showed that there were differences in systolic and diastolic blood pressure after the intervention of honey water with a value of p <0.05. Thus, giving honey water with various dosage can significantly reduce systolic and diastolic blood pressure.

Table 6. Effect of honey water on systolic and diastolic blood pressure

<table>
<thead>
<tr>
<th>Group</th>
<th>Systole</th>
<th>Diastole</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Δ ± SD</td>
<td>p-Value</td>
</tr>
<tr>
<td>O1</td>
<td>30.00 ± 23.46</td>
<td>0.000</td>
</tr>
<tr>
<td>O2</td>
<td>23.33 ± 14.07</td>
<td>9.17 ± 4.58</td>
</tr>
<tr>
<td>K-</td>
<td>-1.33 ± 1.03</td>
<td>-1.00 ± 1.41</td>
</tr>
<tr>
<td>K+</td>
<td>-10.67 ± 5.92</td>
<td>-2.50 ± 5.32</td>
</tr>
</tbody>
</table>

Table 7. The results of the measurement of the difference in mean systolic and diastolic blood pressure after intervention

<table>
<thead>
<tr>
<th>Mean difference</th>
<th>P Value</th>
</tr>
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<tbody>
<tr>
<td>Systole</td>
<td>Diastole</td>
</tr>
<tr>
<td>O1 O2</td>
<td>6.67</td>
</tr>
<tr>
<td>K- K+</td>
<td>31.33</td>
</tr>
<tr>
<td>K- K+</td>
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</tr>
<tr>
<td>O2 K-</td>
<td>24.67</td>
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<tr>
<td>K+ K-</td>
<td>34.00</td>
</tr>
<tr>
<td>K- K+</td>
<td>9.33</td>
</tr>
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</table>

Information:
O1 = intervention group of honey water with 70 grams of pure honey
O2 = intervention group of honey water with 35 grams of pure honey
K- = control group with hypertensive
K + = control group with normotensive
Table 7 showed the results of differences in systolic and diastolic blood pressure after the intervention. Based on the results of the Post Hoc LSD test, it showed that the difference in systolic blood pressure in O1 group compared with both of control group (K- and K+) was obtained p-value <0.05 so that Ha was accepted. While systolic blood pressure in the O2 group compared with the negative control group (K-) was obtained p-value <0.05 so that Ha was accepted. Refer to the statistical test, there were significant differences in systolic blood pressure after the intervention of honey water with 70 and 35 gr of honey for all groups. But, there were no differences in blood pressure between O1 and O2.

The difference in diastolic blood pressure in O1 group compared with both of control group (K- and K+) was obtained p-value <0.05 so that Ha was accepted. While diastolic blood pressure in the O2 group compared with the control group (K- and K+) was obtained p-value <0.05 so that Ha was accepted. Refer to the statistical test, there were significant differences in diastolic blood pressure after the intervention of honey water.

4.2 Discussion

Referring to table 5, it showed that there was a difference between systolic and diastolic blood pressure after giving honey water with p-value <0.05, and -30.00 as the most significant difference in the group given honey water with 70 gr of honey (70 gr honey is equivalent to 6 tbsp). The dosage of honey used in this study was similar to the research conducted by Nurhaedar (2013) in which giving 70 gr of honey per day for patients with type 2 diabetes showed blood pressure stability. Blood pressure in O1 and O2 group tended to decrease was compared to K- and K+ that have not given honey water (Graphic 1). It was similar to the results of Rahmatul Aini (2018) stated that there was a significant effect before and after giving honey therapy 20 gr orally in hypertension patients at Pontianak Health Center UPK.
decreasing in blood pressure after intervention of honey was also presented by Olusula and Helen (2012) in their study of healthy people in which 20 gr of honey affected a reduce of blood pressure at 15, 30 and 60 minutes after drinking honey. A research conducted by Omotayo and colleagues on hypertension rats showed a decrease in systolic blood pressure after honey supplementation (Omotayo et al. 2011).

Blood pressure decreased in intervention group to 132 and 131.5 in systolic, 83.5 and 81.17 in diastolic pressure due to the potassium contained in honey (table 5). Potassium levels in honey are greater than sodium levels (USDA, 2018). The mineral which was contained in honey such as potassium can balance fluid in the body, especially in extracellular fluids so that it can reduce blood pressure with antihypertensive effect (Yaswir et al. 2012). Among the minerals were contained in honey, potassium has the highest concentration of 52 mg followed by calcium and magnesium (Liberato et al. 2013). Honey played a role in regulating blood pressure by fighting the effectiveness of salt in food (Salim, 2012). Honey will reduce the amount of water or plasma in the bloodstream, thereby it reduce the density and blood pressure (Pearce, 2013).

The other mineral that can reduce blood pressure is magnesium. Magnesium levels found in honey as much as 2 mg affect a decrease of blood pressure in elderly (USDA, 2018). Hypertension in the elderly mostly occurs due to a reduce in blood vessel wall elasticity. Overall, food sources contained magnesium compared to supplements provide a preventive or control effect on hypertension (Mahan et al. 2008). By that way, magnesium in the cardiovascular system acts as vasodilator in coronary artery and protects against oxidative stress (Grober, 2015).

Based on table 5, there were significant differences in systolic blood pressure in the negative control group with p-value <0.05 which was indicated by an increasing in the average blood pressure from 148.83 mmHg to 150.17 mmHg. It happened as a result of delaying antihypertensive so that blood pressure increases rapidly. Moreover, stress factor caused fluctuations
in blood pressure during the intervention of honey water for seven days (Graphic 1). In the intervention group, there was an increase in systolic blood pressure on the fifth day while an increase in diastolic blood pressure occurred on day 4. The cause of increasing in blood pressure in the elderly is a stress factor that is difficult to control by the researcher. Based on a research conducted by Handayani (2018), there were relationships between stress levels and an increase of cortisol which has a positive correlation with the occurrence of hypertension. The stiffness of the arteries also caused hypertension in the elderly in which the elasticity of arterial artery walls decreased (Lionakis, 2012).

Systolic blood pressure decreased after the intervention of honey water 70 and 35 gr with p = 0.000 and did diastolic blood pressure with p-value = 0.001 (Table 6). Blood pressure reduced in the elderly after the intervention of honey water which is also caused by the vitamin C in honey. Vitamin C which is one of the water-soluble antioxidants plays a role in protecting endothelial cells by increasing the availability of NO (Nitric Oxide) as an antihypertensive (Grober, 2015). Some patients with hypertension had an impaired of vasodilation ability due to lack of NO in the blood vessel walls (Sherwood, 2013). Vitamin C can protect NO from the oxidation process so that NO bioavailability increased and blood pressure decreased (Combs, 2017). More NO will reduce the phosphorylation of myosin so that the actin and myosin bonds will be released and caused relaxation of the blood vessel walls so that blood pressure decreased (Sherwood, 2013).

The intervention of honey water toward the elderly in this study was carried out at the time before meals in which the elderly were not in full condition. Thus, the distance between the consumption of honey water by the elderly and the time after distribution of honey water did not take long time so that the elderly immediately drank the honey water at one time. The honey water in this study was made from normal temperature water. It is because honey contained of vitamin C which some properties are easily oxidized when in contact with heat (Almatsier, 2010). According
to Sunita Almatsier (2010), the condition that causes the loss of vitamin C is the length of storage and leaving it in the open air.

According to Uwe Grober (2015), the concentration of vitamin C contained in blood plasma provides a strong protective effect and improves vascular dysfunction due to chronic diseases such as hypertension. By that way, vitamin C contained in honey plays an important role in hypertension patients, experiencing by the elderly (Raihan et al., 2014).

In table 7, the intervention of honey water in O1 and O2 had a significant effect of reducing systolic and diastolic blood pressure with a value of $p < 0.05$. But, there were no significant differences in blood pressure between O1 and O2 with a value of $p > 0.05$. A decrease in blood pressure after the intervention of honey water was caused by the phenolic component found in honey, especially the type of flavonoids. The phenolic component in honey has an antioxidant effects that can minimize free radicals as a factor in cardiovascular disease (Arawwawala, 2017). The total phenolic component in honey ranged from 370-1190 mg/100 g in which there are 9 types of phenolic components including flavonoid (Chayati, 2008). It was similar to Arza’s (2018) study on the effect of sweet starfruit juice in which the phenolics components are 1296.25 mg/100 g (Yan et al., 2013).

According to Chayati’s (2014) research, the levels of flavonoid in honey ranged from 3.80-33.46 mg/100 g were directly proportional to antioxidant activity. It was similar to the effect of green tea on blood pressure with levels of flavonoid 0.055 mg/100 g (Sriyono, 2012). According to Caravaca’s study (2016) it was explained that the content of flavonoids affected a reduce blood pressure and restoring endothelial function in hypertensive animals. Flavonoids can also inhibit the activity of Angiotensin I Converting Enzyme (ACE) in forming angiotensin II which is the cause of narrowing blood vessels (Nadila, 2014). Oxidative stress which is one of the causes of increasing blood pressure in the elderly can also be prevented by flavonoids found in honey (Cianciosi, 2018).

Macronutrients contained in 100 gr of honey in addition to
carbohydrates are protein (Bobis, 2018). Cysteine is one of the amino acids in honey that can increase NO bioavailability and prevent an increase of blood pressure (Vasdev, 2010). There is arginine which included in the NO constituent substrate in which NO is a molecule as a neurotransmitter and vasodilator (Rodwell, 2016).

Whereas systolic blood pressure in the negative control group (hypertension) did not get honey water for seven days showed a stable straight line and even increased in the last day (Graphic 1). Some elderly had compliance with the fruits provided by the Nursing home, based on interview and monitoring menu. There was a limit on salt that used while cooking food, so the food served are safe for hypertension elderly.

Honey as one of the foods mentioned in the Qur’an and Hadith has function as a medicine. Allah SWT has said, ‘’In it, there is a cure for humans’’. (An-Nahl: 69). The research was contributed in Islamization of Science to prove statements in the Qur’an which provides benefits for anyone who studies and practices it. By that way, honey can be used as a preventive and alternative treatment for the community, especially people with hypertension.
CHAPTER V
CLOSING

5.1 Conclusion
1. There is a difference in average systolic blood pressure before and after giving honey for O1 with p-value 0.026 and O2 with p-value 0.010. And diastole blood pressure for O1 with p-value 0.030 and O2 with p-value 0.004.
2. There is an effect of honey water with 70 gr honey on systolic and diastolic blood pressure with p-value 0.000.
3. There is an effect of honey water with 35 gr honey on systolic and diastolic blood pressure with p-value 0.001.

5.2 Suggestion
For further research, there needs to be a comparison between the use of various types of honey and their effects on hypertension patients accompanied by records of the patient’s recall results. Also, the role of related nutritionists strongly supports the process of natural alternative medicine to reduce the side effects arising from chemical drugs.
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Appendix 1. Informed consent

PERSETUJUAN MENGIKUTI PENELITIAN / INFORMED CONSENT

Yang bertanda tangan dibawah ini, saya:

Nama : ..............................................  
Tanggal lahir/ Jenis kelamin : .................................../ □ L □ P  
Alamat : ................................................

Dengan ini saya menyatakan setuju menjadi responden penelitian selama 7 hari dengan meminum larutan madu setiap harinya, dan melakukan pemeriksaan tekanan darah sebelum dan sesudahnya, dimana saya mengetahui bahwa peneliti didampingi oleh dokter terkait selama penelitian berlangsung.

Demikian surat pernyataan ini saya buat dalam keadaan sadar tanpa paksaan dari pihak manapun serta untuk dipergunakan sebagaimana mestinya.

Surakarta, .......................  

Peneliti Yang menyatakan

Siti Aulia Musyayyadah (..........................)

Dokter Penanggungjawab Panti

Dr. Titiek Kadarshih
Appendix 2. Statement letter for ethical clearance

Ethical clearance letter as the proof that the research was ethically approved by the health research ethics committee.
Appendix 3. Statement letter after doing research

GEDUNG PUSAT KEGIATAN PENYANTUNAN USIA LANJUT AISYIYAH KOTA SURAKARTA
Alamat : Jl. Pajajaran Utara III No.7 Telp. 0271 - 715805 Kel. Sumber, Banjarsari Surakarta. 57136

SURAT KETERANGAN
Nomor: 56/GPK.PUL’A/1/2019

Dengan ini merangkum bahwa:

Nama : Siti Aulia Musyayyadah
NIM : 362015721177
Program Studi : Ilmu Gizi

Mahasiswa tersebut diatas telah melakukan penelitian di Panti Usia Lanjut Aisyiyah Surakarta.

Demikian surat ini dibuat agar dapat digunakan sebagaimana mestinya.

Surakarta, 12 Januari 2019

[Signature]

Mengetahui,
Ketua Pelaksana Harian

[Signature]

Ibu Hj. Ratmi Samedi
Appendix 4. Documentation during research

**Pure Honey 500 g**

**Honey water: a) 35 g  b) 70 g honey**
Honey water, which the pink one for 35 gr of honey and the yellow one for 70 gr of honey.

Tea with sugar no-calorie for the control group
Measuring blood pressure with Sphygmomanometer digital at the elderly.

The elderly were drinking honey water
Appendix 5. Statistic Test

**T-Test**

**SYSTOLE**

<table>
<thead>
<tr>
<th>Pair</th>
<th>Pre O1</th>
<th>Post O1</th>
<th>Pre O2</th>
<th>Post O2</th>
<th>Pre_Knegatif</th>
<th>Post_Knegatif</th>
<th>Pre_Kpostive</th>
<th>Post_Kpostive</th>
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<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Std. Error Mean</td>
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<td>3.796</td>
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<td>2.007</td>
<td>2.151</td>
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**Paired Samples Correlations**

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<th>Pre O2 &amp; Post O2</th>
<th>Pre_Knegatif &amp; Post_Knegatif</th>
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## Paired Samples Test

<table>
<thead>
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<th>Pre Knegatif - Post Knegatif</th>
<th>Pre Kpositive - Post Kpositive</th>
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</thead>
<tbody>
<tr>
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<td>-10.667</td>
</tr>
<tr>
<td>Std. Deviation</td>
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<td>14.067</td>
<td>1.033</td>
<td>5.922</td>
</tr>
<tr>
<td>Std. Error</td>
<td>9.578</td>
<td>5.743</td>
<td>.422</td>
<td>2.418</td>
</tr>
<tr>
<td>Lower</td>
<td>5.380</td>
<td>8.571</td>
<td>-2.417</td>
<td>-16.881</td>
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<tr>
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<td>54.620</td>
<td>38.095</td>
<td>-2.49</td>
<td>-4.452</td>
</tr>
<tr>
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<td>5</td>
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<td>5</td>
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<tr>
<td>Sig. (2-tailed)</td>
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<td>.010</td>
<td>.026</td>
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### 95% Confidence Interval of the Difference

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<th>Pre O2 - Post O2</th>
<th>Pre Knegatif - Post Knegatif</th>
<th>Pre Kpositive - Post Kpositive</th>
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</thead>
<tbody>
<tr>
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<td>23.333</td>
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<tr>
<td>Std. Deviation</td>
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<td>Lower</td>
<td>5.380</td>
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<td>5</td>
<td>5</td>
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## Tests of Normality

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a. Lilliefors Significance Correction

* It is a lower bound of the true significance.
## Oneway

### Descriptives

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### ANOVA

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### Post Hoc Tests

#### Multiple Comparisons

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<td>.410</td>
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<td>.000</td>
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<td>O1</td>
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<td>8.085</td>
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<td>-23.53 - 10.20</td>
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<td>.006</td>
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<td>.000</td>
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<td>.000</td>
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* The mean difference is significant at the 0.05 level.
## DIASTOLIC

### Paired Samples Statistics

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### Paired Samples Correlations

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### Paired Samples Test

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### Tests of Normality

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<td>K-</td>
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<td>K+</td>
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*a. Lilliefors Significance Correction

*b. It is a lower bound of the true significance.
# Descriptives

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<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
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# ANOVA

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# Post Hoc Tests

## Multiple Comparisons

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* The mean difference is significant at the 0.05 level.