Streszczenie cyklu publikacji

pt. *„Wybrane aspekty stylu życia, wzory żywienia i stan odżywienia a ryzyko raka sutka u kobiet z województwa warmińsko-mazurskiego*"

stanowiącym podstawę do ubiegania się przez mgr inż. Beatę Krusińską
o nadanie stopnia doktora

Summary

Malignant tumours are the second leading cause of death worldwide. Breast cancer is the most frequently diagnosed cancer in woman in the world, including Poland. Its aetiology is complex and includes dietary, hormonal and metabolic factors. The results of available studies examining dietary patterns or hormone concentration or metabolic syndrome in the breast cancer context are inconsistent. There is no research regarding all of the above-mentioned factors in relation to breast cancer. Moreover, the equivalent of a Mediterranean Diet for the purpose of cancer prevention intended for people living outside the Mediterranean Region, particularly in Central and Eastern Europe, including Poland, has not yet been developed.

The aim of the study was twofold: (1) to develop the Mediterranean diet score adapted to the Polish diet ('Polish-aMED' score, *'Polish-adapted Mediterranean Diet' score*) based on a pooled-analysis of two case-control studies, and (2) to comprehensively evaluate associations between dietary patterns (DPs), the 'Polish-aMED' score and metabolic-hormone profiles (M-HPs) and breast cancer risk in women from north-eastern Poland, including the Warmia and Mazury region.

The research was conducted in 2013-2017. Pooled analysis was performed using the data from two case-control studies involving 560 subjects aged 40-75 years, including 140 women diagnosed with breast cancer and 140 men diagnosed with lung cancer (preliminary research). Case-control studies involved 420 women aged 40-79 years, including 190 women diagnosed with breast cancer and 230 women without breast cancer (main research).

Dietary data were collected using a validated and interviewer-administered version of the 62-item Food Frequency Questionnaire (FFQ-6). The 'Polish-aMED' score was developed *a priori* based on the traditional Mediterranean diet model, by excluding alcohol and replacing olive oil with vegetable oils. The 'Polish-aMED' score was calculated based on the positively-correlated consumption frequency of: vegetables, fruit, wholemeal cereals, fish, legumes, nuts and seeds, and the ratio of the frequency consumption of vegetable oils to animal fat, as well as a negatively-correlated consumption frequency of red and processed meats (score range: 0 to 8 points). Triglyceride (TG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), glucose and hormone (estradiol, progesterone, testosterone, prolactin, cortisol and insulin) concentrations were marked in blood serum of 129 postmenopausal women, including 47 women with breast cancer. To evaluate the metabolic syndrome prevalence, it was assumed that at least three out of five parameters should be present: waist circumference ≥88 cm, glucose ≥100 mg/dL, HDL-C <50 mg/dL, TG ≥150 mg/dL and hypertension. *A posteriori* DPs were derived using the Principal Component Analysis (PCA), based on the frequency consumption of 21 food groups and metabolic-hormone

profiles were derived based on metabolic syndrome components and hormone concentrations. A logistic regression analysis was performed to assess the association between DPs or M-HPs and breast cancer risk. Odds ratio (OR) and 95% confidence interval (95% CI) were calculated.

In the study conducted among women, a high adherence to the 'Polish-aMED' score (6-8 points) was associated with the breast cancer risk reduction by 56% (OR: 0.44; 95% CI: 0.23-0.85; p <0.05; without adjustment) compared to the low adherence (0-2 points) to the 'Polish-aMED'. However, this association was not statistically significant after adjustment for confounders. In the pooled analysis, high adherence to the 'Polish-aMED' score was associated with reduction of the breast cancer or lung cancer risk by 63% (OR: 0.37; 95% CI: 0.21-0.64; p <0.001; with adjustment) compared to the low adherence to the 'Polish-aMED'.

In the study conducted among women and in the pooled analysis, three DPs of similar characteristics were identified. The 'Non-Healthy' DP was characterized by relatively frequent consumption of refined cereals, red and processed meats, sugar, honey and sweets, potatoes, animal fat, sweetened beverages and energy drinks. In the study conducted among women, the breast cancer risk was three-times higher (OR: 2.90; 95% CI: 1.62-5.21; p <0.001; with adjustment) in the upper tertile of the 'Non-Healthy' DP compared to the bottom tertile of this pattern. The results in women confirm the finding of studies based on a combined sample of women and men with reference to breast cancer risk and lung cancer risk. In the pooled analysis, the breast cancer or lung cancer risk was 1.7-times higher (OR: 1.65; 95% CI: 1.05-2.59; p <0.05; with adjustment) in the upper tertile of the 'Non-Healthy' DP compared to the bottom tertile of this pattern.

The 'Prudent' DP was characterized by relatively frequent consumption of fruit, fish, legumes, milk, fermented milk drinks and curd cheese, wholemeal cereals, juices, eggs, vegetables, nuts and seeds, vegetable oils and breakfast cereals. No significant association was found between the 'Prudent' DP and breast cancer risk in women. In the pooled analysis, the risk of breast or lung cancer was 38% lower (OR: 0.62; 95% CI: 0.41-0.94; p <0.05; without adjustment) in the upper tertile of the 'Prudent' DP compared to the bottom tertile of this pattern. However, this association was not statistically significant after adjustment for confounders.

The pattern characterized by relatively frequent consumption of other fats (margarine, mayonnaise, dressings), sweetened milk drinks and flavoured curd cheese was called as 'Margarine and Sweetened Dairy' DP in the study conducted among women, or 'Dressings and Sweetened-low-fat Dairy' DP in the pooled analysis. No significant association was found between the 'Margarine and Sweetened Dairy' DP and breast cancer risk or between 'Dressings and Sweetened-Low-Fat Dairy' DP and the risk of breast cancer in women or lung cancer in men.

In the study conducted among women, two metabolic-hormonal profiles were identified. The High-Hormone profile was characterized by a relatively high concentration of progesterone, estradiol, testosterone, cortisol and prolactin in blood serum. In the upper tertile of the High-Hormone profile, the breast cancer risk was five-times higher (OR: 5.34; 95% CI: 1.84-15.48; p <0.01; with adjustment) compared to the bottom tertile of this profile, regardless of the confounders. The 'Metabolic-Syndrome' profile was

characterized by a relatively high waist circumference, a high concentration of triglycerides, insulin and glucose in blood serum, the occurrence of hypertension and by a relatively low HDL-C concentration in blood. Breast cancer risk was three-times higher (OR: 3.30; 95% CI: 1.28-8.49; $p < 0.05$; without adjustment) in the upper tertile of the 'Metabolic Syndrome' profile compared to the bottom tertile of this profile. However, this relation was not statistically significant after adjustment for confounders.

To summarize, the Mediterranean pattern in Polish adaptation, which consisted of excluding alcohol and replacing olive oil with vegetable oils, can significantly reduce breast cancer risk in women and lung cancer risk in men. This provides a basis for recommending the Mediterranean diet modified in this way to adults living outside the Mediterranean Basin for the prevention of those cancers.

The study highlighted that recommending a pro-healthy dietary pattern as the only element of breast cancer prevention in peri- and postmenopausal women cannot be confirmed. To reduce breast cancer risk in women, it is necessary to monitor the concentration of several sex-hormones and to avoid the 'Non-Healthy' dietary pattern, which is characterized by frequent consumption of highly-processed food, high sugar food and animal fat.

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