CorSalud 2019 Jan-Mar;11(1):30-36

CorSalud

Cuban Society of Cardiology

Original Article

Cardiocentro Ernesto Che Guevara Santa Clara Cuba

Characterization of cardiometabolic risk in middle aged women with a history of pre-eclampsia in the last decade

Juan A. Suárez González✉, MD, MSc; and Mario Gutiérrez Machado, MD, MSc

Hospital Universitario Gineco-Obstétrico Mariana Grajales. Santa Clara, Villa Clara, Cuba.

Este artículo también está disponible en español

ARTICLE INFORMATION

Received: November 11, 2018
Accepted December 13, 2018

Competing interests
The authors declare no competing interests

ABSTRACT

Introduction: The history of pre-eclampsia becomes a cardiometabolic risk.
Objectives: To characterize the cardiometabolic risk in middle aged women with a history of pre-eclampsia.
Method: Descriptive, retrospective study with 76 women, selected by a simple random method, at the Hospital Gineco-Obstétrico Mariana Grajales in Santa Clara, between 2017 and 2018.
Results: The pre-eclampsia was observed in 75% of women with a history of only high blood pressure, in 76.5% of those with high blood pressure and diabetes mellitus, in 66.7% of those with high blood pressure and dyslipidemia, and in 62.5% of those where high blood pressure, diabetes mellitus and dyslipidemia are associated. From the 71 women with abdominal circumference greater than 88 cm, an association with previous pre-eclampsia was found in 74.6%; an 80.3% resulted to be obese and only 28.2% had no other cardiometabolic risk factors. From the 55 women (72.4%) who had altered blood pressure levels 53 (96.4%) had a history of pre-eclampsia for a positive predictive value greater than 95%. The metabolic syndrome was significantly related with high blood pressure (χ^2=4.3; p=0.039) and who suffered from it have about six times a higher risk than the ones who do not. From the total of women, 11 (14.5%) had metabolic syndrome, and among these, 9 (81.8%) had a history of pre-eclampsia.
Conclusions: The history of pre-eclampsia is related to cardiometabolic risk factors as obesity, high blood pressure, diabetes mellitus and dyslipidemia, thereby increasing the cardiometabolic risk for these patients.
Keywords: Pre-eclampsia, Risk factors, Metabolic syndrome, Middle aged

Caracterización del riesgo cardiometabólico en mujeres de edad mediana con antecedentes de preeclampsia en la última década

RESUMEN

Introducción: El antecedente de preeclampsia se convierte en un riesgo cardiometabólico.
Objetivo: Caracterizar el riesgo cardiometabólico en mujeres en edad mediana con antecedente de preeclampsia.
Método: Estudio descriptivo, retrospectivo con 76 mujeres, seleccionadas por un método aleatorio simple, en el Hospital Gineco-Obstétrico Mariana Grajales de Santa Clara entre 2017 y 2018.
Resultados: La presencia de preeclampsia se observó en el 75% de las mujeres con antecedentes solo de hipertensión arterial, en el 76,5% de las que padecen hipertensión y diabetes mellitus, en el 66,7% de las que tienen hipertensión y dislipidemia, y en el 62,5% de aquellas donde se asocian hipertensión, diabetes y dislipi-

✉ *JA Suárez González*
Hospital Gineco-Obstétrico Mariana Grajales. Ave. 26 de Julio. Rpto. Escambray. Santa Clara 50200. Villa Clara, Cuba. E-mail address: juansuarezg@infomed.sld.cu

demia. De las 71 mujeres con circunferencia abdominal mayor a 88 cm, se encontró una asociación con el antecedente de preeclampsia en el 74,6%; el 80,3% resultó ser obesa y solamente el 28,2% no tenía otros factores de riesgo cardiometabólico. De las 55 mujeres (72,4%) que tuvieron cifras de tensión arterial alteradas 53 (96,4%) tienen antecedentes de preeclampsia para un valor predictivo positivo mayor de 95%. El síndrome metabólico se relacionó significativamente con la hipertensión arterial (χ^2=4.3; p=0,039) y quienes la padecen tienen aproximadamente 6 veces mayor riesgo que las que no la tienen. Del total de mujeres, 11 (14,5%) tienen síndrome metabólico, y de ellas 9 (81,8%), antecedentes de preeclampsia.
Conclusiones: El antecedente de preeclampsia tiene relación con factores de riesgo cardiometabólico, como la obesidad, la hipertensión arterial, la diabetes mellitus y la dislipidemia, por lo que aumenta el riesgo cardiometabólico en estas pacientes.
Palabras clave: Preeclampsia, Factores de riesgo, Síndrome metabólico, Mediana edad

INTRODUCTION

The pre-eclampsia-eclampsia is a disease of unknown etiology in which a pathophysiological substrate of generalized tissue hypoxia appears, particularly in microcirculation, with multisystem impact that affects especially the kidney, liver, blood vessels and central nervous system[1]. The hypoxia, for other reasons (hypoxic, anemic) will aggravate the situation by increasing the patient insult to microcirculation[1,2].

The increase in life expectancy at birth in many countries in the region, particularly in Cuba, entails that women have an increasing period in their lives (one third or more) in postmenopause stage, with symptoms that cause a "change" in their middle age's state of health. The current life expectancy for Cuban women is 80.2 years[3]; there are almost one million middle aged women in the country, according to Cabal Giner[3]. Alfonso Fraga frames them between 45 and 59 years of age, with a national average of 51.8 years.

In the Caribbean, the Pan-American Health Organization has raised the need to conduct research in order to provide more details regarding the climacteric and menopausal women, in relation to these life conditions[4].

The menopause age is an indicator of socioeconomic status: in developed countries, such as Switzerland and Holland to, the median age for menopause is above 50 years[5], while in developing countries, including Cuba –where is 48–, is below that age[3].

The history of pre-eclampsia or high blood pressure in previous pregnancies becomes an important element for cardiometabolic risk, thus, it was decided to conduct this study for identifying the impact on middle aged women.

METHOD

A descriptive, retrospective study was conducted at the Hospital Gineco-Obstétrico Provincial Mariana Grajales of Santa Clara, Cuba, in the period between January 2017 and July 2018, in order to identify the impact of pre-eclampsia in previous pregnancies occurred in the last ten years, as a current risk factor when these women are in middle ages. Among all women aged between 45 and 59 years from the three family doctor's offices belonging to the Policlínico Docente Capitán Roberto Fleites of Santa Clara, Villa Clara, Cuba, a sample of 76 women was selected by a simple random method, which were applied a survey, where general and specific variables to the study were selected.

Inclusion criteria

Patients in the referred age range, that had pregnancies in the last ten years (i.e. ages are reduced in the sample), and who were willing to participate in the research, thus, they signed the informed consent.

Exclusion criteria

Patients with other diseases which might false the research results, like dementia or psychiatric alterations.

Variables

During the study, the following variables were evaluated:

Qualitative: history of previous pre-eclampsia-

eclampsia in pregnancies, history of chronic non-communicable diseases: chronic high blood pressure, diabetes mellitus, obesity, cardiovascular disease; current cardiovascular complications and knowledge of cardiovascular risk factors.

Quantitative: age, weight, body mass index and number of pregnancies. Blood pressure in millimeters of mercury, systolic and diastolic. Lipid profile, glycaemia, abdominal circumference anthropometric measurements, and waist/hip index.

High blood pressure: based on the average of two or more readings, taken at each of two or more visits after the first examination, it was established according to the VII report on high blood pressure as recommended by Infante Ricardo *et al*[1].

The diagnoses of diabetes mellitus, dyslipidemia and obesity were based on the recommendations of major national and international studies[6-13]. The metabolic syndrome was established according to the criteria of several researchers[14-16], and the one of the myocardial infarction was only by the history reported by each patient, and confirmed by her family doctor's report.

In the conducted survey, personal history of headache and lung cancer was collected in a scattered and minimal frequency, that was decided to be unified as "other" risk factors.

Procedures and information collection

The information was collected through a direct primary source, by conducting direct interviews and a survey for monitoring risk factors or chronic diseases, which had open and closed questions.

The process of selecting the information was carried out in the period of one year. All patients were called for a first meeting, where they were explained the objective and methodology to be followed in the research, and the concepts of metabolic syndrome and cardiovascular and metabolic risk were concisely addressed, with all that this implies, to favor the elucidation of some conceptual elements and to involve the women themselves in the risk prevention. This group, prior informed consent, was applied a survey with general and individual variables in relation to cardiometabolic risk. Subsequent to this, as part of the general physical examination, they had the measurement of some anthropometric elements such as waist circumference, weight, height and manual measurement of blood pressure with a mercury manometer in three random shots, the first at the doctor's office and the others, by the corresponding basic health team at the field activities.

In the examination of this risk group, some additional blood tests were indicated which facilitated the diagnosis of metabolic syndrome and included: glycaemia, total cholesterol, high density lipoprotein cholesterol (HDL) and triglycerides.

Once this first moment of the research was done, each case was analyzed individually in scheduled appointments, to assess the results of the individual physical examination and the additional blood tests indicated.

When one patient needed interconsultation with Internal medicine or another specialty, because there was any significant alteration in the result of the research, each individual case was evaluated in order to favor an individual track and solve the problems of each patient. The meeting, individual and collective, was an ideal educational work on the

Table 1. Relationship between the presence of risk factors and a history of pre-eclampsia.

Combination of CM-RF	Total	History of pre-eclampsia			
		Yes		No	
	Nº	Nº	%	Nº	%
With 1 CM-RF					
HBP	16	12	75.0	4	25.0
DM	3	3	100	0	0
DLP	1	1	100	0	0
MI	1	0	0	1	100
Others	2	2	100	0	0
With 2 CM-RF					
HBP, DM	17	13	76.5	4	23.5
HBP, DLP	3	2	66.7	1	33.3
HBP, MI	2	1	50.0	1	50.0
With 3 CM-RF					
HBP, DM, DLP	8	5	62.5	3	37.5
DM, HBP, MI	1	1	100	0	0

CM-RF, cardiometabolic risk factors; DLP, dyslipidemia; DM, diabetes mellitus; HBP, high blood pressure; MI, myocardial infarction.

topic of metabolic syndrome and the risk of women in this stage of life, and it facilitated the participation of patients in the debate, where they were oriented on healthy diets, healthy life styles, disease prevention and other important elements for posmenopausic women.

All the information collected from the first survey was taken to a database that facilitated its computation and statistical processing, through the SPSS version 21.0. The frequency distribution was used as a summary measure of the information.

RESULTS

The history of pre-eclampsia seems related to other factors of cardiometabolic risk. According to the results of this research, the group of women that had pre-eclampsia had other risk factors alone or more frequently in relation to the group where there was no collected history during pregnancy. Women who have a history of diabetes mellitus and dyslipidemia indistinctly, as isolated risk factors, have a history of pre-eclampsia; on the other hand, 75% of those with only a history of high blood pressure presented pre-eclampsia in the last decade (**Table 1**). Among the women who had episodes of pre-eclampsia, 76.4% showed two related risk factors: high blood pressure and diabetes mellitus; while 66.6% have high blood pressure with dyslipidemia.

When analyzing the three risk factors, the behavior was similar because diabetes mellitus, high blood pressure and myocardial infarction take place in a patient who has history of pre-eclampsia. Moreover, hypertension and diabetes with dyslipidemia in 62.5% of the 8 women, history of pre-eclampsia s expressed.

In general, in **table 1** is shown the relationship of pre-eclampsia with these important cardiometabolic risk factors.

The abdominal circumference is a very easy clinical method of determining, which has opponents in relation to its influence on the cardiovascular and metabolic risk but undoubtedly represents another element to take into consideration, which can be influenced by different causes and can be important if it is associated with other elements to be evaluated when dealing with these risk approaches. In the sample studied, what is shown in **table 2** is interesting because of the total number of women evaluated. It was found that in the 5 middle aged women who had a lower abdominal circumference than 88 cm, as a referred cut-off point to assess metabolic risk, none reported a history of pre-eclampsia, nor were they obese; while in the group of 71 women whose abdominal circumference showed values greater than 88 cm, it was found that 74.6% of them had a history of pre-eclampsia; 80.3 % were obese and only 28.2% did not have other risk factors.

Table 2. Relationship of abdominal circumference with other cardiometabolic risk factors.

Variable	Abdominal circumference			
	< 88 cm (n=5)		≥ 88 cm (n=71)	
	Nº	%	Nº	%
History of pre-eclampsia				
Yes	0	0	53	74.6
No	5	100	18	25.4
Obesity				
Yes	0	0	57	80.3
No	5	100	14	19.7
CM-RF				
HBP	1	20.0	15	21.1
DM	0		3	4.2
DLP	0		1	1.4
MI	0		1	1.4
Others	0		2	2.8
HBP, DM	1	20.0	16	22.5
HBP, DLP	0		3	4.2
HBP, MI	0		2	2.8
HBP, DM, DLP	1	20.0	7	9.9
DM, HBP, MI	0		1	1.4
Without CM-RF	2	40.0	20	28.2

CM-RF, cardiometabolic risk factors; DLP, dyslipidemia; DM, diabetes mellitus; HBP, high blood pressure; MI, myocardial infarction.

In this study, from the 55 middle aged women (72.4%) who had blood pressure figures higher than 120/80 mmHg (**Table 3**), in two or more randomized shots, 53 (96.4%) have a history of pre-eclampsia for a PPV greater than 95%.

Moreover, 100% of the 21 middle aged women, which never were noted figures higher than average blood pressure 120/80, showed no history of pre-eclampsia, with a NPV of 100%.

For high blood pressure, the metabolic syndrome

is significantly related (X^2=4.3; p=0.039), those with this background have about six times a greater risk that the ones who do not.

In **table 4** is shown that women with a history of pre-eclampsia had high blood glucose levels (13.1%), cholesterol (5.2%) and triglycerides. The metabolic syndrome is significantly related to diabetes mellitus (X^2=10.4; p=0.001). Middle aged women with this history have a risk approximately seven times greater than those who do not (RR=7).

The relationship between the metabolic syndrome and dyslipidemia was not identified as significant (X^2=1.3; p=0.259).

From all the middle aged women studied, 11 (14.5%) have metabolic syndrome, and of these, 9 (81.8%) have a history of pre-eclampsia (**Table 5**). This has a statistically significant relationship with X^2=4.2; p=0.028.

DISCUSSION

The high blood pressure in a previous pregnancy can cause undiagnosed underlying vascular disease, although few cases are confirmed histologically[6]. In any case, having had a hypertensive disorder in a pregnancy predisposes to suffer in the next; Castillo Hernández *et al*[7] indicate that pre-eclampsia has a 20% recurrence.

The results found coincide with the criteria proposed, where the risk factors are not exclusive and diversity of these in a population increases the risk of pre-eclampsia *per se*[8,9].

The anthropometry has proven to be a useful

Table 3. Blood pressure behavior in middle aged women.

Blood pressure in middle aged women	History of pre-eclampsia				Total	
	Yes		No			
	Nº	%	Nº	%	Nº	%
< 120/80 mmHg	0	0	21	100	21	27.6
≥ 120/80 mmHg	53	96.4	2	3.6	55	72.4
Total	53	69.7	23	30.3	76	100

Table 4. Additional blood tests associated with metabolic syndrome in middle aged women (n=76).

Altered additional blood tests	History of pre-eclampsia			
	Yes		No	
	Nº	%	Nº	%
Glycaemia > 5.5 mmol/L	10	13.1	18	23.7
Cholesterol > 6.5 mmol/L	4	5.2	11	14.5
Triglycerides > 1.69 mmol/L	13	17.1	25	32.8

Table 5. Presence of metabolic syndrome in middle aged women according to history of pre-eclampsia.

Metabolic syndrome	History of pre-eclampsia				Total	
	Yes		No			
	Nº	%	Nº	%	Nº	%
With metabolic syndrome	9	81.8	2	18.2	11	14.5
Without metabolic syndrome	44	67.7	21	32.3	65	85.5
Total	53	69.7	23	30.3	76	100

tool in the clinical method for the early diagnosis of noncommunicable chronic diseases[10]; in the same way, it happens for pre-eclampsia-eclampsia, the cardiovascular risk and the metabolic syndrome in this population.

The pre-pregnancy body mass index (BMI) is directly related to maternal and fetal health[14,17], regardless of the weight gain in pregnancy[13].

The waist-hip index (WH-I) is a specific anthropometric measure to measure the levels of intra-abdominal fat, which relates the perimeter of the waist with that of the hip (in cm) and depending on the result it is estimated if there is a certain cardiovascular risk[15]. In addition, the abdominal circumference greater than 88 cm is one of the elements that also identify the metabolic syndrome[16,18,19]. In this study, there is a significant number of women with these conditions, which increases the risk approach of noncommunicable chronic diseases.

Previous high blood pressure becomes a risk factor to consider in middle aged women, and this study's results coincide with those review by other authors[20-22].

CONCLUSIONS

The history of pre-eclampsia is related to cardiometabolic risk factors such as obesity, high blood pressure, diabetes mellitus and dyslipidemia, which increases the cardiometabolic risk in these patients during the climacteric period between 45 and 59 years, recognized as middle age.

REFERENCES

1. Infante Ricardo Y, Avello Faura M, Apiao Brito S, Pérez Piñeda M, Isaac González M. Hipertensión arterial en el embarazo. Algunos aspectos epidemiológicos: 2do semestre del 2004. Rev Electron Zoilo [Internet]. 2007 [citado 18 Oct 2018];32(1). Disponible en: http://www.ltu.sld.cu/revista/index_files/articles/2007/ene-marz07/ene-mar2007_5.htm
2. Cabal Giner MA, Hernández Oviedo G, Torres Díaz G, Guerra Marín M. Alteraciones del estado nutricional y la tensión arterial como señales tempranas de aterosclerosis en adolescentes. Rev Cubana Med Gen Integr [Internet]. 2010 [citado 18 Oct 2018];26(2):257-63. Disponible en: http://scielo.sld.cu/pdf/mgi/v26n2/mgi05210.pdf
3. Ministerio de Salud Pública. Anuario Estadístico de Salud 2017. La Habana: Dirección de Registros Médicos y Estadísticas de Salud; 2018.
4. Sibai BM. Diagnosis, controversies, and management of the syndrome of hemolysis, elevated liver enzymes, and low platelet count. Obstet Gynecol. 2004;103 (5 Pt 1):981-91.
5. Kelli HM, Kassas I, Lattouf OM. Cardio metabolic syndrome: A global epidemic. J Diabetes Metab [Internet]. 2015 [citado 21 Oct 2018];6(3):513. Disponible en: https://www.omicsonline.org/open-access/cardio-metabolic-syndrome-a-global-epidemic-2155-6156.1000513.pdf
6. Delgado García AF, Valdés Rodríguez YC, Polo Vega JC, Marcel EA. Intervalos de referencia de los niveles de colesterol en estudiantes de la Universidad de Guayaquil, Ecuador. Rev Latinoam Patol Clin Med Lab. 2015;62(1):40-5.
7. Castillo Hernández JL, Cuevas González MJ, Almar Galiana M, Romero Hernández EY. Síndrome metabólico, un problema de salud pública con diferentes definiciones y criterios. Rev Med UV. 2017;17(2):7-24.
8. Armaza Céspedes AX, Chambi Cayo TT, Mamani Ortiz Y, Abasto González S, Luizaga López JM. Factores de riesgo nutricionales asociados al síndrome metabólico en personal militar de la Fuerza Aérea de Cochabamba, Bolivia. Gac Med Bol. 2016;39(1):20-5.
9. Miguel Soca PE. Predictores de riesgo cardiometabólico. Rev Finlay [Internet]. 2015 [citado 24 Oct 2018];5(2):80-1. Disponible en: http://www.revfinlay.sld.cu/index.php/finlay/article/view/357/1400
10. González Sandoval CE, Díaz Burke Y, Mendizabal-Ruiz AP, Medina Díaz E, Morales JA. Prevalencia de obesidad y perfil lipídico alterado en jóvenes universitarios. Nutr Hosp. 2014;29(2):315-21.
11. Aschner PM, Muñoz OM, Girón D, García OM, Fernández-Ávila DG, Casas LÁ, *et al*. Guía de práctica clínica para la prevención, diagnóstico, tratamiento y seguimiento de la diabetes mellitus tipo 2 en la población mayor de 18 años. Colomb Med (Cali). 2016;47(2):109-31.
12. Fayfman M, Haw S. Diabetes in racial and ethnic minorities in the United States: Individualizing approaches to diagnosis and management. Curr Diabetes Rev. 2017;13(3):239-250.
13. Peltzer K, Pengpid S, Samuels TA, Özcan NK, Mantilla C, Rahamefy OH, *et al*. Prevalence of overweight/obesity and its associated factors among university students from 22 countries. Int

J Environ Res Public Health. 2014;11(7):7425-41.
14. O'Neill S, O'Driscoll L. Metabolic syndrome: a closer look at the growing epidemic and its associated pathologies. Obes Rev. 2015;16(1):1-12.
15. Chávez Canaviri AM, Mamani P, Phillco Lima P. Prevalencia de síndrome metabólico y factores asociados en personal de salud dependiente del gobierno municipal de la ciudad de El Alto (4050 m.s.n.m.), 2013. Rev Méd La Paz. 2016;22(1):27-35.
16. Navia Bueno MP, Yaksic Feraude N, Aguilar Mercado X, Farah Bravo J, Chambi E, Mollinedo Rocha E, *et al*. Factores de riesgo asociados a síndrome metabólico en población habitante de 3600 y 4100 m.s.n.m. Rev Méd La Paz. 2015;21(2): 6-17.
17. Caamaño Navarrete F, Alarcón Hormazábal M, Delgado Floody P. Niveles de obesidad, perfil metabólico, consumo de tabaco y presión arterial en jóvenes sedentarios. Nutr Hosp. 2015;32(5): 2000-6.
18. Herrera Mauricio S, Cuellar JD. Detección del riesgo de diabetes a través de hemoglobina glicosilada Hba1c y la prueba de tolerancia oral a la glucosa1 (Comunidad Chapaco provincia Ichilo - Santa Cruz 2014). Univ Cienc Soc. 2015;15:30-7.
19. Vilarouca da Silva AR, Nascimento de Sousa LS, de Sousa Rocha T, Alves Cortez RM, Gonçalves do Nascimento Macêdo L, de Almeida PC. Prevalencia de componentes metabólicos en universitarios. Rev Latino-Am Enfermagem. 2014;22(6): 1041-7.
20. Heredia Hernández B, Lugones Botell M. Entorno familiar, laboral, manifestaciones clínicas y enfermedades crónicas en mujeres de edad mediana. Rev Cubana Med Gen Integr [Internet]. 2009 [citado 27 Oct 2018];25(2). Disponible en: http://scielo.sld.cu/pdf/mgi/v25n2/mgi08209.pdf
21. Artiles L. Incorporating a gender perspective into Cuba's health system: realities and challenges. MEDICC Rev. 2012;14(2):39-42.
22. Navarro Despaigne DA, Santiago Sierra MT, Vázquez Niebla JC. Publicaciones de artículos originales de autores cubanos sobre algunas afecciones endocrinas en la mujer de edad mediana. Rev Cubana Endocrinol [Internet]. 2016 [citado 30 Oct 2018];27(3). Disponible en: http://www.revendocrinologia.sld.cu/index.php/endocrinologia/article/view/41/49