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The Overview of Coronary Heart Disease Risk Factors in Perimenopausal and Postmenopausal Female Patients at Haji Adam Malik General Hospital in 2021

Elaine Faustine[1], Cut Aryfa Andra[2], Dina Arwina Dalimunthe[3*], Teuku Bob Haykal[4], Yunilda Andriyani[5]

[1]*Faculty of Medicine, Universitas Sumatera Utara, Medan*
[2,4]*Department of Cardiology and Vascular Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan*
[3]*Department of Dermatology and Venereology, Faculty of Medicine, Universitas Sumatera Utara, Medan*
[5]*Department of Parasitology, Faculty of Medicine, Universitas Sumatera Utara, Medan*

*Correspondence: dina.arwina@usu.ac.id

ABSTRACT

Background: Cardiovascular diseases are taking an estimated 17, 9 million lives each year, 85% were caused by coronary heart disease. After menopause, there are physiological changes that occurs in women's body that increase the risk of coronary heart disease. Risk factors associated with the incidence of coronary heart disease are, family history, age, hypertension, diabetes, dyslipidemia, obesity, and smoking. **Objectives:** To examine the risk factors associated with the incidence of coronary heart disease in perimenopausal and postmenopausal women at RSUP Haji Adam Malik in 2021. **Methods:** This study is a descriptive study with cross sectional design and retrospective approach, carried out at RSUP Haji Adam Malik. The data were taken from 1 January-31 December 2021. **Results**: The results showed that out of 75 perimenopausal and postmenopausal women who suffered from CHD, 61 patients (81,3%) were >50 years old, 3 patients (4%) had a family history of CHD, 53 patients (70,7%) had hypertension, 45 patients (60%) had diabetes, 58 patients (77,3%) with dyslipidemia, 10 patients (13,3%) were obese, and 14 patients (18,7%) had a history of smoking. **Conclusion:** Risk factors for CHD in perimenopausal and postmenopausal women, are having a family history of CHD, age, hypertension, diabetes, dyslipidemia, obesity, and smoking.

Keywords: coronary heart disease, risk factors, perimenopausal women, postmenopausal women, women with CHD

ABSTRAK

Latar Belakang: Penyakit kardiovaskular menyebabkan kematian 17,9 juta penduduk dunia setiap tahunnya, dan 85% diantaranya disebabkan oleh penyakit jantung koroner. Pada wanita yang telah mengalami menopause, terjadi perubahan fisiologis pada tubuh wanita sehingga risiko penyakit jantung koroner meningkat. Faktor risiko yang meningkatkan kejadian penyakit jantung koroner antara lain, usia, riwayat keluarga, hipertensi, diabetes, dislipidemia, obesitas, dan merokok. Tujuan: Untuk mengetahui faktor risiko yang menyebabkan terjadinya penyakit jantung koroner pada pasien wanita perimenopause dan postmenopause di RSUP Haji Adam Malik Medan pada tahun 2021. Metode: Jenis penelitian yang dilakukan adalah penelitian deskriptif dengan desain penelitian cross sectional dengan pendekatan retrospektif, yang dilakukan di RSUP H. Adam Malik. Hasil: Hasil penelitian menunjukkan, dari 75 orang wanita perimenopause dan postmenopause yang menderita PJK, sebanyak 61 pasien (81,3%) berusia >50 tahun, 3 pasien (4%) memiliki riwayat keluarga dengan PJK, 53 pasien (70,7%) menderita hipertensi, 45 pasien (60%) menderita diabetes, 58 pasien (77,3%) mengalami dislipidemia, 10 pasien (13,3%) mengalami obesitas, dan 14 pasien (18,7%) memiliki riwayat merokok. Kesimpulan: Faktor risiko PJK pada wanita perimenopause dan postmenopause, meliputi riwayat keluarga, usia, hipertensi, diabetes, dislipidemia, obesitas, dan merokok.

Kata Kunci: faktor risiko, penyakit jantung koroner, wanita dengan PJK, wanita perimenopause, wanita postmenopause

INTRODUCTION

Cardiovascular diseases are the leading cause of death and disability globally. According to The World Health Organization (WHO) in 2019, cardiovascular diseases are taking an estimated 17,9 million lives each year, and 85% of deaths were caused by coronary heart disease.[1] Coronary Heart Disease (CHD) is a narrowing and blockage of coronary arteries due to plaque buildup consisting of cholesterol and fatty deposits in the walls of the coronary arteries. According to the data from Riset Kesehatan Dasar (RISKESDAS) in 2018, the prevalence of CHD in Indonesia is 1,5%, with the highest rate in North Kalimantan (2,2%), and the lowest rate in East Nusa Tenggara (0,7%), while for North Sumatra itself it reached 1,3%.[2] In general, most coronary heart disease patients in Indonesia are in the age over 75 years (4,7%) with a higher proportion in women (1,6%) than men (1,3%). Data from The Framingham Heart Study show that the risk of CHD increases in postmenopausal women. Estrogen plays a role in the cardiovascular system to increase HDL cholesterol level, reduce LDL cholesterol level, and vasodilation to improve blood flow. These help to protect women from CHD risk. However, this protection will decrease after women experienced menopause. After menopause, there is a decrease in estrogen level resulting in an increase of LDL cholesterol level and decrease of HDL cholesterol level which increases the risk of atherosclerosis. Therefore, women with untreated risk factors are prone to developing CHD.

METHODS

This is an observational descriptive study with cross-sectional approach. This study was conducted at Haji Adam Malik General Hospital in August 2022-November 2022. The sample of this study were 75 female patients who met the inclusion criteria, obtained by the total sampling method. The inclusion criteria was perimenopausal and postmenopausal female patients who were diagnosed with coronary heart disease and were hospitalized at Haji Adam Malik General Hospital from 1st January 2021-31st December 2021, while the exclusion criteria was incomplete medical record or patients with no risk factors. Data collection was carried out by recording patients' medical record data. The collected data were analyzed using the univariate analysis method.

RESULTS

The characteristics of perimenopausal and postmenopausal women who suffered from CHD at the Haji Adam Malik General Hospital in 2021 can be seen in the table below:

Table 1. Distribution of Sample Characteristics

Characteristics	Frequency (n)	Percentage (%)
Family History		
Yes	3	4
No	72	96
Age		
40-45 years old	4	5,3
46-50 years old	10	13,3
>50 years old	61	81,3
Hypertension		
Yes	56	74,7
No	19	25,3
Diabetes		
Yes	30	40
No	45	60
Dyslipidemia		
Yes	58	77,3
No	17	22,7
Obesity		
Yes	10	13,3
No	65	86,7
Smoking		

Yes	14	18,7			
No	61	81,3			
Menopause status					
Perimenopausal	14	18,7			
Postmenopausal	61	81,3			

According to **Table 1**, there were 61 postmenopausal women (81,3%) and 14 perimenopausal women (18,7%) who met the study criteria. According to age, there were 61 patients (81,3%) who were >50 years old, 10 patients (13,3%) were 46-50 years old, and 4 others (5,3%) were 40-45 years old. Out of 75 patients, there were 3 patients (4%) who had family history of CHD, 56 patients (74,7%) with hypertension, 30 patients (40%) with diabetes, 58 patients (77,3%) with dyslipidemia, 10 patients (13,3%) were obese, and 14 patients (18,7) had smoking history.

Table 2. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Family History of CHD

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	N	%
Family History						
Yes	0	0%	3	100%	3	100%
No	14	19,4%	58	80,6%	72	100%
Total	14	18,7%	61	81,3%	75	100%

According to **Table 2**, 3 patients who suffered from CHD and had a family history of CHD were all postmenopausal women (100%).

Table 3. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD by Age

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	n	%
Age						
40-45	4	28,6%	0	100%	4	5,3%
46-50	10	71,4%	0	80,6%	10	13,3%
>50	0	0%	61	100%	61	81,3%
Total	14	18,7%	61	81,3%	75	100%

Table 3 shows that according to age, CHD was more common in women >50 years old. There were 61 patients (81,3%) >50 years old, 10 patients (13,3%) at the age of 46-50 years, and 4 patients (5,3%) at the age of 40-45 years. Women aged >50 years old were all postmenopausal women, while others had not experienced menopause.

Table 4. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Hypertension

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	n	%
Hypertension						
Yes	10	17,9%	46	82,1%	56	100%
No	4	21,1%	15	78,9%	19	100%
Total	14	18,7%	61	81,3%	75	100%

Table 4 shows that out of 56 patients who suffered from CHD with hypertension, 46 of them (82,1%) were postmenopausal women, while 10 others (17,9%) were perimenopausal women.

Table 5. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Diabetes

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	N	%
Diabetes						
Yes	5	16,7%	25	83,3%	30	100%
No	9	20%	36	80%	45	100%
Total	14	18,7%	61	81,3%	75	100%

Based on **Table 5**, it was found that out of 30 patients who suffered from CHD with diabetes, 25 patients (83,3%) were postmenopausal women, and 5 others (16,7%) were perimenopausal patients.

Table 6. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Dyslipidemia

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	N	%
Dyslipidemia						
Yes	12	20,7%	46	79,3%	58	100%
No	2	11,8%	15	88,2%	17	100%
Total	14	18,7%	61	81,3%	75	100%

According to **Table 6**, there were 58 patients who suffered from CHD with dyslipidemia, 46 of them (79,3%) were postmenopausal women, and 12 others (20,7%) were perimenopausal women.

Table 7. Lipid Profile in Perimenopausal and Postmenopausal Women with Dyslipidemia

Lipid Profile	CHD			
	Perimenopausal		Postmenopausal	
	n	%	n	%
Total Cholesterol				
Abnormal	8	21,0%	29	78,4%
Normal	6	15,8%	32	84,2%
LDL				
Abnormal	8	22,2%	28	77,8%
Normal	6	15,4%	33	84,6%
HDL				
Abnormal	9	20,9%	34	79,1%
Normal	5	15,6%	27	84,4%
Tri-glycerides				
Abnormal	10	24,4%	31	75,6%
Normal	4	11,8%	30	88,2%

The lipid profile in perimenopausal and postmenopausal women who suffered from CHD with dyslipidemia shows that there were 37 patients with high total cholesterol level, while 21 patients had normal cholesterol level. According to LDL cholesterol level, 36 patients had high LDL cholesterol, while 22 others had normal LDL cholesterol level. There were 43 patients with lower HDL cholesterol level, and only 15 patients with normal

cholesterol level. Furthermore, there were more women who showed high triglycerides level, 41 patients compared to those who had normal triglycerides level, 17 patients.

Table 8. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Obesity

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	n	%
Obesity						
Yes	1	10%	9	83,3%	10	100%
No	13	20%	52	80%	65	100%
Total	14	18,7%	61	81,3%	75	100%

Table 8 shows that out of 10 women who suffered from CHD and were obese, 9 of them (90%) were postmenopausal women, and only 1 patient (10%) who was perimenopausal women.

Table 9. Distribution of Perimenopausal and Postmenopausal Women Suffering from CHD with Smoking Habit

Risk Factors	CHD				Total	
	Peri menopausal		Post menopausal			
	n	%	n	%	N	%
Smoking						
Yes	2	14,3%	12	85,7%	14	100%
No	12	19,7%	49	80,3%	61	100%
Total	14	18,7%	61	81,3%	75	100%

According to **Table 9**, there were 14 patients who had smoking history, 12 patients (85,7%) were postmenopausal women, while 2 others (14,3%) were perimenopausal women.

Table 10. CHD Risk Factors in Perimenopausal and Postmenopausal Women

Risk Factors	Frequency (n)	Percentage (%)
1	19	25,3
2	26	34,7

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3	21	28,0
4	8	10,7
5	1	1,3
Total	75	100,0

According to **Table 10**, out of 75 patients, there were 1 patient (1,3%) with 5 risk factors, 8 patients (10,7%) with 4 risk factors, 21 patients (28%) with 3 risk factors, 26 patients (34,7%) with 2 risk factors, and 19 patients (25,3%) with 1 risk factor. Most women had 2 risk factors, with the most common risk factors being dyslipidemia and hypertension.

DISCUSSION

According to the results of this study, the majority of female patients suffering from CHD were >50 years old, 61 patients (81,3%), followed by the 46-50 years age group, consisted of 10 patients (13,3%), and 40-45 years age, consisted of 4 patients (5,3%). All female patients who had experienced menopause were aged >50 years. This is supported by the research conducted by Yihua *et al* (2017) which shows that out of 235 female CHD patients, 178 of them (75,7%) were postmenopausal women, and 57 others were in perimenopausal category.[3] This is related to the decreased of ovarian estrogen in postmenopausal women, which causes a decrease in endothelial cell turnover and the production of inflammatory and anti-atherogenic compounds which ultimately results in endothelial dysfunction and increases the risk of CHD.[4]

Most of the samples of this study did not have a family history of CHD (96%), there were only 3 female patients (4%) who had a family history of CHD, and all of them were postmenopausal women. Based on the data obtained, the patient's family history of CHD came from the patient's father. This is in accordance with the theory outlined by the World Heart Federation which stated that the risk of CHD will increase if someone have a father or brother who was diagnosed with CHD before age 55, or a mother or sister who was diagnosed with CHD before age 65.[5]

The majority of these female CHD patients had hypertension. There were 56 patients who had hypertension, with a higher proportion in postmenopausal women (82,1%) than perimenopausal women (17,9%). This is consistent with the research conducted by Soman *et al* (2017), that out of 232 female patients who suffered from CHD, 164 patients (71%) had hypertension, with 133 of them (80,12%) were postmenopausal women.[6] The research by Yihua *et al* (2017) also showed that out of 235 patients who suffered from CHD, 159 of them (67,65%) had hypertension with a higher prevalence in postmenopausal women, 134 patients (75,28%) compared to perimenopausal women, 25 patients (43,86%).[3] This is due to decreased estrogen level in postmenopausal women resulting in increased oxidative stress and regulation of the Renin-Angiotensin system which contributes to increase blood pressure. Higher blood pressure can damage the endothelium and increase the permeability of blood vessel walls to LDL which initiates atherosclerosis. Automatically, the risk of CHD will increase.[7]

There were less female CHD patients with diabetes, 30 patients (40%), compared to female patients without diabetes, 45 patients (60%). The data shows that out of 30 patients who suffered from CHD with diabetes, the majority were postmenopausal women, 25 patients (83,3%), while there were 5 perimenopausal women (16,7%). This can be attributed to the study of Sattar *et al* (2019), which stated that based on data from The Swedish National Diabetes

Registry, the risk of CHD is higher in individuals diagnosed with diabetes mellitus at age <45 years, than those at age >45 years.[8] The risk of CHD was found 14 times higher in individuals diagnosed with diabetes mellitus at age <45 years, whereas in individuals aged >45 years, the risk of CHD increased up to 4 times. Diabetes mellitus at a younger individuals (<55 years), is also associated with an increased mortality rate of up to 3 times, compared to age > 55 years. In general, diabetics have a two to four times greater risk of suffering from CHD than non-diabetic patients. It is because in diabetics, there is an increase in systemic inflammation in response to increased cytokine production by adipose tissue, which can accelerate plaque formation and cause atheroscleoris which is a trigger for CHD. Additionally, diabetes tends to be closely related to other risk factors that contribute to CHD, such as hypertension, dyslipidemia, and obesity, so diabetes is considered to increase the risk of CHD events.[9]

Dyslipidemia was the most dominant risk factor in this study. There were 58 patients (77,3%) out of 75 who suffered from CHD with dyslipidemia with higher proportion in postmenopausal women. According to the lipid profile, there were 37 patients with high total cholesterol level, while 21 patients had normal cholesterol level. According to LDL cholesterol level, 36 patients had high LDL cholesterol, while 22 others had normal LDL cholesterol level. There were 43 patients with lower HDL cholesterol level, and only 15 patients with normal cholesterol level. Furthermore, there were more women who showed high triglycerides level, 41 patients compared to those who had normal triglycerides level, 17 patients. This is supported by the theory which states that higher level of total cholesterol, LDL, and triglycerides were associated with an increased risk of CHD

events. Higher level of LDL can cause LDL to accumulate in the subendothelial space and undergo modifications that can damage the intima, thus triggering the development of atherosclerotic lesions, which ultimately trigger CHD. Moreover, data from The Framingham Heart Study also shows that the risk of CHD increases with higher total serum cholesterol level.[7]

Obesity shows a fewer numbers, there were only 10 patients who were obese, while the remaining 65 patients had normal BMI. Those 10 patients were consisted of 9 postmenopausal women (90%), and 1 perimenopausal women (10%). This study is in line with the obesity paradox theory, in a study conducted by Angerås et al (2013), that based on the data from The Swedish Coronary Angiography and Angioplasty Registry, underweight patients with BMI <18,5 kg/m² have the highest risk of experiencing CHD, followed by patients with normal body weight, while overweight patients have the lowest risk of experiencing CHD. Angerås et al's research also showed that overweight and obese patients who suffered from CHD have a lower mortality rate, compared to patients with normal BMI. The obesity paradox theory explained that obesity is protective against CHD risk, as the size of the coronary arteries will enlarge with increasing BMI, so despite the fact that obesity is related to CHD risk, obese individuals who experience CHD have a better prognosis.[10]

In this study, it was found that out of 75 patients who suffered from CHD, 14 patients (18,7%) had a history of smoking, while 61 others (81,3%) had never smoked. This could be due to smoking behaviour in women is indeed less than men. However, smoking behaviour should not be ignored, as tobacco smoking can lead to increased LDL oxidative modification, decreased circulating HDL level, endothelial

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dysfunction due to tissue hypoxia and increased oxidative stress, increased platelet adhesion, and inappropriate sympathetic stimulation by nicotin and oxygen transfer by carbon monoxide from hemoglobin that triggers the development of atherosclerotic lesions. Exposure to cigarette smoke in passive smokers has also been shown to increase platelet aggregation and damage blood vessel endothelium, which will ultimately increase the risk of CHD.[7][11]

CONCLUSION

Based on the results of data analysis and discussions that have been carried out in this study, the risk factors that contribute to CHD events in perimenopausal and postmenopausal women were having a family history of CHD, age, hypertension, diabetes, dyslipidemia, obesity, and smoking history. The prevalence of CHD in perimenopausal and postmenopausal who were diagnosed with CHD in 2021 at Haji Adam Malik General Hospital is 30,24%.

According to age, perimenopausal and postmenopausal women who suffered from CHD were mostly aged >50 years. There were fewer perimenopausal and postmenopausal women who had a family history of CHD, diabetes, and obese. Perimenopausal and postmenopausal women in this study were mostly had hypertension and dyslipidemia was the most common risk factor for perimenopausal and postmenopausal women in this study. Majority of the perimenopausal and postmenopausal women had never smoked.

REFERENCES

[1] WHO, "Cardiovascular diseases (CVDs)," 2021. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) (accessed Mar. 19, 2022).

[2] Kemenkes RI, "Hasil Riset Kesehatan Dasar Tahun 2018," *Kementrian Kesehat. RI*, vol. 53, no. 9, pp. 1689–1699, 2018.

[3] L. Yihua, J. Yun, and Z. Dongshen, "Coronary artery disease in premenopausal and postmenopausal: Women risk factors, cardiovascular features, and recurrence," *Int. Heart J.*, vol. 58, no. 2, pp. 174–179, 2017, doi: 10.1536/ihj.16-095.

[4] R. E. Nappi, P. Chedraui, I. Lambrinoudaki, and T. Simoncini, "Series Menopause 1 Menopause : a cardiometabolic transition," *LANCET Diabetes Endocrinol.*, vol. 10, no. 6, pp. 442–456, 2022, doi: 10.1016/S2213-8587(22)00076-6.

[5] S. Sampson, "Coronary Artery Disease Risk Factors," 2018. https://www.healthline.com/health/coronary-artery-disease/risk-factors (accessed Apr. 06, 2022).

[6] B. Soman, M. Rahaman, R. Rajan, and G. Vijayaraghavan, "Risk factor profile and disease pattern in premenopausal and postmenopausal Indian women presenting with acute coronary syndrome," *J. Clin. Prev. Cardiol.*, vol. 5, no. 3, p. 78, 2016, doi: 10.4103/2250-3528.191098.

[7] L. S. Lilly, *Pathophysiology of heart disease: A collaborative project of medical students and faculty: Fifth edition*. 2016.

[8] N. Sattar *et al.*, "Age at Diagnosis of Type 2 Diabetes Mellitus and Associations With Cardiovascular and Mortality Risks: Findings From the Swedish National Diabetes Registry," *Circulation*, vol. 139, no. 19, pp. 2228–2237, 2019, doi: 10.1161/CIRCULATIONAHA.118.037885.

[9] M. M. Al-Nozha, H. M. Ismail, and O. M. Al Nozha, "Coronary artery disease and diabetes mellitus," *J. Taibah Univ. Med. Sci.*, vol. 11, no. 4, pp. 330–338, 2016, doi: 10.1016/j.jtumed.2016.03.005.

[10] O. Angerås *et al.*, "Evidence for obesity

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paradox in patients with acute coronary syndromes: A report from the Swedish Coronary Angiography and Angioplasty Registry," *Eur. Heart J.*, vol. 34, no. 5, pp. 345–353, 2013, doi: 10.1093/eurheartj/ehs217.

[11] K. Awawdi, H. Steiner, M. S. Green, and S. Zelber-Sagi, "Association between second-hand smoking and acute coronary heart disease among Arab women with multiple risk factors," *Eur. J. Public Health*, vol. 26, no. 1, pp. 141–145, 2016, doi: 10.1093/eurpub/ckv143.