PROFESSIONAL ARTICLE

Cholesterol and triglyceride concentrations in postmenopausal women and women with regular menstruation in urban and rural areas of the Tuzla Canton

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ABSTRACT

Aim To determine the difference in the values of cholesterol and triglycerides in postmenopausal women and women with regular menstruation and determine the influence of body-mass index (BMI), smoking status, duration of menopause and place of residence and the value of cholesterol triglyceride.

Methods The study was conducted on a sample of 80 women aged 45-55 years, and at a total of 40 women (20 menopausal women and 20 with regular menstrual period) in urban and rural areas. The study was conducted in the September-December 2011 survey and included the inspection of medical records.

Results Menopausal women in urban areas had higher values of cholesterol (an average of 6.32 mmol /L) than menopausal women in rural areas (an average of 6. 05 mmol/L). Triglyceride values in menopausal women in urban areas (an average of 1.85 mmol / L) were lower than triglycerides in postmenopausal women in rural areas (an average of 2.38 mmol/L). We did not found a significant correlation between the duration of menopause and cholesterol and triglyceride concentrations (in urban and rural), suggesting that the duration of menopause was not an independent risk factor. The age of menopause in women also showed no significant correlation with the values of cholesterol and triglycerides, as well as in BMI among postmenopausal women. In rural areas there were more women smokers in the menopause than in urban areas.

Conclusion Primary prevention activities should focus on adequate education about nutrition and healthy lifestyle because the risk of CVD in women and men is leveled with menopause.

Keywords: cholesterol, triglycerides, women, urban, rural.

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Original submission:
29 May 2012;
Revised submission:
19 September 2012;
Accepted:
06 October 2012.

SEEHSJ 2012; 2(2):122-128

INTRODUCTION

Menopause is the cessation of menstruation for more than a year that occurs as a consequence of changes in the function of ovaries. In any case we cannot talk about the cessation of ovarian function, because the ovary still retains its vegetative function but also the production of sex steroids. In the spirit of our language the term menopause will be acceptable as a period of one year after the last menstrual period, which is not time-limited (1). In addition to the term menopause, we also find the terms premenopausal, perimenopausal and postmenopausal. Perimenopause would include a broader time period before and after the last menstrual period characterized by changes in the menstrual cycle and the appearance of symptoms characteristic of this period of life (2).

Postmenopause represents a period after menopause and premenopausal period before menopause. Both terms do not accurately delimit life periods that they mark. For example, the term premenopausal could mark a woman's entire reproductive period from menarche to menopause, which cannot be accepted, and the meaning of the term postmenopausal overlaps with the meaning of the term menopause, which causes confusion in the literature (3).

In women of our region menopause occurs around the 50th year. The occurrence of menopause is genetically and individually determined as well as the emergence of other symptoms that accompany it (4). Adipose tissue is not just a passive depot of fat that maintains energy balance and thermoregulation, but it is an important endocrine organ. In menopause not only leptin, but decreased levels of growth hormone, estradiol and androgenic mechanisms leading to changes in lip genesis and lipolysis, the characteristic distribution of body fat after menopause (centripetally fatten) occur. These changes increase the risk of cardiovascular disease, and endometrial cancer and breast cancer (5). Cholesterol is widely distributed in all cells of the body, particularly in nervous tissue. It is found in animal but not vegetable fat. Most of the cholesterol which is synthesized in the body formed (about 1 g / day) a moderate nutrient intake, only about 0.3 g / day. Cholesterol is eliminated via two main pathways: conversion to bile salts and neutral sterol excretion with feces. The tissue, which is known to be able to synthesize cholesterol includes: liver, adrenal cortex, skin, intestine, testes and the aorta. Attempts of people to reduce the level of cholesterol in plasma by reducing the amount of cholesterol in the diet have been shown to be effective (6). Additional factors that play a role in the development of atherosclerosis include high blood pressure, obesity, lack of physical activity and soft water for drinking and the increased level of free fatty acids in plasma, leading to increased secretion of VLDL from the liver, which is the ejection of additional amounts of triglycerides and cholesterol in the blood (7). Triglycerides or neutral fats are esters of glycerol and fatty acids. A large portion of carbohydrates from food goes into triglycerides before it is used for energy purposes. The consequence of this is that the fatty acid triglyceride is probably the main source of energy for many tissues. As the most important form in which energy is stored in the body, triglycerides have certain advantages compared to carbohydrates and protein (8).

After menopause there are changes in the lipid profile, but all the mechanisms of these changes are unknown. One of the important factors in the mechanism is the change in the distribution of body fat after menopause. Elevated values of cholesterol, triglycerides, LDL, Apo lipoprotein B and low HDL and Apo lipoprotein A are the characteristics of the lipid profile in menopausal women (9).

The aim of this study was to determine the difference in the concentration of cholesterol and triglyceride in menopausal women and women with regular menses, the influence of duration of therapy on cholesterol and triglyceride levels in women aged 45-55 year. We also researched the influence of BMI on the concentration of cholesterol and triglycerides in postmenopausal women and women with regular menses in urban and rural environments, determined the influence of smoking status on the concentration of cholesterol and triglycerides and compared the significant differences in the concentration of cholesterol and triglyceride in menopausal women and women with regular menstrual period.

EXAMINEES AND METHODS

The study was conducted on a sample of 80 women, aged 45-55 years, of whom 40 women in rural areas (Interpretive Center-Upper Tuzla) and 40 women in the urban environment (Community Health Education Center of Tuzla). The study included 40 menopausal women aged 45-55 years. The control group consisted of 40 women with regular menstrual cycle over 45 years of life from the outpatient clinic of Upper Tuzla and Educational Center Health Center in Tuzla.

Testing was carried out in the period September - December 2011 by surveying and examining the medical records. The survey contained the following questions: age, first and last periods, BMI of reproductive and menopausal period, place of residence, smoking status, cholesterol and triglyceride values in reproductive and menopausal periods. Patients were interviewed randomly as they came into the office of the family doctor. If they had been made of cholesterol and triglycerides were sent to a laboratory to do. BMI values of the patients who had a BMI recorded were transcribed from medical records, and patients who did not have records of BMI, it was done during the visit to the family practice.

In addition, the inclusion criteria for the study were as follows: no hormone replacement therapy, no medication that could affect the lipid profile, no smoking for more than thirty cigarettes a day and no corticosteroids, no suffering from diabetes and thyroid disease.

Once collected the data was statistically analyzed. In the statistical analysis we used the mean and standard deviation, T-test, and Pearson correlation coefficient. Statistical significance was confirmed at $p < 0.05$.

RESULTS

The average age of menopause in women in urban areas was 52.6 years, and women in rural areas 51.3 years. The life expectancy of women with regular menses in urban areas was 49.35 years whereas in the rural areas it was 47.15 years.

The first menses of menopausal women in urban areas appeared to be slightly earlier at 13.95 years than women in rural areas, where the first menstruation occurred with an average of 14.2 years. The average duration of menopause among women in urban areas was 48 months, and among women in rural areas 54.6 months.

The concentration of cholesterol in women with regular menstrual period is higher than in postmenopausal women. Triglyceride level is greatly increased at menopause than women with regular menstrual periods. The concentration of cholesterol in postmenopausal women in urban areas amounted to 6.32 mmol/L, while in rural areas the value of cholesterol was slightly lower and amounted to 6.05 mmol/L. The concentration of cholesterol in women with regular menses in urban areas amounted to 6.24 mmol/L being higher than among women in rural areas 6.02 mmol/L. The results showed that women in the central urban environment have higher cholesterol values than women in rural areas. In urban areas, women in menopause had lower concentrations of triglycerides (1.85 mmol/L) than women in rural areas 2.38 mmol/L. Women with regular menses in urban areas had higher serum triglycerides 1.98 mmol/L than the women in rural areas with a value of triglycerides averaged 1.50 mmol/L.

BMI in postmenopausal women was significantly higher than in women with regular menstrual periods (BMI in postmenopausal women 29 kg/m2, BMI in women with regular menses 27.5 kg/m2). BMI in menopausal women in urban areas were slightly higher than BMI among women in rural areas. BMI in women with regular menses in urban areas amounted to an average of 28, and in women with regular menstrual 27 kg/m2 in rural areas.

Women with regular menstrual cycle consume more cigarettes than women in menopause. In educational centers of the Health Care Centre of Tuzla out of 20 women (menopausal women) 6 were smokers (or 30%) and 14 nonsmokers (or 70%). Out of 20 patients at the Health Care Centre Tuzla, women with regular menstrual period, there were 8 or 40% of smokers and 12 or 60% of nonsmokers. Out of 20 patients, women with regular menses,

Table 1. Period of cigarette smoking (smoking period)

	Years of smoking		
	<10	10-20	21-30
Number of menopausal women smokers-urban area	0	3	3
Number of menopausal women smokers-rural area	1	4	2
Number of women with regular menstrual period -urban area	1	0	7
Number of women with regular menstrual period -rural area	1	3	2

in the outpatient clinic of Upper Tuzla, there were 6 or 30% of smokers and 14 or 70% of nonsmokers.

Three women from this survey living the in urban area had been consuming cigarettes for 10-20 years and three women from this group for longer than 20 years. Most menopausal women in rural areas (51.14%) had been consuming cigarettes for 10-20 years, and two women for more than 20 years (28.58%). A number of women with a normal menstrual period in the urban areas, who had consumed cigarettes for more than 20 years, was the largest, 87.5%, and the number of those who had consumed them for a period less than 10 years was 12.5%. Three (50%) women with the regular menstrual period from rural areas had smoked cigarettes for 10-20 years and two (33.34%) women had smoked for more than 20 years (Table 1).

Three women from this survey living in the urban area (50%) had smoked up to 10 cigarettes daily, and one surveyed woman had smoked up to 30 cigarettes daily (16.67%). Four women in menopause living in the rural area had smoked up to 20 cigarettes daily (57.14 %) and one woman surveyed had consumed up to 30 cigarettes daily (14.29%). Out of the total number of surveyed women from the urban area, four of them (50%) had smoked up to 30 cigarettes daily and one women surveyed had smoked to 10 cigarettes (12.5%). Three women with the regular menstrual period living in the rural area had smoked up to 10 cigarettes daily (42.85%), and one surveyed woman from this group had smoked up to 30 cigarettes daily (23.82%) (Table 2).

Table 2. Number of cigarettes smoked daily

	Number of cigarettes consumed daily		
	<10	10-20	21-30
Number of menopausal women smokers-urban area	3	2	1
Number of menopausal women smokers-rural area	2	4	1
Number of women with regular menstrual period -urban area	1	3	4
Number of women with regular mentrual period -rural area	3	2	1

DISCUSSION

Changes in the lipid profile that occur in menopause such as increases in cholesterol and triglycerides were accepted as one of the risks for cardiovascular disease in menopausal women, although results of recent studies have shown the so-called metabolic syndrome, which occurs in 60% of menopausal women, and therefore, have an increased risk for cardiovascular disease (10). According to the results of this study in menopausal women higher concentrations of cholesterol in the urban environment were found, as well as in women with regular menstrual period. Also, women with regular menstrual period had higher levels of cholesterol in the urban areas than women with regular menses in rural areas. Data in the literature are different: studies (9, 18-21) have shown significant differences in the concentration of lipids in postmenopausal women, while recent research based on a study of changes in the structure of LDL and HDL and their possible impact on cardiovascular risk in postmenopausal women. In this study, values of triglycerides in postmenopausal women in urban areas were lower than triglycerides in postmenopausal women in rural areas, but triglyceride levels in women with regular menses in urban areas were higher than in triglycerides in women with regular menses in rural areas.

Factors that increase triglyceride synthesis and secretion of VLDL in the liver included a diet rich in carbohydrates (especially if it contains sucrose and fructose), high levels of free fatty acids, alcohol intake, and high levels of insulin (11).

Effects of triglycerides on cardiovascular diseases in women are included in different data, but they mostly refer to triglycerides together with high LDL, and these are so called small-dense LDL particles increasing cardiovascular risk especially in women (12). Some authors believe that triglycerides do not provide clinically relevant information about cardiovascular risks (13). Menopause itself is a risk factor for cardiovascular disease. The results of our study in postmenopausal women did not find a significant correlation between the length of menopause and the concentration of cholesterol and triglycerides, suggesting that the duration of menopause is not an independent risk factor. The life expectancy of women in menopause also showed no significant correlation with the concentration of cholesterol and triglycerides, which suggests that menopausal age was not a significant predictor of cardiovascular risk, but a more significant role is played by other factors such as the distribution of adipose tissue concentrations of estradiol (14). Age at menarche, reproductive years, and menopause status were significantly associated with body composition, insulin sensitivity and blood lipid levels (15). In this study, the first menstruation (menarche) in menopausal women in urban and rural areas did not significantly affect the concentration of cholesterol and triglycerides.

BMI in postmenopausal women was significantly higher than in women with normal menstruation (12). According to the study there were no significant differences in BMI between menopausal women and women with regular menses in rural and urban areas.

Smoking doubles the risk of dying from heart and blood vessels diseases, and 30% - 40% of all deaths from coronary heart disease are associated with smoking. Women who smoke have onset of menopause 2-3 years earlier thus the earlier termination of a protective effect of estrogen in terms of developing cardiovascular diseases and osteoporosis (12). The duration of smoking in this study was greater in postmenopausal women in rural areas, and women with regular menstrual periods consume more cigarettes than women in menopause. The purpose of the primary and secondary prevention of smoking is necessary to better organize affected patients treated in the primary care, particularly those who are being treated for cardiovascular and other diseases which are known to be triggered by nicotine as one of the factors for the onset of disease.

One of the main conclusions arising from this study is that primary prevention activities should focus on adequate education about nutrition and healthy lifestyle in both educational centers, because with the occurrence of menopause the risk of developing cardiovascular disease is leveled between women and men.

FUNDING

No specific funding was received for this study.

TRANSPARENCY DECLARATIONS

Competing interests: none to declare

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Koncentracije holesterola i triglicerida kod žena u menopauzi i žena s redovnim menstruacijama u urbanoj i ruralnoj sredini na području tuzlanskog kantona

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SAŽETAK

Cilj istraživanja je utvrditi razliku u vrijednosti holesterola i triglicerida kod žena u menopauzi i žena s redovnim menstruacijama, te utvrditi uticaj *body-mass indexa* (BMI), pušačkog statusa, dužine trajanja menopauze i mjesta stanovanja na vrijednosti holesterola i triglicerida.

Metode Istraživanje je sprovedeno na uzorku od 80 žena, starosne dobi od 45 do 55 godina, koje su podijeljenje u dvije grupe po 40 žena (20 žena u menopauzi i 20 s redovnim menstruacijama) u urbanoj i ruralnoj sredini. Ispitivanje je obavljeno, u periodu od septembra do decembra 2011. godine, anketiranjem i uvidom u zdravstveni karton.

Rezultati Žene u menopauzi u urbanoj sredini imale su više vrijednosti holesterola (u prosjeku 6,32 mmol/L) od žena u menopauzi u ruralnoj sredini (u prosjeku 6,05 mmol/L). Vrijednosti triglicerida kod žena u menopauzi u urbanoj sredini bile su niže od vrijednosti triglicerida (u prosjeku 1,85 mmol/L) kod žena u menopauzi u ruralnoj sredini (u prosjeku 2,38 mmol/L).

Nije pronađena značajna korelacija između dužine trajanja menopauze i koncentracije holesterola i triglicerida (u urbanoj i ruralnoj sredini), što upućuje na to da dužina trajanja menopauze nije samostalan faktor rizika. Životna dob žena u menopauzi također nije pokazala značajnu korelaciju s vrijednostima holesterola i triglicerida, te nije bilo značajne razlike u BMI-u između žena u menopauzi. U ruralnoj sredini bilo je više žena pušača u menopauzi nego u urbanoj sredini.

Zaključak Aktivnosti primarne prevencije treba usmjeriti na što adekvatniju edukaciju o zdravoj ishrani i zdravom stilu života jer se s pojavom menopauze izjednačava rizik od obolijevanja od KVB-a, i kod žena i kod muškaraca.

Ključne riječi: holesterol, trigliceridi, žena, grad, selo