Conference Paper

The Effect of Cucumber Juice on Lowering Blood Pressure Among Hypertensive Patients: Literature Review

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Abstract.

Hypertension is a common disease in Indonesia and can affect all social, economic, and age groups. Hypertension patients whose blood pressure is consistently elevated will live dependent on drugs and regularly visit doctors for examinations and prescriptions. Cucumber has hypotensive properties because the water and potassium content in cucumber attracts sodium to the intracellular system and works by opening blood vessels (vasodilation), thereby lowering the blood pressure. This study aims to analyze the effect of giving cucumber juice on reducing blood pressure in patients with hypertension. This research is based on the literature review method. Articles were collected through an electronic database and Google Scholar, Garuda Portal, the National Library of the Republic of Indonesia, Academia.edu, and ResearchGate using the keywords: hypertension, blood pressure, cucumber juice. The results showed that the analysis of several studies conducted related to the administration of cucumber juice, namely five journals, concluded that it could reduce blood pressure in the intervention group, and also experienced a decrease in the control group. The control group experienced a less than maximal decrease in blood pressure. Frthe results of the study also showed that giving cucumber juice that was not according to the dose did not have an effect in reducing blood pressure. The results of the examination carried out in the intervention and control groups turned out to have differences in reducing blood pressure, even though the measurement results did not show the maximum value. But in general, measurements made in the intervention group were shown to decrease blood pressure.

Keywords: cucumber, blood pressure, hypertension

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Published 4 August 2023

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICHSSE Conference Committee.

1. Introduction

Hypertensionis a common disease in Indonesia and can occur in all groups, all ages, and at all levels of socioeconomic conditions, both lower, middle and upper classes. The influence of age also affects the occurrence of increased stress in general as well as a triggering factor. [1]. Hypertensionis increasing gradually from year to year, not

only in Indonesia but in the world there are up to 1 billion people in the world, one in 4 people suffer from this disease, moreover it is estimated that the number of people with hypertensionwill increase to 1.6 billion in 2025. Close 10-30% of the population aged people in most countries with hypertensionand close to 50-60% of the population aged categorized mostly whose health recovers when blood pressure is controlled [2]. According to the American Heart Association (AHA) Americans aged over 20 years with hypertensionreached 7.5 million people, but almost 90-95% of the problems are unknown. Based on data from the World Health Organization (World Health Organization) in 2010, of 50% of known hypertensiondiseases, only 25% were treated with good treatment, around 805 high blood problems occur mainly in developing countries. People with hypertensionalso attack Thailand with 17% of the total population, Vietnam 34%, Singapore 24.9%, Malaysia 29.9% and Indonesia with a rather large number, 15% of the 230 million Indonesian people who suffer from high blood pressure.

Patients with hypertensionin a way that does not change will live depending on drugs and with a disciplined way to go to the doctor to check and get a prescription [3] [3](Kharisna et al, 2012)(Kharisna et al, 2012). Some methods that can be used to lower blood pressure are medicinal methods (medicine treatment) and non-medicinal methods are using herbal ingredients in the form of fruits or vegetables. There are many fruits and vegetables that can lower high blood pressure, such as celery, cucumber, chayote, kiwi, apples, tomatoes, bananas, watermelon, carrots. One fruit that is said to be non-medicinal to lower hypertensionis cucumber. The use of cucumbers to lower blood pressure in people with hypertensionis caused by the release of solutions in the body (*urinary*) [4]. Cucumber has hypotensive properties because the water and potassium content in cucumber attracts sodium to the intracellular system and works by opening blood vessels (*vasodilation*), so it is possible to lower the blood pressure (Dwi Hastuti et al., 2021).

Sources in several journals explain that there is an effect of giving cucumber juice to reducing blood pressure in people with hypertension because the position of potassium has been studied thoroughly in relation to blood pressure regulation [6]. Some of the ways in which potassium can lower blood pressure, potassium can reduce blood pressure. This has a vasodilator effect, creating an overall reduction in peripheral blood flow and an increase in cardiac output. Consuming potassium that exceeds the limit increases its concentration in the intracellular solution, eventually leading to withdrawing the solution from the extracellular matrix and lowering the center of gravity of the blood

[7]. The view here is to analyze a significant problem because the level of events in the population is so large. In the family realm, non-medical intervention is also meaningful and this is one of the most valuable and current trends, so the research raised by the authors or researchers is related to literature review issues related to the use of cucumber juice as a form of treatment in blood pressure reduction.

Research [8], drinking 100 grams of cucumber juice for 6 days and monitoring the ratio of blood pressure reduction for 2 hours and 9 hours after drinking can lower blood pressure and reduce blood pressure 2 hours after days 4 and 5. Zauhari in the Jomblang area of Semarang from June to August 2014 proved that cucumber juice with 100 grams of cucumber in hypertensionsufferers for 7 days with a frequency of 2 a day [9]. A total of 15 respondents who wanted to drink cucumber juice were selected as the treatment and the rest as the control group. Substances contained in cucumbers are potassium supplements can reduce blood pressure with 60-120 mmol/ day potassium supplementation which can reduce systolic and diastolic blood pressure.

Efforts to analyze some of the research results related to the effectiveness of cucumber juice in reducing hypertensionis the goal of this research. Cucumber juice with its potassium content as one of the herbal remedies in theory has a position in lowering blood pressure in people with high blood pressure. By analyzing some of the research results related to cucumber juice for high blood pressure, it is hoped that some general conclusions will be drawn regarding the effectiveness of the results.

2. Method

This study uses a literature review method. The method used in this literature review is to collect and analyze research articles regarding the use of cucumber juice in hypertension therapy. The method used in the literature review is through a systematic approach to analyze the data in a simplified approach. Research design articles using Randomized Controlled Trials (RCT) by tracing the results of experimental research. The articles used are focused on original empirical research articles or research articles that contain the results of actual observations or experiments where there are abstracts, introductions, methods, results, and discussions.

Articles were collected through electronic databases and Google Schoolar, Garuda Portal, National Library of the Republic of Indonesia, Academia.edu, and ResearchGate. The keywords used in finding the article were: hypertension, blood pressure, cucumber

juice. The discussion of this literature includes: method, number of population/sample, research design and research results obtained.

Inclusion data to determine the criteria for literature review materials, namely: 1) Randomized Controlled Trials (RCT) research design articles, 2) Experimental research, 3) Original articles from primary sources. 4) Research articles published from 2010 to 2021. The exclusion data are: 1) Articles outside the use of cucumber juice in treating blood pressure due to hypertension, 2) Articles published above before 2011, 3) Articles only contain the abstract part or part of the part. of text.

The data analysis used in this literature review is a simplified approach. The simplified approach is data analysis by compiling each article obtained and simplifying each finding [10].

3. Results and Discussion

The following are the results of the search for journals that the author got to be used as research with the method of analyzing journals.

Sourced on the first journal; With the results of a research entitled the effect of consuming cucumber juice by reducing blood pressure in people with hypertensionin Dusun Way Ngison in 2018, it can be concluded that the character of the respondents in the research due to consuming cucumber juice on reducing blood pressure in people with hypertensionin Dusun Way Ngison, which is very many experience hypertensionoccurs in women with elementary education level and profession as housewives. In general, the systolic blood pressure before (pre-test) in the intervention group was 168, 8 with the lowest score of 140 and the highest score of 190. In contrast, in the control group, the systolic blood pressure before (pre-test) was generally 170.00 with the lowest number was 150 and the highest number was 210. In general, the post-test systolic blood pressure in the intervention group was 137.27 with the lowest number 120 and the highest number 160. In contrast, the control group was generally systolic blood pressure after the intervention (post-test) was 153, 73 with the lowest score of 130 and the highest score of 190. There was a significant effect of giving cucumber juice with reducing blood pressure in people with hypertensionin Dusun Way Ngison. Other research results show that by giving fruits that have lots of potassium, calcium, and magnesium such as papaya, watermelon, melon, and star fruit demak can reduce blood pressure significantly. The position of potassium has been widely studied in relation to

Table 1: Journal of Sample Material.

Authors, years	Title	Study design	Sample	Result
Fitra Pringgayuda, Cikwanto, Zamzami Hidayat. (2018)	The effect of cucumber juice on reducing blood pressure in patients with hypertension	This study used a quasi experimental method with a non equivalent control group design. The sampling technique used purposive sampling of 22 people.	22 people	Based on the results of research conducted on the administration of cucumber juice, it can be concluded that the average systolic blood pressure before (pre-test) in the intervention group was 168.8 with the lowest score being 140 and the highest score 190. the average systolic blood pressure before (pre-test) was 170.00 with the lowest score of 150 and the highest score of 210. The average systolic blood pressure after (post-test) in the intervention group was 137.27 with the lowest score of 120 and the highest was 160. On the other hand, in the control group the mean systolic blood pressure after the intervention (post-test) was 153.73 with the lowest score being 130 and the highest score being 190. There is an important effect of giving cucumber juice to hypertensive patients for reducing blood pressure. .
Lovindi Putri Lebalado, Tatik Mulyati. (2014)	The effect of giving cucumber juice (*Cucumis sativus L.*) on systolic and diastolic blood pressure in hypertensive patients	This type of research is a true experiment with a control group pre-post test design of 22 subjects.	38 people	The results of the research proved that there was a significant comparison of systolic and diastolic blood pressure before and during treatment ($p<0.05$), whereas systolic and diastolic blood pressure in the control group did not change significantly ($p>0.05$). The results of the average systolic blood pressure in the control group with numbers before treatment were 147.619 and diastolic 90, the reduction in systolic pressure was 15.850 and diastolic was 8.455. On the other hand, in the control group, the average systolic pressure before treatment was 144.706 and after treatment was 141, 849, and the average diastolic pressure before treatment was 90 and after treatment was 89.
Meirlina Christenal, Theresia Ivana, Margareta Martini. (2020)	The effect of giving cucumber juice on reducing blood pressure in the elderly with hypertension at PSTW Sinar Rangkang in 2020	The design of this study used a pre-experiment with one test group to 17 people.	17 people	The intervention carried out proved related to the comparison of systolic and diastolic blood pressure before and after administration of cucumber juice, namely ($a=0.002$). This proves that cucumber juice is effective in reducing blood pressure. The results of blood pressure before being given cucumber juice systolic pressure was 160 mmHg and diastolic pressure was 100 mmHg. The results after being given cucumber juice was a decrease in systolic blood pressure to 120 mmHg and diastolic to 80 mmHg.

blood pressure regulation [6] reported several methods on how potassium can reduce blood pressure as follows: Potassium can reduce blood pressure by causing vasodilating effects resulting in decreased peripheral resistance. overall and increase cardiac output. Consuming a lot of potassium will increase its concentration in the intracellular solution and consequently tend to pull the solution from the extracellular part and reduce blood

Table 1: Journal of Sample Material.

Authors, years	Title	Study design	Sample	Result
Ucu Wandi Somantri. (2019)	The effectiveness of giving cucumber juice to reduce blood pressure in the elderly with hypertension in the village of Kondangjaya Pandeglang Banten	This study used a quasi experimental pre test and post test design with a control group. With a sample of 12 people.	12 people	The procedure for giving cucumber juice affects the reduction of blood pressure in people with high blood pressure. The results of giving cucumber juice to residents of Kondangjaya hamlet who have hypertension aims to change their attitude to a healthy life. Cucumber juice can reduce blood pressure provided that it is taken 2x a day with a duration of morning and evening, on the other hand the amount that is drunk in 1x administration of 1 glass of cucumber juice is approximately 250cc. The results at the beginning, the intervention group was an average systolic pressure of 174.1 mmHg and a diastolic pressure of 90.83 mmHg, and the average systolic pressure in the control group was 171.66 mmHg and a diastolic pressure of 85.8 mmHg. On the last day, the intervention group had an average systolic blood pressure of 127.5 mmHg and diastolic 80 mmHg, whereas the average pressure in the control group was 158.3 mmHg systolic and 93.3 mmHg diastolic.
Cerry Elfind Pong-gohong, Sefti S.J. Rompas. (2015)	The effect of giving cucumber juice on reducing blood pressure in patients with hypertension in Tolombuka village, sub-district. Pasan district. Southeast 2015	The design used is a quasi-experimental research design pre test and post test with a control group of 32 people.	32 people	Research results prove that there is an effect of giving cucumber juice to reducing blood pressure in people with high blood pressure. With the result that the average blood pressure in the previous intervention group was 167.50 and the average after giving the intervention was 113.13 with a standard deviation of 6.021. It can be concluded that it is 95% believed that the average reduction in blood pressure measured in the intervention group is 45,465-63,285. Compared to the previous average blood pressure in the control group without giving cucumber juice, it was 161.88 and the average after administration was smaller, namely 123.75 with a standard deviation of 9.574. It can be concluded that the average reduction in blood pressure in the control group is 30,788-45,462.

pressure [7]. Contents in cucumbers that can help reduce blood pressure, content in cucumbers include potassium (potassium), magnesium, and phosphorus effectively treat high blood pressure. Not only that, cucumber is also a diuretic because of its large water content which helps reduce blood pressure.

Sourced in the second journal; systolic and diastolic blood pressure and food consumption, subjects before the intervention in the two groups did not prove a significant comparison. The recommended adequate potassium value for the 2013 RDA is 4700 milligrams, this value is similar to that stated by the International Food Information Council

Foundation. The adequacy of magnesium for the 2013 RDA for men is 350 milligrams and 320 milligrams for women [11]. The average potassium consumption of subjects before the intervention was 1152 milligrams for the treatment group and 1228 milligrams for the control group. After being given the intervention, the average consumption of potassium in the treatment group increased significantly to 1457 milligrams. This figure fulfills 31% of the sufficient value. In the control group, potassium consumption before the intervention was 1228 milligrams and decreased to 1185 milligrams during the treatment. The average sodium consumption of treatment and control group subjects before the intervention was 1255 milligrams and 1170 milligrams. During the treatment, sodium consumption in the treatment and control groups increased, namely 1286 milligrams in the treatment group and 1266 milligrams in the control group. When compared, the ratio of consumption of potassium: sodium in the treatment group is 0.7:1, in the control group the comparison is 0.6: 1. It can be observed that the ratio of potassium in the treatment group is greater than the control group. When associated with the difference in reductions in systolic blood pressure, a greater reduction took place in the treatment group. This may be due to a larger ratio of potassium than the control group, but not much different. Therefore, the reduction also occurred in the control group but was not significant. The ability of potassium in reducing the sensitivity of norepinephrine and angiotensin II, increasing natriuresis, increasing the dimensions of vascular endothelial cells, reducing blood vessel stiffness, and maintaining the function of endothelial cells by increasing the production of nitric oxide has an effect on reducing systolic or diastolic blood pressure.

Sourced on the third journal; blood pressure analysis before being given cucumber juice therapy which is pre taken at the initial administration where in general blood pressure at pre with systolic an average of 150 and diastolic an average of 91, 7. Analysis of blood pressure after being given cucumber juice therapy which post taken at the last administration with an average post systolic blood pressure of 124.7 and diastole 78, 8 mmHg. The results of the reduction in blood pressure occur because cucumber contains potassium which causes inhibition of the Renin Angiotensin System and causes a reduction in aldosterone secretion, resulting in a reduction in sodium and water reabsorption in the kidney tubules. The impact of this method is that there is an increase in diuresis which causes a decrease in blood capacity, as a result, blood pressure also drops. Aisyah's research (2014) said that cucumbers have various kinds of vitamin content, including potassium, calcium, and magnesium [12]. Various

studies have shown that there is a close relationship between intake of potassium, calcium, and magnesium to reduce blood pressure. The smaller the potassium intake, the higher the blood pressure. The ratio of sodium or potassium is also related to blood pressure. Decreased sodium intake by 100 mmol / day and consuming up to 70 mmol of potassium in one day, so that systolic blood pressure is predicted to decrease by 3.4 mmHg. Potassium intake affects blood vessels, namely potassium will reduce peripheral vascular resistance which can directly dilate the pulse, increase water and sodium expenditure from the body, suppress renin-angiotensin secretion, and stimulate sodium-potassium pump activity.

Sourced in the fourth journal; with the results of treatment for 7 days to 12 respondents, namely 6 respondents from the control group and 6 respondents from the intervention group in patients with cardiovascular or heart system disorders. The general percentage in patients with intervention on the first day to day 7 (day 1: 174, 1 mmHg/ 90, 83 mmHg, day 2: 173, 3 mmHg/ 88, 83 mmHg, day 3: 167, 5 mmHg/87.5 mmHg, day 4: 151, 67 mmHg/ 86.7 mmHg, day 5: 146.7 mmHg/ 83.3 mmHg, day 6: 140 mmHg/ 83.3 mmHg , 7th day: 127.5 mmHg / 80) experienced a very important reduction, on the contrary in control patients on the initial day to day 7 (day 1: 171.66 mmHg / 85.8 mmHg, day 7 2: 168.33 mmHg/ 85 mmHg, day 3: 172.5 mmHg/ 87.5 mmHg, day 4: 170 mmHg/ 95 mmHg, day 5: 166.6 mmHg/ 91.7 mmHg, day 6: 170 mmHg/ 95 mmHg, day 7: 158, 3 mmHg/93.3 mmHg) no reduction. Generally, in the intervention group with cucumber juice, an average of 154.4 mmHg/ 85.7 mmHg was obtained, whereas in the control group it was generally 168 mmHg/ 90.4 mmHg. Cucumber juice can lower blood pressure with the provision of drinking 2x a day with a duration of morning and evening, on the other hand the amount that is drunk in 1 serving is 1 cup of approximately 250cc.

Based on the results of the fifth journal; The results of this research prove that there is an effect of giving cucumber juice to reduce blood pressure in people with high blood pressure. In general, blood pressure before administration of cucumber juice in the intervention group was 167.50 and the average after administration became smaller was 113.13 with a standard deviation of 6.021. When compared with the average blood pressure before administration of cucumber juice in the group control is 161.88 and the average after administration becomes smaller is 123.75 with a standard deviation of 9.574. The results of the estimated interval can be concluded if it is 95% believed that in general the blood pressure in the control group is between 30,788-45,462. The results of this research are in line with research conducted by Prakoso (2014) if there

is a significant effect of giving cucumber juice to systolic and diastolic blood pressure in the elderly with high blood pressure, namely the p value of 0.000 (p <0.05) [13]. It is also supported by Hariada's research (2011) if the percentage of blood pressure reduction in women aged commensurate with older men [14]. Giving cucumber juice can reduce blood pressure in older women and men, with a significant percentage reduction in blood pressure. Empirically there is a significant effect of giving cucumber juice on reducing blood pressure, this is possible because cucumbers have potassium (potassium), magnesium, and phosphorus, where these minerals are effective and can cure high blood pressure. The position of potassium has been widely studied in relation to the reduction of blood pressure. Some methods of how potassium can reduce blood pressure is by causing a vasodilating effect, so that it can cause decreased retention.

From the five journals studied, it can be concluded that giving cucumber juice actually has an impact on reducing blood pressure, but from these five journals there are several things that must be considered:

1. Giving cucumber juice to hypertensive patients with a dose of 1 cup or 2 cups in fact has a not much different effectiveness in reducing blood pressure

2. Examination of blood pressure was not known what percentage decrease in systolic and diastolic pressure and only explained that there had been a decrease in systolic and diastolic pressure

From the five journals, it can also be concluded that the research that was carried out related to giving cucumber juice could reduce blood pressure in the intervention group, and also experienced a reduction in the control group, but the control group experienced a less than maximum reduction. Giving cucumber juice that is not appropriate in terms of dosage also has no effect on reducing blood pressure. Examinations carried out in the intervention group and the control group actually had differences in reducing blood pressure. From the existing journals the measurements did not show the maximum value, but the measurements made in the intervention group proved to have decreased.

Cucumber fruit can help reduce blood pressure because the content of cucumbers, including potassium, magnesium, phosphorus is effective in treating high blood pressure. Potassium is the first intracellular electrolyte, 98% of potassium is located inside cells, 2% more outside of cells functions for neuromuscular, and potassium affects the performance of heart muscle [15]. Cucumber juice contains potassium, which is useful for sterilizing carbon dioxide in the blood, causing muscle and nerve activity and managing osmotic pressure with sodium. The mineral content of calcium, magnesium and fiber

in cucumber is useful in reducing blood pressure. The mineral magnesium functions to improve blood circulation. In addition, cucumber is a diuretic because of its large water content which helps to reduce blood pressure.

4. Conclusion

Based on the results of research that has been tried in reviews, the authors can share the following conclusions:

1. There is a significant change in blood pressure after being given cucumber juice to people with high blood pressure. The significant effect between the mean pulse blood pressure in general in the experimental group before and after being given cucumber juice, it can be concluded that the consumption of cucumber juice is effective in reducing blood pressure.

2. There is a comparison between the intervention group and the control group to changes in blood pressure in people with hypertension

3. Cucumber is a diuretic because of its large water content which in turn helps reduce blood pressure. This ensures that even if a person has high blood pressure, his blood pressure can be lowered by non-pharmacological treatment of cucumber juice which has substances that help lower blood pressure to normal.

4. Administration of cucumber juice in appropriate doses will give significant results in reducing systolic and diastolic blood pressure in men and women with high blood pressure.

5. There is a strong relationship between intake of potassium, calcium, and magnesium to reduce blood pressure. The smaller the intake of potassium, the blood pressure will continue to be large. The ratio of sodium or potassium is also related to blood pressure. Reducing sodium intake and consuming potassium results in a reduction in blood pressure

6. Reduction of blood pressure is generally not of a short duration, but tried for approximately one to 2 weeks and then there will be changes. The effectiveness of the results will arise if tested not in an immediate duration, meaning that it must be tested not within a certain period of time because the body in carrying out safe physiological processes takes time.

References

[1] Tukan RA. Efektifitas Jus Mentimun Dalam Menurunkan Tekanan Darah Pada Pasien Hipertensi. J Borneo Holistic Health. 2018;1(1):43–50.

[2] Tarigan AR, Lubis Z, Syarifah S. Pengaruh Pengetahuan, Sikap Dan Dukungan Keluarga Terhadap Diet Hipertensi Di Desa Hulu Kecamatan Pancur Batu Tahun 2016. Jurnal Kesehatan. 2018;11(1):9–17.

[3] Kharisna D, Nisfha Dewi W, Lestari W. Efektifitas Konsumsi Jus Mentimun Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi. J Ners Indo. 2012;2(2).

[4] Siti R. Pengaruh terapi air rebusan daun salam terhadap perubahan tekanan darah pada penderita hipertensi di desa Katipugal Kecamatan Kebonagung Kabupaten Pacitan. STIKES Bhakti Husada Mulia; 2017.

[5] Dwi Hastuti V, Meriwati M, Okfrianti Y, Haya M, Wahyu T. Pengaruh Pemberian Jus Buah terhadap Tekanan Darah pada Penderita Hipertensi di Wilayah Kerja Puskesmas Air Bintunan Kabupaten Bengkulu Utar Tahun 2021. Poltekkes Kemenkes Bengkulu; 2021.

[6] Solanki P. Nilai gizi mentimun. Jakarta: Rineka; 2011.

[7] Amran Y, Febrianti F, Irawanti L. Pengaruh tambahan asupan kalium dari diet terhadap penurunan hipertensi sistolik tingkat sedang pada lanjut usia. Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health J). 2010;5(3):125–130.

[8] Kusnul Z, Munir Z. Efek pemberian jus mentimun terhadap penurunan tekanan darah. Prosiding Seminas Competitive Advantage. 2012;1(2):1–6.

[9] Zauhani ZMEPJ. Efek Pemberian Jus Mentimun Terhadap Penurunan Tekanan Darah. Available from: Academia edu. 2014.

[10] Aveyard H. Doing a literature review in health and social care: A practical guide. 2018.

[11] Almatsier S. Gizi seimbang dalam daur kehidupan. Gramedia Pustaka Utama; 2013.

[12] Aisyah A, Probosari E. Pengaruh Pemberian Jus Mentimun (Cucumis sativus l) Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi Wanita Usia 40-60 Tahun. Diponegoro University; 2014.

[13] Prakoso A, MM FA. Pengaruh Pemberian Jus Mentimun Terhadap Tekanan Darah Pada Lansia dengan Hipertensi di Posyandu di Kabupaten Demak. In: Prosiding Seminar Nasional & Internasional. 2014.

[14] Hariada LH. Pengaruh Jus Mentimun (Cucumis Sativus Linn) Pada Tekanan Darah Perempuan dan Laki-Laki Dewasa. Universitas Kristen Maranatha Diperoleh tanggal. 2011;12.

[15] Smeltzer SC. Keperawatan medikal bedah brunner & suddarth. In EGC; 2013.