

Clinical Profile of Postmenopause Women with Genetic Predisposition of Metabolic Syndrome in Batam, Makassar, and Surabaya

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Abstract

Background: Menopause is described as the discontinuation of menstruation for 12 months or longer. Women who experienced menopause often present with some symptoms associated with menopause. Menopausal symptoms are a serious problem in menopausal women as menopausal symptoms suffered by some women can interfere with their quality of life. Metabolic syndrome refers to a group of metabolic disorder that increase the risk of cardiovascular disease and type 2 diabetes. The development of metabolic syndrome is affected by both genetic and environmental factors.

Objective: The purpose of this study was to determine the clinical profile of postmenopausal women with a genetic predisposition to metabolic syndrome.

Materials and Methods: This is a cross-sectional study using the total sampling method in a population of postmenopausal women from 3 communities in Batam, Makassar, and Surabaya. The research was conducted online using a questionnaire.

Result: Researchers selected 70 postmenopausal women. Of the 70 respondents, the average age of the respondents was 55.66 ± 4.24 (SD) years. The mean age of the respondents at menopause was 50.01 ± 3.57 (SD) years. The majority of respondents in this study had menopause for 1 – 5 years. The job that most respondents had was as a civil servant. The majority of respondents have a university level of education. The number of respondents who are in income group 3 and group 4 is the same. Most of the menopausal symptoms experienced by respondents were physical and mental exhaustion followed by joint and muscular discomfort. The most common genetic predisposition of the metabolic syndrome component suffered by respondents in this study was central obesity, followed by hypertension. The highest prevalence of metabolic syndrome components suffered by respondents is central obesity, then hypertension. Based on the hypothesis test using chi-square on the genetic predisposition of the metabolic syndrome component and the metabolic syndrome component on menopausal symptoms, there was no significant correlation between the variables tested (P value > 0.05)

Conclusion: There was no significant correlation between the genetic predisposition of the metabolic syndrome component variable and the metabolic syndrome component variable on the menopausal symptoms variable.

Keywords: Menopause; Menopausal symptoms; Genetic predisposition; Metabolic Syndrome

1. Introduction

The average age of most women going through menopause is between the ages of 45 and 55 (1). The estimated average age at menopause in Indonesia is 50 years. (2). Currently, menopause affects around 25 million women globally each year. The worldwide population of menopausal women is predicted to reach 1.2 billion by 2030 (3). In Indonesia, menopausal women in 2016 reached 14 million, or 7.4% of the total

population (2).

Vasomotor symptoms (hot flashes, sweating, and sleeplessness), psychological symptoms (depression, nervousness, and anxiety), urogenital symptoms (genitourinary atrophy, vaginal dryness, and sexual dysfunction), and bone and joint pain are all menopause symptoms. Osteoporosis and cardiovascular disease are two additional major health concerns for postmenopausal women (4). In a survey of women from seven Southeast Asian countries, 22.1% of menopausal women reported hot flushes and sweating. Body aches/joint pain (86.3%) was the most often reported menopausal symptom in a regional study of Southeast Asian and South Asian women, ranging from 76% in South Korean women to 96% in Vietnamese women. Body aches/joint pain was followed by memory loss in 80.1%, restlessness/irritability in 71.0%, and sleeplessness in 68.7% of women. Moreover, atrophic vaginitis was seen in 54% of older postmenopausal Filipino women with a mean age of 60 years. 16% of 386 postmenopausal women in Taiwan reported loss of bladder control (5).

Between 2003 and 2012, the total prevalence of metabolic syndrome in the United States was around 33%, with women having a significantly higher prevalence than males (35.6% vs. 30.3%) (6). The prevalence of metabolic syndrome in Indonesian women aged 45-65 years ranges from 46.2%. Additionally, hypertension is a component of the metabolic syndrome with the highest prevalence in Indonesian women aged 45-65 years compared to other components of the metabolic syndrome with a prevalence of approximately 64.6%. Hypertension is followed by central obesity with a prevalence of 57.5%, hyperglycemia at 50.9%, low HDL levels at 45.3%, and hypertriglyceridemia at 24.2% (8).

Genetic and environmental factors both have a role in the development of metabolic syndrome (MetS) (8). The clustering of the syndromes within families suggests a genetic component. Common variants in candidate genes affecting fat and glucose metabolism may enhance vulnerability to the metabolic syndrome when combined with environmental stressors. (9).

As previously known, individuals, in this case, women with metabolic syndrome, are known to be at high risk for developing cardiovascular disease. Menopause increases the prevalence of metabolic syndrome. Many features of the metabolic syndrome emerge with the transition from pre- to postmenopausal, including: 1) increased central (intra-abdominal) body fat; 2) a transition towards a more atherogenic lipid profile, with elevated levels of LDL (Low-Density Lipoprotein) cholesterol and triglycerides, reduced HDL (High-Density Lipoprotein) cholesterol and small, dense LDL particles; and 3) elevated levels of glucose and insulin. These risk factors may occur as a direct result of ovarian failure or as an indirect result of the metabolic consequences of central fat redistribution in the presence of estrogen insufficiency (10).

2. Materials and Methods

This research is a cross-sectional study using primary data collected by online questionnaire in 3 communities of women in Indonesia in the period July 2021 – March 2022. The method used is total sampling, namely the technique of taking all samples that meet the inclusion and exclusion criteria from 3 communities in Batam, Makassar, and Surabaya.

Data processing uses Microsoft Excel and is presented in the form of frequency distribution tables and diagrams. Data will be analyzed using SPSS software with the chi-square test and fisher's exact test.

3. Result

After applying the inclusion and exclusion criteria, 70 respondents met the criteria. The distribution of the city of origin of the respondents is shown in table 1.

Table 1. Distribution of respondents' city of origin

City	Frequency (N)	Percentage (%)
Batam City	20	29%
Makassar City	34	49%
Surabaya City	16	23%

Table 1 shows the distribution of the city origin of the respondents. Most respondents came from the city of Makassar (49%).

3.1 Characteristics

Table 2. Characteristics of respondents

Characteristics	Frequency (N)	Percentage (%)
Age (years)		
45-50	6	9%
51-55	29	41%
56-60	27	39%
61-65	8	11%
Menopause Length (years)		
1-5	41	59%
6-10	19	27%
11-15	9	13%
16-20	1	1%
Sociodemographic characteristics		
Education		
Elementary school/equivalent	1	1%
Junior high school/equivalent	0	0%
Senior high school/equivalent	19	27%
University	50	72%
Income		
Group 3	35	50%
Group 4	35	50%
Occupation		
Housewife	19	27%
Civil servant	27	39%
State civil apparatus	4	6%
Teacher	9	13%
Lecturer	4	6%
Others	7	10%

Table 2 shows the characteristics of the respondents. Of the 70 respondents, the majority of respondents were in the age range of 51-55 years (41%). Most respondents have been menopausal for 1-5 years (59%). The majority of respondents have a university education level (72%). Respondents who are in income group 3 and group 4 are the same (50%). Most of the jobs held by respondents were civil servants (39%).

3.2 Symptoms of menopause

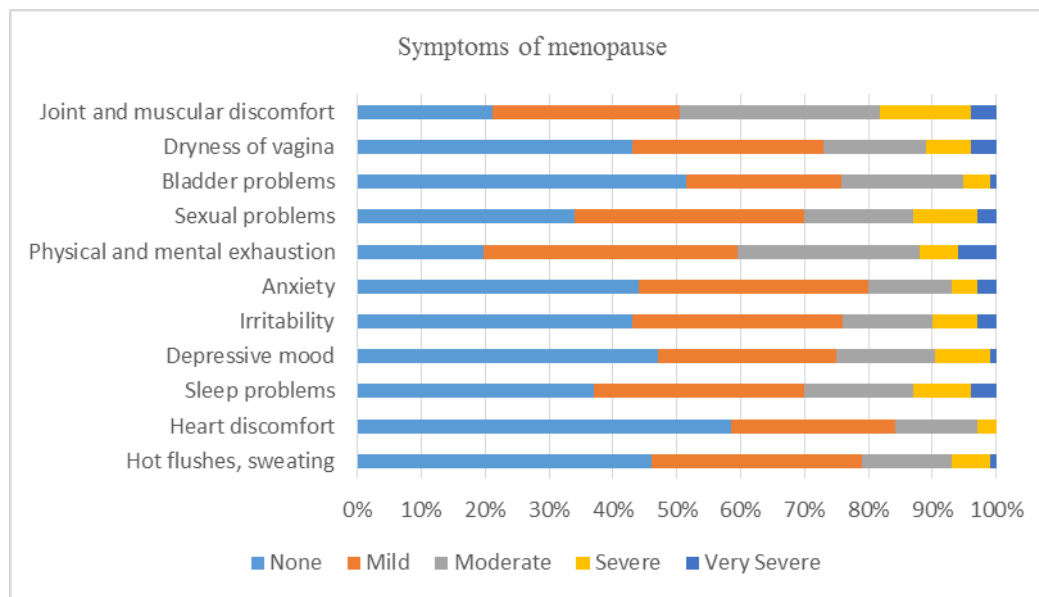


Fig 1. Symptoms of menopause based on the level of symptoms

The level of menopausal symptoms experienced by respondents in this study varied from mild, moderate, severe, and very severe. Details of menopausal symptoms based on symptom level can be seen in Figure 1.

Table 3. Distribution of respondents' menopause symptoms

Symptoms of Menopause	Frequency (N)	Percentage (%)
Hot flushes, sweating	38	54%
Heart discomfort	29	41%
Sleep problems	44	63%
Depressive mood	38	54%
Irritability	40	57%
Anxiety	39	56%
Physical and mental exhaustion	56	80%
Sexual problems	46	66%
Bladder problems	34	49%

Dryness of vagina	40	57%
Joint and muscular discomfort	55	79%

Table 3 shows the distribution of menopausal symptoms of respondents. Menopausal symptoms that most respondents felt were physical and mental exhaustion in 56 people (80%), followed by joint and muscular discomfort in 55 people (79%). The least common symptom experienced by respondents was heart discomfort (41%).

3.3 Genetic predisposition to the components of the metabolic syndrome

Table 4. Distribution of respondents' genetic predisposition to the components of the metabolic syndrome

Component	Yes	No	Cannot Answer
Central obesity	31 (44%)	23 (33%)	16 (23%)
Hypertension	21 (30%)	41 (59%)	8 (11%)
Hyperglycemia	17 (24%)	49 (70%)	4 (6%)
Low HDL	3 (4%)	53 (76%)	14 (20%)
High TG	7 (10%)	51 (73%)	12 (17%)

Table 4 shows the distribution of genetic predisposition to the components of the metabolic syndrome among respondents. The genetic predisposition for the metabolic syndrome component that most respondents had was a genetic predisposition to central obesity (44%).

3.4 Components of the metabolic syndrome

Table 5. Distribution of respondents' metabolic syndrome components

Component	Yes	No
Central obesity	45 (64%)	25 (36%)
Hypertension	11 (16%)	59 (84%)
Hyperglycemia	10 (14%)	60 (86%)
Low HDL	4 (6%)	66 (94%)
High TG	6 (9%)	64 (91%)

Table 5 shows the distribution of the components of the respondent's metabolic syndrome. The most common component of the metabolic syndrome that respondents had was central obesity (64%).

3.5 Relationship between the genetic predisposition of the components of the metabolic syndrome and the components of the metabolic syndrome with menopausal symptoms

Table 6. Results of hypothesis testing between variables

Dependent Variable	Independent Variable	P value
Symptoms of menopause	Genetic predisposition to the components of the metabolic syndrome	
	Central obesity	0.057
	Hypertension	0.924
	Hyperglycemia	0.260
	Low HDL	1000
	High TG	0.246
	Components of the metabolic syndrome	
	Central obesity	0.129
	Hypertension	0.918
	Hyperglycemia	0.736
	Low HDL	0.115
	High TG	0.199

Table 6 shows the results of hypothesis testing between the independent variables, namely genetic predisposition to the metabolic syndrome component and the metabolic syndrome component to the dependent variable, namely menopausal symptoms. Based on the results of hypothesis testing using the chi-square and fisher's exact test, no significant relationship was found between the variables tested (P value > 0.05).

4. Discussion

4.1 Characteristics

In this study, the mean age of the respondents at menopause was 50.01 ± 3.57 (SD) years with a median of 50 years. The mean age at menopause in this study matches the average age at menopause in an Indian study performed by Khatoon et al., which was 50.33 ± 5.26 (SD) years (11). Other studies in India found that the average age of menopause was between 49.4 and 51.1 years. Research in Malaysia (51.3 years), Thailand (49.7 years), Singapore (49.1 years), and the Middle East (50.4 years), as well as other Asian women studies, demonstrate about the same age of menopause as our study (12).

The duration of menopause in this study was at intervals of 1-19 years with the duration of menopause for most respondents being at intervals of 1-5 years. The average length of menopause in this study was 5.64 ± 3.88 (SD) years. In a research done in Sri Lanka by Rathnayake et al., it was discovered that the average length of menopause for respondents was longer, namely 7.4 ± 5.04 (SD) years (13).

Of the 70 respondents, the majority of respondents in this study graduated from university. This contrasts with the findings of Rathnayake et al. in Sri Lanka, where the majority of respondents in the study were educated up to high school (13). In this study, it was also found that most respondents worked, with most working as civil servants. This is different from the research by Mazloomi Mahmoodabad et al. in Iran, where the majority of their respondents are housewives (14). More working respondents experienced menopausal symptoms in this study compared to non-working respondents. In addition, based on the income group of the respondents, the number of respondents who were in group 3 and group 4 were the same, namely 35 people. In another study conducted by Sushmitha and Shettian in India, the majority of respondents were in the lower

economic class (12).

4.2 Symptoms of menopause

The majority of menopausal symptoms reported by respondents were physical and mental exhaustion, followed by joint and muscle discomfort. This study was linear, but the prevalence of symptoms differed from a study performed in Pakistan by Husain et al., who stated that the most prevalent symptoms were physical and mental exhaustion, followed by joint and muscle discomfort (15).

The classic symptoms of menopause, namely hot flushes and sweating, were found in 38 people (54%). This is consistent with findings from studies performed by Khatoon et al. in India and Dhillon et al. in Malaysia, which reported that 53% of respondents experienced hot flushes and sweating. Another study by Sushmitha and Shettian in India also showed a prevalence similar to this study, namely 52.2% (12).

Furthermore, the prevalence of genitourinary symptoms, such as sexual problems, vaginal dryness, and bladder problems, was higher in the current study than in the study by Husain et al. in Pakistan, where the prevalence of genitourinary symptoms was relatively low (15). The prevalence of sleep problems in this study was 63%, which was higher than the prevalence of sleep problems in the study by Dhillon et al. in Malaysia, which was 45.1% (16).

Geographic, sociodemographic, genetic, and ethnic disparities, as well as women's attitudes and understanding, may explain variances in the prevalence and severity of menopausal symptoms described in research. However, other important perspectives that may explain the varying prevalence of these symptoms are differences in study designs, study settings, sample sizes, the menopausal status of respondents, and tools used in different studies (17).

4.3 Genetic predisposition to the components of the metabolic syndrome

Environmental and genetic factors play an important role in the development of metabolic syndrome (8). In this study, the focus is on genetic factors. The most genetic predisposition for the components of metabolic syndrome that respondents in this study had was central obesity, followed by hypertension, hyperglycemia, high TG, and low HDL. In this study, genetic predisposition was defined as a family history of the components of metabolic syndrome (first and second-degree relatives).

4.4 Components of the metabolic syndrome

The most common metabolic syndrome component among responders was central obesity, followed by hypertension. This study is consistent with the findings of Maharlouei et al. in Iran, who found that central obesity was the most prevalent component of the metabolic syndrome among responders, followed by hypertension (18).

Furthermore, in a study of menopausal women in Brazil performed by Gravena et al., the prevalence of central obesity was 63.6%. (19). This research's findings are similar to the prevalence of central obesity in this study, which is 64%. The prevalence of hypertension in menopausal women was 16% in this study, while in a study performed by Bagdey et al. in Kamptee, India, the prevalence of hypertension in menopausal women was 33%, which was two times higher than the prevalence of hypertension in menopausal women in this study (20). The prevalence of hyperglycemia in this study was 14%, the prevalence of hyperglycemia in this study was slightly lower than the prevalence of hyperglycemia in a study conducted by Marjani and Moghasemi in Gorgan, Iran, which was 17% (21). Meanwhile, in the prevalence of dyslipidemia in this study, it was found that the prevalence of respondents with high TG was higher than that of respondents with low HDL. This contrasts with the prevalence of dyslipidemia in a research done in Ghana by Kow Nanse Arthur et al., who found that the prevalence of respondents with low HDL was higher than that of respondents with high TG (22).

Differences in the prevalence of metabolic syndrome in different studies can be caused by different methods of examining the syndrome (different examination criteria), socioeconomic and environmental differences, genetic factors, and lifestyle (23).

4.5 Relationship between the genetic predisposition of the components of the metabolic syndrome and the components of the metabolic syndrome with menopausal symptoms

This study showed that genetic predisposition to central obesity and central obesity did not correlate significantly with menopausal symptoms. The findings of this study differ with those of a study done in the United States by Thurston et al., who found that an elevation in central adiposity is related with an increase in symptoms of hot flushes and sweating (24). According to Lee et al., the increase in hot flushes and sweating symptoms was caused by an increase in body fat, inhibition of heat dissipation, and a reduction in body temperature (4).

Also in this study, it was concluded that genetic predisposition to hypertension and hypertension did not correlate significantly with menopausal symptoms. This is consistent with the findings of a research done by Lee et al. in Korea, which found no significant relationship between systolic and diastolic blood pressure and total MRS (menopause rating scale) (4). However, another study done in the Netherlands by Gast et al. discovered contradictory results where they mentioned vasomotor symptoms related with hypertension (25).

Another variable tested in this study was the correlation of genetic predisposition to hyperglycemia and hyperglycemia on menopausal symptoms. In this research, It was found that neither the genetic predisposition to hyperglycemia nor the hyperglycemia variables had a significant correlation with menopausal symptoms. In an Ecuadorian research, Chedraui et al. reported an increased risk of dry skin and alterations in sexual desire in hyperglycemic women (26). Nonetheless, the findings of this research are consistent with those of a Chinese study done by Li et al., which found no significant association between vasomotor symptoms and blood sugar levels (27).

Then, other variables, such as genetic predisposition to low HDL and low HDL were also tested in this study. This study found that both genetic predisposition to low HDL and low HDL did not correlate significantly with menopausal symptoms. This is similar with a research done in Turkey by Cengiz et al., which found no significant connection between low HDL and menopausal symptoms (28).

In addition, this study also tested the genetic predisposition to high TG and high TG to menopausal symptoms, and it was also found that there was no significant correlation, either between genetic predisposition to high TG and menopausal symptoms, or high TG and menopausal symptoms. This differs from a research done by Chedraui et al. in Ecuador, which reported that high TG levels raised the risk of experiencing hot flushes and sweating (26). Research conducted by Cengiz et al. in Turkey stated that high TG was associated significantly with the menopausal symptoms subscale, namely the psychological symptoms subscale (28). In contrast, in a study conducted by Lee et al. in Korea, it was stated that high TG was associated with another menopausal symptom subscale, namely the somatic symptom subscale (4).

Menopausal symptoms can be influenced by a variety of variables, and the study of these symptoms called biopsychosocial. Evidence shows that metabolic syndrome and its predominant component (abdominal obesity) increase the prevalence and severity of menopausal symptoms significantly (4). Furthermore, age, sociodemographic characteristics (such as income, education, and race/ethnicity), chronic conditions, psychosocial and lifestyle factors, and menopausal status all have a role in the prevalence and severity of menopausal symptoms (29). For moderate to severe symptoms, age is a protective factor (30). The length of menopause was found to be a significant predictor of severe menopausal symptoms (31).

In this study, other factors that may influence menopausal symptoms include age, length of menopause, and sociodemographic characteristics, which include occupation, education, and income. The majority of respondents with menopausal symptoms were in the age group of 51-55 years. Most respondents who had menopausal symptoms had also just experienced menopause for 1-5 years. According to sociodemographic characteristics, most of the respondents who experienced menopausal symptoms were respondents who were

working, had a bachelor's degree, and had income group 3 according to the dollar street gapminder criteria. This shows the influence of other factors beyond the genetic predisposition to metabolic syndrome and metabolic syndrome which can affect menopausal symptoms. Other factors affecting menopausal symptoms besides the metabolic syndrome component can explain the absence of a significant correlation between the genetic predisposition of the metabolic syndrome component and the metabolic syndrome component to menopausal symptoms in this study.

5. Conclusion

Most of the menopausal symptoms experienced by the respondents were physical and mental exhaustion followed by joint and muscular discomfort. The genetic predisposition for the metabolic syndrome component and the metabolic syndrome component that most respondents have are both central obesity.

No significant association was found between the genetic predisposition of the metabolic syndrome component variables and the metabolic syndrome component variables to the menopausal symptom variables. Various factors can affect menopausal symptoms besides the genetic predisposition of the metabolic syndrome component variables and the metabolic syndrome component variables. These factors include age, length of menopause, and sociodemographic characteristics.

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