REVIEW ARTICLE

Lifestyle and dietary factors determine age at natural menopause

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ABSTRACT

A literature search was done using PubMed. The age at natural menopause (ANM) depends on various factors like genetic, environmental, socioeconomic, reproductive, dietary, and lifestyle of which some like nulliparity, vegetarian diet, smoking, high fat intake, cholesterol, and caffeine accelerates; while others like parity, prior use of oral contraceptive pills, and Japanese ethnicity delays the ANM. ANM is an important risk factor for long-term morbidity and mortality; and hence, the need to identify the modifiable risk factors like diet and lifestyle changes. Delayed menopause is associated with increased risk of endometrial and breast cancer, while early ANM enhances the risk for cardiovascular diseases and osteoporosis. The correlation between diet and ANM has not been extensively studied; however, whatever studies have been done till now point towards role of high intake of total calories, fruits, and proteins in delaying the ANM, while high polyunsaturated fat intake accelerates it. The role of dietary soy, total fat, saturated fat, red meat, and dietary fiber in determining the ANM has been controversial and needs further studies to substantiate it. The lifestyle factors like current smoking and vigorous exercise have been significantly associated with early menopause, while moderate alcohol consumption delays the ANM. Large prospective studies are needed to study the association of ANM and other modifiable factors like passive smoking fish consumption, soy, and various types of tea. The knowledge of modifiable determinants of ANM can help in setting up menopausal clinics and initiating health programs specially in developing countries.

Key Words: Diet, lifestyle, natural menopause

INTRODUCTION

A literature search was done using PubMed. Natural menopause has been defined by World Health Organization (WHO) as at least 12 consecutive months of amenorrhea not due to surgery or any other cause. The mean age at natural menopause (ANM) is 51 years in industrialized nations, while it is 48 years in poor and non-industrialized nations.[1-3] Menopause is not a central event but rather a result of primary ovarian failure secondary to apoptosis or programmed cell death. This results in reduced production of estradiol, the most active form of estrogen as well as increased levels of follicle-stimulating hormone (FSH) and decreased levels of inhibin. It is an important event in the life of women and with the increase life expectancy at birth for women they spend about more than one-third of their lives in this phase. The ANM remains an independent risk factor for long-term morbidity[4] and mortality.

Delayed menopause has been found to be associated with:
1. Longer reproductive span and reduced overall cause mortality.
2. Increased risk of breast, endometrial, and ovarian cancers.[5]
3. Reduced risk of osteoporosis and fractures.[6]
4. Reduced risk of morbidity and mortality from cardiovascular diseases[7,8] like ischemic heart disease, myocardial infarction, and atherosclerosis.

Health concern's in menopausal women is principally related to estrogen deficiency which includes sexual problems, urogenital atrophy, vasomotor symptoms, cognitive problems, cardiovascular diseases, estrogen responsive malignancy, and osteoporosis. The greatest

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risk associated with menopause is that of acute myocardial infarction and hypertension. The effect is more pronounced for women with artificial menopause than with surgical menopause. The health concerns linked with the use of hormone replacement therapy (HRT)[9] and other drugs for prevention and treatment of menopausal symptoms[10] emphasizes the need to identify the modifiable risk factors and role of alternative medicine like phytoestrogens,[11] isoflavones,[12] acupuncture,[13] and yoga.[14] ANM is influenced by various determinants[15-18] like genetic, demographic, socioeconomic, dietary, reproductive, and behavioral; of which some are modifiable like lifestyle and dietary.

Current smoking, lower education, unemployment, nulliparity being separated, divorced, widowed, vegetarian diet, and prior history of heart disease are independently associated with accelerated menopause; while parity, prior use of oral contraceptive pills, Japanese ethnicity, higher body mass index (BMI), and moderate alcohol consumption is associated with delayed ANM. Recent studies have shown that women who carry BRCA mutation[19,20] have early onset menopause and heavy smoking compounds the risk. However, there are very few studies that evaluate the impact of dietary and lifestyle factors on the ANM.

PHYSICAL ACTIVITY

Higher BMI[21,22] at 20 years age, mid-life weight gain moderate-high, exercise participation, and enhanced leisure time physical activity[22-24] during adulthood and adolescence are associated with late menopause and longer reproductive span; however, severe weight loss or vigorous exercise accelerates ANM by lowering the estrogen levels. The role of moderate weight gain and physical activity with the onset of menopause has not been studied yet.

LIFESTYLE FACTORS

Behavioral or lifestyle factors like smoking,[25-27] alcohol consumption, and intake of coffee and tea influence ANM. Smoking and ANM have an inverse consistent relationship such that it accelerates menopause by 1.5-2 years. Polycyclic aromatic hydrocarbons present in cigarette smoke are toxic to ovarian follicles that result in decreased estrogen levels, and hence menopause. The drug metabolism is enhanced in smokers with the result that estrogen gets more rapidly metabolized in liver and moreover smoking has an antiestrogenic effect as well. Effect of passive smoking on ANM has not been documented well. There are studies that have documented a dose-response effect on atrophy of ovarian follicles such that heavy smokers have an earlier natural menopause as compared to light smokers. Alcohol consumption and its effect on the ANM

has been evaluated in very few studies due to certain social and ethnic limitations. Moderate alcohol[28-30] consumption delays ANM. Regular tea consumption also delays the ANM probably due to the antioxidant and nonsteroidal estrogenic effects of flavonoids that counteract the degenerative processes. However, there are no studies on the effect of various types of tea on age at menopause. Low level of lifelong sun[31] exposure has been found to be associated with early ANM.

DIET

The effect of nutrition on sex hormone levels and reproductive span has been extensively studied in animal models; however, large prospective studies in humans are scarce. Studies on dietary factors and ANM have conflicting[32] results; and hence, the need for further studies. Caloric restriction particularly during early childhood decreases ANM as evidenced by famous 1944-1945 Dutch famine.[33] Dietary factors[34-37] influence ANM by virtue of their effect on serum estradiol levels. High intake of fruits and vegetables delays the onset of menopause and prolongs the reproductive lifespan because of the presence of antioxidants in fruits and vegetables that counteracts the adverse effects of reactive oxygen species on the number and quality of ovarian follicles. Higher intake of total calories, high carbohydrate, and high protein intake are found to be associated with delayed age at menopause; however, the correlation of carbohydrate diet with ANM has conflicting results with some studies documenting inverse or no relationship. Dietary fiber, soy products, and red meat have inconsistent results in various studies; and hence, the need for larger studies. High intake of polyunsaturated fats accelerates ANM, while total fat and saturated fat intake has no effect on menopause. Current calcium supplementation and lifelong fish consumption influencing ANM need larger studies for confirmation. Thus; apart from genetic, reproductive, socioeconomic, and demographic factors influencing ANM there has been increasing insight and research in modifiable risk factors like diet and lifestyle, but still larger prospective studies are needed. There is a growing need of menopausal clinics and health awareness campaigns to initiate preventive strategy specially in developing nations[38-41] like India[42] where the ANM is 2-3 years earlier than the industrialized nations.

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