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Assessment of clinical and metabolic parameters in women after natural or surgical menopause and its clinical repercussions

Avaliação dos parâmetros clínicos e metabólicos em mulheres após a menopausa natural ou cirúrgica e suas repercussões clínicas

Evaluación de parámetros clínicos y metabólicos en mujeres después de la menopausia natural o quirúrgica y sus repercusiones clínicas.

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ABSTRACT

Objective: To evaluate the clinical and metabolic parameters of women after natural or surgical menopause. **Methods:** We carried out a cross-sectional study in which we analyzed 686 medical records of women after natural or surgical menopause treated at the Menopause Outpatient Clinic of the Department of Obstetrics and Gynecology of a Public Hospital in São Paulo between 2020 and 2022. Data collected from medical records were: age, age at menopause, type of menopause, body mass index (BMI), waist circumference, blood pressure, HDL, triglycerides, fasting blood glucose and medication use. An interview was carried out about the use of medications during the consultation, and it was noted when the patient confirmed the use of any of these medications. **Results:** Women showed no difference between ages and age at menopause differed between groups. The average BMI of participants in both groups showed that they were obese (grade I obesity) and presented an increase in the average value of abdominal circumference and a high risk for cardiovascular diseases. **Conclusion:** The type of menopause did not lead to changes in the clinical parameters of women after natural or surgical menopause.

Keywords: Menopause, Heart disease risk factors, Climacteric, Essential hypertension, Cholesterol HDL.

RESUMO

Objetivo: Avaliar os parâmetros clínicos e metabólicos das mulheres após a menopausa natural ou cirúrgica. **Métodos:** Realizamos um estudo transversal em que analisamos 686 prontuários de mulheres após a menopausa natural ou cirúrgica atendidas no Ambulatório de Climatério do Departamento de Obstetrícia e Ginecologia de um Hospital Público em São Paulo entre o período de 2020 a 2022. Os dados coletados dos prontuários foram: idade, idade da menopausa, tipo de menopausa, índice de massa corpórea (IMC), circunferência abdominal, pressão arterial, HDL, triglicérides, glicemia jejum e uso de medicações. Foi realizada uma entrevista sobre o uso de medicações como anti-hipertensivos, estatinas e hipoglicemiantes orais durante a consulta e anotado quando a paciente confirmava o uso de algum desses medicamentos. **Resultados:** As mulheres não apresentaram diferença entre as idades e a idade da menopausa diferiu entre os grupos. A média do IMC das participantes de ambos os grupos mostrou que elas eram obesas (obesidade grau I) e apresentaram aumento do valor médio da circunferência abdominal e risco elevado para doenças cardiovasculares. **Conclusão:** O tipo de menopausa não levou as alterações nos parâmetros clínicos das mulheres após a menopausa natural ou cirúrgica.

Palavras-chave: Menopausa, Fatores de risco de doenças cardíacas, Climatério, Hipertensão essencial, HDL-colesterol.

RESUMEN

Objetivo: Evaluar los parámetros clínicos y metabólicos de mujeres post menopausia natural o quirúrgica. **Métodos:** Se realizó un estudio transversal en el que se analizaron 686 historias clínicas de mujeres post

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menopausia natural o quirúrgica atendidas en el Ambulatorio de Menopausia del Departamento de Obstetricia y Ginecología de un Hospital Público de São Paulo entre 2020 y 2022. Los datos recolectados de las historias clínicas fueron: edad, edad de menopausia, tipo de menopausia, índice de masa corporal (IMC), circunferencia de cintura, presión arterial, HDL, triglicéridos, glucemia en ayunas y uso de medicamentos. Se realizó una entrevista sobre el uso de medicamentos durante la consulta y se anotó cuando el paciente confirmaba el uso de alguno de estos medicamentos. **Resultados:** Las mujeres no mostraron diferencias entre edades y la edad de la menopausia difirió entre grupos. El IMC promedio de los participantes de ambos grupos mostró que eran obesos (obesidad grado I) y presentaban un aumento en el valor promedio de la circunferencia abdominal y un alto riesgo de enfermedades cardiovasculares. **Conclusión:** El tipo de menopausia no provocó cambios en los parámetros clínicos de las mujeres después de la menopausia natural o quirúrgica.

Palabras clave: Menopausia, Factores de riesgo de enfermedad cardíaca, Climatérico, Hipertensión esencial, Colesterol HDL.

INTRODUCTION

The increase in cardiovascular risk in a certain period of women's lives is related to the climacteric (ZHANG Z, et al., 2021). At this stage, there is a drop in ovarian estrogen production and there may be an association with other risk factors, such as abdominal obesity, hypertension and dyslipidemia (ELKHOUDARY S, et al., 2020; GONÇALVES VBS and LIMA SMRR, 2024; LEE SW, et al., 2022). Endogenous hormonal changes and the physiology of aging can affect cardiac function, cause arterial discomfort, insulini resistance, changes in the lipid profile, increased body weight and central adiposity (ELKHOUDARY S, et al., 2020; FERREIRA-CAMPOS L, et al., 2022). Anthropometry comprises the measurement of the variables of body dimensions, components and proportions, using alone or in combination with measurements of weight, height, skinfolds and body circumferences, seeking to evaluate the body profile (MARLATT KL, et al., 2022).

Anthropometric assessment is widely used in clinical practice as it presents several application advantages, such as: simplicity, easy execution, high reliability and safety, that is, it is a non-invasive procedure. Furthermore, the low cost of the equipment, which is usually durable and portable, makes anthropometry the method of choice for many professionals (MARLATT KL, et al., 2022; NACIF M and VIEBIG RF, 2011). Anthropometric data are: weight, height, body mass index, abdominal circumference (WC), blood pressure (BP) among others (NACIF M and VIEBIG RF, 2011). Two decades ago, they suggested calling the relationship body mass and height body mass index, with body mass expressed in kilograms and height in meters (KEYS A, et al., 1972). This relationship became popular in the nutritional assessment of adults, and it was also called the Quételet index in honor of its creator (QUETELET A, 1870).

The suggested cut-off limits were: low weight (BMI < 20), normal (20 ≥ BMI < 25), overweight (25 ≥ BMI < 30) and obese (BMI ≥ 30) (BRAY GA, 1992). BMI has been used in clinical practice for three decades and is considered by several authors to be the best indicator of body mass in adults (WILLETT W, 1998). In 1995, a Committee of Experts from the World Health Organization modified the BMI cutoff points, recommending its use both for diagnosing malnutrition and obesity, as follows: underweight III (severe): BMI < 16.0; low weight II (moderate): 16.0 ≥ BMI ≤ 16.99; low weight I (mild): 17.0 ≥ BMI ≤ 18.49; normal range: 18.5 ≥ BMI ≤ 24.99; pre-obesity (increased): 25.0 ≥ BMI ≤ 29.99; obesity grade I (moderate): 30.00 ≥ BMI ≤ 34.99; grade II obesity (severe): 35.0 ≥ BMI ≤ 39.99; grade III obesity (very severe): BMI ≥ 40.00.

Although BMI does not indicate body composition, the ease of measurement and its relationship with morbidity and mortality seem to be sufficient reasons for its use as an indicator of nutritional status in epidemiological studies in association or not with other anthropometric measurements (ACUÑA K and CRUZ T, 2004). The cut-off points adopted for abdominal circumference were recommended by Lean et al (13), according to the degree of risk for cardiovascular diseases: increased risk for women (WC > 80 cm) and for men (WC > 94 cm), risk very increased for women (WC > 88 cm) and for men (WC > 102 cm).

Waist circumference can be used in health promotion programs to identify individuals who should receive weight control or weight loss guidance (LEAN MEJ, et al., 1995). The pathophysiology of primary arterial hypertension is multifactorial, with genetic and environmental influences. The genetic mechanisms involved in

this disease remain unclear and it is known that children of hypertensive patients have a greater chance of developing hypertension. However, the environment plays an important role in its development. As an individual ages, the prevalence of high blood pressure increases significantly. According to the 7th Brazilian Guideline on Hypertension, systolic blood pressure (SBP) and diastolic blood pressure (DBP) values equal to or above 140 to 90 mmHg are considered hypertension (PRÉCOMA DB, et al., 2019).

In relation to the 2020 Arterial Hypertension Guidelines, hypertensive patients have blood pressure levels above 140/90 mmHg, and individuals with SBP between 120 and 139 mmHg and DBP between 80 and 89 mmHg are classified as having normal blood pressure or prehypertensive, and such people have a higher cardiovascular risk compared to optimal or normal blood pressure (≤ 120/80 mmHg) (BARROSO WKS, et al., 2024). The Brazilian Society of Cardiology (SBC) guidelines establish therapeutic and percentage reduction targets for LDL (low-density lipoprotein) and non-HDL cholesterol (high-density lipoprotein). Depending on the risk, we need important reductions in the percentage, and we seek to improve LDL or non-HDL cholesterol values [16]. For individuals at low cardiovascular risk, the LDL target should be < 130 mg/dL and non-HDL < 160 mg/dL.

When at intermediate cardiovascular risk: LDL should be reduced to < 100 mg/dL and non-HDL to < 130 mg/dL. Individuals at high cardiovascular risk: LDL should be reduced to < 70 mg/dL and non-HDL to < 100 mg/dL (TOTH P and PHAN B, 2014). In 2017 there was an update to the Brazilian Guideline on Dyslipidemia and Prevention of Atherosclerosis in which dyslipidemias were classified as: isolated hypercholesterolemia which is the isolated increase in LDL (LDL≥ 160 mg/dL), isolated hypertriglyceridemia being the isolated increase in triglycerides (TG ≥ 150 mg/dL or ≥ 175 mg/dL, if the sample is obtained without fasting), mixed hyperlipidemia which is an increase in LDL (LDL ≥ 160 mg/dL) and TG (TG ≥ 150 mg/dL or ≥ 175 mg/dL) dL, if the sample is obtained without fasting). If TG ≥ 400 mg/dL, the calculation of LDL using the Friedewald formula is inappropriate, and mixed hyperlipidemia should be considered in which non-HDL ≥ 190 mg/dL and low HDL, which is the reduction of HDL (men < 40 mg /dL and women < 50 mg/dL) alone or in association with increased LDL or TG (FALUDI AA, et al., 2017).

When faced with a diagnosis of dyslipidemia, we should encourage women to change their eating habits, mainly reducing their intake of carbohydrates, red meat and sweets. Changing your lifestyle is also related to advising you to practice physical activity. Pharmacological therapy, in turn, should be initiated when there are important changes, especially in LDL cholesterol (FERREIRA-CAMPOS L, et al., 2022). Statins are the most recommended medications to treat dyslipidemia, being able to change the course of atherosclerotic disease. The literature shows that, when it comes to hypercholesterolemia, these drugs act to prevent primary and secondary disease. A major problem is the fact that women are poorly represented in clinical studies regarding the use of medications. In clinical trials with statins, the participation of women has ranged from 14% to 38% (TOTH P and PHAN B, 2014). Reducing LDL-c by HMG-CoA reductase inhibitors or statins remains the most validated therapy in clinical studies to reduce the incidence of cardiovascular events.

The use of statins is indicated in primary and secondary prevention therapies as a first option. The reduction in LDL-c varies between statins, and this difference is fundamentally related to the initial dose. Each time we double the dose of any of these statins, the additional average reduction in LDL-c is 6 to 7% (FALUDI AA, et al., 2017). Insulin resistance is associated with an increase in uric acid in the blood, a decrease in the volume of low-density lipoprotein (LDL) particles, an increase in postprandial lipemia, sodium retention, an increase in the activity of the sympathetic nervous system, an increase in fibrinogen, of plasminogen activator inhibitor type 1 (PAI-1) and consequently endothelial dysfunction (LEE SW, et al., 2022).

Screening for diabetes should be carried out from the age of 35, especially in people with a history of pre-diabetes, a family history of diabetes (first-degree relatives), a history of gestational diabetes, a history of cardiovascular disease, high blood pressure, HDL low (< 35 mg/dL) and/or high triglycerides (> 250 mg/dL), polycystic ovary syndrome, physical inactivity, acanthosis nigricans or high-risk ethnicities (blacks, Hispanics and indigenous South Americans) (ERDÉLYI A, et al., 2023). Diagnosis of diabetes mellitus, request fasting blood glucose or an oral glucose tolerance test (OGTT) or glycated hemoglobin (HbA1c). Pre-diabetes is characterized by fasting blood glucose between 100 mg/dL and 125 mg/dL, OGTT between 140 mg/dL and

199 mg/dL and HbA1c between 5.7% and 6.4% using the HPLC method – liquid chromatography high efficiency.

The patient is diagnosed with diabetes when fasting blood glucose is ≥ 126 mg/dL, OGTT ≥ 200 mg/dL or HbA1c ≥ 6.5% (ERDÉLYI A, et al., 2023). The presence of classic risk factors (hypertension, dyslipidemia, obesity, sedentary lifestyle, smoking, diabetes, family history, etc.) increases the likelihood of cardiovascular disease and guides the primary and secondary prevention of these changes. Our study aimed to evaluate the clinical and metabolic profile and medication use of women during natural or surgical menopause and their clinical repercussions.

METHODS

We carried out a cross-sectional study in which we analyzed 686 medical records of women after natural or surgical menopause treated at the Menopause Outpatient Clinic of the Department of Obstetrics and Gynecology of the Irmandade da Santa Casa de Misericórdia de São Paulo between the period 2020 and 2022. Women were considered after menopause: those with amenorrhea for at least one year and FSH ≥ 30 mIU/mL. In relation to surgical menopause, those who underwent bilateral oophorectomy were considered. The group of women after natural menopause consisted of 459 participants and the group after surgical menopause consisted of 227 patients. The data collected from the medical records were: age, age at menopause, type of menopause, body mass index (BMI), waist circumference, blood pressure, HDL, triglycerides, fasting blood glucose and use of medications (antihypertensives, statives and oral hypoglycemics).

Body weight (kg) was obtained using an electronic scale (accuracy of 0.1 kg) with the bladder empty and with the woman wearing only underwear. Height (m) was obtained using a wall stadiometer with the woman barefoot and with an accuracy of 0.5 cm. Body mass index (BMI = Weight/Height2) (kg/m2) was calculated as recommended by the World Health Organization for assessing nutritional status (WHO, 1998). Measuring abdominal circumference (cm), the flexible and inelastic measuring tape was positioned at the smallest curvature located between the last costal arch and the iliac crest without compressing the tissues. Blood pressure was measured in the non-dominant arm with a mercury sphygmomanometer with an accuracy of 2 mmHg, with the woman sitting and resting for at least five minutes and after bladder emptying.

Two measurements were taken by two different investigators, previously trained, with an interval of approximately 30 minutes between them. Blood pressure was obtained by averaging the two measurements. The appropriate cuff for obese people was used when necessary. All anthropometric measurements were performed by trained professionals. Total cholesterol, serum concentrations of high-density lipoprotein and triglycerides were measured by the enzymatic method using the BT 3000 plus device (Wienerlab®, Rosario, Argentina) 40. Fasting blood glucose was also requested, and the patients were instructed to fast for 12 hours to carry out laboratory tests. All biochemical evaluations were carried out by the Clinical Analysis Laboratory of the public hospital in São Paulo.

An interview was carried out about the use of medications such as antihypertensives, statins and oral hypoglycemic agents during the consultation and it was noted when the patient confirmed the use of any of these medications. The statistical tests used were the chi-square test, Mann-Whitney test and the significance level was 5%. The work was approved by the Human Research Ethics Committee of the Irmandade da Santa Casa de Misericórdia de São Paulo CAEE: 89877418.9.0000.5479 and opinion number: 274.108.

RESULTS

The Natural Menopause Group was made up of 459 women, with a mean age of 59 (SD±6.7) years, average age of menopause of 49.1(SD±4.6) years, BMI of 30 kg/m2 (SD±4.1), waist circumference of 98.2 (SD±10) cm, systolic blood pressure of 118.9 (SD± 20.4) mmHg, diastolic blood pressure of 73.6 (SD± 11.9) mmHg, HDL of 51 (SD± 11.5) mg/dL, triglycerides of 136.6 (SD ± 78.8) mg/dL and fasting blood glucose 100.4 (SD ± 24.2) mg/dL (**Table 1**).

The Surgical Menopause Group consisted of 277 participants, with a mean age of 58.6 (SD±6.7) years, average age of menopause of 43,7 (SD±6,9) years, BMI of 30.3 kg/m2 (SD±4.2), waist circumference of 98.4 (SD± 10.2) cm, systolic blood pressure of 120.6 (SD± 18.7) mmHg, diastolic blood pressure of 74.7 (SD± 11.6) mmHg, HDL of 52.2 (SD± 13, 1) mg/dL, triglycerides of 132.9 (SD ± 69.6) mg/dL and fasting blood glucose 100.7 (SD ± 32.7) mg/dL (**Table 1**).

Women showed no difference between ages and age at menopause differed between groups. The average BMI of participants in both groups showed that they were obese (grade I obesity) and had an increase in the average value of abdominal circumference and a high risk for cardiovascular diseases, according to Lean MEJ, et al. (1995). When we compared the groups, there was no difference between clinical parameters (**Table 1**). In relation to the medications used (antihypertensives, statins and hypoglycemic agents) there was also no difference (**Table 2**).

Table 1 - Assessment of clinical and metabolic parameters of women after natural and surgical menopause.

Variable	Natural menopause	Surgical menopause	*p**
Mean age (years)	59 (SD± 6,4)	57,8 (SD ±7,1)	0,089
Average age of menopause (years)	49,1(SD±4,6)	43,7 (SD±6,9)	<0,001
Average BMI (Kg/m2)	30 (SD± 4,1)	30,3 (SD± 4,2)	0,303
WC (cm)	98,2 (SD± 10)	98,4 (SD± 10,2)	0,756
SBP (mmHg)	118,9 (SD± 20,4)	120,6 (SD± 18,7)	0,089
DBP(mmHg)	73,6 (SD± 11,9)	74,7 (SD± 11,6)	0,156
HDL (mg/dL)	51 (SD± 11,5)	52,2 (SD± 13,1)	0,458
TG (mg/dL)	136,6 (SD± 78,8)	132,9 (SD± 69,6)	0,252
Fasting blood glucose (mg/dL)	100,4 (SD ± 24,2)	100,7 (SD ± 32,7)	0,602

Legend: BMI: body mass index, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure, HDL: high-density lipoprotein, TG: triglycerides. SD: standard deviation. **Note:** Women treated at the Climacteric Outpatient Clinic of DOGI – in a Public Hospital in São Paulo between 2020 to 2022. *Mann-Whitney Test (p<0,05). **Source:** Macruz CF and Lima SMRR, 2025.

Table 2 - Assessment of medications used by women after natural and surgical menopause.

Medications in use	Natural menopause	Surgical menopause	*p**
Antihypertensives	43,8%	45,4%	0,694
Statins	21,1%	20,7%	0,897
Oral hypoglycemic agents	16,1%	12,8%	0,248

Note: Women treated at the Climacteric Outpatient Clinic of DOGI - in a Public Hospital in São Paulo between 2020 to 2022. *Chi-square test (p<0.05). **Source:** Macruz CF and Lima SMRR, 2025.

DISCUSSION

The increase in cardiovascular risk in women is related to the climacteric period and the existence of associated risk factors such as abdominal obesity, hypertension and dyslipidemia (ZHANG Z, et al., 2021; MUMUSOGLU S and YILDIZ BO, 2019). Few Brazilian studies compare women in natural and surgical menopause in relation to their clinical parameters and use of medication such as antihypertensives, statins and hypoglycemic agents to control comorbidities. There is a lot of research that reports on the cardiovascular assessment of premenopausal and postmenopausal women. The main conclusion is about the increased cardiovascular risk of women who are in menopause (LEE SW, et al., 2022; ELKHOUDARY S, et al., 2020; FERREIRA-CAMPOS L, et al., 2022; K SH and KIM HS, 2020).

Studies that analyze the type of menopause, cardiovascular risk factors and the use of medications are scarce (CAROLYN J, et al., 2013; MICHIEL HF, et al., 2022). In this study, clinical and metabolic parameters were compared, such as: age, age at menopause, type of menopause, body mass index (BMI), abdominal circumference, blood pressure, HDL, triglycerides, fasting blood glucose among women who had natural menopause. and surgical. When comparing the two groups, it was found that there was no difference between the clinical parameters between the groups studied. Carolyn J, et al. (2013) carried out a prospective study in which they evaluated body mass index in women undergoing natural and surgical menopause and found

greater weight gain in middle-aged women, being accentuated in those who underwent hysterectomy (CAROLYN J, et al., 2013).

Michiel HF. et al, (2022) evaluated the risk of ischemic arterial and cerebral disease in Chinese women who underwent hysterectomy and concluded that cardiovascular risk was higher in those under 48 years of age and that hysterectomy was indicated when compared to older women (MICHIEL HF, et al., 2022). In our manuscript we also evaluated the treatment of chronic clinical comorbidities, such as chronic arterial hypertension, dyslipidemia and type 2 diabetes mellitus and there was no difference when comparing the use of the following medications: antihypertensives, statins and hypoglycemic drugs in women undergoing natural versus surgical menopause. The women had high body mass index and waist circumference, these measurements being clinical evidence of increased abdominal fat and changes in the cardiovascular system.

Heart disease continues to be the main cause of death in women, with dyslipidemia being highly prevalent among them. With menopause, there is a worsening of the lipid profile, with a transition to increasingly atherogenic dyslipidemia. Women in the primary prevention scenario should undergo a risk assessment, and statin therapy should be initiated when the Framingham global risk score is greater than 10%, indicating high cardiovascular risk in accordance with the recommendations of cardiological guidelines (PRÉCOMA DB, et al., 2019).When compared to men, women tend to have higher high-density lipoprotein (HDL) in their baseline pattern. Furthermore, it is noteworthy that patients with high HDL may be at risk of elevated low-density lipoprotein (LDL) and non-HDL cholesterol. These cases may be accompanied by changes in triglycerides, especially if there is diabetes (CARRION - MACHILENE MJ, 2022; MARCHI R, et al., 2017).

In our research, 42% of patients use statins due to established dyslipidemia. It is estimated that changes in glucose metabolism precede the diagnosis of diabetes by 4 to 12 years (MARCHI R, et al., 2017). While in earlier stages insulin resistance can be compensated with insulin hyperproduction, after a certain point, the pancreatic functional reserve is exhausted, and insulin production no longer compensates for insulin resistance. From that moment on, the diagnosis will be perceived by hyperglycemia, but the adaptive cardiovascular changes to insulin resistance and cellular oxidative stress are no longer reversible (MARLATT KL, et al., 2022).

In our study, 29% of women use hypoglycemic drugs to treat established diabetes mellitus. The menopausal transition and menopause are female-specific events that profoundly affect the cardiometabolic future. Medical assistance during the climacteric period requires special attention to some diseases, such as diabetes, obesity, high blood pressure and dyslipidemia and the indication of treatment and monitoring when comorbidities are detected.

CONCLUSION

The type of menopause did not lead to change in the clinical parameters of women after natural or surgical menopause. The diagnosis and treatment of the main diseases that affect the cardiovascular system are important during the climacteric period.

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