Metabolic Disorders in Menopause

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Introduction

- ✓ Globally, the proportion of older adults is growing rapidly
- ✓ Life expectancy was 72.6 years in 2019 but is expected to increase to 77.1 years by 2050
- ✓ Life expectancy differs between the sexes; (longer in women than in men)
- ✓ Differences in life expectancy between the sexes are a result of:

The high incidence of cardiovascular diseases in men due to differences in cholesterol-lipoprotein profiles and other cardiovascular factors caused by sex hormones.

The increase in life expectancy, especially in women, increases the time a woman has to live following menopause
while simultaneously increasing interest in its impact on various health problems during the postmenopausal period

Generally, menopause is clinically diagnosed when a woman has not menstruated for twelve months, which usually occurs around the age of 45–55 years

Signs and symptoms of menopause include:

- metabolic , weight, cardiovascular, and musculoskeletal changes;
- genitourinary and skin atrophy;
- sexual dysfunction;
- central-nervous-system-related disorders

Although the physiological bases for these symptoms is complex and interrelated, the symptoms
are not solely caused by estrogen deficiency.
Among them, metabolic disorders are chronic, and progressive and greatly affect the health of postmenopausal women

In this review, we investigated the metabolic disorders, especially metabolic syndrome (MetS), in postmenopausal women to determine which approach is needed for healthy living in postmenopausal women

2. Definition of Menopause and Metabolic Disorders

2.1. Menopause

The median age of menopause was reportedly 51.3 years
(Massachusetts Women's Health Study)

- Smoking may hasten menopause by 1.5 years
- Factors that do not affect age at menopause include
  Use of oral contraceptives/ socioeconomic /marital status

Abrupt cessation of menstruation-related hormone production affects bones (especially density) and several organs, including the heart and vessels; it even precipitates some cancers

Body weight, metabolic, and cardiovascular changes are chronic and progressive
in menopause, and management of chronic non-infectious diseases is important because it extends life expectancy

2.2. Change of Metabolism in Menopausal Women

✓ Aging is associated with an increase in
- obesity , CVD, type 2 diabetes, hypertension
- non-inflammatory diseases, such as stroke

✓ The increased risk of non-infectious diseases is associated with
- Increase in central obesity and waist circumference (WC)
- Not be related to general obesity or an increase in body mass index (BMI) itself

✓ Menopause is associated with quantitative and morphological changes in
- adipose tissue (e.g., increased abdominal adiposity)
- altered lipid profile
- onset of insulin resistance (IR)

Menopausal transition is characterized by a shift from a predominantly estrogenic state to an androgenic state due to increased levels of bioavailable testosterone

An increase in bioavailable testosterone can induce fat accumulation in the preadipocytes of visceral fat

Incidence of obesity is higher in postmenopausal women, with faster increases in bioavailable testosterone levels than in those with more stable levels

In the case of surgical menopause, estrogen and progesterone levels suddenly drop

An abrupt decline in estrogen levels after surgery may be associated with dysfunction of endothelium, increase in atherosclerotic lipoproteins and increase in lipid oxidation

In HUNT-2 study, women who had a removed bilateral ovary before the age of 50 years had a higher prevalence of MetS than controls

Based on these results, the authors suggested that metabolic disorders were more prevalent in surgical menopausal women than in spontaneous
menopausal women

2.3. Metabolic Disorders in Women with Menopause

Metabolic diseases commonly found in menopause include components of MetS, such as Dyslipidemia, impaired glucose tolerance, and type 2 diabetes, which are risk factors for cardiovascular disease

This review focuses on MetS and NAFLD/MAFLD, which can chronically affect middle-aged and older adults, especially postmenopausal women

2.3.1. Definition and Prevalence of MetS

MetS : a combination of factors that increase the risk of CVD;

- It comprises : abdominal obesity, dyslipidemia, hyperglycemia, IR, and hypertension
- Prevalence : is higher in men than in premenopausal women of similar age
- Prevalence is reversed during menopause, becoming higher in women than in men
- According to the Study of Women's Health Across the Nation (SWAN),
  - The incidence of MetS increased between 6 years before and 6 years after FMP regardless of age and other known CVD risk factors
  - The prevalence of MetS in postmenopausal women varies by country and race is estimated to range from 32 to 58%.

2.3.2. Diagnosis of MetS

In general, MetS is defined based on five criteria:

- Increased WC, hypertension,
- low high-density lipoprotein-cholesterol (HDL-C),
- High triglyceride (TG) concentrations
- Hyperglycemia.

In updated IDF criteria introduction of
Three out of the four criteria, except abdominal obesity
at the time of MetS diagnosis

2.3.3. Pathophysiology of MetS

Abdominal obesity and IR appear to be the most critical factors in the pathophysiology of MetS

✓ Central obesity could be considered an early stage of related to MetS

whether metabolic disorders are the result of hormonal changes due to menopause or simply a result of aging?

- All MetS components are associated with postmenopausal status, but only abdominal obesity has a significant association with menopause after adjusting for age
- Both menopause and temporal aging contribute to the elevated risk of metabolic disorders in women after menopause

2.3.5. Other Considerations

One opinion is that **sarcopenia and MetS are related**
These two conditions should also be considered more closely as they are more prevalent in postmenopausal women

Skeletal muscle is relevant to major organs involved in insulin-induced glucose metabolism, and **loss of muscle mass is associated with IR and MetS**

Sarcopenia is defined as a decrease in the quantity and quality of skeletal muscle and muscle function and is usually common in the elderly

Skeletal muscle loss and intramuscular fat accumulation cause abnormal muscle
contractility and metabolic abnormalities

A positive correlation is emerging between sarcopenia and obesity

When lean body mass decreases, physical activity decreases and risk of obesity increases.

3. Diagnosis of Metabolic Disorders in Menopausal Women

3.1. History and Physical Examination

The clinical diagnosis of menopause and recent weight change can be clues
 for diagnosing menopause and MetS after menopause

Abdominal obesity increases IR, and risk of diabetes and MetS

In physical examination includes BMI, WC, and WHR

Blood pressure is a diagnostic criterion for MetS

3.2. Laboratory Examination

Among the criteria for MetS,

Fasting glucose, HDL-C, and TG levels can be measured by serum

blood tests

3.3. Imaging Test

Imaging tests are not essential for diagnosing MetS

Physicians can utilize

- Dual-energy X-ray absorptiometry to check the distribution of body fat
- Computed tomography, or magnetic resonance imaging to determine
  - central fat distribution
- Magnetic resonance spectroscopy to check the liver fat content

3.4. Other Biomarkers Associated with MetS

BMI, WC, and WHR increase in men and women with age
Perimenopausal women might undergo a more abrupt change in lean and fat mass than men

Farahmand et al. recommended that clinicians use some easily measurable obesity indices, including WC, WHtR, WHR, in their routine practice.

calculating each value is as follows:
BMI: Weight (kg)/square of height (m)
WHR: WC (cm)/hip (cm);
WHtR: WC (cm)/height (cm);

4. Management of Metabolic Disorders in Menopausal Women

I. Among the components of MetS, drug treatment should be administered according to the medical diagnostic criteria for hypertension, dyslipidemia, and glucose metabolism abnormalities, including T2DM

II. Hormone replacement therapy (HRT), may improve fat mass and distribution, dyslipidemia, and insulin sensitivity in postmenopausal women

HRT for MetS :

- Increased lean body mass
- Reduced abdominal fat, and onset of new diabetes
- Decreased fasting blood glucose levels and in women with diabetes with menopause compared to controls.
- Improved metabolic function, increasing HDL-C
- Decreasing LDL-C, LDL-C/HDL-C ratio, and PAI-1 In postmenopausal women with and without diabetes
- The effect of HRT on blood pressure was negligible

Oral HRT was more advantageous than percutaneous HRT

In subgroup analysis, oral HRT resulted in significant decreases in PAI-1 , whereas transdermal HRT had no decreasing effect on PAI-1

The authors concluded that,

although oral HRT had a significant beneficial effect on most components of MetS,

It could adversely affect c-reactive protein(CRP) and TG concentrations,

Possibly weakening the beneficial effects of HRT on the cardiovascular system

The effect of MHT on cardiovascular diseases remains controversial.

According to the results of most systematic and meta-analyses,

HRT does not affect incidence of CVD or even increase the risk of cardiovascular events

As a result

patient characteristics and initiation timing are important factors for the preventive effect of HRT

It is not recommended that MHT be used for prevention of CVD

5. Prevention of Metabolic Disorders in Menopausal Women

Strategies for preventing metabolic diseases in postmenopausal women include:

I. lifestyle modifications, such as physical activity and calorie-controlled diet,
II. Pharmacotherapy,
III. Bariatric surgery,
IV. Traditional health practices
V. Medicines

Diet is a key factor in management of MetS

- The prevalence of MetS in postmenopausal women was significantly lower in women who ate a healthy diet than in those who ate a Western diet
- An energy-restricted diet combined with physical activity results in gradual decreases in body weight
- low-fat diet:
  Reduced diastolic blood pressure and increased HDL-C levels

- Nutrition and supplementation, are recommended for MetS : foods rich in vitamin D, omega-3,fatty acids, antioxidants, phytochemicals, and probiotics,

6. Conclusions

The importance of MetS and NAFLD/MAFLD is increase the risk of cardiovascular events and cause long-term health problems in middle-aged women who live 30–40 years after menopause

I. In the case of diseases such as hypertension and diabetes,
drug treatment is implemented

II. lifestyle modifications, such as a

- ✓ calorie-restricted diet and
- ✓ Increased physical activity, are also important for management and prevention of MetS NAFLD/MAFLD.

Recently, new facts regarding the relationship between diseases of skeletal muscle metabolism, such as sarcopenia and MetS, have been revealed

THANKS FOR ATTENTION