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# Hormonal Contraception and Duration of Use as Causal Factors for Hypertension in Menopausal Women: A Cross-sectional Study

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**ABSTRACT**

**Introduction**: Menopause occurs in women between ages of 45 and 55. It's normal phase for women, marked by cessation of menstruation due to decreased estrogen and progesterone levels. This causes blood vessels to become less elastic and triggers an increase in blood pressure. Hypertension can occur in menopausal women due to hormonal changes. One contributing factor is a history of hormonal contraceptive use. This study aims to determine the relationship between a history of hormonal contraceptive use and the incidence of hypertension in menopausal women.

**Methods:** This study used an observational analytical method with a cross-sectional approach. Population was 134 postmenopausal women with a history of hormonal contraceptive use. Respondents were selected using a purposive sampling technique, with 101 menopausal women selected. Variables studied were the type and duration of hormonal contraceptive use and the incidence of hypertension. The research instruments were questionnaires and observation sheets. Data were analyzed using the Spearman test with SPSS 25 software.

**Results:** The study showed a significant association between the type of hormonal contraceptive (p=0.000; r=0.618) and incidence of hypertension in menopausal women. Variable duration of hormonal contraceptive use (p=0.000; r=0.513) was associated with the incidence of hypertension in menopausal women. Therefore, hormonal contraceptive use (type and duration of use) is associated with the risk of hypertension in menopausal women.

**Conclusion:** Health education regarding contraceptive method selection, especially hormonal contraception, and duration of use is crucial. Health workers play a role in assisting in the selection of appropriate contraception.

**Keywords:** Contraception, Hormone, Hypertension and

## INTRODUCTION

Menopause is not a disease, but rather a natural phase experienced by women, usually occurring between the ages of 45 and 55, marking the end of the last menstrual cycle (Mauliati & Kurniawati, 2025). This phase causes various changes, including physical changes affecting the hair, eyes, skin, and other organs such as the breasts and vaginal area, with common symptoms including hot flashes (Pákozdy et al., 2020). Furthermore, physiological changes occur due to decreased estrogen levels, which cause thickening of the artery walls due to collagen buildup, thus increasing the risk of hypertension(Umah et al., 2023). The hormone estrogen supports the potential for vasoconstriction as well as other factors that can cause increased blood pressure (Fardoun et al., 2020)

The number of menopausal women in Asia is projected to increase from 107 million to 373 million by 2025 (Roseyanti et al., 2024). Contraceptive use shows an increasing trend every year in Indonesia. Based on data from the Central Statistics Agency (BPS), the contraceptive use rate in 2022 was 55.06%, increasing by 0.30% to 55.36%, and rising again to 55.49% in 2023. Hormonal contraceptive methods such as pills and injections are the most widely used by women. Based on 2023 BPS data in Gresik Regency, in Manyar District, the coverage of injectable contraceptive users reached 61.93%, followed by pills at 19.41%, and implants at 6.14%. Other contraceptive methods contributed 12.53%.

The 2023 Indonesian Health Survey (SKI) recorded a prevalence of hypertension in East Java Province of 30,108 out of 89,343 respondents, with the 45–54 age group accounting for approximately 41,114 cases. Data from Gresik Regency shows hypertension among the top ten most common outpatient diseases, with 3,212 cases occurring in women aged 45–64. Data from the Sukomulyo Community Health Center (Puskesmas) in January 2025 recorded 124 cases of hypertension, of which 71% occurred in women aged 45–59.

Hypertension can be caused by various factors, such as age, weight, lack of physical activity, and a history of hormonal contraceptive use (Hidayah, 2022). One of the main risk factors for hypertension is age. The incidence of hypertension in women tends to be higher as they enter old age or menopause compared to men, with prevalence reaching up to 41%. This is caused by hormonal changes, particularly decreased estrogen levels (Estin Gita Maringga, 2020). After menopause, the prevalence of hypertension in women is higher than in men (Lima et al., 2012).Estrogen plays a protective role in women's health; when levels decrease, the body's systems can become dysfunctional. Arteries become hard and tense, leading to increased blood pressure (Sagita et al., 2022). These hormonal changes during menopause can increase the risk of hypertension, especially in women who have a history of hormonal contraceptive use such as injections, pills, or implants, because these methods contain additional hormones that the body absorbs to delay pregnancy (Hidayah, 2022)(Hidayah, 2022). The purpose of this study was to determine

whether hormonal contraception and duration of use are contributing factors to hypertension in menopausal women.

## METHOD

This is a quantitative, observational analytical study using a correlational approach with a cross-sectional design. Data were collected from respondents regarding their history of hormonal contraceptive use and duration of use, and hypertension variables by measuring their blood pressure. The study was conducted from May to June 2025 at the Sukomulyo Community Health Center in Gresik, East Java, Indonesia.

The study population consisted of all menopausal women (aged 45–55 years) totaling 134 women. The sample included a subset of menopausal women aged 45–55 years with a history of hormonal contraceptive use and who agreed to participate in the study by signing an informed consent. The sample size calculation was determined using the Slovin formula, resulting in a sample size of 100.37 and rounded up to 101 samples.

The research instruments used in this study consisted of a questionnaire and an observation sheet. The questionnaire was used to collect general data on respondents, demographic data, and history of hormonal contraceptive use. The observation sheet was used to collect blood pressure data. A sphygmomanometer was used to measure respondents' blood pressure. The blood pressure measurement results were recorded on the observation sheet, which was then used to classify respondents based on their hypertension (hypertension or non-hypertension).

After data collection, the data underwent processing, including editing, coding, assessment, and calculations. The data were then analyzed using univariate analysis (frequency distribution and percentages) and bivariate analysis using the Spearman test (Contingency Coefficient with a p-value <0.05). This research has been declared ethically sound by the Research Ethics Committee of the Faculty of Vocational Studies, Airlangga University, under the license number 004.KKEP.05.202.

## RESULTS

The results of Table 1 show that most of the respondents are aged 51-55 years, and the average age of respondents is 53 years (82.2%). More than half of the respondents have more than two children (56.5%). Almost the same number (50.5%) aged 45-50 years and over 55 years. The last level of education is more than half of high school (61.4%).

Table 2 Specific data on hormonal contraceptive methods, duration of use and incidence of hypertension. shows that almost half of the respondents used the contraceptive pill (46 respondents (45.5%), and a small proportion used the implant (16 respondents (15.8%). Table 3, it is known that the majority of respondents have used hormonal contraception for ≤ 5 years, namely 58 respondents (57.4%). Table 4 shows that almost half of the respondents were in the Hypertension 1 category (32.7%), and a small proportion of respondents had normal blood pressure (19.8%).

Table 3 shows that the results of the Spearman Rho statistical test show a significance value of p = 0.000 and a correlation coefficient value of r = 0.618. Since the p-value is <0.05, it can be

concluded that there is a significant relationship between the type of hormonal contraception and the incidence of hypertension. The correlation coefficient value of r = 0.618 indicates that the relationship between the type of hormonal contraception and the incidence of hypertension is categorized as strong and positive. This means that the higher the risk of a particular type of hormonal contraception, the greater the tendency to develop hypertensio.

Table 1. Frequency Distribution of Respondents' Demographic Characteristics

| Characteristics | n | % |
|---|---|---|
| Age (years) | | |
| 45-50 | 18 | 17.8 |
| 51-55 | 83 | 82.2 |
| Total | 101 | 100 |
| Number of children | | |
| 1-2 | 44 | 43.6 |
| 2 ≤ | 57 | 56.4 |
| Total | 101 | 100 |
| Age of menopause | | |
| 45-50 | 51 | 50.5 |
| 50< | 50 | 49.5 |
| Total | 101 | 100 |
| Level of Education | | |
| Elementary School | 12 | 11.8 |
| Junior High School | 20 | 19.9 |
| Senior High school | 62 | 61.4 |
| College | 7 | 6.9 |
| Total | 101 | 100 |

Table 3 also shows a significance value of p = 0.000 and a correlation coefficient of r = 0.543. Since the p-value is <0.05, it can be concluded that there is a significant relationship between the duration of hormonal contraceptive use and the incidence of hypertension. The correlation coefficient value of r = 0.543 indicates that the relationship between the duration of hormonal contraceptive use and the incidence of hypertension is in the moderate and positive category. This means that the longer a particular hormonal contraceptive is used, the greater the likelihood of hypertension.

Table 2. Frequency Distribution of Variable

| Characteristics | n | (%) |
|---|---|---|
| Hormonal Contraception Types | | |
| Implant | 16 | 15.8 |
| injection 1-month | 17 | 16.8 |
| injection 3-month | 22 | 21.8 |
| Pill | 46 | 45.8 |
| Total | 101 | 100 |
| Duration of Hormonal Contraceptive | | |
| <5 years | 58 | 57.4 |
| >5 years | 43 | 42.6 |
| Total | 101 | 100 |
| Incidence of Hypertension | | |
| Normal | 20 | 19.8 |
| Pre-Hypertension | 24 | 23.8 |
| Hypertension-1 | 23 | 32.7 |
| Hypertension-2 | 24 | 23.8 |
| Total | 101 | 100 |

Table 3. Relationship between History of Use (Type) of Hormonal Contraception and the Incidence of Hypertension in Menopause

| Variable/ Category | Normal (n=20) | Pre HT (n=24) | HT 1 (n=33) | HT 2 (n=24) | Total (N=101) | Correlation (r) | P - value |
|---|---|---|---|---|---|---|---|
| Types of Hormonal Contraception | | | | | | | |
| Implant | 6 (37.5%) | 9 (56.3%) | 1 (6.3%) | 0 (0.0%) | 16 (15.8%) | 0.618 | < 0.001 |
| 1-Month Injection | 7 (41.2%) | 9 (52.9%) | 1 (5.9%) | 0 (0.0%) | 17 (16.8%) | | |
| 3-Month Injection | 3 (13.6%) | 3 (13.6%) | 12 (54.5%) | 4 (18.2%) | 22 (21.8%) | | |
| Oral Pill | 4 (8.7%) | 3 (6.5%) | 19 (41.3%) | 20 (43.5%) | 46 (45.5%) | | |
| Total | 20 (19.8%) | 24 (23.8%) | 33 (32.7%) | 24 (23.8%) | 101 (100%) | — | — |
| Usage Duration | | | | | | | |
| ≤ 5 years | 17 (29.3%) | 19 (32.8%) | 20 (34.5%) | 2 (3.4%) | 58 (57.4%) | 0.543 | < 0.001 |
| > 5 years | 3 (7.0%) | 5 (11.6%) | 13 (30.2%) | 22 (51.2%) | 43 (42.6%) | | |
| Total | 20 (19.8%) | 24 (23.8%) | 33 (32.7%) | 24 (23.8%) | 101 (100%) | — | — |

## DISCUSSION

### History of Hormonal Contraceptive Use in Menopausal Women

This study showed that half of the respondents had a history of using the pill as their last contraceptive. The results of this study are in line with research conducted by (Liwang et al., 2018). The pill is a hormonal contraceptive that is less expensive than other hormonal methods. It can be purchased in a single blister pack or cycle at a very affordable price for women who do not work, such as housewives. The packaging clearly states how to take it and the potential side effects. You can use it yourself without having to queue for medical services. You can stop using it if you no longer wish to delay pregnancy. Fertility returns more quickly than with other hormonal contraceptives. Women find it easier to purchase birth control pills at pharmacies or health clinics independently (Kartika & Ronoatmodjo, 2020). Theoretically, the choice of contraceptive method is influenced by several factors, such as age, cost, availability of contraception, husband's support, education, parity, and experience with side effects (Kopp Kallner et al., 2015). Research relealed statements from several informants that they prefer using

birth control pills due to fear of pain and concerns about possible side effects from implants or injections (Suryati Romauli, et al 2024). Pill contraception is popular in Indonesia for many of the reasons mentioned above.

Where among the types of hormonal contraception, the pill is the most widely used. The pill is a hormonal contraceptive that is cheaper than other hormonal methods. Women find it easier to buy birth control pills at pharmacies or health clinics independently (Kartika & Ronoatmodjo, 2020). According to theory, the choice of contraceptive method is influenced by several factors such as age, cost, availability of contraceptives, husband's support, education, parity, and experience of side effects (Kopp Kallner et al., 2015). Research conducted by (Suryati Romauli, et al 2024) revealed statements from several informants that they prefer using birth control pills due to fear of pain and concerns about possible side effects when using implants or injections.

**Hypertension Incidence in Menopausal Women**

This study shows that most menopausal women are in the stage 1 hypertension category. This is in line with research conducted by (Febriyona, 2023) which showed that most menopausal women experience hypertension with blood pressure (≥ 140/90 mmHg). Postmenopausal hypertension occurs because the protective effect of estrogen decreases, and the sympathetic nervous system becomes overactive with age (Ayubi et al., 2025).

The risk of hypertension increases in women when they enter menopause, that is, after the age of 45. Women who have not yet reached menopause are protected by the hormone estrogen, which helps increase HDL (High-Density Lipoprotein) levels. HDL levels play a role in preventing atherosclerosis. If HDL levels decrease and LDL (Low-Density Lipoprotein) levels increase, this will influence the occurrence of atherosclerosis and result in high blood pressure (Podungge & Gorontalo, 2020).

Hypertension in menopausal women is caused not only by decreased estrogen but also by weight gain due to a slowed metabolism, which triggers weight gain and the accumulation of abdominal fat. Women entering menopause tend to experience weight gain. Blood volume increases due to larger body size, requiring the heart to pump with extra effort. Excess fat stimulates the sympathetic nervous system, which causes blood vessels to narrow (vasoconstriction). High levels of insulin and leptin trigger the kidneys to retain salt and water, resulting in increased blood volume and pressure. Menopause is accompanied by a decrease in IR and SLR levels, as well as relative hyperinsulinemia and hyperleptinemia in the context of a progressive increase in hemodynamic load, even within the pre-hypertensive range (C Thomopoulos, D Papadopoulos, n.d.). Menopausal women experience increased blood pressure due to overweight or obesity. Research shows a significant association between weight changes and the risk of hypertension later in life in menopausal women (Saei Ghare Naz et al., 2024).

**The Relationship Between History of Hormonal Contraceptive Use and the Incidence of Hypertension in Menopausal Women**

This study found a relationship between a history of hormonal contraceptive use (type and duration of use) and the incidence of hypertension in menopausal women. This is consistent with research conducted by (Hidayah, 2022), which showed a relationship between a history of hormonal contraceptive use and blood pressure in menopausal women. In that study, the majority of menopausal women aged 45 years and older with a history of hormonal contraceptive use had high blood pressure (45%). Hormonal contraceptives increase the prevalence of hypertension, as well as the detrimental effects of cumulative exposure to increased blood pressure on the risk of cardiovascular disease (Pákozdy et al., 2020).

The estrogen and progesterone hormones contained in contraceptive injections, pills, or implants trigger fluid and sodium retention in the body. The progestin hormone present in hormonal contraceptives causes significant water and salt retention in the body, which will affect endothelial function (the inner lining of blood vessels), increase the inflammatory response, and affect the sensitivity of blood vessels to substances that affect their contraction or relaxation, which can lead to increased blood volume and blood pressure. If this condition occurs continuously, it will result in a significant increase in blood pressure. As in Yuliana's 2020 research, there was a significant relationship between the length of use of birth control pills and the incidence of hypertension (YulianaD, 2020).

Hormonal contraceptives contain estrogen, which causes fluid retention, causing the body to retain more salt and water. Estrogen retains fluid through stimulation of the renin-angiotensin-aldosterone system (RAAS), direct effects on the renal tubules, and changes in the osmoregulatory set point. Activation of the RAAS by estrogen increases angiotensinogen production in the liver and stimulates renin release, leading to increased aldosterone production by the adrenal glands. Aldosterone triggers the kidneys to reabsorb sodium, and water is passively retained. A proper balance of estrogen and progesterone in hormone therapy is important to avoid the negative consequences of fluid and sodium retention, including edema and hypertension (Stachenfeld, 2014).

## CONCLUSION

This study shows a significant association between a history of hormonal contraceptive use and the incidence of hypertension in menopausal women. The type of hormonal contraceptive used had a strong effect on the increased risk of hypertension, while the duration of hormonal contraceptive use also had a significant association with the incidence of hypertension. These findings confirm that the longer and higher the exposure to hormones from contraceptives, the greater the likelihood of menopausal women experiencing hypertension.

The implications of this study are the importance of health education regarding contraceptive method selection, particularly hormonal contraceptives, and consideration of the duration of use. Furthermore, continuous blood pressure monitoring and hypertension management

in menopausal women are necessary to prevent future cardiovascular complications. Further research with longitudinal designs is recommended to strengthen the evidence for causality and broaden understanding of the biological mechanisms underlying the relationship between hormonal contraceptives and hypertension during the menopausal phase.

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