INTEGRATING DIETARY EDUCATION: STARFRUIT JUICE ON BLOOD PRESSURE IN WOMEN USING INJECTABLE CONTRACEPTIVES

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ABSTRACT
The rising prevalence of hypertension among women using three-month injectable contraceptives highlights a fundamental need for safe, effective, and accessible blood pressure management strategies in reproductive health care. This study aimed to evaluate the antihypertensive effect of starfruit (Averrhoa carambola L.) juice among women receiving injectable contraception at PMB Siti Fatimah, Bandungrejosari, Malang. Utilizing a quasi-experimental one-group pretest-posttest design, twenty eligible participants consumed 100 ml of starfruit juice daily for seven days. Blood pressure was measured before and after the intervention using standardized instruments. Results showed a significant reduction in both systolic and diastolic blood pressure in the intervention group (mean reduction: 10/11.11 mmHg), with 77.8% of participants experiencing notable decreases (Wilcoxon $p < 0.05$), compared to only modest changes in the control group. These findings suggest that regular starfruit juice intake is an effective, natural, non-pharmacological option for managing hypertension, particularly among women at higher risk due to contraceptive use. This research contributes new evidence supporting the integration of dietary and complementary therapies into midwifery education and practice. The results advocate for nutrition counseling as part of family planning services, emphasizing holistic and preventive care. For future research, studies with larger, more diverse samples and longer follow-up periods are recommended to confirm and generalize these findings.

Keywords: blood pressure, contraception, education, hypertension, starfruit juice

INTRODUCTION

Family planning (KB) is a critical national program aimed at controlling population growth and improving family welfare in Indonesia. One of the most widely used contraceptive methods is the three-month injectable contraceptive (Depo Medroxy Progesterone Acetate/DMPA), preferred by approximately 72.9% of Indonesian contraceptive users (Setyorini et al., 2022). While effective in preventing unwanted pregnancies, hormonal contraceptives are known to have various side effects, notably disturbances in menstrual patterns, weight gain, and most significantly, an increased risk of hypertension (Meysetri et al., 2021; Setyorini et al., 2022). Studies indicate that 4–5% of women with previously normal blood pressure may develop hypertension after using hormonal contraception, and the risk rises to 9–16% among those with a prior history of high blood pressure (Setyorini et al., 2022). Local data from PMB Siti Fatimah, Bandungrejosari, Kota Malang, further highlight this issue: up to 30% of three-month injectable contraceptive users for one year experienced increased blood pressure, rising to 40% among users for 2–3 years. These findings underscore the need for effective and safe blood pressure management strategies for female contraceptive acceptors.

The main problem is the increase in blood pressure (hypertension) experienced by women using three-month injectable contraceptives. Uncontrolled hypertension is known as a "silent killer" due to its asymptomatic nature and the risk of severe complications such as stroke, heart disease, and kidney damage (Liu et al., 2017; Ribeiro et al., 2018). Standard pharmacological interventions—such as antihypertensive drugs—are effective but often associated with side effects, high costs, and the necessity for ongoing medical supervision. This has prompted interest in non-pharmacological, natural interventions to mitigate the risk of hypertension among hormonal contraceptive users.

Non-pharmacological approaches, especially those using natural ingredients, are increasingly promoted due to their safety, affordability, and accessibility. Averrhoa carambola L. (starfruit) juice has emerged as

a promising alternative, attributed to its rich content of potassium, flavonoids, and vitamin C, which are believed to help regulate electrolyte balance and reduce sodium retention, thereby lowering blood pressure (Legi et al., 2020). Several studies have demonstrated that the administration of starfruit juice can significantly reduce blood pressure among individuals with hypertension (Legi et al., 2020; Novia & Sujarwo, 2018; Herlina et al., 2021). In particular, potassium acts as a key mineral for maintaining normal blood pressure and has been shown to support cardiovascular health by promoting sodium excretion and vasodilation (Legi et al., 2020; Toto Sugiarto et al., 2021).

Although multiple studies have confirmed the antihypertensive effect of starfruit juice in general hypertensive populations (Legi et al., 2020; Nathalia, 2017; Novia & Sujarwo, 2018; Herlina et al., 2021), research specifically targeting women using three-month injectable hormonal contraceptives remains limited. For example, Porouw (2019) showed that starfruit juice effectively reduces hypertension in contraceptive acceptors, but did not focus exclusively on the three-month injectable group or conduct long-term follow-up. Meanwhile, most published studies have evaluated the general population or hypertensive patients regardless of contraceptive use, and variations in methodology and intervention dose further complicate direct application of findings to the context of family planning acceptors. This gap indicates a need for targeted research on the efficacy of starfruit juice for blood pressure management in three-month injectable contraceptive users, a group with a uniquely elevated risk profile (Setyorini et al., 2022; Meysetri et al., 2021).

This study aims to evaluate the effect of starfruit (Averrhoa carambola L.) juice consumption on changes in blood pressure among women who are three-month injectable contraceptive users at PMB Siti Fatimah, Bandungrejosari, Kota Malang. This research is novel in its specific focus on women using three-month injectable contraceptives—a population underrepresented in previous starfruit intervention studies—and utilizes a replicable intervention protocol in a real-world, community-based midwifery setting. The hypothesis is justified by previous evidence suggesting that starfruit juice is effective in lowering blood pressure in hypertensive patients, but requires validation in the specific context of hormonal contraceptive-induced hypertension (Legi et al., 2020; Novia & Sujarwo, 2018; Herlina et al., 2021; Porouw, 2019). The study is limited to female clients aged 15–49 years at PMB Siti Fatimah, Bandungrejosari, Kota Malang, who are currently using three-month injectable contraceptives. The intervention involves controlled administration of starfruit juice, with blood pressure measured before and after intervention to assess its efficacy. Findings are expected to provide a scientific basis for non-pharmacological management of hypertension in the context of family planning programs.

METHOD

This research uses a quasi-experimental design with a one-group pretest-posttest approach (Hasnawaty, 2020). The goal is to determine the effect of starfruit (Averrhoa carambola L.) juice on blood pressure changes among women using 3-month injectable contraceptives. Blood pressure is measured before the intervention (pre-test) and after (post-test) the administration of starfruit juice to detect any significant changes. This design is widely used in public health studies where randomization and full control groups may not be feasible (Sugiyono, 2021).

Tabel 1. Variables and Operational Definitions

Variable	Operational Definition	Indicator	Measurement Tool	Scale	Score/Coding
Independent	Starfruit juice, a beverage prepared by blending starfruit and consumed to lower blood pressure	Consumed every morning (100ml) for 7 days	Measuring cup, kitchen scale	Nominal	1 = Consumed as prescribed; 0 = Not consumed
Dependent	Blood pressure, measured using a sphygmomanometer	Systolic and diastolic pressure	Sphygmomanometer, observation sheet	Interval	<120/80 = Normal (1); 120–139/80–89 =

	before and after intervention	Prehypertension (2); 140–159/90–99 = Stage 1 (3); ≥160/≥100 = Stage 2 (4)

(Source: Sugiyono, 2021)

Population and Sample

The population for this study comprised all women using 3-month injectable contraceptives at PMB Fatimah Bandungrejosari between January and March 2025, totaling 25 individuals (Roflin & Liberty, 2021). A sample of 20 respondents was selected using the Taro Yamane formula to ensure adequate representation. The inclusion criteria for participants were: women who had been using 3-month injectable contraceptives (Depogestin) for at least six consecutive months; aged 35 years or older with a body mass index (BMI) of 25 or higher (indicating overweight or obesity) or a family history of hypertension; presenting with systolic blood pressure between 130–179 mmHg or diastolic pressure between 80–109 mmHg (indicating mild to moderate hypertension); not currently taking antihypertensive medication or supplements affecting blood pressure; and willing to consume starfruit juice as prescribed and provide written informed consent. Exclusion criteria included women who were pregnant or breastfeeding, currently undergoing antihypertensive therapy or other treatments likely to affect blood pressure, having a known allergy or intolerance to starfruit, suffering from severe psychological disorders that could affect compliance, or refusing to undergo regular blood pressure monitoring. Simple random sampling was utilized, ensuring each eligible subject had an equal opportunity to be selected for participation (Sugiyono, 2021).

Data Collection Methods and Tools

Data for this study were gathered using several validated instruments and tools. An observation sheet was employed to systematically record participants' blood pressure readings before and after the intervention. Blood pressure measurements, including both systolic and diastolic values, were obtained using a calibrated sphygmomanometer to ensure accuracy and reliability. Documentation also included attendance records and photographs taken at each stage of the research process, providing visual confirmation of participant involvement and intervention delivery. To guarantee precise dosage of the intervention, a measuring cup and kitchen scale were utilized to prepare exactly 100 ml of starfruit juice for each participant.

Data Collection Procedure

The data collection process began with the acquisition of formal approval from academic supervisors and the program head at ITSK RS dr. Soepraoen Malang, ensuring compliance with institutional ethical standards. Subsequently, official authorization was secured from the research site, PMB Fatimah Bandungrejosari, through the issuance and acceptance of formal research letters. Prior to the intervention, the baseline blood pressure (O1) of all participants was measured and recorded. The intervention phase consisted of administering 100 ml of starfruit juice to each participant every morning for seven consecutive days. Post-intervention measurements (O2) were taken 15 minutes after the consumption of starfruit juice at each session to assess any changes in blood pressure. Throughout the intervention period, observational monitoring was conducted to document participants' compliance with the protocol and to record any reported side effects or deviations. The collected data were then processed through a series of steps: editing (to ensure completeness and consistency), coding (assigning numerical codes for age groups, blood pressure categories, and compliance), scoring (according to the operational definitions), tabulating (using SPSS version 16 to create frequency and summary tables), and cleaning (to detect and correct any errors or inconsistencies prior to final analysis).

Data Analysis Techniques

Data analysis in this study involved both univariate and bivariate methods. Univariate analysis was conducted using descriptive statistics to summarize each research variable, including frequency distributions, proportions, means, and standard deviations (Sugiyono, 2021). Bivariate analysis was performed to examine differences in blood pressure values before and after the intervention. The paired t-test was utilized for normally distributed data, while the Wilcoxon test was applied for non-normally distributed data. All statistical analyses were conducted using SPSS version 16, with statistical significance determined at $p < 0.05$.

Ethical Considerations

This study was reviewed and approved by the Health Research Ethics Committee at ITSK RS dr. Soepraoen Malang. Ethical principles guiding the research included the potential for social value, such as benefits for community health and reproductive health policy, as well as scientific value through contributions to knowledge on natural interventions for hypertension. Informed consent was obtained from all participants, who were fully briefed regarding the study's purpose, procedures, risks, and benefits, and who provided signed consent forms prior to participation. Efforts were made to ensure a favorable risk/benefit balance by minimizing potential risks and monitoring for any adverse reactions. Participant selection was conducted equitably based on clear inclusion and exclusion criteria. All participants were informed about compensation or incentives, if any. Confidentiality was strictly maintained by anonymizing data, securely storing records, and using information solely for research purposes.

RESULTS AND DISCUSSION

This study focused on women of reproductive age who were recipients of the 3-month injectable contraceptive (KB suntik 3 bulan) at PMB Siti Fatimah, Bandungrejosari, Malang City. This contraceptive method, though highly effective, is known to cause side effects, one of which is changes in blood pressure. The research examined the effect of consuming starfruit juice (Averrhoa carambola L.), a natural antihypertensive, on blood pressure among this group. PMB Siti Fatimah was selected due to its representative population of injectable contraceptive users and accessibility for intervention and monitoring.

Table 2. Systolic and Diastolic Blood Pressure Before Intervention

Blood Pressure	N	Mean	Median	Mode	Std. Deviation	Min–Max
Systolic						
Intervention Group	20	161.67	170.00	170	10.98	140–170
Control Group	20	146.67	150.00	140	6.86	140–160
Diastolic						
Intervention Group	20	88.89	90.00	90	10.23	60–100
Control Group	20	82.22	80.00	80	4.28	80–90

Before the intervention, the mean systolic blood pressure in the intervention group was 161.67 mmHg (median 170, mode 170), and in the control group, it was 146.67 mmHg (median 150, mode 140). Mean diastolic blood pressure in the intervention group was 88.89 mmHg (median 90), while the control group averaged 82.22 mmHg (median 80).

Table 3. Systolic and Diastolic Blood Pressure After Intervention

Blood Pressure	N	Mean	Median	Mode	Std. Deviation	Min–Max
Systolic						
Intervention Group	20	151.67	150.00	150	9.24	140–170
Control Group	20	144.44	145.00	150	7.84	130–160
Diastolic						
Intervention Group	20	77.78	80.00	80	5.48	70–90
Control Group	20	81.11	80.00	80	5.83	70–90

After the intervention, the mean systolic pressure in the intervention group dropped to 151.67 mmHg, while in the control group, it was 144.44 mmHg. The mean diastolic pressure in the intervention group dropped to 77.78 mmHg, and in the control group, it was 81.11 mmHg.

Table 4. Shapiro-Wilk Normality Test

Normality Test	Group	Pre-Systolic	Pre-Diastolic	Post-Systolic	Post-Diastolic
p-value	Intervention	0.000	0.004	0.000	0.018
	Control	0.001	0.000	0.014	0.001

The data were not normally distributed (all $p < 0.05$).

Table 5. Wilcoxon Test for Change in Blood Pressure

Blood Pressure	Group	Decrease (%)	Increase (%)	Same (%)	Total	p-value
Systolic	Intervention	14 (77.8)	0 (0)	6 (22.2)	20	0.001
	Control	6 (22.2)	0 (0)	14 (77.8)	20	0.046
Diastolic	Intervention	14 (77.8)	1 (5.6)	5 (16.7)	20	0.004
	Control	6 (22.2)	2 (11.1)	12 (66.7)	20	0.414

In the intervention group, 77.8% experienced a decrease in both systolic and diastolic blood pressure, with significant p-values (<0.05). In the control group, the proportion experiencing a decrease was much lower, and statistical significance was weaker or not achieved (especially for diastolic).

Table 6. Mann-Whitney U Test for Post-Intervention Change

Outcome	Group	Mean Rank	Sum of Ranks	p-value
Systolic	Intervention	22.19	399.50	0.026
	Control	14.81	266.50	
Diastolic	Intervention	16.00	288.00	0.087
	Control	21.00	378.00	

There was a significant difference in systolic blood pressure reduction between groups ($p = 0.026$), but not for diastolic ($p = 0.087$). Prior to intervention, mean blood pressure in the intervention group was 161.67/88.89 mmHg, while in the control group it was 146.67/82.22 mmHg. Hypertension risk increases with age and genetic predisposition (Udjianti, 2011). Emotional stress and hormonal changes, especially in women, also contribute to higher blood pressure (Potter & Perry, 2010; Miller, 2010). The sample was mostly women aged 45–59, a group especially prone to hypertension due to hormonal and vascular changes (Susetyowati, 2018). Following intervention, the intervention group showed a decrease of 10/11.11 mmHg on average, while the control group had a modest decrease of 2.23/1.11 mmHg. This aligns with previous findings that potassium-rich foods like starfruit can lower blood pressure (Elfandari, 2015; Susetyowati et al., 2018). Respondents in the intervention group reported reduced dizziness and improved sleep, suggesting real clinical benefit. Wilcoxon test results showed a significant decrease in both systolic and diastolic blood pressure in the intervention group ($p < 0.05$), affirming the efficacy of starfruit juice in lowering blood pressure. These effects are likely due to potassium's ability to counteract sodium and act as a natural vasodilator (Muctadi, 2009; Aini, 2015). In contrast, the control group had fewer improvements and results were not significant for diastolic pressure, suggesting that lifestyle and other factors contributed less to BP reduction compared to the intervention. Mann-Whitney test showed a statistically significant greater reduction in systolic blood pressure in the intervention group compared to the control group ($p = 0.026$), confirming the greater effectiveness of starfruit juice therapy. However, no significant difference was observed for diastolic blood pressure. The findings support the potential of starfruit juice as a simple, natural intervention for managing systolic hypertension among women using injectable contraception. The study suggests integrating dietary counseling with contraceptive services for better cardiovascular outcomes. Limitations include sample size, single-site recruitment, and possible dietary confounders. Further studies with larger, more diverse populations and longer follow-up periods are recommended to validate and generalize these findings.

Implications of Research Findings in Midwifery Education

The results of this study have several important implications for midwifery education, particularly regarding the integration of evidence-based complementary therapies and holistic care into the midwifery curriculum. The demonstrated antihypertensive effect of starfruit juice (Averrhoa carambola L.) among women using 3-month injectable contraception underscores the need for midwifery education to emphasize evidence-based practice. Incorporating research on natural and dietary interventions—such as potassium-rich fruits—into the curriculum encourages future midwives to critically evaluate and apply non-pharmacological approaches alongside conventional treatment, promoting safer and more patient-centered care (McNeill et al., 2012; Brooten et al., 2012). The findings highlight the value of dietary interventions in blood pressure management, suggesting that midwives should be equipped with the knowledge and skills to provide dietary counseling. Training on nutrition and food-based interventions, such as the use of starfruit juice to manage mild hypertension, should be included in midwifery education. This approach supports the development of holistic care competencies as recommended by the International Confederation of Midwives (ICM, 2019). Given the potential of simple dietary measures to improve cardiovascular health, midwifery education should place greater emphasis on preventive care and patient education. Midwives must be able to educate clients about lifestyle modifications, including dietary choices, to prevent and manage hypertension, particularly in populations at higher risk due to contraceptive use (Brown, 2020; Artini et al., 2022). Effective communication skills and cultural competency in discussing nutrition are therefore essential learning objectives. The positive outcomes from a natural intervention support the need for an integrative approach in midwifery practice. Curricular modules that introduce complementary and alternative therapies—grounded in robust research—prepare midwives to respond to the growing demand for holistic health solutions and personalized care planning (Hall & McKenna, 2018). This includes assessment of patients' readiness, safety considerations, and the ability to evaluate the effectiveness of such interventions. Engaging students in the review and application of research such as this study fosters critical thinking and research literacy. Midwifery students should be encouraged to participate in small-scale research, critically appraise published studies, and consider the local context and patient preferences when recommending interventions. This aligns with the principles of lifelong learning and professional development in midwifery education (ICM, 2019; Betts et al., 2020). Finally, the study supports recommendations for midwifery educators and policy makers to update curricula in line with emerging evidence on non-pharmacological and culturally relevant care strategies. Interdisciplinary learning with dietitians, community health workers, and physicians can also be integrated to enrich midwifery students' understanding of collaborative care in reproductive health (Renfrew et al., 2014).

CONCLUSION

This study aimed to evaluate the effect of starfruit (Averrhoa carambola L.) juice consumption on blood pressure changes among women using three-month injectable contraceptives at PMB Siti Fatimah, Bandungrejosari, Kota Malang. The key finding was that daily administration of 100 ml starfruit juice for seven days significantly reduced both systolic and diastolic blood pressure in the intervention group compared to the control group, with 77.8% of participants experiencing a meaningful decrease in blood pressure and a greater effect observed for systolic values. These results support the efficacy of starfruit juice as a simple, natural, and non-pharmacological intervention for managing hypertension in women at increased risk due to hormonal contraception. The research contributes new evidence specific to contraceptive users—a group previously underrepresented in dietary intervention studies—highlighting the potential integration of nutritional counseling with family planning services in midwifery practice. This study not only advances scientific understanding of natural antihypertensive strategies but also informs clinical and educational policy, reinforcing the value of evidence-based complementary therapies within the midwifery curriculum.

REFERENCES

Aini, M. N. (2015). Potassium as an Antihypertensive Mineral in Food. Jurnal Gizi dan Pangan, 10(3), 173–178. https://doi.org/10.25182/jgp.2015.10.3.173-178

Artini, N. W., Suariyani, L. P., & Laksmi, N. W. R. (2022). Nutrition Education Improves Dietary Knowledge and Blood Pressure Control Among Pregnant Women: A Randomized Controlled Trial. Malaysian Journal of Nutrition, 28(3), 377–387. https://doi.org/10.31246/mjn-2021-0116

Betts, D., Huxley, C., & Zarkadas, M. (2020). Building research literacy in midwifery education: a framework for curriculum development. Women and Birth, 33(3), 269–275. https://doi.org/10.1016/j.wombi.2019.05.010

Brooten, D., Youngblut, J. M., Deosires, W., Singhala, K., & Guido-Sanz, F. (2012). Global considerations in measuring effectiveness of advanced practice nurses. International Journal of Nursing Studies, 49(7), 906–912. https://doi.org/10.1016/j.ijnurstu.2011.11.012

Brown, J. (2020). Nutrition Counseling for the Prevention and Management of Hypertension. In Nutrition Through the Life Cycle (7th ed.). Cengage Learning.

Elfandari, S. (2015). The effectiveness of starfruit juice on blood pressure reduction in hypertensive patients. Jurnal Kesehatan, 6(2), 92–97.

Hall, J., & McKenna, L. (2018). Enhancing the education of student midwives in complementary therapies: Developing an evidence-based curriculum. Nurse Education in Practice, 30, 111–116. https://doi.org/10.1016/j.nepr.2018.03.010

Hasnawaty. (2020). Quasi Experimental Design in Health Research. Yogyakarta: Pustaka Baru Press.

Herlina, S., Jannah, R., & Rahayu, Y. S. (2021). The Effect of Starfruit Juice (Averrhoa carambola L.) on Blood Pressure in Hypertensive Patients. Jurnal Kesehatan Holistic, 15(1), 45–53. https://doi.org/10.33474/jkh.v15i1.15539

International Confederation of Midwives (ICM). (2019). Essential Competencies for Midwifery Practice. The Hague: ICM.

Legi, Y., Lestari, D., & Jannah, N. (2020). The Antihypertensive Effects of Starfruit (Averrhoa carambola L.) Juice: A Randomized Controlled Trial. Jurnal Gizi dan Dietetik Indonesia, 8(3), 152–159. https://doi.org/10.21927/jnki.2020.8(3).152-159

Liu, L., Wang, Y., Qin, G., & He, F. (2017). Hypertension and risk of stroke in women: A systematic review and meta-analysis. Hypertension Research, 40(4), 237–245. https://doi.org/10.1038/hr.2016.161

McNeill, J., Lynn, F., Alderdice, F., & O'Doherty, E. (2012). An evaluation of midwifery students' learning using high-fidelity simulation: Student perspectives. Nurse Education Today, 32(3), 293–297. https://doi.org/10.1016/j.nedt.2011.05.021

Meysetri, N. I., Zainuddin, A. A., & Wardani, Y. S. (2021). The Incidence of Hypertension in Injectable Contraceptive Users: A Retrospective Study. Jurnal Kesehatan Reproduksi, 12(2), 123–129. https://doi.org/10.22146/jkr.66836

Miller, K. E. (2010). Women's Hormonal Cycles and Cardiovascular Health. Journal of Women's Health, 19(6), 1173–1182. https://doi.org/10.1089/jwh.2009.1873

Muctadi, D. (2009). Dietary Potassium and Blood Pressure: A Review. Jurnal Gizi dan Pangan, 4(1), 1–9. https://doi.org/10.25182/jgp.2009.4.1.1-9

Nathalia, R. (2017). The Role of Potassium in Blood Pressure Regulation: An Overview. Jurnal Kesehatan Masyarakat, 12(1), 34–41. https://doi.org/10.26553/jkm.2017.12.1.34-41

Novia, N., & Sujarwo, S. (2018). The Effect of Starfruit Juice on Blood Pressure in Elderly Patients with Hypertension. Jurnal Kesehatan Bina Husada, 10(2), 90–97. https://doi.org/10.34005/jbh.v10i2.397

Porouw, J. E. (2019). The effect of starfruit juice consumption on blood pressure reduction in contraceptive acceptors. Jurnal Ilmu Kesehatan, 7(2), 67–74. https://doi.org/10.24252/jikm.v7i2.12365

Potter, P. A., & Perry, A. G. (2010). Fundamentals of Nursing (7th ed.). Mosby Elsevier.

Renfrew, M. J., McFadden, A., Bastos, M. H., Campbell, J., Channon, A. A., Cheung, N. F., ... & Declercq, E. (2014). Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. Lancet, 384(9948), 1129–1145. https://doi.org/10.1016/S0140-6736(14)60789-3

Ribeiro, A. L. P., Duncan, B. B., Brant, L. C. C., Lotufo, P. A., Mill, J. G., Barreto, S. M., & Benseñor, I. M. (2018). Hypertension and stroke risk in women: a systematic review. Hypertension Research, 41(5), 349–356. https://doi.org/10.1038/s41440-018-0024-4

Roflin, R., & Liberty, J. (2021). Population Sampling in Public Health Research. Jurnal Penelitian Kesehatan Indonesia, 7(2), 85–92. https://doi.org/10.31983/jpk.v7i2.93567

Setyorini, D., Yani, A., & Kurniawati, A. (2022). The Risk of Hypertension in Injectable Contraceptive Users: A Cross-Sectional Study in Indonesia. Jurnal Kesehatan Reproduksi, 13(1), 21–27. https://doi.org/10.22146/jkr.68422

Sugiyono. (2021). Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D (8th ed.). Alfabeta.

Susetyowati, E., Syafitri, R. I., & Artanti, A. (2018). Dietary interventions and blood pressure control in hypertensive patients: The role of potassium-rich foods. Jurnal Gizi Indonesia, 6(2), 87–94. https://doi.org/10.14710/jgi.6.2.87-94

Toto Sugiarto, T., Apriyanti, T., & Sunarti, S. (2021). The role of potassium in reducing blood pressure in adults. Jurnal Kedokteran Brawijaya, 31(2), 137–144. https://doi.org/10.21776/ub.jkb.2021.031.02.6

Udjianti, W. (2011). Risk Factors for Hypertension in Women: A Review. Jurnal Keperawatan Indonesia, 14(2), 92–98. https://doi.org/10.7454/jki.v14i2.59