

TREATMENT AND PREVENTION OF ATHEROSCLEROSIS IN 145 POSTMENOPAUSAL WOMEN

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Abstract

Background: Atherosclerosis is one of the leading causes of cardiovascular morbidity and mortality among postmenopausal women. After menopause, estrogen deficiency contributes to adverse changes in lipid metabolism, endothelial function, vascular stiffness, insulin resistance, and inflammatory activity. These changes increase the risk of coronary artery disease, cerebrovascular disease, and peripheral arterial disease.

Objective: The aim of this study was to evaluate clinical, metabolic, and therapeutic characteristics of atherosclerosis in 145 postmenopausal women and to determine effective approaches to treatment and prevention.

Methods: A clinical observational study was conducted among 145 postmenopausal women with signs of atherosclerotic vascular disease or high cardiovascular risk. The assessment included clinical examination, blood pressure measurement, body mass index evaluation, lipid profile analysis, fasting glucose testing, electrocardiography, and, when indicated, ultrasound examination of carotid arteries. Treatment and prevention strategies included lifestyle modification, lipid-lowering therapy, antihypertensive treatment, antiplatelet therapy when clinically indicated, and correction of metabolic risk factors.

Results: The most frequent risk factors were arterial hypertension, dyslipidemia, abdominal obesity, physical inactivity, and impaired glucose metabolism. Elevated low-density lipoprotein cholesterol was one of the most common laboratory findings. Women with combined risk factors had more pronounced clinical manifestations and higher probability of subclinical or clinically evident atherosclerosis. Comprehensive management, including statin therapy, blood pressure control, dietary correction, and regular physical activity, was associated with improvement in lipid parameters and stabilization of clinical symptoms.

Conclusion: Atherosclerosis in postmenopausal women is strongly associated with hormonal, metabolic, and vascular changes. Early detection of cardiovascular

risk factors, aggressive lipid control, blood pressure optimization, lifestyle correction, and individualized pharmacotherapy are essential for reducing cardiovascular complications in this population.

Keywords

atherosclerosis, postmenopausal women, cardiovascular risk, dyslipidemia, estrogen deficiency, prevention, statins, hypertension.

Introduction

Atherosclerosis is a chronic progressive disease of the arterial wall characterized by lipid accumulation, endothelial dysfunction, inflammation, oxidative stress, and formation of atherosclerotic plaques. It is the pathological basis of coronary artery disease, ischemic stroke, and peripheral arterial disease. In women, the risk of atherosclerosis increases markedly after menopause due to the reduction of endogenous estrogen levels.

Estrogen has several protective cardiovascular effects, including improvement of endothelial function, favorable regulation of lipid metabolism, reduction of vascular inflammation, and maintenance of arterial elasticity. After menopause, the decline in estrogen contributes to increased low-density lipoprotein cholesterol, decreased high-density lipoprotein cholesterol, increased visceral adiposity, insulin resistance, and elevated blood pressure. These changes accelerate atherogenesis and increase the probability of cardiovascular events. Current scientific data emphasize that menopause is an important period for cardiovascular risk assessment and early preventive intervention in women.

Postmenopausal women often have multiple overlapping cardiovascular risk factors. Arterial hypertension, dyslipidemia, obesity, diabetes mellitus, smoking, family history, chronic stress, and sedentary lifestyle all contribute to atherosclerotic progression. In recent European recommendations, female-specific and reproductive factors are increasingly recognized as important modifiers of cardiovascular risk.

The treatment of atherosclerosis in postmenopausal women should be comprehensive. It includes lifestyle modification, lipid-lowering therapy, blood pressure control, glucose regulation, antiplatelet therapy in selected patients, and long-term cardiovascular monitoring. Statins remain the first-line lipid-lowering therapy for patients with established chronic coronary disease, while additional agents may be considered when lipid targets are not achieved.

The aim of this study was to analyze the clinical features, risk factors, treatment approaches, and prevention strategies of atherosclerosis in 145 postmenopausal women.

Materials and Methods

This observational clinical study included **145 postmenopausal women** with confirmed or suspected atherosclerotic cardiovascular disease. The study population consisted of women who had been in natural menopause for at least one year and had clinical or laboratory evidence of increased cardiovascular risk.

Inclusion criteria

The study included women who met the following criteria: postmenopausal status, age above 45 years, presence of at least one cardiovascular risk factor, and availability of clinical and laboratory data. Risk factors included arterial hypertension, dyslipidemia, obesity, impaired glucose metabolism, family history of cardiovascular disease, and reduced physical activity.

Exclusion criteria

Women with acute myocardial infarction, acute stroke, severe heart failure, active inflammatory disease, severe hepatic or renal failure, malignant disease, or incomplete clinical data were excluded from the study.

Clinical assessment

All patients underwent a structured clinical examination. The following parameters were assessed: age, duration of menopause, body mass index, waist circumference, blood pressure, smoking status, physical activity level, presence of diabetes mellitus, family history of cardiovascular disease, and clinical symptoms such as chest discomfort, dyspnea on exertion, palpitations, dizziness, and leg pain during walking.

Laboratory and instrumental investigations

Laboratory evaluation included total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides, fasting plasma glucose, and basic biochemical parameters. Electrocardiography was performed in all patients. Carotid artery ultrasound was used in selected patients to evaluate intima-media thickness and atherosclerotic plaque formation.

Treatment and prevention program

The management strategy included non-pharmacological and pharmacological interventions. Lifestyle modification involved dietary correction, reduction of saturated fats and trans fats, increased intake of vegetables, fruits, whole grains and fish, weight control, smoking cessation, and regular aerobic physical activity.

Pharmacological therapy included statins for lipid control, antihypertensive drugs for blood pressure management, glucose-lowering treatment in patients with diabetes mellitus, and antiplatelet therapy in patients with established atherosclerotic cardiovascular disease when clinically indicated. According to

recent ESC recommendations, intensive LDL-cholesterol reduction is especially important in patients with established atherosclerotic arterial disease.

Results

The study included **145 postmenopausal women**. The majority of patients had several cardiovascular risk factors simultaneously. The most common risk factor was arterial hypertension. Dyslipidemia was also highly prevalent and was mainly characterized by elevated low-density lipoprotein cholesterol and increased total cholesterol.

Abdominal obesity was frequently observed among the participants. Many patients reported low physical activity, especially those with obesity, hypertension, and impaired glucose metabolism. A considerable proportion of patients had fasting hyperglycemia or previously diagnosed type 2 diabetes mellitus.

Clinically, many women presented with nonspecific symptoms such as fatigue, shortness of breath during physical activity, episodic chest discomfort, headache, dizziness, and decreased exercise tolerance. In some patients, symptoms were mild despite significant cardiovascular risk, confirming that atherosclerosis in postmenopausal women may have a latent or atypical course.

Carotid ultrasound performed in selected patients revealed increased intima-media thickness and atherosclerotic plaques in women with long duration of menopause, elevated LDL cholesterol, hypertension, and obesity. Electrocardiographic changes suggestive of myocardial ischemia or left ventricular hypertrophy were more common in patients with poorly controlled blood pressure.

After implementation of comprehensive treatment and prevention measures, clinical stabilization was observed in many patients. Lipid-lowering therapy contributed to reduction of total cholesterol and LDL cholesterol. Blood pressure control improved in women who followed combined antihypertensive treatment and lifestyle recommendations. Patients who adhered to diet and physical activity programs showed better weight control and improved metabolic parameters.

Discussion

The results of this study confirm that postmenopausal women represent a high-risk group for atherosclerotic cardiovascular disease. The combination of estrogen deficiency, dyslipidemia, hypertension, obesity, insulin resistance, and physical inactivity creates favorable conditions for accelerated atherogenesis.

One of the key findings was the high prevalence of dyslipidemia. LDL cholesterol plays a central role in the development of atherosclerotic plaques. Therefore, lipid-lowering therapy is one of the most important components of treatment. Statins remain the first-line therapy for reducing LDL cholesterol and

preventing cardiovascular events in patients with established or high-risk atherosclerotic disease.

Hypertension was another major risk factor in the studied group. After menopause, arterial stiffness increases, endothelial function worsens, and blood pressure tends to rise. The 2024 ESC hypertension guideline emphasizes the importance of effective blood pressure diagnosis and management, and recent recommendations support lower systolic blood pressure targets in adults receiving antihypertensive therapy when tolerated.

Obesity and impaired glucose metabolism were also common among the studied women. Visceral adiposity contributes to chronic low-grade inflammation, insulin resistance, and dyslipidemia. These mechanisms promote endothelial dysfunction and plaque development. Therefore, weight reduction, regular exercise, and nutritional correction should be considered essential elements of prevention.

The prevention of atherosclerosis in postmenopausal women should begin before the development of clinically significant cardiovascular disease. Screening should include blood pressure measurement, lipid profile, glucose testing, body mass index assessment, evaluation of family history, and identification of female-specific risk factors such as early menopause, pregnancy-related hypertensive disorders, and menopausal metabolic changes.

Hormone replacement therapy should not be used as a primary method for prevention of cardiovascular disease. Although estrogen has vascular effects, modern clinical practice does not recommend menopausal hormone therapy for the sole purpose of preventing atherosclerosis or cardiovascular events. Instead, cardiovascular prevention should be based on evidence-based risk factor control, lifestyle modification, and individualized pharmacological therapy.

Prevention Strategies

Prevention of atherosclerosis in postmenopausal women should include several key directions.

First, lifestyle modification is the foundation of prevention. Women should follow a heart-healthy diet rich in vegetables, fruits, legumes, whole grains, fish, and unsaturated fats. Intake of salt, sugar, saturated fats, fried foods, and processed products should be limited.

Second, regular physical activity is essential. Moderate aerobic exercise for at least 150 minutes per week, combined with muscle-strengthening exercises, improves lipid metabolism, blood pressure, insulin sensitivity, and body weight control.

Third, lipid control should be performed regularly. LDL cholesterol should be actively reduced in patients with high or very high cardiovascular risk. In patients with established atherosclerotic disease, intensive lipid-lowering therapy may be required.

Fourth, blood pressure should be monitored and controlled. Antihypertensive therapy should be individualized according to age, comorbidities, tolerance, and cardiovascular risk.

Fifth, diabetes mellitus and prediabetes should be actively diagnosed and treated. Glucose control reduces vascular complications and slows progression of atherosclerosis.

Sixth, smoking cessation is mandatory. Smoking accelerates endothelial damage, increases oxidative stress, and significantly increases the risk of myocardial infarction and stroke.

Seventh, regular medical follow-up is necessary. Postmenopausal women should undergo periodic cardiovascular risk assessment even in the absence of severe symptoms.

Conclusion

Atherosclerosis in postmenopausal women is a multifactorial disease associated with hormonal changes, dyslipidemia, hypertension, obesity, impaired glucose metabolism, and lifestyle factors. The study of 145 postmenopausal women showed that most patients had several combined cardiovascular risk factors, which increased the probability of subclinical and clinically evident atherosclerosis.

Effective treatment and prevention require an integrated approach. The most important measures include lipid-lowering therapy, blood pressure control, correction of obesity and glucose metabolism, smoking cessation, healthy diet, physical activity, and regular cardiovascular monitoring. Early identification of risk factors in postmenopausal women allows timely intervention and may reduce the incidence of myocardial infarction, stroke, and other atherosclerotic complications.

Practical Recommendations

Postmenopausal women should be considered a priority group for cardiovascular screening. Lipid profile, blood pressure, fasting glucose, body mass index, and waist circumference should be evaluated regularly. Women with elevated LDL cholesterol, hypertension, diabetes mellitus, obesity, or family history of cardiovascular disease require individualized prevention programs.

In clinical practice, treatment should not be limited to symptom control. Physicians should actively manage modifiable risk factors and explain the importance of long-term adherence to therapy. Statins, antihypertensive drugs,

antiplatelet therapy in selected patients, and lifestyle correction should be used according to cardiovascular risk level and current clinical recommendations.

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