JMCH Journal of Maternal and Child Health (2025), 10(05): 304-314
Masters Program in Public Health, Universitas Sebelas Maret

Original Research
Open Access

Effect of Soybean Milk *(Glycine Max L.)* on Reducing Blood Pressure and Cholesterol Levels in Women of Reproductive Age

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Received: 29 August 2025; Accepted: 29 September 2025; Available online: 16 September 2025

ABSTRACT

Background: Women of reproductive age often experience problems with blood pressure and cholesterol levels. Therefore, researchers innovated in an effort to stabilize blood pressure and cholesterol levels in women of reproductive age by providing an intervention of soy milk. The purpose of this study was to determine the effect of soy milk administration on reducing blood pressure and cholesterol levels in women of reproductive age.

Subjects and Method: This study used a quasi-experimental design with control group. The study was located at the Pangaribuan Community Health Center, North Tapanuli Regency, North Sumatera, Indonesia in June 2025. The intervention group received 40 grams of soy milk and the control group received health education. The dependent variables were blood pressure and cholesterol levels. The independent variable was soy milk. The data were tested using independent t test.

Results: After intervention, mean of SBP in the intervention group (Mean= 138.12; SD= 7.52) was lower than control group (Mean= 139.06; SD= 4.33), with p= 0.034; mean of cholesterol level in the intervention group (Mean= 232.94; SD= 7.56) was lower than control group (Mean= 256.88; SD= 15.95), with p<0.001; there was no difference of DBP between groups (p= 0.795).

Conclusion: Soy milk has an effect in lowering systolic blood pressure and cholesterol level in women of reproductive age.

Keywords: soybeans, cholesterol, milk, blood pressure, women of reproductive age.

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Cite this as:
Simbolon A, Sumarni S, Anwar C (2025). Effect of Soybean Milk *(Glycine Max L.)* on Reducing Blood Pressure and Cholesterol Levels in Women of Reproductive Age. *J Matern Child Health*. 10(05): 304-314. https://doi.org/10.26911/thejmch.2025.10.05.04.

BACKGROUND

One of the leading causes of premature death worldwide is hypertension, often known as high blood pressure, a non-communicable disease. Twenty-two percent of people worldwide suffer from hypertension, yet only one in five of them attempt to manage their blood pressure (WHO, 2023). Hypertension is a disease that causes complications that require public attention. Indonesia is one of the countries facing a rapid increase in deaths related to non-

communicable diseases. The prevalence of non-communicable diseases, including obesity, hypertension, and diabetes, is significantly higher in women than in men (Giena, Thongpat, and Nitirat, 2018).

The prevalence of hypertension is 1 in 5 women and 1 in 4 men worldwide, but most people with hypertension are often unaware of their condition. One of the global targets for non-communicable diseases is to reduce hypertension by 25% by 2025 (WHO, 2023).

WHO data from 2021 estimates that 1.28 billion people worldwide suffer from hypertension, and approximately 10.44 million people die annually from hypertension and its complications. By 2025, the number of people with hypertension worldwide is expected to increase to 1.5 billion (Ministry of Health of the Republic of Indonesia, 2019).

According to the Indonesian Health Survey, the prevalence of hypertension diagnosed by doctors in 2023 was 8.0% (BKPK, 2024). The number of people with hypertension aged 15 years and older in North Sumatra Province in 2023 was 3,287,526, and 611,911 of them, or 18.61%, had received healthcare services. Of these, 294,933 were men (18.01%) and 316,978 were women (19.22%). (North, 2023) Data from North Tapanuli Regency in 2022 showed that 4,533 people with hypertension received healthcare services (Taputkab, 2023). The prevalence of high blood pressure is known to increase with age.

Women of reproductive age with a history of hormonal contraceptive use contribute to the number of hypertension sufferers (Septiani, Anwar, and Santjaka, 2024). In addition to hypertension, women of reproductive age are also more susceptible to high cholesterol due to a combination of hormonal factors, lifestyle, and certain medical conditions. Fluctuations in estrogen levels during the fertile period can affect lipid metabolism, while hormonal contraceptive use often increases LDL or triglyceride levels (Ardiana, 2024). A diet high in saturated fat, lack of physical activity, and stress also exacerbate this condition. Furthermore, metabolic changes during pregnancy and postpartum can lead to persistent increases in cholesterol levels, especially if not balanced with a healthy lifestyle. Genetic factors and medical conditions such as polycystic ovary syndrome (PCOS) or hypothyroidism also contribute to the risk of high cholesterol in this group (Amalia, 2020).

Hypertension is defined as high blood pressure with systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg after repeated examinations (Unger et al., 2020). If left untreated and without lifestyle changes, hypertension can cause dangerous complications, including heart disease, stroke, and kidney failure. Hypertension affects people of all ages, especially women of reproductive age (WOMEN OF FERTILE AGE). Women of reproductive age are those of reproductive age, between the ages of 15-49 who are married or widowed, unmarried, and planning to have a family (Irma Yunawati et al., 2020). Hypertension and high cholesterol have a causal relationship that influences each other, where high cholesterol is often the main factor underlying the occurrence of hypertension. High LDL cholesterol levels cause the formation of atherosclerotic plaques in blood vessels, which reduce elasticity and narrow the lumen of the arteries, thereby increasing vascular resistance and blood pressure. On the other hand, hypertension can also accelerate endothelial damage due to mechanical stress, worsening the accumulation of cholesterol plaques. From this relationship, high cholesterol tends to be the dominant factor be-

cause its mechanism directly triggers structural changes in blood vessels, which then exacerbate hypertension. Therefore, interventions to lower cholesterol are often a crucial step in the prevention and management of hypertension (Susanti, 2023).

Given the numerous effects of pharmacological drugs, non-pharmacological treatments are necessary to complement them for better results. Soy milk is one such non-pharmacological treatment. Consuming soy milk can reduce hypertension. Soy milk is a processed soy product that is high in protein, low in fat, a source of potassium, and also contains isoflavones. Potassium alters the function of the renin-angiotensin system by inhibiting renin release, increasing salt and fluid excretion, and regulating peripheral and central neurons that influence blood pressure.

Research (Supardi, 2023) shows that counseling on the benefits of soybean extract for lowering blood pressure in pregnant women at the Bontomarannu Community Health Center in Gowa Regency showed positive results. Pregnant women's knowledge increased after the counseling, which contributed to changes in behavior, such as regular consumption of soybean extract. The isoflavone content in soybean extract helps lower blood pressure through blood vessel relaxation and reduced vascular resistance. This makes soybean extract a natural and safe alternative to help control blood pressure, especially when combined with a healthy lifestyle. Effective education has also proven important to increase awareness and implementation of dietary patterns that support maternal health. Furthermore, research (Fitranti and Marthandaru, 2016) shows that consuming soy milk and ginger has a significant effect on lowering total cholesterol levels in women with hypercholesterolemia.

The isoflavone content in soy milk plays a role in lowering LDL (bad) cholesterol levels and increasing HDL (good) cholesterol levels, while ginger, with its antioxidant and anti-inflammatory properties, helps reduce oxidative stress that contributes to high cholesterol levels. Research (Putri et al., 2022) found that consuming two glasses of soy milk for seven days effectively reduced systolic blood pressure in postmenopausal women. Furthermore, research (Hamid, 2022) found that consuming soy milk for seven days effectively reduced cholesterol levels.

The combination of the two produces a synergistic effect that supports overall lipid profile improvement. These results suggest that soy milk and ginger can be a natural and safe complementary therapy option for managing hypercholesterolemia, although it still needs to be balanced with a healthy lifestyle. The recommended daily intake of isoflavones is around 40–80 mg, requiring approximately 14–28 mL of soy milk with this concentration. On average, fresh soybeans contain approximately 1–3 mg of isoflavones per gram of dry, raw soybeans. This content can vary depending on the soybean variety and processing method. Based on this average, to achieve 40–80 mg of isoflavones, it requires around 20–40 grams of fresh soybeans (Fawwaz et al., 2017).

SUBJECTS AND METHOD

1. Study Design

This was a quasi-experimental design with a pretest-posttest control design located at the Pangaribuan Community Health Center (Puskesmas), North Tapanuli, North Sumatera, Indonesia in June 2025.

2. Population and Sample

The target population was women of reproductive age in the Pangaribuan Community Health Center, Pangaribuan District, North

Tapanuli Regency. The total sample size was 34 women of reproductive age.

3. Study Variables

The dependent variables studied were blood pressure and cholesterol levels, and the independent variable was 40 grams of soy milk.

4. Operational Definition of Variables

Soy milk was administered once a day, each serving 40 grams of soy milk, and health education on blood pressure and cholesterol for 7 days. Blood pressure and cholesterol education was administered health education on blood pressure and cholesterol for 7 days. Blood pressure was measured before and after the intervention. Cholesterol levels, a fatty substance (lipid) found in all cells of the human body, were measured before and after the intervention.

5. Study Instruments

Blood pressure was measured with a sphygmomanometer, and cholesterol levels were measured with an Easy Touch.

6. Data Analysis

Data analysis used Excel and SPSS software. Mean differences between paired groups were tested using Repeated Measures ANOVA and Paired Sample T-Test.

7. Research Ethics

Research ethics issues, including informed consent, anonymity, and confidentiality, were carefully addressed throughout the research process. A research ethics approval letter was obtained from the Research Ethics Committee of Ministry of Health Polytechnic of Health Semarang, Semarang, Indonesia, No. 926/EA/F.XXIII/2025, dated June 15, 2025.

RESULTS

1. Sample Characteristics

Table 1 shows the characteristics of the respondents: the average age of the intervention group was 37 years in both groups, and the average BMI for the intervention group was 25.97 kg/m² and the control group was 26.13 kg/m².

Table 1. Sample Characteristisc

Characteristics	Intervention				Control			
	Mean	SD	Min	Max.	Mean	SD	Min	Max.
Age	37.41	3.65	28	43	37.12	2.54	30	40
BMI	25.97	2.61	20.81	30.66	26.13	1.99	21.90	29.04

Before treatment, there was no significant difference in systolic blood pressure between the intervention group (Mean= 143.82; SD= 5.48 mmHg) and the control group (Mean= 140.88; SD= 4.42 mmHg), p= 0.399). After treatment with 40 grams of soy milk, there was a significant decrease in systolic blood pressure in the intervention group compared to the control group. In the first post-treatment measurement, the mean systolic blood pressure in the intervention group was 138.12 (SD= 7.52 mmHg), while in the control group it was 139.06 (SD= 4.33 mmHg), with p= 0.034. This reduction continued in the second post-treatment measurement (post-2), where the mean systolic blood pressure in the intervention group further decreased to 133.29 (SD= 10.20 mmHg), compared to 139.18 (SD= 5.86 mmHg) in the control group (p= 0.033).

Table 2. Bivariate analysis of 40 grams of soy milk on systolic blood pressure

Systolic Blood Pressure	Mean	SD	p
Before treatment			
Intervention	143.82	5.48	0.399
Control	140.88	4.42	
After treatment (post-1)			
Intervention	138.12	7.52	0.034
Control	139.06	4.33	
After treatment (post-2)			
Intervention	133.29	10.20	0.033
Control	139.18	5.86	

Table 3 show that before treatment, there was no significant difference in diastolic blood pressure between the intervention group (Mean= 92.88; SD= 5.44 mmHg) and the control group (Mean= 90.35; SD= 5.70 mmHg), p= 0.854. After treatment with 40 grams of soy milk, both groups showed a slight decrease in diastolic blood pressure. However, the differences between groups remained statistically insignificant. In the first post-treatment measurement (post-1), the mean diastolic blood pressure in the intervention group was 89.24 (SD= 5.41 mmHg), compared to 89.06 (SD= 5.78 mmHg) in the control group, with p= 0.795. Similarly, in the second post-treatment measurement (post-2), the diastolic blood pressure was identical between the two groups, with a mean of 86.88 mmHg (SD= 5.18) for intervention SD = 5.08 for control, with p= 0.939).

Table 3. Bivariate analysis of 40 grams of soy milk on diastolic blood pressure

Diastolic Blood Pressure	Mean	SD	p
Before treatment			
Intervention	92.88	5.44	0.854
Control	90.35	5.70	
After treatment (post-1)			
Intervention	89.24	5.41	0.795
Control	89.06	5.78	
After treatment (post-2)			
Intervention	86.88	5.18	0.939
Control	86.88	5.08	

Table 4 shows that before treatment, there was no significant difference in cholesterol levels between the intervention group (Mean= 261.24; SD= 13.27 mg/dL) and the control group (Mean= 262.71; SD= 15.39 mg/dL), p= 0.767. However, after treatment with 40 grams of soy milk, there was a significant reduction in cholesterol levels in the intervention group compared to the control group. The mean cholesterol level in the intervention group decreased markedly to 232.94 (SD= 7.56 mg/dL), while in the control group it remained relatively high at 256.88 (SD= 15.95 mg/dL), with p < 0.001.

Table 4. Bivariate analysis of 40 grams of soy milk on cholesterol levels

Cholesterol levels	Mean	SD	p
Before treatment			
Intervention	261.24	13.27	0.767
Control	262.71	15.39	
After treatment			
Intervention	232.94	7.56	<0.001
Control	256.88	15.95	

DISCUSSION

1. The effect of 40 grams of soy milk for 7 days on systolic blood pressure in women of reproductive age

This study indicates a significant effect between the two groups of 40 grams of soy milk given for 7 days on systolic blood pressure in women of reproductive age. The average change in systolic blood pressure was greater in the intervention group. Soy milk contains several bioactive components that play a role in lowering systolic blood pressure, particularly isoflavones such as genistein and daidzein. These isoflavones work by increasing the production of nitric oxide (NO) in blood vessel walls, causing vasodilation, or widening of blood vessels, which ultimately lowers blood pressure. In addition, soy milk also contains polyunsaturated fatty acids (PUFAs), which help maintain blood vessel elasticity and reduce inflammation, as well as plant-based proteins that have been shown to improve vascular endothelial function. Minerals such as magnesium and potassium in soy milk also contribute to lowering blood pressure; potassium helps remove excess sodium from the body, while magnesium helps regulate blood vessel muscle contractions. This combination makes soy milk a plant-based beverage with the potential to help control blood pressure, particularly systolic blood pressure, especially when consumed regularly as part of a healthy diet (Lei et al., 2024)

The mechanism by which soy milk consumption can lower systolic blood pressure is that isoflavones such as genistein and daidzein in soy milk act as phytoestrogens that can mimic the action of the hormone estrogen in the body, primarily by binding to estrogen receptor beta (ERβ) found in blood vessels and the central nervous system. This binding stimulates the release of nitric oxide (NO) from blood vessel endothelial cells, which functions as a natural vasodilator, widening blood vessels and lowering systolic blood pressure. Furthermore, isoflavones also inhibit the angiotensin-converting enzyme (ACE), which plays a role in the formation of angiotensin II, a substance that causes vasoconstriction and increased blood pressure. By inhibiting ACE, vasoconstriction is reduced and blood pressure is lowered. Isoflavones also affect the central nervous system by decreasing sympathetic nerve activity, which contributes to lower heart rate and blood pressure. Furthermore, the antioxidant and anti-inflammatory properties of isoflavones help maintain healthy blood vessel walls and reduce oxidative stress, which is a common trigger for hypertension (Ramlal et al., 2022).

This study aligns with research by (Wening, Suyatno, and Pradigdo, 2020), which showed that regular consumption of soy milk can significantly reduce systolic and diastolic blood pressure in pregnant women with pre-hypertension. In a 14-day intervention, 200 mL of soy milk per day significantly reduced blood pressure compared to the control group. This study, conducted by (Erlich et al., 2024), is a

systematic review and meta-analysis that evaluated the effect of replacing cow's milk with soy milk on various cardiometabolic health indicators, including systolic blood pressure. The analysis found that substituting cow's milk with soy milk significantly reduced systolic blood pressure, especially in individuals with metabolic risk factors such as pre-hypertension and obesity. Soy milk consumption also showed potential improvements in lipid profiles and insulin sensitivity. Furthermore, a study (Sohouli et al., 2021), which evaluated the effect of soy milk consumption on various cardiometabolic risk factors, showed that soy milk consumption significantly contributed to lowering systolic and diastolic blood pressure, as well as improving lipid profiles, including lowering total and LDL cholesterol levels.

Researchers hypothesize that soy milk consumption is able to lower systolic blood pressure due to its isoflavone content, such as genistein and daidzein. Furthermore, soy milk contains potassium, magnesium, and plant protein, which are known to play a role in regulating blood pressure balance and improving vascular endothelial function, thus contributing to a physiological reduction in systolic blood pressure.

2. The effect of 40 grams of soy milk for 7 days on diastolic blood pressure in women of reproductive age

Soy milk is a plant-based beverage made by soaking, grinding, and filtering soybeans, resulting in a yellowish-white liquid that resembles milk. This beverage is a good source of plant-based protein and contains various essential nutrients such as isoflavones, fiber, unsaturated fats, B vitamins, calcium (if fortified), and minerals such as potassium and magnesium. Because it is lactose- and cholesterol-free, soy milk is often used as an alternative to cow's milk, especially by individuals who are lactose intolerant or choose a plant-based diet. Furthermore, the isoflavone content in soy milk offers health benefits, including the potential to maintain heart health, support hormonal balance, and lower blood pressure.

The blood pressure-lowering effect of soy milk is primarily attributed to its isoflavone content, which has estrogen-like activity, antioxidant and anti-inflammatory properties, and can relax blood vessels, increase nitric oxide production, improve endothelial function, and increase insulin sensitivity. Furthermore, the plant-based protein, potassium, and magnesium content in soy milk also support blood pressure regulation. Therefore, soy milk is considered a safe and effective functional nutritional alternative, with the potential to be part of a healthy plant-based diet for controlling blood pressure and reducing the risk of cardiovascular disease and metabolic syndrome (Bratha and Irwan, 2023).

This is supported by research (Lestari, 2019), which analyzed calcium and magnesium intake (from both the DASH diet and non-DASH sources) and blood pressure. The results showed that increasing calcium and magnesium consumption from the DASH diet or other sources consistently lowers blood pressure. Each 300–400 mg/day increase in calcium intake is associated with an average reduction in systolic blood pressure of 1.5–1.6 mmHg. Meanwhile, a similar supplemental magnesium intake resulted in a 1.6–1.9 mmHg reduction.

Research Yulianto et al. (2021) showed that regularly administering soy milk to people with hypertension significantly reduced blood pressure. After a 4- to 8-week intervention period, there was a significant reduction in both systolic and diastolic blood pressure compared to before

the intervention. Furthermore, research (Mosallanezhad et al., 2021) concluded that soy consumption is significantly associated with lower blood pressure in adults. Soy intake, whether in whole food form or isoflavone supplements, can lower systolic and diastolic blood pressure, especially in individuals with high blood pressure or pre-hypertension.

Researchers speculate that soy milk's ability to lower diastolic blood pressure is due to its isoflavone content. Minerals like potassium and magnesium in soy milk also help maintain electrolyte balance and reduce vascular resistance, which in turn lowers diastolic pressure. Previous research strengthens the evidence that soy consumption has the potential as part of a dietary strategy to prevent and manage hypertension naturally and safely.

3. The Effect of 40 Grams of Soy Milk for 7 Days on Cholesterol Levels in Women of reproductive age

There is an effect of 40 grams of soy milk for 7 days on diastolic blood pressure in women of reproductive age. The average change in diastolic blood pressure was greater in the intervention group. Soy milk contains various bioactive components that contribute to lowering blood cholesterol levels, especially total cholesterol and low-density lipoprotein (LDL) cholesterol. One of its main components is soy protein, which has been scientifically proven to increase LDL receptor activity in the liver, thereby accelerating cholesterol removal from the bloodstream. Furthermore, soy milk is also rich in isoflavones, such as genistein and daidzein, which have antioxidant effects and help inhibit LDL cholesterol oxidation, a process that plays a key role in the formation of atherosclerotic plaque. The soluble fiber content in soy milk also helps lower cholesterol levels by binding bile acids in the digestive tract, causing the body to use more cholesterol to regenerate them. This combination of ingredients makes soy milk a plant-based beverage choice that is not only cholesterol-free but also active in lowering blood cholesterol levels (Triandita and Putri, 2019).

Soy milk lowers cholesterol levels primarily through mechanisms in the liver and digestive tract. The soy protein in soy milk can increase the expression of LDL receptors in the liver, which capture and break down bad cholesterol (LDL) from the bloodstream, thereby lowering total and LDL cholesterol levels. Furthermore, isoflavones such as genistein and daidzein have antioxidant properties that prevent the oxidation of LDL cholesterol, a process that contributes to the formation of plaque that clogs arteries. Soy milk also contains soluble fiber that can bind bile acids in the intestines, forcing the body to use cholesterol from the blood to regenerate bile acids, thus naturally reducing blood cholesterol levels (Setyawan, 2017).

This study aligns with research by Eslami and Shidfar (2018), which showed that soy milk consumption significantly reduced total cholesterol, LDL (bad) cholesterol, and triglyceride levels, especially in individuals with dyslipidemia or high cholesterol. This study concluded that soy milk has the potential to be an effective and natural functional beverage in lowering blood cholesterol levels and supporting the prevention of cardiovascular disease. Furthermore, research by Hamid (2022) also showed that soy milk consumption significantly reduced total blood cholesterol levels. After 7 days of intervention, average cholesterol levels decreased from 265.4 mg/dL to 218.7 mg/dL, a decrease of 46.7 mg/dL (67.2% of respondents showed a decrease; p=0.013). This significant decrease explains the effectiveness of soy

proteins such as β-conglycinin and glycinin in stimulating bile acid secretion and inhibiting cholesterol absorption in the intestine, thus supporting the recommendation of soy milk consumption as a non-pharmacological therapy to lower blood cholesterol. Furthermore, research (Pratiwi et al., 2024) showed that regularly consuming black soybean milk (Glycine soja) effectively lowers total cholesterol levels in the elderly. In a 7-day intervention involving 250 mL of black soybean milk daily, a significant decrease in total cholesterol levels was recorded, with an average of 15.89 mg/dL.

Researchers assume that soy milk is able to lower cholesterol levels because it contains plant protein, isoflavones, and soluble fiber, which work synergistically to inhibit cholesterol absorption in the intestine and increase cholesterol excretion through the bile. Isoflavones in soybeans, such as genistein, also have antioxidant effects that prevent LDL cholesterol oxidation, while soy protein stimulates increased LDL receptor activity in the liver, thereby accelerating cholesterol clearance from the blood. This combination of mechanisms makes soy milk an effective natural alternative to help control cholesterol levels in the body.

AUTHORS CONTRIBUTION

In preparing this journal, Agustina Simbolon, Sri Sumarni, and M. Choiroel Anwar collaborated on the development of the manuscript. Agustina Simbolon prepared all research administrative documents (research permits) and data collection. Agustina Simbolon, Sri Sumarni, and M. Choiroel Anwar analyzed and interpreted the data.

FUNDING AND SPONSORSHIP

None.

ACKNOWLEDGEMENT

The researchers would like to thank the Midwifery Study Program of the Applied Master's Program, Ministry of Health Polytechnic of Health Semarang, Semarang, Indonesia, for the successful implementation of this research.ather the respondents in this study.

CONFLICT OF INTEREST

No conflict of interest.

REFERENCES

Amalia M (2020). Effect of giving boiled binahong leaves on blood pressure in elderly people studied in RW 004, Sukomulyo Village, Mojowarno, Jombang. Insan Cendekia Medika Health Sciences, Jombang, East Java, Indonesia. Retrieved from: https://-repository.itskesicme.ac.id/id/eprint/5359/

Ardiana M (2024). Cardiovascular disease screening in pregnancy (in Indonesian). Surabaya: Airlangga University Press.

BKPK H (2024). The prevalence of hypertension in Indonesia is decreasing (in Indonesian). https://www.badankebijakan.kemkes.go.id/prevalensi-hipertensi-di-indonesia-menurun/

Bratha SDK, Irwan M (2023). The effect of giving soy milk on reducing blood pressure in elderly with hypertension (in Indonesian). Pekalongan: Nasya Exapanding Management.

Erlich MN, Ghidanac D, Mejia SB, Khan TA, Chiavaroli L, Zurbau A, Ayoub-Charette S (2024). A systematic review and meta-analysis of randomized trials of substituting soymilk for cow's milk and intermediate cardiometabolic outcomes: understanding the impact of dairy alternatives in the

transition to plant-based diets on cardiometabolic health. BMC Medicine. 22(1): 336. doi:10.1186/s12916-024-03524-7.

Eslami O, Shidfar F (2018). Soy milk: a functional beverage with hypocholesterolemic effects? a systematic review of randomized controlled trials. Complement Ther Med. 42: 82-88. doi: 10.1016/j.ctim.2018.11.001.

Fawwaz M, Natalisnawati A, Baits M (2017). Kadar isoflavon aglikon pada ekstrak susu kedelai dan tempe (Isoflavone aglycone levels in soy milk and tempeh extracts). Industria: Jurnal Teknologi dan Manajemen Agroindustri. 6(3): 152–158. doi: 10.21776/ub.industria.2017.006.03.6

Fitranti DY, Marthandaru D (2016). Pengaruh susu kedelai dan jahe terhadap kadar kolesterol total pada wanita hiperkolesterolemia (The effect of soy milk and ginger on total cholesterol levels in hypercholesterolemic women). Indones J Nutr. 4(2): 89–95. doi: 10.14710/jgi.4.2.89-95.

Giena VP, Thongpat S, Nitirat P (2018). Predictors of health-promoting behaviour among older adults with hypertension in Indonesia. Int J Nurs Sci. 5(2): 201–205. doi: 10.1016/j.ijnss.-2018.04.002.

Hamid MA (2022). Konsumsi susu kedelai dalam menurunkan kolestrol darah pada klien dengan hiperkolesterolemia. Journals of Ners Community. 13(1): 97–105. Retrieved from: https:-//scholar.archive.org/work/ii6quu6sa5azljlpakky3r2ixi/access/wayback/http://journal.unigres.ac.id/index.php/JNC/article/download/1657/1264.

Kemenkes RI (2019). Hari hipertensi dunia 2019 : “Know your number, kendalikan tekanan darahmu dengan cerdik”. Retrieved from: http://p2ptm.kemkes.go.id/kegiatan-p2ptm/dki-jakarta/hari hipertensi-dunia-2019-know-your-number-kendalikan-tekanan-darahmu-dengan-cerdik.

Lei L, Hui S, Chen Y, Yan H, Yang J, Tong S (2024). Effect of soy isoflavone supplementation on blood pressure: a meta-analysis of randomized controlled trials. Nutr J. 23(1): 32. doi: 10.1186/s12937-024-00941-5.

Lestari D (2019). Relationship between calcium and magnesium intake and blood pressure in adulthood. Ilmu Gizi Indonesia. 3(1): 01–12. doi: 10.35842/ilgi.v3i1.112.

Mosallanezhad Z, Mahmoodi M, Ranjbar S, Hosseini R, Clark CCT, Carson CK, Norouzi Z, et al. (2021). Soy intake is associated with lowering blood pressure in adults: a systematic review and meta-analysis of randomized double-blind placebo-controlled trials. Complement Ther Med. 59. doi: 10.1016/j.ctim.2021.102692.

Prawtiwi DE, Widiany FL, Sari PM (2024). Efikasi pemberian susu kacang kedelai hitam (Glycine soja) terhadap kadar kolesterol total lansia. J Nutr College. 13(1): 89–95. doi: 10.14710/-jnc.v13i1.39767.

Putri HA, Widyastuti E, Amelia R (2022). Efektivitas Susu Kedelai terhadap Tekanan Darah dan Kolesterol Pada Wanita Menopause, Jurnal Kesehatan Madani Medika. 13(1). doi:10.36569/-jmm.v13i1.247.

Ramlal A, Nautiyal A, Baweja P, Kumar V, Mehta S, Mahto RK, Tripathi S, Shanmugam A, Pujari Mallikarjuna B, Raman P, Lal SK, Raju D, Rajendran A (2022). Angiotensin-converting enzyme inhibitory peptides and isoflavonoids from soybean [Glycine max (L.) Merr.]. Front Nutr. 9:1068388. doi: 10.3389/fnut.2022.1068388.

Septiani AL, Anwar MC, Santjaka A, (2024). Time of aerobic exercise on mean arterial pressure (AP) in women of reproductive age with hypertension (in Indonesian). J Telenursing. 6(1). DOI: 10.31539/joting.v6i1.9731.

Setyawan FEB (2017). Study on the effect of soy nutrition (Glycine Max) on reducing total cholesterol levels in menopause (in Indonesian). MAGNA MEDICA Berkala Ilmiah Kedokteran dan Kesehatan. 1(4): 33–42. doi: 10.26714/magnamed.1.4.2017.33-42

Sohouli MH, Lari A, Fatahi S, Shidfar F, Gaman MA, Guimaraes NS, Sindi GA (2021). Impact of soy milk consumption on cardiometabolic risk factors: a systematic review and meta-analysis of randomized controlled trials. J Functional Foods. 83(1). doi: 10.1016/j.jff.2021.104499.

Supardi N (2023). Penyuluhan tentang manfaat sari kacang kedelai terhadap penurunan tekanan darah pada ibu hamil di Puskesmass Bontomarannu Kabupaten Gowa. Jurnal Pengabdian Ilmu Kesehatan. 3(1): 56–63. doi: 10.55606/jpikes.v3i1.1387.

Susanti AM (2023). Hubungan kadar interleukin 6 (IL-6) dengan Kadar Small Dense-Low Density Lipoprotein (sd-LDL) pada pasien penyakit jantung koroner (PJK). Pekalongan: Nasya Exapanding Management.

Taputkab (2023). Infografis kesehatan di kabupaten Tapanuli Utara Tahun 2022. Retrieved from: https://www.taputkab.go.id/berita/v/infografis-kesehatan-di-tapanuli-utara-tahun-2022.

Triandita N, Putri NE (2019). Peranan kedelai dalam mengendalikan penyakit degeneratif (The role of soybean in control of degenerative disease). Teknologi Pengolahan Pertanian, 1(1): 6–17. doi: 10.35308/jtpp.v1i1.1478.

Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, Ramirez A, et al. (2020). International society of hypertension global hypertension practice guidelines, Hypertension, 75(6): 1334–1357. doi: 10.1161/hypertensionaha.120.15026.

Wening N, Suyatno S, Pradigdo SF (2020). Susu kedelai menurunkan tekanan darah sistolik dan diastolik pada ibu hamil pre-hipertensi (Soy milk lowers systolic and diastolic blood pressure in pre-hypertensive pregnant women). Jurnal Kesehatan Masyarakat. 8(2): 272–277. doi: 10.14710/jkm.v8i2.26362.

WHO (2023). Global report on hypertension: the race against a silent killer. World Health Organization.

Yulianto A, Tristiningsih T, Fadhilah N (2021). Giving soy milk to reduce blood pressure in hypertension sufferers in Pringkumpul Village, South Pringsewu (in Indonesian). Jurnal Ilmiah Kesehatan. 10(1): 54–63. DOI:10.52657/jik.v10i1.1318.

Yunawati I, Karimuna K, Rabbani S, Lisnawaty L, Jafriati J (2020). Counseling and blood pressure examination activities in the coastal community of talia, kendari city as an effort to detect hypertension from an early age. Mattawang: Jurnal Pengabdian Masyarakat. 1(2): 79–84. doi: 10.35877/454ri.mattawang171.