HEALTH, HEALTH-RELATED BEHAVIOR AND QUALITY OF LIFE OF MIDDLE- AND OLD-AGED WOMEN IN HUNGARY

Ph.D. Thesis

Ágnes Maróti-Nagy M.D.

Supervisor:
Edit Paulik M.D., Ph.D.

Department of Public Health
Faculty of Medicine, University of Szeged

2011

TABLE OF CONTENTS

LIST OF PUBLICATIONS

Publications related to the Thesis

I Paulik Edit, **Nagy Ágnes**: A háziorvos szerepe az osteoporosis megelőzésében és kezelésében. *Medicus Universalis* 2008;41(1):27-30.

II **Nagy Ágnes**, Paulik Edit: Az életmód és az osteoporosis kapcsolata közép- és időskorú nők körében. *Egészségfejlesztés* 2009,50(3):8-13.

III **Maróti-Nagy Ágnes**, Paulik Edit, Thurzó László: Az egészségügyi személyzet életmód-tanácsadó tevékenységének szerepe daganatos betegséggel kezelt nők táplálkozási szokásainak megváltoztatásában. *Magyar Onkológia* 2010;54:41-45. doi:10.1556/MOnkol.54.2010.1.6

IV **Maróti-Nagy, Ágnes**, Paulik, Edit: Factors influencing quality of life of Hungarian postmenopausal women screened by osteodensitometry. *International Journal of Rehabilitation Research* 2011;34(1):73-78. *IF: 1,192*

List of citable abstracts related to the Thesis

1. **Nagy Ágnes**, Paulik Edit: Az életmód és az osteoporosis kapcsolata közép- és időskorú nők körében. Magyar Higiénikusok Társasága XXXVII. Vándorgyűlése, Siófok 2007. október 2-4. Program, összefoglalók 53. pp.

2. **Maróti-Nagy Ágnes**, Paulik Edit: Quality of life of postmenopausal women. 2nd International Conference on Gerontology 2008. szeptember 26-27. Arad, Románia. Abstract Book pp. 36.

3. **Nagy Ágnes**, Paulik Edit: A kockázati tényezők szerepe az osteoporosis rizikójának becslésében. (The role of the risk factors in the risk assesssment of osteoporosis) Népegészségügyi Tudományos Társaság XVI. Nagygyűlése 2008. ápr. 17-19. Pécs. *Magyar Epidemiológia* 2008;5(S):69-70.

4. **Maróti-Nagy Ágnes**: A táplálkozási szokások változása nőgyógyászati daganatos betegekben. Fiatal Higiénikusok Fóruma V. 2009. május 14-16. Eger. Előadás összefoglalók pp. 32-33.

5. **Maróti-Nagy Ágnes**, Paulik Edit: The Relationship Between Quality of Life of Postmenopausal Women and Some Demographic Factors. DKMT 11th Regional Conference on environment and Health, 2009. május 15-16. Szeged CD pp. 54.

6. Paulik Edit, **Maróti-Nagy Ágnes**: Az egészségi állapot és az életminőség összefüggései. Népegészségügy 2009;87(3):154-155.

7. Paulik Edit, **Maróti-Nagy Ágnes**, Nagymajtényi László: A dohányzást korlátozó intézkedések megítélésének társadalmi egyenlőtlenségei. Népegészségügyi Tudományos Társaság XVIII. Nemzetközi Kongresszusa 2010. május 13-15. Orosháza-Gyopárosfürdő. Magyar Epidemiológia 2010;7(S1):65.

ABBREVIATIONS

BMD	Bone Mineral Density
BMI	body mass index
CI	confidence interval
EQ-5D	European Quality of Life - 5 Dimensions
EU	European Union
EUROSTAT	European Statistics Office
GP	general practitioner
HEP	Hungarostudy Epidemiological Panel
HPV	Human Papilloma Virus
HRQOL	Health Related Quality of Life
HRT	hormone replacement therapy
IARC	International Agency for Research on Cancer
NSAIDs	non-steroidal anti-inflammatory drugs
OCs	oral contraceptives
OPAQ	Osteoporosis Assessment Questionnaire
QOL	quality of life
RR	relative risk
SD	standard deviation
SERM	selective oestrogen receptor modulator
SF-36	Short Form (36) Health Survey
WHO	World Health Organization
WHOQOL-BREF	the abbreviated version of the World Health Organization quality of life instrument

1. INTRODUCTION

Nowadays, in the 21st century, specialists are facing new challenges in the field of medical attendance. After the successful management of infectious diseases, non-communicable diseases became the main problems of healthcare in the developed countries. Beside genetics, and environmental effects, the most important risk factors of these diseases are derived from poor lifestyle (diet, lack of exercise, alcohol and tobacco use, etc.).

Although women's life expectation at birth is increasing throughout the world, in Hungary the values of it are behind most of those other developed countries of the European Union (EU). According to the data of the EUROSTAT, in 2008 the life expectancy of women in Hungary was 78.25 years, which is about four years below the EU average [1].

However in the last ten years a decreasing tendency can be seen, also the mortality rates of women are still much higher in Hungary (in 2008: 685.6/100 000 inhabitants) than in the EU (in 2008: 488.9/100 000 inhabitants) [2]. The highest proportion of overall mortality rate of Hungarian women in 2008 was caused by two non-communicable diseases, such as cardiovascular diseases (55.4%) and malignant tumors (22.8%) [3].

Regarding malignant tumors, breast cancer have caused women's most deaths until 2002 [4], even though a population based screening program has been implemented in Hungary since the January of 2002 [5]. In 2008 the lung cancer exceeded the mortality rate of breast cancer. Breast cancer is a type of cancer which can be cured in case of early detection and through that longevity can be achieved [6-8]. Other types of cancers affecting only women (cervix, endometrial, other parts of uterus, ovary, etc.) were responsible for 5.7% of the overall deaths of women in the year 2008 [3]. Most of these tumors have risk factors correlating with lifestyle, mainly diet, alcohol consumption, smoking and lack of physical activity [9-34]. Beyond breast cancer, also cervix cancer can be screened and early detected through an organized, nationwide screening program in Hungary, which has been operating since September of 2003 [35].

Participation in these screening programs, detection of the above mentioned two types of tumor in early stage and in case of treatment the decrease of mortality and a long survival can be achieved [6-8]. In Hungary the increasing of screening participation is desirable; the Hungarian National Mammography and Cytological Network aimed to improve the mammography and cervix screening rates by expanding the services of specialists, using ambulatory screening stations in the rural areas of Hungary [35].

Hungarian people care little about their health, most of them do little exercise, their nutrition is unhealthy, the prevalence of smoking and the consumption of alcohol is high, their health behavior needs improvement [36]. Most of them visit their physician in case of advanced diseases involving malignant tumors too, which may affect their quality of life (QOL) negatively. World Health Organization (WHO) defines QOL as individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment [37].

Other type of diseases which may affect women's QOL – mainly in case of fractures – is osteoporosis [38-42]. In Hungary and also all over the world it is a type of non-communicable diseases, which causes a great problem to health care systems through its prevalence and consequences (e.g. fractures in vertebrae, femur). Nowadays in Hungary the proportion of women diagnosed with osteoporosis is about 6% of women's population [3].

After menopause the loss of the bone mineral substance is accelerated. Sometimes it does not cause any symptoms; in other cases pain may occur [43-46]. With appropriate lifestyle in the childhood and young ages, the peak bone mass can be increased. Lifestyle factors such as diet (calcium and vitamin D intake), no coffee consumption, non-smoking, and moderate or vigorous physical activity are associated with the development of the desirable bone mass [47-51]. This is a „preventable" disease [52] that means, living a healthy lifestyle (as mentioned above), the occurrence of osteoporosis may be decreased or delayed.

Both osteoporosis and breast/gynecological cancers are public health important non-communicable diseases, but there is a huge difference in their seriousness and surviving aspects. In osteoporosis long survival can be achieved even in case of having no fractures, in spite of breast/gynecological cancers, where the outcome is strongly correlated with the stage of the tumor at the time of diagnosis. Cancers are life-threatening diseases; living with this disease is more uncertain and life expectancy is worse in many cases. These kind of facts may affect women's intention for changing their lifestyle in a healthier direction for faster recovering.

On the whole we can say that by changing lifestyle, reduction of symptoms and through this faster recovery and the increasing of QOL also in breast cancer and some other types of gynecological cancers and also in osteoporosis can be achieved.

1.1. Aim of the study

The overall aim of our study was to examine Hungarian women's health, health behavior and QOL, who are suffering from public health important non-communicable diseases (breast/gynecological cancers and osteoporosis), which affect them in the middle- and old-age.

The main aim can be achieved by analyzing the socio-demographic, and health status parameters (e.g. body mass index, presence of chronic disease, regular medication) of the women and revealing the relationship between these data. Also the changes in lifestyle should have been analyzed and identification of the factors was needed that were associated with making the women to alter their lifestyle (diet, exercise, smoking, etc.). Designation of the factors that were associated with better QOL was also an important way of finding the line of sight for middle- and old-aged women to improve their health.

Our working hypotheses were:

1. the type of the examined disease (osteoporosis or malignant tumor) affects women intention for lifestyle change; women with malignant tumor as a life-threatening disease are more likely to change all aspects of their lifestyle, than women with osteoporosis;
2. socio-demographic factors (age, education, urbanization, marital status, etc.), presence of other chronic diseases, and counseling from medical staff affect women intention to change their lifestyle in osteoporosis and malignant tumor;
3. both of the analyzed diseases affects women's QOL in negative direction, and women with malignant tumor have lower QOL scores.

2. LITERATURE REVIEW

2.1. Health status of middle- and old-aged Hungarian women

The health status of women can be measured through a comparison to men. Data exists about their lifestyle, their self-rating health, about the frequency of risk factors affecting them. Other way to adjudge women's health status is analyzing their mortality data.

There are several diseases more frequent in women, such as osteoporosis, anxious diseases, and depression, which are among other chronic diseases the causes of the decreased ability to work and physical impairment [53].

In Hungary the two most frequent non-communicable diseases are cardiovascular diseases and malignant tumors. According to the data of the Hungarostudy Epidemiological Panel (HEP) [54] – which was carried out in 2005 as the follow up of the Hungarostudy 2002 – it was revealed, that the frequency of the cardiovascular diseases is increasing with age, although there are no gender differences. The comorbidity with depression is high (47.4%) among these patients attended in hospitals [55]. One third of the respondents have changed their diet because of their illness [55]. In relation to international data some of the risk factors of cardiovascular diseases – such as smoking, high fat diet, high blood pressure – are there in significantly higher proportion in Hungarian women than in women of other developed countries [56].

Analyzing oncology diseases the main differences among Hungarian men and women is only in the occurrence of liver tumors, the frequency of it is tenfold in men according to the data of the Hungarostudy in 2005. The most frequent gender-depending tumors are the prostate cancer in men and breast cancer in women [55].

Self-rating health in a scale with five degrees has been proven to be the most prognosticating method in the evaluation of risk of death by a study of Skrabski et al. [57, 58]. Other studies have proven that Hungarian women are less satisfied with their health than men, one-fourth of them adjudge it bad. In spite of altogether 9% of them have answered to live unhealthy lifestyle, so we can say that these women are not in aware of the connection between lifestyle and health [59].

Smoking is the leading, preventable risk for premature death and disability in Hungary. Each year, smoking results in an estimated 28,000 deaths, of which about 3,500 are non-smokers as a result of exposure to secondhand smoke [4]. According to the data of the

National Health Survey an increasing prevalence of smoking in women can be seen despite improvements in the tobacco control measures [60, 61]. The rate of women's smoking is increasing mostly in younger ages; among divorced, widow, urban residents, low educated, and physical workers there are smoking women in the highest proportion. The effectiveness of comprehensive tobacco-control programs in relation to smoking prevalence and health-related outcomes is supported by scientific evidences [62].

In Hungary alcohol consumption is the most frequent in the capital, and is there in equal proportion in the urban and rural areas. Of the 15-64 years women 40% is non-drinker, 1.5% of them drinks every day.

Regarding diet, women eat healthier than men: they are moderate in eating and eat regularly. Among 15-64 years old women two-third eat fruits and vegetables every day in summer months, this proportion is 45% in winter months, and also two-third of them uses vegetable oil or margarine mainly if higher-educated or urban resident. Regular exercise is uncharacteristic, only 13.5% of them do it, and it is mainly prevalent among students [59].

In all we can say that women have less risk factor in their life than men, they live more consciously, their lifestyle is healthier. Their morbidity is worse, their mortality is better then men's. This can be explained by their worse self-health rating, and that they have more illness which can be cured more successfully.

Today scientists are also analyzing the so called "non-conventional risk factors" affecting health status. These factors play a main role in the development of self-destructing attitudes (e.g. smoking, pathological alcohol abuse) or in themselves can be risk or protective factors. These factors are: relative socio-economic status, education, ability of control in workplace, feelings of depression, hopeless, malignancy, exist of coping strategies, problem solving ability, social support, piety [63, 64].

Women's health is affected positively by their mutual help and confidence, social support, which operates among them better then among men. In women the worsening financial, economical status and the unemployment are less influencing factors in their health [64].

2.2. Osteoporosis

2.2.1. The epidemiology of osteoporosis

Osteoporosis has been defined by a Consensus Development Conference as "a systemic skeletal disorder characterized by low bone mass and micro architectural deterioration of the bone tissue, with a consequent increasing of bone fragility and susceptibility to fracture" [65].

It often does not cause symptoms through years, so it is named as a "silent disease".

The risk of fractures increases as bone mass falls by age or bone loss accelerates in women after menopause. With the increasing life expectancy at birth (in most countries women who reach the age 50 can expect to live another 30-40 years), osteoporosis has become one of the major problems of health care; its social and economic burden is increasing.

Approximately 200 million women have osteoporosis in the world [66]. Women who live in North America or Europe have the greatest chance to develop osteoporosis [50].

The most serious consequences of osteoporosis are fractures, especially the fractures of hip and femur; every 1 in 5 persons die during the first year after a hip fracture [67]. The other important type of fractures caused by osteoporosis is vertebra fracture. It is responsible for the increased morbidity by causing symptoms such as back pain, height loss, kyphosis, disability and also increases mortality [68, 69]. The symptoms caused by osteoporotic fractures can lead to several psychological consequences, such as anxiety, fear, anger, depression, loss of self-confidence, and can effect negative changes in social relationships [70-72].

In Hungary about 80,000 fractures occur every year through osteoporosis. One fifth of these cases affect the hip and femur and about 2,500 person die because of it every year [73].

By etiology two main types of osteoporosis can be mentioned such as primary and secondary osteoporosis. Analytical epidemiological studies have proven, that the development of peak bone mass, so also the later involution of it are influenced by several – genetic, environmental, lifestyle – factors [74, 75]. In primary osteoporosis the decrease of the organic and mineral substance of the bones are accelerated by age. Secondary osteoporosis is caused by several diseases (e.g. increased or decreased hormone production of the thyroid gland) or

by taking some medicines (corticosteroids in high doses, L-thyroxin, long-acting benzodiazepines, lithium, etc.) [76].

Today osteoporosis can be screened by simple methods measuring the bone mineral density (BMD). In Hungary the National Health Insurance Office pays 2-3 billion Hungarian Forint for this purpose every year [77].

By analyzing BMD, the bone's mineral content is being measured, and being compared to the bone mineral density of the healthy persons' mean at the same age (it is called Z-score), or to the peak bone mass at young ages (it is called T-score).

T-score is the number of standard deviations (SDs) by which a patient's test result exceeds (positive T-score) or falls below (negative T-score) the mean of the young adult group. In clinical studies mainly T-score is used. According to the WHO criteria, values are designated as: "normal" (T-score>-1), "osteopenia" (-2.5≤T-score≤-1), "osteoporosis" (T-score<-2.5) [78].

2.2.2. Osteoporosis risk factors

Several factors interact when bone mineral loss occurs. These factors are clinical, medical behavioral, nutritional and genetic variables [79-82].

A. Clinical risk factors

A major determinant of bone mineral density in an older person is the *peak bone mass*, which began to develop in utero and reaches its maximum by the mid-30s. The most mass of the bones are incorporated in the years of adolescence [80, 83]. The higher the peak bone mass the slower the reduction of BMD. In the first years of *ovarian cessation* bone loss is accelerated because of the lower level of estrogen hormones and bone mass continues to decline with age, so in this relation *age* is also a risk factor [80, 84]. *Postmenopausal* women with a *low body mass index*, with a low body weight and low body fat are at increased risk of accelerated bone mineral substance loss [85]. In a study by Cummings et al. it was shown that both *low serum total estradiol* concentrations (<5pg/mL) and high serum, concentrations of sex hormone binding globulin (≥ 1 µg/dL) increase the risk of vertebral and hip fractures independently from BMD [86]. Deficiencies in the bone micro architecture may affect the risk of fractures regardless of BMD. Several studies had found an association between fractures in the medical history at any site and future hip and vertebra fractures [87, 88]. Poor hand grip

strengths, diabetic neuropathy, disorders of the joints, pain and propensity to fall are independent risk factors of fractures in postmenopausal women [89].

B. Medical risk factors

Secondary osteoporosis is associated with several medical disorders including *gastrointestinal diseases* (e.g. malabsorption syndromes), *hematological disorders* (e.g. pernicious anemia), and *hypogonadal states* (e.g. amenorrhea) [79]. *Medical therapy* that may be associated with reduced bone mass [79, 90]: aluminium, lithium, anticonvulsants (phenytoin, phenobarbital), long-acting bensodiasepines, cytotoxic drugs, immunosuppressants, glucocorticoids, gonadotropin-releasing hormone agonists, progesterone parenteral, long-acting, heparin (long term use), supraphysiologic thyroxine, Tamoxifen (premenopausal use), total parenteral nutrition.

C. *Behavioral risk factors*

Several behavioral risk factors increase the risk of osteoporosis. One of them is *cigarette smoking*, which is associated with accelerated bone loss, caused at least in part by reduced intestinal calcium absorption efficiency [91, 92]. A *low level of physical activity* has been associated with the increased risk of fractures in several studies [49, 81, 89, 93]. *Alcohol intake* of 207 mL or more per week is a risk factor for bone loss [94]. In addition, *caffeine intake* has been correlated positively with the risk of hip fracture and the rate of bone loss in elderly women [81].

D. *Nutritional risk factors*

Dietary *calcium intake* is correlated with BMD; this relationship can be observed only among men and women with lower body mass index (BMI<27 kg/m^2) [82]. *Vitamin D* deficiency is an established risk factor for fractures in the elderly, due to the higher bone turnover, reduced calcium absorption, and loss of bone mass resulting from secondary hyperparathyroidism [95].

E. Other risk factors

Race and ethnicity, as well as *age* and *gender*, influence the incidence of hip fractures. Incidence rates obtained from studies among different racial and ethnic groups demonstrate that although women have higher fracture rates compared with men overall, these differences vary by race and age. For example, in white and Asian subjects, women had higher rates for all age groups older than 50 years. For Hispanic persons aged 50 to 59 years, men had a higher rate than women, but this gender relationship reversed after age 60. Black men had

higher rates than black women until age 70, after which the women had higher rates. For both genders and all race and ethnic groups, the rates increased sharply with age [96-98].

Body size is another factor affecting the risk of fracture. One study in older, non-Hispanic white women showed that older women with smaller body builds are at increased risk of hip fracture because of lower hip BMD values [99]. Although all measurements of body size (including total body weight, percentage weight change since age 25, lean mass, fat mass, body fat percentage, hip girth, body mass index, and modified body mass index) were associated with hip fracture risk, measurement of total body weight by itself was found to be sufficient for ascertaining hip fracture risk and was not improved by measurements of the other attributes of body size and composition [99].

Women with a *maternal history* of hip fracture are approximately twice as likely to experience hip fractures as women without such a family history [81, 89].

2.2.3. Osteoporosis and QOL

QOL can be measured in patients with osteoporosis with generic questionnaires such as SF-36 and EQ-5D, WHOQOL-BREF, which can be used in many diseases or with one of the six available osteoporosis-specific questionnaires, e.g. Qualeffo-41 or OPAQ (Osteoporosis Assessment Questionnaire).

In a study of Lasaite et al. the QOL of postmenopausal women with osteoporosis was analyzed using WHOQOL-BREF. They did not find significant differences in QOL of osteoporotic patients and healthy controls [100].

In some studies the single effect of BMD on QOL was investigated in osteoporosis patients and in postmenopausal women [40, 42]. In these studies disease-specific questionnaires have been adopted. The results of the study of Martin et al. show that domain scores related to physical difficulty and fear of falling or having a fracture are significantly worse among women with BMD in the osteoporotic range. However, after controlling for age and self-reported arthritis, scores of the physical difficulty domain have not differed significantly based on BMD alone [40]. The study of Romagnoli et al. shows that even a reduction of BMD can negatively influence some aspects of health-related quality of life (HRQOL) [42].

Measuring QOL Lombardi et al. have applied the SF-36 questionnaire. They have asked three groups of women: women with osteoporosis and vertebral fractures, women with

osteoporosis and without vertebral fractures and a control group. They have observed no difference in SF-36 scores between the 3 groups [45].

In a study by Hallberg et al. women with different osteoporotic fractures (forearm, proximal humerus, hip, vertebral fractures) were analyzed. Their HRQOL was evaluated by the SF-36 questionnaire and compared with age-matched reference material. They have found that patients with osteoporosis had lower HRQOL than those with normal BMD. Regarding to fractures HRQOL was significantly reduced at baseline in all SF-36 domains after vertebral fractures and most after hip fractures, but only regarding some domains after forearm and humerus fracture [101].

To evaluate the impact of osteoporosis on the patients' QOL Bianchi et al. used the Qualeffo-41. They found impaired physical ability, reduced social activity, poor well-being and depressed mood among 41% of women with osteoporosis. In the control group only 11% of women reported a reduced QOL [43].

2.3. Breast and gynecological cancers

2.3.1. The epidemiology of breast and gynecological cancers

With one million new cases in the world each year, breast cancer is the commonest malignancy in women and comprises 18% of all female cancers. In the United Kingdom, where the age standardized incidence and mortality is the highest in the world, the incidence among women aged 50 approaches two per 1,000 women per year, and the disease is the single commonest cause of death among women aged 40-50 years. There are more than 14,000 deaths each year, and the incidence is increasing particularly among women aged 50-64 years, probably because breast screening is organized for this age group [26].

Table 1: Estimated breast and gynecological cancer incidence in the World population, in the EU and in Hungary in 2008 [102]

Cancer type	**World population**		**EU**		**Hungary**	
	Number	ASR	Number	ASR	Number	ASR
Breast	1 383 523	39.0	332 503	77.1	5408	57.9
Cervix uteri	529 409	15.2	31 419	9.0	1104	16.6
Corpus uteri	287 630	8.2	55 906	11.5	1289	12.6
Ovary	225 484	6.3	45 322	9.9	956	10.2

ASR: Age-standardized rates per 100 000

Table 2: Estimated breast and gynecological cancer mortality in the World population, in the EU and in Hungary in 2008 [102]

Cancer type	World population		EU		Hungary	
	Number	ASR	Number	ASR	Number	ASR
Breast	458 367	12.5	89 559	16.5	2208	19.3
Cervix uteri	274 883	7.8	13 568	3.0	504	5.8
Corpus uteri	74 170	2.0	13 034	2.0	314	2.4
Ovary	140 153	3.8	28 903	5.2	647	5.8

ASR: Age-standardized rates per 100 000

The incidence and mortality rates in Hungary are high comparing the national data with world and EU data (Table 1-2). In Hungary approximately one third of the malignant tumors of women are derived from the cancers of the female genital organs (cervix, endometrium, ovaries, Fallopian tubes, vagina and vulva) and the breasts. In 2008, in the age group of 20 and over, the percentage of malignant neoplasms of cervix uteri was 3.2%, malignant neoplasms of other and unspecified parts of uterus was 3.8%, malignant neoplasms of the ovaries was 4.0%, and malignant neoplasms of the breasts was 21.2%, regarding the total number of women's cancer cases. 24.6% of malignant tumor related deaths were caused by breast cancer and other gynecological tumors; the rate of deaths per hundred thousand population in breast cancer was 26.6, and in malignant neoplasms of the female genital organs 19.3, in the year of 2008, in Hungary [2].

2.3.2. Breast and gynecological cancers risk factors

2.3.2.1. Risk factors for breast cancer

The strongest risk factor for breast cancer (after gender) is age: the older the woman, the higher the risk [102].

Women in developed countries are at increased risk of breast cancer compared with women from less developed countries. A large part of this variation can be explained by the fact that women in developed countries have fewer children on average and a limited duration of breastfeeding [103].

A. Reproductive factors influencing the risk of breast cancer

Early *age at menarche* has been consistently associated with an increased risk of breast cancer. The estimated decrease in risk per five year delay in menarche is 22% [104].

Age at first birth: the younger the woman is when she begins childbearing, the lower her risk of breast cancer [103]. *Childbearing* reduces the risk of breast cancer and the higher the number of full-term pregnancies, the greater the protection. Risk of breast cancer is reduced by 7% with each full-term pregnancy, and overall women who have had children have a 30% lower risk than nulliparous women [105]. Women who *breastfeed* reduce their risk compared with women who do not breastfeed. The longer a woman breastfeeds, the greater the protection: risk is reduced by 4% for every 12 months of breastfeeding [103]. *Late menopause* increases the risk of breast cancer [106].

B. *Exogenous hormones influencing the risk of breast cancer*

The use of oral contraceptives (OCs) increases the risk of breast cancer in current and recent users, but there is no significant excess risk ten or more years after stopping use [107]. Women currently taking hormone replacement therapy (HRT) have a 66% increased risk of breast cancer compared to non-users; a woman's BMI modifies the effect of HRT, with a stronger effect in women with a lower BMI [106].

Previous proliferative breast disease and family history of breast cancer are increasing the risk of breast cancer [108]. Mutations in the breast cancer susceptibility genes BRCA1 and BRCA2 account for the majority of families with four or more affected members and 2-5% of all breast cancers [109].

C. Non reproductive lifestyle factors as risk factors for breast cancer

Overweight and obesity, as measured by high BMI, moderately increases the risk of post-menopausal breast cancer and is one of the few modifiable risk factors for breast cancer [110]. *Physical activity* probably protects against breast cancer, with studies showing a 20-40% risk reduction for women in the highest category of physical activity. Women in this category were walking or hiking for 10 or more hours per week or running for 3.5 hours [111]. Epidemiological studies have consistently shown a significant association between *alcohol consumption* and breast cancer and a recent International Agency for Research on Cancer (IARC) report concluded that this association is causal [112]. From the point of the *diet* the strongest evidence seems to be for fat intake: a meta-analysis of 45 studies reported that higher total fat intake increased breast cancer risk by 13% [113]. There are some evidences that women who do night *shift work* have an increased risk of breast cancer [114]. *Ionizing radiation* is an established risk factor for breast cancer; the effect is strongly related to age at exposure, that is, the younger the woman is exposed, the greater the excess risk [115]. Regarding the role of *medications,* a risk reduction of up to 25% has been shown for

women regularly using aspirin or other non-steroidal anti-inflammatory drugs (NSAIDs) [116].

2.3.2.2. Risk factors for cervical cancer

Members of the *Human Papilloma Virus* (HPV) family have been detected in cervical tumors worldwide with studies showing the presence of HPV in virtually all cervical tumors tested. The highest risks are associated with HPV types 16 and 18 [117]. Suggested *co-factors* for cervical cancer include age at first intercourse, number of life-time partners, co-infection with herpes simplex virus 2 or Chlamydia trachomatis, parity, age at first birth, oral contraceptive use and family history [118-120]. A lower risk has been shown in partners of men who have been circumcised [121]. A meta-analysis showed that risk of squamous cell cervical cancer was increased by almost 50% in current *smokers*, although there was no risk increase for adenocarcinomas [118].

2.3.2.3. Risk factors for uterine cancer

Most of the established risk factors for uterine cancer are the result of excess exposure to *estrogen unopposed by progestagens*, a process that stimulates proliferation of the cells of the womb, increasing cancer risk [122]. *Insulin and insulin-like growth factors* may increase the effect of estrogen on uterine tissue [123]. Evidence suggests that risk of uterine cancer is 2-3 times higher in *overweight and obese* women [124]. *Tamoxifen*, an estrogen receptor modulating hormone used to treat and prevent breast cancer, has been shown to treble risk of uterine cancer [125]. A meta-analysis of prospective studies reported the role of *physical activity*: most active women have a 23% reduction in risk of uterine cancer [126]. *Smokers* have a modest reduction in uterine cancer risk; this effect may be linked with the fact that smokers metabolize estrogens into less active metabolites than non-smokers [127].

2.3.2.4. Risk factors for ovarian cancer

The two most influential risk factors are increasing *age* and the presence of certain *gene mutations*. The role of several other factors has been revealed in epidemiological studies. The risk of ovarian cancer is lower in women that have had *children* compared to women who have no children [128]. There was an approximate 20% reduced risk of ovarian cancer in

those women who had ever *breastfed* compared to those who had never breastfed in one collaborative study [129]. *The use of OCs* is protective, perhaps due to cessation of ovulation. A recent collaborative analysis showed a 27% reduction in ovarian cancer risk in ever versus never users [130]. Ever use of *HRT* is associated with a 19-24% increase in risk of ovarian cancer, according to the most recent meta-analysis [131]. Results from the European Prospective Investigation into Cancer and Nutrition showed that post-menopausal women with a *BMI over 30 kg/m^2* (obese) have a relative risk (RR) of 1.59 (95%CI 1.2-2.1) in comparison to women with a BMI under 25 kg/m^2 (normal) [132]. A meta-analysis showed a RR of 2.1 (95%CI 1.7 to 2.7) for mucinous ovarian tumors in current *smokers* [133]. From the point of *family history* and previous cancers, women with a mother or sister diagnosed with ovarian cancer have a RR of 2.6 (95%CI 2.2 to 3.08) for ovarian cancer [128]. BRCA1 and BRCA2 *mutations* are known to increase the risk of ovarian cancer [134].

2.3.3. Breast and gynecological cancers and QOL

An important goal for cancer patients is to improve the QOL by maximizing functions affected by the disease and its therapy.

Valenti et al. aimed to assess the association between physical exercise and QOL in a population of female breast cancer survivors, followed up from diagnosis to the off-treatment time period, and investigated their exercise habits in pre-diagnosis. They have used the WHOQOL-BREF. They have found that QOL strongly decreases during active treatment; significant correlations were found between total exercise on- and off-treatment and all QOL indicators. Strenuous exercise have been strongly correlated with QOL, while absent/mild exercise have seemed to be inversely correlated with QOL on all axes [135].

Social networks and HRQOL were assessed among breast cancer survivors. On average, socially isolated women were more adversely affected by breast cancer, their role function, vitality and physical function was lower compared to the most socially integrated women [136].

In a study by Amichetti et al. the QOL has been evaluated in patients with early stage invasive carcinoma of the breast treated with conservative surgery and postoperative irradiation. The results of the study revealed a satisfactory HRQOL in patients treated with breast conservation and postoperative irradiation. A preserved favorable body image and lack of a negative impact on sexuality was observed, even though about half of the patients

reported a negative judgment on esthetic outcome. Some patients had persistent psychosocial concerns [137].

Wong's et al. findings added clinical evidence to support the beneficial effects of herbal therapy on QOL and vitality status in breast cancer patients [138].

In a Korean study it has been described whether levels of HRQOL has been differed by socio-demographic characteristics (age, marital status, employment status, education, monthly household income, and religion) and time since breast cancer has been diagnosed in women. The psychological well-being domain scored the lowest among domains of HRQOL. Women who were younger, married, unemployed, highly educated, or religious, with higher monthly household income or with greater than one year elapsed time since diagnosis, had higher HRQOL [139].

3. MATERIALS AND METHODS

3.1. Study design and sample

The study was carried out in two groups of patients: in women with osteoporosis and in women with malignant tumors. The collection of the different groups' data was performed at different times. The description of study design and sample is separated along this grouping.

3.1.1. Osteoporosis

An interviewer-administered questionnaire-based cross sectional study was performed in 2007. The survey was carried out in the outpatient Bone Densitometry Centre of Szeged, among women over 40 years, who were referred to the Centre by general practitioners and by specialists (gynecologists, rheumatologists, orthopedic surgeons, endocrinologists, etc.). Within the study period, all eligible women were offered the questionnaire by the medical staff. Women were asked to read a written description about the aims of the study, and we asked them to volunteer as anonymous participants in our study. An informed consent was signed by those who agreed to participation.

The enrolment of 500 patients was planned. Altogether 424 women (84.8%) completed the questionnaire. After sorting the questionnaires, the total number of the sample was reduced by 20 persons because of incomplete filling-in (important demographical data, e.g. age or education, were missing). Another 45 persons were excluded because of the pre-menopausal status of the women (postmenopausal status was defined as a period in the last 12 months without any menses). We evaluated the data of the remaining 359 women, thus the total response rate was 71.8%.

In parallel with data collection also the analyzing was carried out, so we were able to publish partial results before the end of the data collection. These publications have incorporated the data of 254 women. In further analysis these data were completed with the data of the whole sample.

The study protocol was approved by the Human Investigation Review Board, Albert Szent-Györgyi Clinical Centre, University of Szeged.

3.1.2. Malignant tumors

A self-administered questionnaire-based, cross-sectional study was performed between December 2008 and February 2009 by the Department of Public Health in cooperation with the Department of Oncotherapy, Faculty of Medicine, University of Szeged, Hungary.

In this study, 201 volunteer, randomly selected patients, treated for cancer at the Department of Oncotherapy were involved. The participants originated from the population of the city of Szeged and its region. The total number of the sample was reduced by 39 because these women were not treated for gynecological or breast cancer and by further 7 cases because of the missing demographic and health status data. We evaluated the data of the remaining 155 women (77.1%).

The study protocol was approved by the Human Investigation Review Board, Albert Szent-Györgyi Clinical Centre, University of Szeged.

3.2. Instruments

To interview selected patients, two kinds of tools were used according to their selection criteria (osteoporosis, breast/gynecological cancer). Each of them consisted of the WHOQOL-BREF and a self-developed questionnaire.

3.2.1. WHOQOL-BREF

QOL was measured by the WHOQOL-BREF instrument. It is a brief 26-item questionnaire, derived from the WHOQOL-100 [37, 140-143], and mostly used in clinical and epidemiological studies. The quick and easy applicability and the international comparability of the instrument led us to apply WHOQOL-BREF.

In Hungary, the WHOQOL-BREF questionnaire was validated and adapted in the general population to local conditions according to the criteria of the WHOQOL Group [144, 145], and proved to be suitable for assessing QOL of persons with various demographical, social and health conditions. The questionnaire has good differentiating power between the healthy and the ill.

The questionnaire involved two global items (questions): one about overall QOL and another about general health [144].

It also involved four domains of QOL, such as physical (7 items), psychological (6 items), social (3 items) and environmental (8 items) domain. The answers of each question were graded from 1 to 5. The mean scores of each domain were calculated according to the original model of the WHO [37]. These data became comparable to WHOQOL-100 data by transforming them to a scale from 4 to 20 by multiplying the means of each item by four. Higher QOL scores meant better QOL.

In some of the statistical analysis the global questions and the domains were dichotomized. The answers of the two global questions – overall QOL and general health – were dichotomized (in the proportion 3/5 (60%) and 2/5 (40%)): the answers graded from 1 to 3 (very poor – poor – neither poor nor good and very dissatisfied – dissatisfied – neither satisfied nor dissatisfied) were categorized as 'poor QOL' and 'unsatisfied with her health'. The answers 4 and 5 (good/very good; satisfied/very satisfied) were categorized as 'good QOL' and 'satisfied with her health'.

With regard to the mean scores of the four domains, the division of the maximum mean score of 20 was carried out in the same proportion as mentioned above: scores less than or equal to 12 were categorized as 'poor QOL', scores more than 12 were categorized as 'good QOL' according to the physical, psychological, social and environmental domains.

3.2.2. Self-developed questionnaires

Patients, who were screened by osteodensitometry and patients with the diagnosis of cancer were asked about their *socio-demographic data*:

- age was measured in years on the basis of the date of birth;
- the level of education was classified into three groups on the basis of the highest qualification: elementary (primary school or less than primary school), secondary (vocational or secondary school) and high (college or university);
- marital status was categorized into four groups as married/common-law marriage, divorced, widow or being single, in some analysis these categorical values were closed up in two groups, as living in partnership or being single;
- working status was defined as 'active worker', if the woman was employed, and 'non active worker' if the woman was unemployed or retired at the time of the survey;
- type of settlement of living was categorized as town or village.

Data of *general health status* was measured in both diseases:

- height (centimeters) and weight (kilograms);
- age in years at the time of menarche;
- age in years at the time of the last period;
- self-reported chronic diseases (osteoporosis, diabetes mellitus, cardiovascular-, gastrointestinal-, endocrinological-, psychiatric-, locomotor-, liver-, kidneys-, and neurological disease);
- the type of prescribed medication if any.

Health-related behaviors in both diseases:

- *coffee* consumption if any
  - amount of consumed coffee by each serving, defined in deciliters;
- frequency of *alcohol* drinking (each day, weekly, monthly, several times in a year, never)
  - type of alcohol consumed (wine, beer, brandy ("pálinka"), vodka, etc.);
  - amount of consumed alcohol by each serving, measured in units (1 unit alcohol equals about 8-12 g absolute alcohol, which is the amount, the liver degrades for an hour; e.g. 1 dL wine or 3 dL beer);
- *smoking* if ever
  - duration of smoking;
  - number of smoked cigarettes per day;
  - recent smoking if any;
  - duration of smoking ever;
  - number of smoked cigarettes per day;
- regular (several times a week) *physical activity* (walking, biking, house work, physical work as a job, etc.);
  - doing exercise regularly (running, swimming, gymnastics, etc.);
  - regular exercise's duration per week in hours.

Health-related behaviors in BMD screened patients:

- frequency of previous and actual consumption of milk and diary products (several times a day, once a day, several times a week, once a week, several times a month, never);
- frequency and type of taken calcium-products;

- frequency and type of taken vitamin D-products;
- consumption of other products containing vitamins and/or mineral substances.

Dietary habits in breast/gynecological cancer patients before and after the diagnosis:

- frequency of picking vitamins (A, B, C, D, E, multivitamins) and/or minerals (iron, magnesium, zinc, selenium, calcium and other) in pills (every day, several times in a week, several times in a month, once a month, several times in a year, never);
- frequency (several times a day, once a day, several times in a week, once in a week, several times a month, not in every month or never) of eating different kind of foods (e.g. white bread, whole wheat bread, milk and diary products, white and red meat, fish, vegetables, and fruits, etc.).

Data about *health care* of BMD screened patients:

- the specialization of the assigning doctor (general practitioner, gynecologist, rheumatologist, orthopedist, other);
- reason for visiting a doctor (having complaints, general examination, cancer screening, other);
- type of symptoms if any (pain, periods disorders, unstable emotional reactions, perspiration at night, others);
- type and duration of medication according to osteoporosis if any;
- alternative therapy use regarding osteoporosis (medical exercise therapy, balneotherapy, etc.).

Data about *health care* of breast/gynecological cancer patients:

- type of cancer;
- time of diagnosis;
- cancer screening (mammography, cervix, colon, lung, skin, cave of the mouth, prostate gland);
    - cancer screening regularly if any and the time of the last screening;
    - motivation for visiting cancer screening (of their own motion, sent by general practitioner, invitation letter from public health authority, sent by other doctor);
- reason for visiting a doctor regarding to the malignant tumor (having complaints, general examination, cancer screening, other);

- type of symptoms if any (pain, fever, slimming, etc.);
- recent treatment if any, and duration of it;
- time passing after the end of the therapy;
- types of received treatments (operation, radiotherapy, chemotherapy, psychotherapy);
- alternative therapy use regarding cancer and the type of it;
- getting psychological help for coping the disease if any (from psychiatrist, from psychologist, from social worker, from mental hygienic worker, from other person).

Other important data of BMD screened patients:

- weight of birth measured in grams;
- immature neonate anamnesis;
- spontaneous fracture of the hip, femur, vertebra, ulna, radius in the own anamnesis;
- familiar history of osteoporosis;
- familiar history of spontaneous fracture;
- result of the recent bone mineral density measurement defined as T-score at the hip and anterior-posterior (AP) spine.

Other important data of breast/gynecological cancer patients:

- type of workplace, status, time spend at the same workplace;
- health damaging factors at the workplace (UV radiation, heavy metals, pesticides, drugs, etc.).

3.3. Statistical analysis

Data processing was carried out using SPSS 15.0 for Windows. In case of continuous variables the mean, the standard deviation and the range were calculated. Distribution was calculated in categorical data, and the χ^2 test was used to compare different groups (e.g. consuming milk, vitamin D and calcium in women with different BMD groups; dietary change according to demographic data and advice for lifestyle change). Comparing the means of the QOL domains in different groups, one-way ANOVA was used.

To assess the internal consistency of the QOL domains we used Cronbach's alpha. For scales which are used as research tools to compare groups, Cronbach's alpha may be less than in the clinical situation, when the value of the scale for an individual is of interest. For comparing groups, Cronbach's alpha values of 0.7 to 0.8 are regarded as satisfactory [146, 147].

Joint analysis of factors influencing the dietary change of women with malignant tumors was modeled by logistic regression. Logistic regression describes the relationship between one categorical dependent variable and several categorical or continuous independent variables. In our research the dietary change of women with malignant tumors was the categorical dependent variable. Age group, education, type of tumor, advice for lifestyle change from physician, advice for lifestyle change from any other medical staff were the categorical independent variables.

Forward stepwise method was used during logistic regression analysis, after that only those factors remained in the model which proved to have been significant. At first, the most considerable ones were selected to get into the model, and than the range grew with the other significant factors till the point where the model reached its optimal verifying power. The determinations of the logistic regression model were based on the Hosmer-Lemeshow goodness of fit tests for each dependent variable. Odds ratios (ORs) and 95% confidence intervals (CIs) were also calculated for all variables. For all comparisons $p<0.05$ was considered significant.

4. RESULTS

4.1. Patient characteristics

The mean age of BMD-measured women was 64±8.24 years (min: 46, max: 88) and the mean age at menopause was 48.37±5.90 years. The mean age of women with osteoporosis was 66.21±8.28 (min: 51, max: 88). These data were by the tumor-treated women 57.6±11.83 years (min:18 max:85), the mean age at menarche was 13.56±1.52 years [148].

The main characteristics of patients are shown by Table 4. Education, marital status, type of settlement, to be an active worker and type of (recent or previous) work of the women are presented. These characteristics of the BMD-measured women are appeared according to their T-score results. Most of the sampled women were secondary-educated, lived in partnership, in towns and were non-workers.

Table 4. Socio-demographic characteristics of the sample

	BMD-measured women N=359 N (%)			**Women with tumor** N=155 N (%)
	Normal 53 (14.8)	Osteopenia 137 (38.2)	Osteoporosis 169 (47.1)	
Education				
Elementary	20 (5.6)	40 (11.1)	47 (13.1)	46 (29.7)
Secondary	20 (5.6)	74 (20.6)	87 (24.2)	75 (48.4)
High	13 (3.6)	23 (6.4)	35 (9.7)	33 (21.3)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
Marital status				
In partnership	37 (10.3)	82 (22.8)	96 (26.7)	87 (56.1)
Single	16 (4.5)	55 (15.3)	73 (20.3)	68 (43.9)
Settlement				
Town/city	35 (9.7)	103 (28.7)	140 (39.0)	117 (75.5)
Village	18 (5.0)	34 (9.5)	29 (8.1)	37 (23.9)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
Active worker				
Yes	15 (4.2)	35 (9.7)	18 (5.0)	36 (23.2)
No	38 (10.6)	102 (28.4)	151 (42.1)	118 (76.1)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
Type of work				
Intellectual	26 (7.2)	62 (17.3)	69 (19.2)	56 (37.1)
Physical	21 (5.8)	48 (13.4)	71 (19.8)	67 (43.2)
Mixed	6 (1.7)	27 (7.5)	29 (8.1)	28 (18.1)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.6)

4.2. Health status of the sample

4.2.1. Osteoporosis

The results of the osteodensitometry according to the T-score values were normal in 14.8%, osteopenia in 38.2% and osteoporosis in 47.1% of the sampled women (Table 4). The reasons for visiting a general practitioner or a specialist – which were resulted in bone density screening – were developing some symptoms (e.g. pain, fatigue, periods disorders) in 63.0%, the need for a general check-up in 25.8% or the need for cancer screening in 10.6% [149]. Other family members had osteoporosis in 23.9% of the respondents.

Analyzing only women with osteoporosis 35.7% of them had spontaneous fracture after the age 45. In the highest proportion (18.7%) they had forearm fractures and in 6.4% of them had vertebra fractures. About one-fourth of them had familiar anamnesis of osteoporosis, as their mothers had spontaneous fractures after the age 45.

To treat the osteoporosis, about 90% of the women were advised to take medication. A half of them were treated by bisphosphonates, only 5.8% of them got SERM (selective oestrogen receptor modulator) products. D-vitamin was used by 73.7% and calcium supplementation by 66.7% of them. Alternative therapy has been occurred in 37.5% of the respondents [150].

Some health status parameters (BMI group, presence of any chronic disease, and regular medication) of BMD measured women are shown by Table 5. By women with osteoporosis the proportion of the underweight women was the highest, and the proportion of the obese women was the lowest comparing them to women with normal BMD and osteopenia. Regarding other chronic diseases, the ratio of hypertonic and other cardiovascular diseases were the highest by all the groups, as it was also shown in our earlier results [149], and gastrointestinal diseases are added to this (hypertension: 53.2%, gastrointestinal diseases: 25.4%, cardiovascular diseases: 19.5%). Taking pills regularly was mostly occurred in women with osteoporosis.

4.2.2. Women treated with breast /gynecological cancer

The greatest part (34.8%) of the sample were formed by women treated with breast cancer. Cervix cancer occurred in 22.6%, malignant tumors of the other parts of the uterus in 23.1%, ovarian cancer in 15.4%, vaginal cancer in 1.5%. Both the genital organs and the breast were affected in 2.5% [148].

Women approximately in the same proportion (~85%) visited mammography and cervix screening. The reason for visiting a doctor was having complaints in three-fourth of the women, 7.1% of them had a need for general check-up and 14.2% of them attended cancer screening.

At the time of the survey 84.2% of the women underwent treatment; about 35% of them were treated for years and also the same proportion were treated for months. About two-third of the women were cured by surgery and the same rate by radiotherapy. One-fifth of the women were resorted to alternative therapy (e.g. homeopathy).

Table 5. The health status of the sample population

	BMD-measured women N=359 N (%)			**Women with tumor** N=155 N (%)
	Normal 53 (14.8)	Osteopenia 137 (38.2)	Osteoporosis 169 (47.1)	
BMI group				
Underweight	0 (0.0)	1 (0.3)	4 (1.1)	3 (1.9)
Normal	17 (4.8)	46 (13.0)	83 (23.4)	54 (35.1)
Overweight	16 (4.5)	54 15.2)	59 (16.6)	49 (31.8)
Obese	20 (5.6)	35 (9.9)	20 (5.6)	48 (31.2)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
Chronic diseases				
Osteoporosis	9 (2.5)	46 (12.8)	152 (42.3)	26 (17.0)
Hypertension	32 (8.9)	74 (20.6)	90 (53.3)	83 (54.2)
Diabetes mellitus	3 (0.8)	15 (4.2)	16 (4.5)	13 (8.5)
Gastrointestinal	8 (2.2)	26 (7.2)	43 (12.0)	12 (7.8)
Kidneys	4 (1.1)	2 (0.6)	6 (1.7)	5 (3.3)
Endocrinological	8 (2.2)	21 (5.8)	24 (6.7)	16 (10.5)
Haematological	0 (0.0)	1 (0.3)	8 (2.2)	7 (4.6)
Liver	1 (0.3)	4 (1.1)	5 (1.4)	2 (1.3)
Locomotor	13 (3.6)	44 (12.3)	25 (7.0)	35 (22.9)
Cardiovascular	7 (1.9)	28 (7.8)	33 (9.2)	26 (17.0)
Psychiatric	3 (0.8)	7 (1.9)	12 (3.3)	16 (10.5)
Other disease	1 (0.3)	20 (5.6)	22 (6.1)	0 (0.0)
Regular medication				
Yes	45 (12.7)	117 (33.1)	153 (43.3)	121 (78.1)
No	7 (2.0)	20 (5.7)	11 (3.1)	17 (11.0)
Missing	0 (0.0)	0 (0.0)	0 (0.0)	17 (11.0)

Some health status parameters (BMI group, presence of any chronic disease, and regular medication) of these women are shown in Table 5. Most of the tumor-treated women had normal weight. Regarding other chronic diseases hypertension and other cardiovascular diseases were associated in the highest proportion, as it also was appeared by the BMD-measured women. About three-third of the women took regular medication.

4.3. Quality of life

In women screened by osteodensitometry, the mean value of the general health question was 2.95±0.99, the mean value of the overall QOL was 3.19±0.80, in women with osteoporosis the self-rated health score was 2.83±0.99 and the overall QOL was 3.20±0.85. In women diagnosed with malignant tumor these numbers were 3.02±0.85 and 3.57±0.68. The higher the scores the better the QOL.

Table 6. QOL according to the four domains [151]

Domains	**BMD-screened women**		**Women with tumor**	
	Mean±SD	Cronbach's alpha	Mean±SD	Cronbach's alpha
Physical	13.28±3.03	0.854	14.48±2.81	0.846
Psychological	13.73±2.69	0.805	14.05±2.61	0.859
Social	14.01±3.28	0.669	15.39±3.16	0.672
Environmental	14.39±2.33	0.758	14.57±2.18	0.771

The mean QOL scores were higher in every domain in women treated with tumor (Table 6). Values of Cronbach's alpha were acceptable in case of physical, psychological and environmental domains and marginal in case of social domain.

The most important factors affecting QOL of BMD-screened women were education, being an active worker, T-score groups and the presence of any chronic disease. Significant differences were found in the QOL of the subgroups of these variables regarding all QOL domains. In addition there were some variables (age group, marital status, previous fracture) which have caused significant differences in QOL only in the social domains (Table 7) [151].

Binary logistic regression model was performed to assess the factors increasing the odds of having good QOL (Table 8). The most influential proven factor of having good QOL was higher education (higher: $p<0.001$, OR: 6.30, CI: 3.21-12.36; secondary: $p=0.002$, OR: 2.48, CI: 1.40-4.38) [151].

Table 7. The effect of demographic factors and some health status indicators on WHOQOL-BREF QOL domain scores in women screened by osteodensitometry [151]

Variables	Domains			
	Physical Mean±SD	Psychological Mean±SD	Social Mean±SD	Environmental Mean±SD
Age group				
40-65 years	13.52±3.17	13.85±2.74	14.44±3.33	14.37±2.46
66 years and over	12.95±2.79	13.53±2.64	13.12±3.02	14.41±2.16
p-value	*0.081*	*0.271*	***0.003***	*0.879*
Education				
Elementary	11.79±2.74	12.72±2.71	12.91±2.86	13.62±2.15
Secondary	13.56±2.91	13.92±2.70	14.15±3.47	14.48±2.42
High	14.76±2.79	14.68±2.17	14.99±2.89	15.24±2.03
p-value	***<0.001***	***<0.001***	***0.003***	***<0.001***
Marital status				
In partnership	13.35±3.01	13.79±2.38	14.34±3.12	14.54±2.18
Single	13.15±3.04	13.57±3.11	13.07±3.55	14.16±2.54
p-value	*0.541*	*0.450*	***0.007***	*0.136*
Settlement				
Town/city	13.40±2.95	13.73±2.64	14.08±3.30	14.46±2.24
Village	12.82±3.25	13.63±2.89	13.73±3.25	14.12±2.61
p-value	*0.137*	*0.773*	*0.468*	*0.246*
Active worker				
Yes	15.55±2.41	15.20±2.46	15.71±3.09	15.09±2.61
No	12.73±2.90	13.35±2.63	13.50±3.18	14.22±2.24
p-value	***<0.001***	***<0.001***	***<0.001***	***0.006***
T-score groups				
Normal	13.81±3.24	14.23±2.41	15.42±3.57	15.08±2.70
Osteopenic	13.53±2.84	14.26±2.40	14.20±3.21	14.42±2.18
Osteoporotic	12.90±3.07	13.11±2.88	13.37±3.11	14.15±2.30
p-value	*0.078*	***<0.001***	***0.003***	***0.043***
Previous fracture				
Yes	12.77±2.95	13.33±2.67	13.29±3.11	14.25±2.30
No	13.46±3.03	13.85±2.70	14.23±3.31	14.44±2.35
p-value	***0.053***	*0.107*	***0.049***	*0.493*
Chronic disease				
Yes	13.05±2.95	13.58±2.69	13.86±3.29	14.32±2.32
No	16.28±2.41	15.47±2.21	15.71±2.68	15.35±2.28
p-value	***<0.001***	***0.001***	***0.018***	***0.037***

p-values were derived from one-way ANOVA

General health was analyzed to assess which factors had contributed to the odds of high-graded health. The most influential proven factors were being an active worker (p<0.001, OR: 3.42, CI: 1.72-6.77), higher education (higher: p=0.002, OR: 3.03, CI: 1.49-6.16, secondary: p=0.008, OR:2.26, CI:1.23-4.13), younger age (p=0.002, OR: 1.05, CI: 1.01-1.09) and the absence of chronic diseases (p=0.014, OR: 3.15, CI: 1.25-7.93) [151].

The dichotomized QOL domains (mean score>12.0) were analyzed to reveal the factors that were associated with better QOL. The results of the physical, psychological, social and environmental domains are shown in Table 8.

Table 8. The odds ratios of 'good' quality of life of physical, psychological, social and environmental domains – forward stepwise logistic regression models [151]

Variables		Physical domain			Psychological domain			Social domain			Environmental domain		
		OR	95%CI	Step[a]	OR	95%CI	Step[a]	OR	95%CI	Step[a]	OR	95%CI	Step[a]
Age		-	-		-	-		-	-		1.08**	1.03-1.13	2
Education	High	6.82***	3.07-15.17	1	4.20**	1.76-9.97	2	-	-		4.54**	1.60-12.87	1
	Secondary	2.82***	1.68-4.74		1.79**	1.18-3.59		-	-		2.02*	1.07-3.80	
	Elementary	1.00	-		1.00	-		-	-		1.00	-	
Marital status	Having a partner	-	-		-	-		-	-		2.43**	1.33-4.46	3
	Single	-	-		-	-		-	-		1.00	-	
Active worker	Yes	4.70***	2.01-10.98	2	4.01**	1.52-10.54	1	3.65**	1.63-8.14	1	2.56*	1.02-6.40	4
	No	1.00	-		1.00	-		1.00	-		1.00	-	
T-score groups	Normal	-	-		2.10	0.94-4.72	3	-	-		-	-	
	Osteopenia	-	-		2.06*	1.18-3.59		-	-		-	-	
	Osteoporosis	-	-		1.00	-		-	-		-	-	
Chronic disease	No	7.75*	0.96-62.21	3	-	-		-	-		-	-	
	Yes	1.00	-		-	-		-	-		-	-	

[a]The order of the variables getting into the model; OR=Odds Ratio; CI= Confidence Interval
*p<0.05; **p<0.01; ***p<0.001

Education proved to be influential in the physical (higher: p<0.001, OR: 6.82, CI: 3.07-15.17; secondary: p<0.001, OR: 2.82, CI: 1.68-4.74), psychological and environmental domains. Working status was shown to be involved in all aspects of QOL and affected the physical domain at most (p<0.001, OR: 4.70, CI: 2.01-10.98) (Table 8).

The effect of BMD appeared only in the psychological domain (p=0.01, OR: 2.06, CI: 1.18-3.59) (Table 8).

Table 9. The effect of demographic factors and some health status indicators on WHOQOL-BREF QOL domain scores in women treated with malignant tumor

Variables	**Domains**			
	Physical Mean±SD	Psychological Mean±SD	Social Mean±SD	Environmental Mean±SD
Age groups				
40-65 years	14.46±2.97	13.94±2.73	14.90±3.06	14.43±2.19
66-years	14.26±2.40	14.40±2.16	16.81±3.18	15.05±2.07
p-value	*0.707*	*0.336*	***0.001***	*0.120*
Education				
Elementary	13.96±2.39	13.66±2.52	16.28±3.56	14.63±2.20
Secondary	14.42±3.04	14.16±2.68	14.91±3.16	14.44±2.34
High	15.40±2.68	14.42±2.59	15.27±2.35	14.85±1.76
p-value	*0.076*	*0.414*	*0.066*	*0.660*
Marital status				
In partnership	14.56±2.80	14.32±2.43	15.48±2.74	14.62±2.12
Single	14.38±2.83	13.71±2.79	15.27±3.65	14.50±2.27
p-value	*0.682*	*0.154*	*0.681*	*0.747*
Settlement				
Town/city	14.43±3.01	14.09±2.72	15.43±3.16	14.65±2.21
Village	14.65±2.09	13.88±2.28	15.24±3.24	14.31±2.10
p-value	*0.682*	*0.666*	*0.749*	*0.409*
Active worker				
Yes	15.38±2.62	14.57±2.29	15.24±2.46	14.58±1.80
No	14.20±2.82	13.92±2.68	15.43±3.37	14.58±2.29
p-value	***0.027***	*0.189*	*0.749*	*0.994*
Type of tumor				
Breast	14.36±3.10	13.58±2.78	14.58±2.96	14.13±2.23
Cervix	14.96±2.40	14.33±2.12	15.75±3.40	14.79±2.30
Other	14.32±2.74	14.32±2.66	15.92±3.11	14.84±2.02
p-value	*0.519*	*0.232*	***0.050***	*0.162*
Regular medication				
Yes	14.29±2.80	13.90±2.64	15.38±3.12	14.52±2.14
No	15.08±2.08	14.94±2.18	16.00±3.30	14.90±2.38
p-value	*0.264*	*0.124*	*0.454*	*0.500*
Chronic disease				
Yes	14.08±2.84	13.79±2.58	15.16±3.21	14.46±2.20
No	16.08±2.13	15.11±2.55	16.33±2.82	15.06±2.09
p-value	***0.001***	***0.013***	*0.070*	*0.177*

p-values were derived from one-way ANOVA

Table 9 shows the factors influencing QOL in women with tumors. Regarding tumor-treated women the most QOL-affecting factor was the presence of any other chronic disease. It caused huge differences in the QOL of these women in the physical and psychological domains. The social domain was also significantly affected by age group and tumor type. Being an active worker have meant significantly better QOL in the physical domain.

Overall QOL and general health were analyzed to assess the factors increasing the odds of having good QOL and the odds of high-graded health by women treated with malignant tumor. Binary logistic regression model was performed, and the same demographic and health status variables were used, which were analyzed in Table 9. These parameters have been proven influencing neither by the overall QOL nor by the general health.

Also each of the four domains were analyzed to show the factors that were associated with better QOL. Only two variables have proven to be influencing and only in two domains. The type of tumor and the marital status were effective in case of psychological domain: to have gynecological cancer meant almost four times odds to have better QOL (p=0.003, OR: 3.71, CI: 1.55-.8.91); to live in partnership meant about three times odds to have better QOL (p=0.008, OR: 3.31, CI: 1.37-7.99). In the environmental domain the type of tumor was resulted in better QOL: women who had gynecological cancer had almost three times the odds of having good QOL, than women with breast cancer (p=0.048, OR: 2.85, CI: 1.01-8.08).

We analyzed the effects of the different ways of cancer treating to the QOL of women. Four treatments were investigated: surgical operation, radiotherapy, chemotherapy and psychotherapy. Surgical operation had significant effects on the social (p=0.005) and environmental (p=0.030) domains: women who were treated this way had higher scores. Radiotherapy had significant effects on the social domain (p=0.034): women who were not getting radiation therapy had higher scores of QOL. There were no significant differences between the four domain scores of women depending on the treatment with chemotherapy. Psychotherapy had the most effects in the psychological (p=0.001), social (p<0.001) and environmental (p=0.060) domains: women who were partaken this kind of treatment had significantly lower QOL scores comparing them to women who were not partaken.

Using binary logistic regression model to define which therapy contributes to women choosing better QOL, psychotherapy and surgical operation had effects. The former by the psychological (p=0.017, OR: 3.43, CI: 1.25-9.42) and social domains (p=0.008, OR: 4.03, CI: 1.43-11.37); the latter by the environmental domain (p=0.036, OR: 2.781, CI: 1.06-7.23).

4.4. Smoking, coffee and alcohol consumption

Table 10 shows the *smoking habits* of the BMD-measured women as if they were recent smokers or have left cigarette smoking years before. The highest proportion of current smokers was found among women with osteoporosis. They smoked in average 14 cigarettes per day for about 30 years. In our previous results it has been shown, that the rate of cigarette smokers was the highest among patients with osteoporosis [150]. Previous smokers have left cigarette in average for 15-17 years.

Table 10. Smoking habits of BMD-measured women

Variables	Regular smoking before osteodensitometry			Daily smoking at the time of osteodensitometry		
	Normal	Osteo-penia	Osteo-porosis	Normal	Osteo-penia	Osteo-porosis
Smoking rate [N (%)]	10 (18.9)	18 (13.1)	25 (14.8)	4 (7.5)	20 (14.6)	27 (16.0)
Duration of smoking (years)[a]	13.3±8.7	19.23±11.6	20.17±13.0	23.0±10.6	31.7±9.4	31.3±9.0
Number of cigarettes per day [a]	15.0±10.8	15.9±9.4	13.34±7.0	12.5±6.4	15.31±5.1	14.00±5.4
Number of years after cessation [a]	17.6±10.1	15.0±13.1	17.4±13.6	-	-	-

[a] Mean±SD

Smoking habits of the tumor-treated women are summarized in Table 11. Before the diagnosis two-fifth of the women smoked cigarettes, which proportion decreased to its half after the diagnosis of the tumor. Also the mean number of the smoked cigarettes shown decreasing tendency.

Table 11. Smoking habits of tumor-treated women

Variables	Before the diagnosis	After the diagnosis	During the treatment
Smoking rate [N (%)]	62 (40.0)	33 (21.3)	28 (18.1)
Duration of smoking (years)[a]	21.11±12.64	8.28±13.53	4.5±11.8
Number of cigarettes per day[a]	14.9±7.8	12.5±7.4	12.5±8.2

[a] Mean±SD

Women who participated osteodensitometry drank *coffee* every day in 74.9%. The mean amount of the consumed coffee was 0.85±0.37dL (min:0.5; max: 2dL). Comparing women with different T-score groups it can be seen that women with osteopenia and

osteoporosis drank coffee the highest proportion: about three-fourth of each of the two groups. Also the mean amount of the consumed coffee was the higher in these two groups: 1.58±0.55dL in the group normal, 1.83±0.86dL in the group osteopenia and 1.61±0.67dL in the group osteoporosis.

Women treated with malignant tumor drank coffee every day in 86.5% before the diagnosis; almost one-tenth of them consumed coffee not at all. The mean amount of the consumed beverage was 0.76±0.48dL (min: 0.5; max: 3dL) before the diagnosis of the tumor. After the diagnosis the proportion of the every day-drinking women decreased (73.5%) and the coffee non-drinkers' proportion increased (20.6%). Although the mean amount of the consumed coffee did not change significantly (0.73±0.46dL).

Almost 50% of BMD-screened women did not consume *alcohol* at all, and 1.9% of them answered to drink alcohol every day. In the highest proportion these women drank wine, almost one-third of them. The mean amount of the consumed alcohol per serving, measured in units was 1.25±0.74 (min: 1; max: 6).

Comparing different T-score groups it was shown that women with osteopenia and osteoporosis drank hard drinks in the highest proportion (5.1% and 4.2%) [150]. The proportion of drinking wine was 29.2% in the osteopenia group and 28.1% in the osteoporosis group. Consuming alcohol every day occurred in the highest proportion in women with osteoporosis (2.4%). The mean amount of the consumed alcohol per serving, measured in units were 1.43±0.89 in the group normal, 1.26±0.82 in the group osteopenia and 1.19±0.63 in the group osteoporosis.

Before the diagnosis of tumor 38.7% of the interviewed women had never consumed alcohol and 2.6% of them drank every day. The mean amount of the consumed alcohol per serving and measured in units was 2.36±2.28 (min: 0.5; max: 15.0). About half of them drank soft drinks and 8.4% of them drank hard drinks. After the diagnosis the proportion of the non-drinkers increased (60.6%), although more women drank every day (4.5%). The mean amount of the consumed alcohol measured in units was 2.08±2.29 (min: 0.5; max: 15.0). About one-third of the women consumed soft drinks (e.g. wine, beer), and 4.5% of them consumed hard drinks.

4.5. Diet and nutrition

Three-third of BMD-measured women consumed milk and diary products daily at the time of the survey, which was almost equal to the daily consumption of milk and dairy products in the childhood of these women. About one-fourth of them occasionally took vitamin and mineral substance supplementation beyond vitamin D and calcium intake, and one-third of them took these supplementations daily.

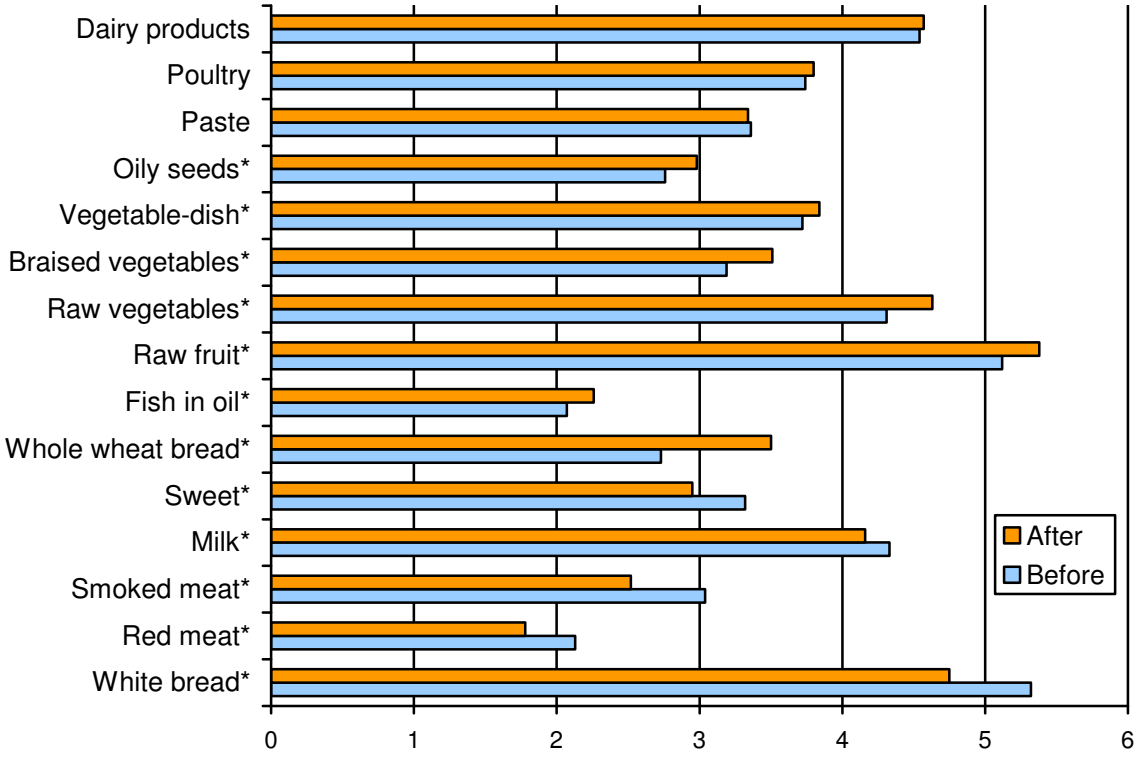
According to T-score groups, earlier (in the childhood) daily consuming of milk and dairy products was more frequent in the group normal (86.8%), than in the other two groups (70.8% in the group osteopenia; 73.4% in the group osteoporosis). Analyzing the recent consumption this proportion has not changed significantly (83.0%, 75.7%, and 73.4%). At the time of the survey the most frequent daily supplementation of calcium and vitamin D was in group osteoporosis (61.7% and 64.8%), while lower frequency was reported by the two other groups (43.4% and 52.6% in group osteopenia; 28.3% and 13.2% in group normal). Taking multivitamins occurred in almost equal proportion (30.2%-36.4%) in every group [150].

After the diagnosis of osteoporosis 52.7% of the women changed their diet. One-third of them ate more dairy products and drank more milk, 14.6% of them consumed more raw fruits and vegetables and 7.0% of them ate less fatty foods.

The relationship between the change in dietary habits and some demographic factors (age, education, activity in work, and type of settlement), previous fractures, and medical staff's advice was analyzed by using binary logistic regression analysis. The only affecting factor by women with osteoporosis was medical staff's advice ($p<0.001$, OR: 4.07 CI: 2.04-8.11). Women who were advised for lifestyle change changed their diet about four times more likely than women who were not advised.

After the diagnosis of the malignant tumor 78.7% of the women changed their nutrition. Also the same proportion mentioned to eat more raw vegetables and fruits. About one-third of the women ate more fiber rich foods and the same proportion ate less fatty foods [148].

Figure 1 shows the dietary change of the tumor-treated women (greater values meant more frequent consumption). The white bread, red meat, smoked meat, milk and sweet consumption significantly decreased after the diagnosis of tumor, while the whole wheat bread, fish in oil, raw fruit, raw vegetable, braised vegetables, vegetable-dish and oily seeds consumption significantly increased after the diagnosis of tumor.



Results of one-way ANOVA: *p<0.05

Figure 1. Consumption of some foods before and after the diagnosis of tumor

Table 12. The odds ratios of changing dietary habits according to advice for lifestyle changes, type of cancer, and active work activity in tumor-treated women [148]

Variables	p-value[b]	OR	95% CI	
			Lower	Upper
Advice for lifestyle changes	<0.001			
Yes		6.05	2.52	14.55
No[a]		1.00		
Type of cancer	0.025			
Breast		3.37	1.178	9.71
Gynecological[a]		1.00		
Active worker	0.044			
No		2.71	1.03	7.12
Yes[a]		1.00		

[a]Reference category; [b]p-values were derived from logistic regression analysis
OR:odds ratio; CI: confidence interval

The relationship between the change in dietary habit and some demographic factors (age, education, activity in work, and type of settlement), type of the malignant tumor, and medical staff's advice was analyzed by using binary logistic regression analysis (Table 12). Three out of six variables – medical staff's advice, type of the tumor and active work – fitted

the best the model. The strongest variable was the medical staff's advice (OR: 6.05). Women who got advice for lifestyle changes were 6.05 times more likely to change their nutrition compared to those who did not get any advice. The second factor influencing dietary changes was the type of the cancer. Patients with breast cancer changed 3.36 more likely (OR: 3.36) their dietary habits than patients with gynecological cancer. Thirdly, women who were not active workers changed their eating habits 2.70 more likely (OR: 2.70) than active working women [148].

4.6. Physical activity

45.9% of women who participated in osteodensitometry walked every day as the part of their schedule and one-third of them have ridden bicycle. Only 6.6% answered to have a job with physical work. Almost a half of them had sport regularly: one-tenth of them did less than one hour weekly, 38.8% of them did one or two hours per week, and 19.7% of them did more than four hours per week. Two-third of them did not change anything in her physical activity after the BMD measurement and one-third of them answered to move more.

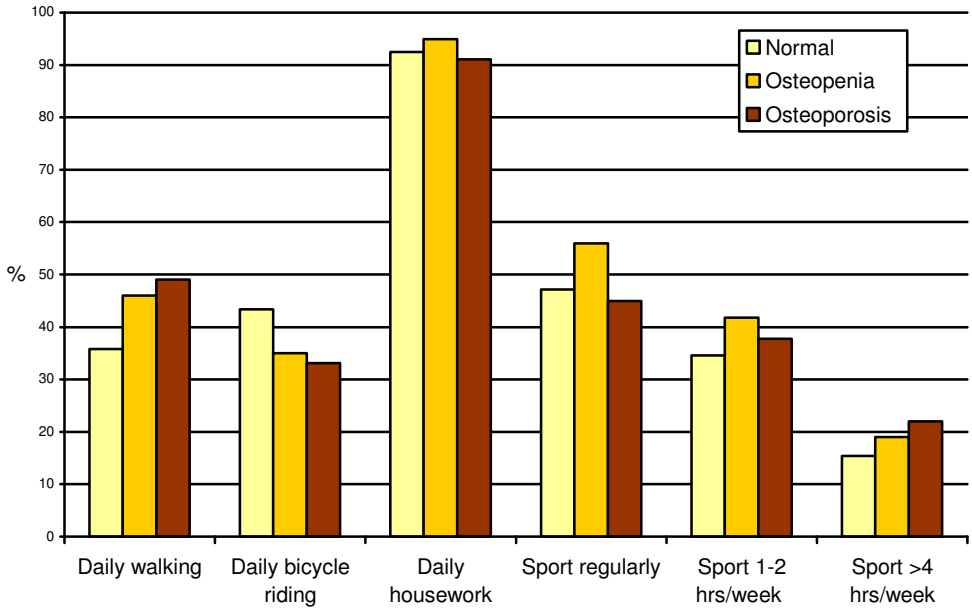


Figure 2. Physical activity according to T-score groups

Figure 2 shows the physical activity of women according to their BMD results. In their daily activities there was no significant difference, although it can be seen, that women with osteopenia and osteoporosis rather walk than to ride bicycle. More than four hours regular

sport per week was presented in the highest proportion by women suffering from osteoporosis.

After the BMD measurement women with osteoporosis changed their physical activity in the highest proportion (36.5%) (women with osteopenia: 30.1%, normal group: 29.4%). Among changing women, more physical activity occurred in the osteoporosis group (92.7%), in osteopenia group (97.3%) and by all members of the group normal [150].

68.0% of women who were treated for malignant tumor walked every day as the part of their schedule, almost a half of them rode bicycle, 7.1% of them had physical work. Regular sport activity was mentioned by 36.8% of them. Most of the women (32.4%) did sport weekly one or two hours. One-fourth of the women had sport three to four hours per week. More than four hours physical activity per week was reported by 12.7% of them.

4.7. Counseling and lifestyle change

BMD-screened women were advised for lifestyle change in similar proportion regarding their T-score results. Counseling was given from general practitioners (GPs), gynecologists and rheumatologists in the same proportion [149]. Analyzing BMD results, women with osteoporosis were advised for lifestyle change in the highest proportion by rheumatologists (36.6%) and GPs (23.2%). Dietary change occurred in BMD-screened women in higher proportion (52.7%) than changing in physical activity (36.5%) [150].

Women treated with tumor were advised to change their lifestyle in the highest proportion by their therapist and their GPs (46.5%), and this kind of information was given to them by other medical staff in 23.9% [148]. After the diagnosis of tumor 79.2% of them changed their diet and 52.3% of them changed something in her physical activity – 23.5% did more exercise, while 28.8% of them did less exercise [148].

Table 13 shows the differences in changing lifestyle (diet and physical activity) in women with osteoporosis according to some demographic factors and the presence of any chronic disease. None of the analyzed characteristics caused differences in the two groups of changers and non-changers.

Table 13. Lifestyle change (diet and physical activity) and demographic factors in women with osteoporosis

Variables	Dietary change		Changing physical activity	
	N (%)	p-value[a]	N (%)	p-value[a]
Education		0.175		0.123
Higher	22 (62.9)		11 (31.4)	
Secondary	40 (46.0)		38 (43.7)	
Elementary	26 (57.8)		12 (26.7)	
Age group		0.353		0.438
40-65 years	46 (56.8)		32 (39.5)	
66 years and over	42 (48.8)		29 (33.7)	
Settlement		0.839		0.922
Town	72 (52.2)		51 (36.7)	
Village	16 (55.2)		10 (35.7)	
Marital status		0.740		0.581
In partnership	49 (51.6)		33 (34.7)	
Single	39 (54.2)		28 (38.9)	
Other chronic disease		0.724		0.691
Yes	87 (52.7)		60 (36.4)	
No	1 (50.0)		1 (50.0)	

[a]p-values were derived from chi-square test

Table 14 shows the differences in changing lifestyle (diet and physical activity) in women with tumor according to some demographic factors and the presence of any chronic disease. There were significant differences in changing diet by education and marital status, in changing physical activity by education and age group.

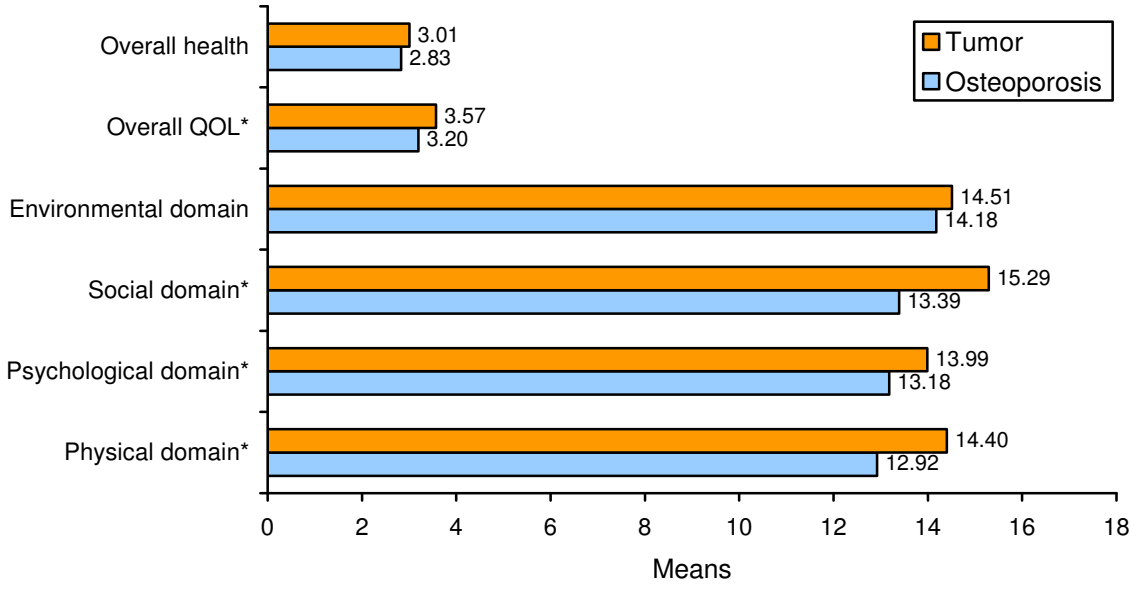
Table 14. Lifestyle change (diet and physical activity) and demographic factors in women with tumor

Variables	Dietary change		Changing physical activity	
	N (%)	p-value[a]	N (%)	p-value[a]
Education		**0.031**		**0.022**
Elementary	30 (65.2)		4 (8.7)	
Secondary	63 (84.0)		25 (34.2)	
High	28 (84.8)		7 (21.2)	
Age group		0.598		**0.007**
40-65 years	82 (79.6)		27 (26.5)	
66 years and over	31 (75.6)		5 (12.5)	
Settlement		0.341		0.822
Town	94 (80.3)		27 (23.5)	
Village	27 (73.0)		9 (24.3)	
Marital status		**0.010**		0.147
In partnership	75 (86.2)		25 (28.7)	
Single	47 (69.1)		11 (16.7)	
Other chronic disease		0.388		0.163
Yes	99 (80.5)		30 (24.6)	
No	22 (73.3)		6 (20.7)	

[a]p-values were derived from chi-square test

4.8. Comparison of women with osteoporosis to women with tumor

Figure 3 shows the differences in the QOL scores. The values of the women treated with tumor were higher in all the four QOL domains, and in the two general questions and these differences were significant in three of the domains (physical, psychological, social) and regarding the overall QOL question.



Results of one-way ANOVA: *p<0.05

Figure 3. The QOL mean scores according to patients' diagnosis (osteoporosis, tumor)

Comparing women with osteoporosis to women with tumor according to their lifestyle change on the whole we can state that women treated with tumor changed their lifestyle more frequently. This change proved to be significant by diet and exercise, as it is represented in Table 15.

Table 15. Lifestyle change according to the type of disease (osteoporosis, tumor)

Variables	**Type of disease**		**p-value**
	Osteoporosis N (%)	**Tumor** N (%)	
Dietary change	88 (52.7)	126 (79.2)	<0.001
Consumption more fruits, vegetables	23 (14.6)	113 (71.1)	<0.001
Less consumption of fatty foods	11 (7.0)	56 (35.2)	<0.001
Increased physical activity	51 (30.2)	36 (23.2)	0.022

Table 16 shows the effect of demographic factors and some health status indicators on WHOQOL-BREF QOL domain scores in women with osteoporosis. Education and to be an active worker are the factors which have resulted in their subgroups QOL significant differences regarding the most domains.

Table 16. The effect of demographic factors and some health status indicators on WHOQOL-BREF QOL domain scores in women with osteoporosis

Variables	**Domains**			
	Physical Mean±SD	Psychological Mean±SD	Social Mean±SD	Environmental Mean±SD
Age groups				
40-65 years	12.81±3.18	13.18±3.05	13.76±3.17	13.92±2.33
66-years	13.04±2.88	13.18±2.63	12.82±2.94	14.44±2.20
p-value[a]	*0.623*	*0.990*	*0.117*	*0.147*
Education				
Elementary	11.87±2.78	12.16±2.69	12.64±2.75	13.59±1.94
Secondary	13.06±2.98	13.39±2.94	13.53±3.37	14.15±2.41
High	13.99±3.09	14.06±2.39	13.84±2.51	15.00±2.12
p-value[a]	***0.007***	***0.009***	*0.363*	***0.024***
Marital status				
In partnership	12.90±3.06	13.31±2.56	13.73±2.97	14.34±1.99
Single	12.96±2.99	13.02±3.18	12.58±3.28	13.98±2.60
p-value[a]	*0.909*	*0.523*	*0.071*	*0.324*
Settlement				
Town/city	13.04±2.99	13.30±2.79	13.37±3.14	14.30±2.27
Village	12.33±3.17	12.61±3.03	13.46±3.00	13.60±2.22
p-value[a]	*0.269*	*0.247*	*0.912*	*0.139*
Active worker				
Yes	15.07±2.70	14.55±3.49	15.75±2.44	14.52±3.08
No	12.66±2.96	13.01±2.71	13.00±3.03	14.14±2.16
p-value[a]	***0.001***	***0.030***	***0.001***	*0.504*
Previous fracture				
Yes	12.77±2.94	13.04±2.83	13.22±2.85	14.29±2.21
No	13.01±3.08	13.25±2.85	13.47±3.22	14.12±2.31
p-value[a]	*0.629*	*0.654*	*0.692*	*0.649*
Chronic disease				
Yes	12.91±3.04	13.15±2.84	13.40±3.11	14.17±2.28
No	13.71±0.80	15.33±0.94	12.00±0.00	15.50±1.41
p-value[a]	*0.713*	*0.284*	*0.654*	*0.414*

[a]p-values were derived from one-way ANOVA

Table 17 shows the effects of some socio-demographic and health status parameters on the feasibility of choosing 'good QOL'. The analyzed factors were: age, education, marital status, type of settlement, to be an active worker, previous fracture, having any chronic disease. In Table 17 only the most affecting factors in each domains are appeared.

Table 17. The odds ratios of 'good' quality of life of physical, psychological, social and environmental domains by women with osteoporosis – forward stepwise logistic regression model

Variables	Domains			
	Physical	Psychological	Social	Environmental
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Age group	-	-	-	
66 years and over				3.11 (1.27-7.62)**
40-65 years				1.00
Education			-	-
High	3.85 (1.45-10.19)**	4.14(1.43-11.99)**		
Secondary	2.69 (1.27-5.69)**	2.09 (0.99-4.38)*		
Elementary	1.00	1.00		
Marital status	-	-	-	
In partnership				3.42 (1.42-8.26)**
Single				1.00
Active worker	-	-		-
Yes			5.12 (1.10-23.79)*	
No			1.00	

OR: odds ratio; CI: confidence interval
p-values were derived from logistic regression analysis: *p<0.05 **p<0.01***p<0.001

Analyzing the general question about 'good QOL' it was shown that women who had no fractures in their anamnesis chose about two times more likely (p=0.046, OR: 1.99, CI: 1.01-3.91) the answer of 'good QOL', than women with fractures. This was the only affecting factor among the investigated socio-demographic and health status parameters.

By the question about general health the two affecting factors were education and age group. Comparing women with elementary qualification to women with high education it has been revealed that in the latter group it was more than five times more likely (p=0.003, OR: 5.51, CI: 1.805-16.824) choosing the answer 'good health'. Also age group had effect: women over the age 65 (which is in Hungary the retiring age by mostly women) almost three times more often (p=0.016, OR: 2.61, CI: 1.19-5.70) chose 'good health' answer, than younger women.

5. DISCUSSION

The aim of our study was to examine Hungarian women's health, health-related behavior and QOL, who are suffering from breast/gynecological cancers or osteoporosis, which diseases affect them in the middle- and old-age. We have analyzed their socio-demographic, and health status parameters (e.g. body mass index, presence of chronic disease, regular medication), their lifestyle and lifestyle change, QOL and the factors that were associated with their better QOL.

Most of the sampled women were secondary-educated, lived in partnership, in towns and were non-workers. Women with malignant tumors were in higher proportion obese and also took medication in higher rate. The frequency of chronic diseases was similar in the two groups. Smoking, consuming coffee and hard drinks and also the dietary change were more specific to women with tumor. The main motivating factor for lifestyle change was getting advice from the medical staff.

Regarding QOL all the scores of the tumor-treated women were higher than that of with osteoporosis. Age, to be an active worker and having any chronic disease were significant factors in affecting QOL in women with tumor. Education and to be an active worker resulted in significantly higher QOL scores in women with osteoporosis. To choose 'good' QOL was more likely in higher-educated, active-worker women, in women living with partner, and in women not treated with psychotherapy.

5.1. Demographic and socio-economic factors

In the present study women with osteoporosis were about eight years older than women with tumor. This value of osteoporotic women is equal to a study by de Felipe et al. who studied Spanish women [152]; and is 12 years beyond the average of Pakistani women investigated by Fatima et al. [153]. According to the data of the American Cancer Society approximately 77% of breast cancer cases occur in women over 50 years of age and the probability of developing breast cancer by the age 60 is one out of 29 [154].

In our study the ratio of the more educated (secondary and high) women, and those living with partner was twofold in the group of women treated with tumor comparing them to women with osteoporosis. The number of years spent in school was found to be a protective factor against osteoporosis [153] and in an other study it was revealed that low qualification is

a risk factor for osteoporosis [155]. The incidence of breast cancer is higher among women with higher socioeconomic status according to a study of Larsen et al.: higher income and higher education increases the occurrence of breast cancer [156]. According to our results, among women treated with tumor there were fourfold more active workers comparing them to women with osteoporosis.

5.2. Health and health-related behavior

In our study among women with tumors there were twofold as much overweight subjects and two-and-a-half-fold as much obese women than among women with osteoporosis. It is in correlation with the statement that lower BMI is a risk factor for osteoporosis [153], and also with the study of Singh et al. reporting that disease stage and cancer related mortality significantly associated with increased BMI in breast cancer patients [157].

The frequency of chronic diseases was similar in the two groups in this study; hypertension and other cardiovascular diseases were the leading problems. In women with osteoporosis the ratio of the third most frequent chronic disease (gastrointestinal disease) is threefold more frequent than in women with tumor. Regular medication was there somewhat in higher proportion among women with osteoporosis.

Analyzing some lifestyle factors, it can be seen that before the diagnosis the smoking rate among tumor-treated women was twofold higher than in women with osteoporosis. The number of years spending with smoking and the average number of daily-smoked cigarettes was similar in the two groups. The association between smoking and osteoporosis was stated by other studies, such as smoking and smoking during 5.4 pack-years was associated with the higher risk of osteoporosis [153, 158]; ever-smoker status was associated with decreased lumbar BMD in a Japanese study, with the increasing the pack-years[1], the odds ratio for low bone status at the lumbar spine has also increased [159].

Consuming coffee before the diagnosis was there in higher proportion by women with tumor, although the units of consumed coffee per serving was less than in osteoporosis women in our study. No correlation was found between the amount of coffee consumption

[1] Pack-year: a way to measure the amount a person has smoked over a long period of time. It is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked. For example, 1 pack year is equal to smoking 20 cigarettes per day for 1 year, or 40 cigarettes per day for half a year, and so on.)

and BMD in a study by Demirbag et al. [160] however in a study of Tamaki et al. coffee consumption was found as a risk factor of low bone status [159].

According to the present results before the diagnosis of the diseases, everyday alcohol drinking occurred in the same proportion in the two groups, although women treated with tumor have consumed hard drinks in twofold proportion and the mean amount of consumed alcohol per serving was about one unit higher by them. It was shown in a study of Croatian women that increased alcohol consumption has occurred in women with osteoporosis and had statistically significant positive association with femur and spine BMD [161]. There was no changing in alcohol consumption and BMI among women with positive family history of breast cancer; the spontaneous behavioral change to a more preventive lifestyle in relatives of cancer patients was very low according to a study of Ochoa et al. [162].

Analyzing diet we have revealed that women with normal BMD have drunk the most milk and consumed the most diary products in their childhood. There are a lot of studies emphasizing the preventive role of Ca-rich diet in the development of osteoporosis [153, 158, 159, 163], and it was shown that education positively associated with Ca intake [163]. After the diagnosis about half of the osteoporotic women have changed their diet (mainly the milk and diary product consumption), which proportion is much less than that of the tumor-treated women. This difference can be seen when analyzing the details: after the diagnosis among women with tumor the number of more raw fruits and vegetables consumers was five times as much as in women with osteoporosis and also the proportion of less fat consumers was the same. Our findings about changing diet in tumor treated women are correlating to other findings: the intake of fruit and vegetables, whole grains and lean sources of protein significantly increased after the diagnosis, and consumption of high-fat, high-sugar products, red meat, coffee, some alcoholic drinks and refined grains significantly decreased [164].

5.3. Quality of life

Our study showed that regarding QOL all the scores of the tumor-treated women were higher than that of with osteoporosis, also in case of the two general questions and also in domains. Except environmental domain and overall health question these differences were significant. Education and to be an active worker resulted in significantly higher QOL scores in at least three of the domains in women with osteoporosis: both affected the physical and the psychological domains and also another out of the remaining two domains. Except these

results univocal tendency can only be seen by marital status (women in partnership have had better QOL scores). Through this analysis it was revealed, that higher education and to be an active worker affects QOL in a positive way. More highly educated women were also more likely to answer that they had good QOL; similarly to findings of other studies [38, 165]. Blumel et al. have found that women with lower education had lower psychological and social QOL scores [166]. To be an active worker means better QOL, this can be achieved through the better social support of these women when working with others; de Oliviera et al. have stated that paid work has been associated with better QOL [39].

Our analysis has also demonstrated the effectiveness of these factors: higher-qualified women have chosen better QOL according to physical and psychological domains about four times more likely than women with elementary education. Also secondary-educated women have done this about two times more likely. The social site of the QOL was influenced the most by the working status of the women: active workers have chosen better QOL about five times more likely than non-workers. Analyzing QOL on the whole (considering the two general questions about overall QOL and overall health) it can be revealed that education has affected the self-health rating of women with osteoporosis: higher-educated women have chosen the "good health" answer about five times more likely than women with elementary qualification.

Women over the retiring age have chosen "good health" answer about two and a half times more likely, than younger women. By the data of our survey, older women seem to have more time for leisure activities, and, in general, they have fewer problems with conditions of residential area. These facts could explain their satisfaction in that case. In the literature, there are several different findings considering age and QOL in postmenopausal women. Romagnoli et al. stated that age had no effect on QOL of osteoporotic women, unlike a study in Japan, which has found a negative correlation between age and QOL, similar to findings of Oleksik et al. and Salaffi et al. [42, 167, 168].

By the question about overall QOL, the most and only affecting analyzed factor was having fractures in the anamnesis in our study. Women with no fractures have answered "good QOL" two times more likely than women with previous fractures. These findings are consistent with the results of other studies. In a study of Rostom et al. it was shown that fractures and the number of them were determinants of a low QOL [169]. Lai et al. have revealed that subjects with clinical vertebral fractures had a significant reduction in QOL compared with other subjects [170].

Age, to be an active worker and having any chronic disease have been significant factors in affecting QOL in women with tumor. Regarding social domain women over the age 65 have had significantly higher QOL scores than younger women. These results are consistent with conclusions in the literature: older women with breast cancer experience less distress, less life disruption, and better psychosocial adjustment and well-being than their younger counterparts do [171, 172], and tend to be emotionally resilient from prior life stage experiences and are likely better able to manage the psychosocial demands of breast cancer [173].

To be an active worker or having no other chronic disease have meant better QOL regarding physical and psychological domains. One of the most important variables consistently related to QOL was the number of days of work or usual activity missed in the three months after diagnosis of breast cancer in a study by Avis et al.: those who reported missing all 3 months – compared with those who did not miss any days – had lower QOL on all domains [174].

In our results a higher tendency of QOL have been occurred by women who live in partnership or who have not taken regular medication according to all the domains and except the social domain by women with higher qualification. Perceived social support may likely predict a better QOL; and this may be explained by the beneficial influence of social support on QOL, the better management of QOL that older women likely have [175].

In the present study logistic regression models have proven that marital status has affected the psychological domain significantly: women with partner have chosen better QOL three times more likely than single women. Social support seeking was associated with lower scores of QOL in a study of Reid-Arndt et al. [176], and higher levels of social support were associated with higher QOL [177].

Women who were not treated with psychotherapy have chosen ‘good QOL’ three and four times more likely according to the psychological and social domains. Patients with breast cancer have often undergone many actions and treatment. Women with different personalities cope this serious disease in different ways. Those who have greater self-efficacy and greater social support can cope easier, but there are women who are more vulnerable and also need professional help to face cancer [178-182].

The type of the tumor also had significant effects in our study: regarding the psychological domain women with gynecological cancer have chosen better QOL four times more often, than women with breast cancer; in case of the environmental domain this ratio was three times more likely. Treating a women with breast cancer often causes huge changes

in the body image. The surgical operations have much consequences: in some cases mastectomy with no reconstructions, which can affect women self-judgment and through this QOL, mainly in younger women [174].

In women treated with malignant tumor the analyzed parameters (age, education, marital status, settlement, to be an active worker, previous fracture, any chronic disease, type of treatment) have not been proven significantly influencing neither by the overall QOL nor by the general health questions.

5.4. Changing behavior

Analyzing changes of health-related behaviors five factors were investigated (smoking, coffee consumption, alcohol consumption, diet, physical activity) in the osteoporotic and tumor-treated women

At the time of diagnosis the smoking rate and the number of smoked cigarettes among osteoporotic women was higher. After the diagnosis in women with cancer the smoking rate has fallen with 50%, and also the number of smoked cigarettes decreased. The proportion of coffee consumers was less in group osteoporosis before diagnosis. After the diagnosis, the every-day coffee drinkers' rate decreased among women with tumor, although the amount of coffee per serving has not changed. Before the diagnosis, the every-day alcohol consumption was equal in the two groups, and the mean amount of alcohol per serving was about half the amount of tumor-treated women in women with osteoporosis. After the diagnosis, in cancer-treated women, the number of non-drinkers increased about one-fifth proportion, and the mean amount of consumed alcohol per serving decreased. Analyzing diet, tumor-treated women have changed something in 25% higher proportion, the ratio of more raw fruit and vegetable consumption was five-and-a-half-fold higher by them as in osteoporotic women. Among women with cancer the rate of less fatty food consumers was fivefold higher, than in osteoporotic women. Changing physical activity was there about the same proportion in the two groups.

On the whole we can say that women with tumor as a life-threatening disease have changed there lifestyle in higher proportion and in higher degree comparing them to women with osteoporosis, which statement correlates to our first working hypothesis.

It is worth mentioning the role of the medical staff (mainly therapists and GPs) in making osteoporotic and tumor-treated women to alter their lifestyles. We have analyzed the

factors that have been contributed to the dietary change. The main and most effective factor of dietary change was getting advice from the medical staff. It was the most significant factor in both of the groups and the only affecting factor by women with osteoporosis. In women with tumor information about cancer and proposed lifestyle variation were given to patients by therapists in the highest proportion, and in higher rate than in other study findings [21, 183]. Salminen et al. have proved that the main reason for changing lifestyle and diet was the follow up of physicians' recommendations [183].

Women were informed in the highest proportion by their therapists, and well-informed patients have altered their lifestyles in significantly higher proportion. This result attracts the attention to the effective co-operation of the preventive and clinical care and refers to the significant role of the tailor-made intervention.

Analyzing women's lifestyle change with different socio-demographic characteristics, there were no differences in osteoporotic women's changing according to their demographic characteristics.

However in cancer-treated women there were some significant differences according to their age education and marital status. Younger women have changed their physical activity in higher proportion. They were in better physical condition with less other diseases which facts contributed to their more positive changes. Women who were higher qualified have changed their lifestyle in significantly higher proportion; this finding was consistent with other study findings [184]. Women with higher education claimed about reading more information about lifestyle change in cancer from handouts and media than women with lower education. Also more of them reported being informed by any medical staff or by other cancer-treated patient about lifestyle change in case of having malignant tumor. Furthermore, well-educated women generally have more theoretical knowledge about healthy living and diet, which could be a reason of their conscious altering. Cancer-treated subjects who were living with a partner have changed in significantly higher proportion, which fact contributes to the important role of social support in patients facing with cancer [178, 179].

6. CONCLUSIONS

1. Our first hypothesis has worked; the extent of changing lifestyle has differed in the two patient groups. Women with tumor as a life-threatening disease have changed there lifestyle in higher proportion, in higher degree, and in more aspects of their health-related behavior comparing them to women with osteoporosis, this refers to the different effect of the different diseases.

2. Our second working hypothesis has worked in part: while type of settlement and having any other chronic disease have not played any role in lifestyle change, age, education and marital status caused differences in lifestyle changing and only in tumor-treated women. The main driver of the lifestyle change was the medical staff's advice, which fact draws attention to the responsibility of health care workers, especially the role of the primary care physicians and the therapists during treatment and prevention. On the whole we can say that women treated with tumor have changed their health behavior in higher proportion, in higher degree and in more aspects of their life. This could be related to the life-threatening feature of their disease and to the fear deriving from this, which stimulates and motivates changing, so the role of physicians in giving them advice is more important.

3. Our third working hypothesis was that all women with breast cancer had lower QOL scores. This has not worked: regarding QOL all the scores of the tumor-treated women were higher than that of with osteoporosis. According to our results age, education, to be an active worker, and having no other chronic disease and in some cases marital status were the factors that affected QOL. The average age of women with osteoporosis was eight years higher, the proportion of women living with a partner was equal in the two groups. Education have played significant role in modulating QOL, higher qualification have meant higher QOL scores: among osteoporotic women the proportion of low-educated women was higher. Having other chronic diseases was there in similar proportion in the two groups. The main difference regarding these women was in the proportion of active workers: women with tumor have worked more than two times more. Also having fractures and pain have caused decreasing in the QOL scores, which facts occurred mostly in women with osteoporosis. These variables can explain the differences in the QOL of the two groups.

In conclusion it can be stated that women with osteoporosis were older, lower-educated; women with tumor had higher BMI scores, the proportion of active workers, smokers and coffee-drinkers was also higher among them. In the two groups the ratio of

partner-living, urbanized women was equal, consuming alcohol was there also in same proportion, and also the ratio a having chronic diseases.

Women treated with tumor has changed mainly their diet, osteoporotic women has changed more their physical activity. QOL has been affected in women with osteoporosis by age, education, to be an active worker, having fractures, and a positive correlation has occurred regarding marital status (living in partnership). In tumor-treated women older age, to be an active worker, having no other chronic disease, living with a partner and no regular medication were in coherency with better QOL. Comparing the two groups, tumor-treated women had higher QOL scores.

REFERENCES

1. *EUROSTAT*. Life expectancy at birth, by gender (Females). *2008* [updated 2008; cited]; *Available from: http://epp.eurostat.ec.europa.eu/guip/themeAction.do*.
2. European health for all database (HFA-DB) World Health Organization Regional Office for Europe. [cited]; *Available from: http://data.euro.who.int/hfadb/*.
3. *Central Statistical Office H*. Information database. *2008* [updated 2008; cited]; *Available from: http://statinfo.ksh.hu/Statinfo/haViewer.jsp*.
4. Yearbook of Health Statistics, 2008. Hungarian Central Statistical Office; 2009.
5. *Boncz I.* Organized nationwide breast cancer screening programme was introduced in Hungary in 2002. *Swiss Med Wkly. 2006;136(19-20):328*.
6. *Shapiro S, Venet W, Strax P, Venet L, Roeser R.* Ten- to fourteen-year effect of screening on breast cancer mortality. *J Natl Cancer Inst. 1982;69(2):349-55*.
7. *Shapiro S, Venet W, Strax P, Venet L, Roeser R.* Selection, follow-up, and analysis in the Health Insurance Plan Study: a randomized trial with breast cancer screening. *Natl Cancer Inst Monogr. 1985;67:65-74*.
8. *Tabar L, Fagerberg CJ, Gad A, et al.* Reduction in mortality from breast cancer after mass screening with mammography. Randomised trial from the Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. *Lancet. 1985;1(8433):829-32*.
9. *Bandera EV, Kushi LH, Moore DF, Gifkins DM, McCullough ML.* Consumption of animal foods and endometrial cancer risk: a systematic literature review and meta-analysis. *Cancer Causes Control. 2007;18(9):967-88*.
10. *Bandera EV, Kushi LH, Moore DF, Gifkins DM, McCullough ML.* Fruits and vegetables and endometrial cancer risk: a systematic literature review and meta-analysis. *Nutr Cancer. 2007;58(1):6-21*.
11. *Bandera EV, Kushi LH, Moore DF, Gifkins DM, McCullough ML.* Dietary lipids and endometrial cancer: the current epidemiologic evidence. *Cancer Causes Control. 2007;18(7):687-703*.
12. *Bosetti C, Negri E, Franceschi S, et al.* Olive oil, seed oils and other added fats in relation to ovarian cancer (Italy). *Cancer Causes Control. 2002;13(5):465-70*.
13. *Chlebowski RT, Aiello E, McTiernan A.* Weight loss in breast cancer patient management. *J Clin Oncol. 2002;20(4):1128-43*.
14. *Clarke EA, Morgan RW, Newman AM.* Smoking as a risk factor in cancer of the cervix: additional evidence from a case-control study. *Am J Epidemiol. 1982;115(1):59-66*.
15. *Dossus L, Kaaks R.* Nutrition, metabolic factors and cancer risk. *Best Pract Res Clin Endocrinol Metab. 2008;22(4):551-71*.
16. *Ghosh C, Baker JA, Moysich KB, Rivera R, Brasure JR, McCann SE.* Dietary intakes of selected nutrients and food groups and risk of cervical cancer. *Nutr Cancer. 2008;60(3):331-41*.
17. *Glade MJ.* Food, nutrition, and the prevention of cancer: a global perspective. American Institute for Cancer Research/World Cancer Research Fund, American Institute for Cancer Research, 1997. *Nutrition. 1999;15(6):523-6*.
18. *Goodman MT, Wilkens LR, Hankin JH, Lyu LC, Wu AH, Kolonel LN.* Association of soy and fiber consumption with the risk of endometrial cancer. *Am J Epidemiol. 1997;146(4):294-306*.
19. *Key TJ, Allen NE, Spencer EA, Travis RC.* The effect of diet on risk of cancer. *Lancet. 2002;360(9336):861-8*.
20. *Kjellberg L, Hallmans G, Ahren AM, et al.* Smoking, diet, pregnancy and oral contraceptive use as risk factors for cervical intra-epithelial neoplasia in relation to human papillomavirus infection. *Br J Cancer. 2000;82(7):1332-8*.
21. *Landers P, Tkacheva-Jameson O, Anderson S, Tolma E, Skaggs V.* An update on breast cancer in Oklahoma and the dietary changes women make after diagnosis. *J Okla State Med Assoc. 2008;101(1):15-9*.
22. *Lanneau GS, Argenta PA, Lanneau MS, et al.* Vulvar cancer in young women: demographic features and outcome evaluation. *Am J Obstet Gynecol. 2009*.

23. *Le Corre L, Chalabi N, Delort L, Bignon YJ, Bernard-Gallon DJ.* Resveratrol and breast cancer chemoprevention: molecular mechanisms. *Mol Nutr Food Res. 2005;49(5):462-71.*
24. *Maillard V, Bougnoux P, Ferrari P, et al.* N-3 and N-6 fatty acids in breast adipose tissue and relative risk of breast cancer in a case-control study in Tours, France. *Int J Cancer. 2002;98(1):78-83.*
25. *Maunsell E, Drolet M, Brisson J, Robert J, Deschenes L.* Dietary change after breast cancer: extent, predictors, and relation with psychological distress. *J Clin Oncol. 2002;20(4):1017-25.*
26. *McPherson K, Steel CM, Dixon JM.* ABC of breast diseases. Breast cancer-epidemiology, risk factors, and genetics. *BMJ. 2000;321(7261):624-8.*
27. *Nordevang E, Callmer E, Marmur A, Holm LE.* Dietary intervention in breast cancer patients: effects on food choice. *Eur J Clin Nutr. 1992;46(6):387-96.*
28. *Plummer M, Herrero R, Franceschi S, et al.* Smoking and cervical cancer: pooled analysis of the IARC multi-centric case--control study. *Cancer Causes Control. 2003;14(9):805-14.*
29. *Schnoll RA, Malstrom M, James C, et al.* Correlates of tobacco use among smokers and recent quitters diagnosed with cancer. *Patient Educ Couns. 2002;46(2):137-45.*
30. *Sherman JF, Mount SL, Evans MF, Skelly J, Simmons-Arnold L, Eltabbakh GH.* Smoking increases the risk of high-grade vaginal intraepithelial neoplasia in women with oncogenic human papillomavirus. *Gynecol Oncol. 2008;110(3):396-401.*
31. *Taper HS, Roberfroid M.* Influence of inulin and oligofructose on breast cancer and tumor growth. *J Nutr. 1999;129(7 Suppl):1488S-91S.*
32. *Thomson CA, Flatt SW, Rock CL, Ritenbaugh C, Newman V, Pierce JP.* Increased fruit, vegetable and fiber intake and lower fat intake reported among women previously treated for invasive breast cancer. *J Am Diet Assoc. 2002;102(6):801-8.*
33. *Wayne SJ, Neuhouser ML, Ulrich CM, et al.* Dietary fiber is associated with serum sex hormones and insulin-related peptides in postmenopausal breast cancer survivors. *Breast Cancer Res Treat. 2008;112(1):149-58.*
34. *Zhang S, Hunter DJ, Hankinson SE, et al.* A prospective study of folate intake and the risk of breast cancer. *JAMA. 1999;281(17):1632-7.*
35. *Kovacs A, Dobrossy L, Budai A, Cornides A, Boncz I.* [The state of the organized screening in Hungary in 2006]. *Orv Hetil. 2007;148(10):435-40.*
36. *National Center for Epidemiology H.* Országos Lakossági Egészségfelmérés 2003. [National Health Interview Survey 2003]. *2004* [updated 2004; cited]; *Available from: http://www.oszmk.hu/index.php?m=29.*
37. *WHO.* Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychol Med. 1998;28(3):551-8.*
38. *Abourazzak FE, Allali F, Rostom S, et al.* Factors influencing quality of life in Moroccan postmenopausal women with osteoporotic vertebral fracture assessed by ECOS 16 questionnaire. *Health Qual Life Outcomes. 2009;7:23.*
39. *de Oliveira Ferreira N, Arthuso M, da Silva R, Pedro AO, Neto AM, Costa-Paiva L.* Quality of life in women with postmenopausal osteoporosis: correlation between QUALEFFO 41 and SF-36. *Maturitas. 2009;62(1):85-90.*
40. *Martin AR, Sornay-Rendu E, Chandler JM, Duboeuf F, Girman CJ, Delmas PD.* The impact of osteoporosis on quality-of-life: the OFELY cohort. *Bone. 2002;31(1):32-6.*
41. *Ozkan S, Alatas ES, Zencir M.* Women's quality of life in the premenopausal and postmenopausal periods. *Qual Life Res. 2005;14(8):1795-801.*
42. *Romagnoli E, Carnevale V, Nofroni I, et al.* Quality of life in ambulatory postmenopausal women: the impact of reduced bone mineral density and subclinical vertebral fractures. *Osteoporos Int. 2004;15(12):975-80.*
43. *Bianchi ML, Orsini MR, Saraifoger S, Ortolani S, Radaelli G, Betti S.* Quality of life in post-menopausal osteoporosis. *Health Qual Life Outcomes. 2005;3:78.*
44. *Lin MR, Wolf SL, Hwang HF, Gong SY, Chen CY.* A randomized, controlled trial of fall prevention programs and quality of life in older fallers. *J Am Geriatr Soc. 2007;55(4):499-506.*
45. *Lombardi I, Jr., Oliveira LM, Monteiro CR, Confessor YQ, Barros TL, Natour J.* Evaluation of physical capacity and quality of life in osteoporotic women. *Osteoporos Int. 2004;15(1):80-5.*
46. *Yao KP, Lee HY, Tsauo JY.* Are hip-specific items useful in a quality of life questionnaire for patients with hip fractures? *Int J Rehabil Res. 2009;32(3):245-50.*

47. *Javaid MK, Cooper C.* Prenatal and childhood influences on osteoporosis. *Best Pract Res Clin Endocrinol Metab. 2002;16(2):349-67.*
48. *Jordan KM, Cooper C.* Epidemiology of osteoporosis. *Best Pract Res Clin Rheumatol. 2002;16(5):795-806.*
49. *Korpelainen R, Korpelainen J, Heikkinen J, Vaananen K, Keinanen-Kiukaanniemi S.* Lifelong risk factors for osteoporosis and fractures in elderly women with low body mass index--a population-based study. *Bone. 2006;39(2):385-91.*
50. *Lane NE.* Epidemiology, etiology, and diagnosis of osteoporosis. *Am J Obstet Gynecol. 2006;194(2 Suppl):S3-11.*
51. *Moyad MA.* Osteoporosis: a rapid review of risk factors and screening methods. *Urol Oncol. 2003;21(5):375-9.*
52. *McClung MR.* The menopause and HRT. Prevention and management of osteoporosis. *Best Pract Res Clin Endocrinol Metab. 2003;17(1):53-71.*
53. *Csoboth C.* A magyar nők egészsége. [Health status of Hungarian women]. *Hippocrates. 2003;5(6):375-8.*
54. *Susánszky É, Székely A, Szabó G, et al.* A Hungarostudy Egészség Panel (HEP) felmérés módszertani leírása. [The methodology of the Hungarostudy Health Panel]. *Mentálhigiéné és Pszichoszomatika. 2007;8(4):259-76.*
55. *Purebl G, Susánszky É, Szumska I, et al.* Gyorsjelentés a Hungarostudy Egészség Panel (HEP) 2005-ös vizsgálatáról. [Report of the Hungarostudy Epidemiological Panel Survey in 2005]. *2005* [updated 2005; cited]; *Available from: http://www.magtud.sote.hu/hungarostudy-egeszseg-panel-gyorsjelentes.htm.*
56. *Brands A, Yack D.* Women and the rapid rise of noncommunicable diseases. *NMH Reader. 2002;(1):WHO.*
57. *Skrabski A, Kopp M, Rozsa S, Rethelyi J, Rahe RH.* Life meaning: an important correlate of health in the Hungarian population. *Int J Behav Med. 2005;12(2):78-85.*
58. *Kopp M, Skrabski Á.* A magyar népesség életkilátásai. [Life expectancies of the Hungarian population]. *Magyar Tudomány. 2007;9:1149.*
59. Józan P. A nők egészségi állapotának néhány jellemzője. [Some parameters of the health status of Hungarian women]. In: Pongrácz T, Tóth IG, editors. Gender role changes Report of the status of men and women; 1999. p. 101-15.
60. National Health Interview Survey 2000. Research Report (in Hungarian). Budapest: National Center for Epidemiology; 2002.
61. Országos Lakossági Egészségfelmérés 2003.[National Health Interview Survey 2003, Hungary Executive Update.]. Budapest: Johan Béla National Center for Epidemiology; 2004.
62. *Cokkinides V, Bandi P, McMahon C, Jemal A, Glynn T, Ward E.* Tobacco control in the United States--recent progress and opportunities. *CA Cancer J Clin. 2009;59(6):352-65.*
63. *Kopp M.* Magatartástudomány és orvoslás a XXI. században. [Behavioural science and medicine in the XXI. century]. *Magyar Tudomány. 2003;11:1352.*
64. *Skrabski A, Kopp M, Kawachi I.* Social capital in a changing society: cross sectional associations with middle aged female and male mortality rates. *J Epidemiol Community Health. 2003;57(2):114-9.*
65. Consensus development conference: diagnosis, prophylaxis, and treatment of osteoporosis. *Am J Med. 1993;94(6):646-50.*
66. International Osteoporosis Foundation. The facts about osteoporosis and its impact.; [cited 2010]; *Available from: http://www.iofbonehealth.org/facts-and-statistics.html.*
67. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy, March 7-29, 2000: highlights of the conference. *South Med J. 2001;94(6):569-73.*
68. *Johnell O, Kanis JA, Oden A, et al.* Mortality after osteoporotic fractures. *Osteoporos Int. 2004;15(1):38-42.*
69. *Miyakoshi N, Itoi E, Kobayashi M, Kodama H.* Impact of postural deformities and spinal mobility on quality of life in postmenopausal osteoporosis. *Osteoporos Int. 2003;14(12):1007-12.*
70. *Adachi JD, Ioannidis G, Olszynski WP, et al.* The impact of incident vertebral and non-vertebral fractures on health related quality of life in postmenopausal women. *BMC Musculoskelet Disord. 2002;3:11.*

71. *Johnell O, Kanis J.* Epidemiology of osteoporotic fractures. *Osteoporos Int. 2005;16 Suppl 2:S3-7.*
72. *Lips P, Cooper C, Agnusdei D, et al.* Quality of life in patients with vertebral fractures: validation of the Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO). Working Party for Quality of Life of the European Foundation for Osteoporosis. *Osteoporos Int. 1999;10(2):150-60.*
73. *Lakatos P.* Az osteoporosis gyógyszeres kezelésének korszerű szemlélete. [Modern aspects of the medical treatment of osteoporosis]. *Hippocrates. 2005;7(2).*
74. *László Á.* Posztmenopausas osteoporosis. [Osteoporosis in postmenopause] *Orvosi Hetilap. 2004;145(1):3-13.*
75. *Somogyi P.* A csontritkulás diagnosztikája és terápiája 2007-ben. [Diagnosis and therapy of osteoporosis in 2007]. *Hippocrates. 2007;9(2):91-8.*
76. *Tárczi C, Szerb J, Varga L, Toldy E.* Posztmenopauzában lévő nők csontanyagcsere-vizsgálata a testtömegindex függvényében.[Bone metabolism in postmenopausal women according to Body Mass Index]. *Ca és Csont. 2004;7(2):43-7.*
77. *Szathmári M.* Új gyógyszer a csontritkulás kezelésére. [New medicine for the treatment of osteoporosis]. *Világgazdaság Online. 2006.*
78. Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. Report of a WHO Study Group. *World Health Organ Tech Rep Ser. 1994;843:1-129.*
79. National Osteoporosis Foundation. Physician's guide to prevention and treatment of osteoporosis. *Washington (DC): National Osteoporosis Foundation. 2003:1.*
80. *Cooper C, Melton LJ, 3rd.* Epidemiology of osteoporosis. *Trends Endocrinol Metab. 1992;3(6):224-9.*
81. *Cummings SR, Nevitt MC, Browner WS, et al.* Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. *N Engl J Med. 1995;332(12):767-73.*
82. *Nguyen TV, Center JR, Sambrook PN, Eisman JA.* Risk factors for proximal humerus, forearm, and wrist fractures in elderly men and women: the Dubbo Osteoporosis Epidemiology Study. *Am J Epidemiol. 2001;153(6):587-95.*
83. *Mora S, Gilsanz V.* Establishment of peak bone mass. *Endocrinol Metab Clin North Am. 2003;32(1):39-63.*
84. *Garnero P, Delmas PD.* Contribution of bone mineral density and bone turnover markers to the estimation of risk of osteoporotic fracture in postmenopausal women. *J Musculoskelet Neuronal Interact. 2004;4(1):50-63.*
85. *Ravn P, Cizza G, Bjarnason NH, et al.* Low body mass index is an important risk factor for low bone mass and increased bone loss in early postmenopausal women. Early Postmenopausal Intervention Cohort (EPIC) study group. *J Bone Miner Res. 1999;14(9):1622-7.*
86. *Cummings SR, Browner WS, Bauer D, et al.* Endogenous hormones and the risk of hip and vertebral fractures among older women. Study of Osteoporotic Fractures Research Group. *N Engl J Med. 1998;339(11):733-8.*
87. *Klotzbuecher CM, Ross PD, Landsman PB, Abbott TA, 3rd, Berger M.* Patients with prior fractures have an increased risk of future fractures: a summary of the literature and statistical synthesis. *J Bone Miner Res. 2000;15(4):721-39.*
88. *Lindsay R, Silverman SL, Cooper C, et al.* Risk of new vertebral fracture in the year following a fracture. *JAMA. 2001;285(3):320-3.*
89. *Albrand G, Munoz F, Sornay-Rendu E, DuBoeuf F, Delmas PD.* Independent predictors of all osteoporosis-related fractures in healthy postmenopausal women: the OFELY study. *Bone. 2003;32(1):78-85.*
90. National Osteoporosis Foundation Medications that may cause bone loss - pack of 50.; *2010* [updated 2010; cited]; *Available from: http://www.nof.org/catalog/order_form_stand_alone_080505*
91. *Krall EA, Dawson-Hughes B.* Smoking increases bone loss and decreases intestinal calcium absorption. *J Bone Miner Res. 1999;14(2):215-20.*
92. *Law MR, Hackshaw AK.* A meta-analysis of cigarette smoking, bone mineral density and risk of hip fracture: recognition of a major effect. *BMJ. 1997;315(7112):841-6.*
93. *Omland LM, Tell GS, Ofjord S, Skag A.* Risk factors for low bone mineral density among a large group of Norwegian women with fractures. *Eur J Epidemiol. 2000;16(3):223-9.*

94. *Hannan MT, Felson DT, Dawson-Hughes B, et al.* Risk factors for longitudinal bone loss in elderly men and women: the Framingham Osteoporosis Study. *J Bone Miner Res. 2000;15(4):710-20.*
95. *Lips P.* Vitamin D deficiency and secondary hyperparathyroidism in the elderly: consequences for bone loss and fractures and therapeutic implications. *Endocr Rev. 2001;22(4):477-501.*
96. *Furstenberg AL, Mezey MD.* Differences in outcome between black and white elderly hip fracture patients. *J Chronic Dis. 1987;40(10):931-8.*
97. *Kellie SE, Brody JA.* Sex-specific and race-specific hip fracture rates. *Am J Public Health. 1990;80(3):326-8.*
98. *Villa ML.* Cultural determinants of skeletal health: the need to consider both race and ethnicity in bone research. *J Bone Miner Res. 1994;9(9):1329-32.*
99. *Margolis KL, Ensrud KE, Schreiner PJ, Tabor HK.* Body size and risk for clinical fractures in older women. Study of Osteoporotic Fractures Research Group. *Ann Intern Med. 2000;133(2):123-7.*
100. *Lasaite L, Krasauskiene A.* Psychological state, quality of life, and body composition in postmenopausal women with osteoporosis in Lithuania. *Arch Osteoporos. 2009;4(1-2):85-90.*
101. *Hallberg I, Rosenqvist AM, Kartous L, Lofman O, Wahlstrom O, Toss G.* Health-related quality of life after osteoporotic fractures. *Osteoporos Int. 2004;15(10):834-41.*
102. Statistical information team. Cancer Research UK *2009.*
103. Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50302 women with breast cancer and 96973 women without the disease. *Lancet. 2002;360(9328):187-95.*
104. *Garcia-Closas M, Brinton LA, Lissowska J, et al.* Established breast cancer risk factors by clinically important tumour characteristics. *Br J Cancer. 2006;95(1):123-9.*
105. *Ma H, Bernstein L, Pike MC, Ursin G.* Reproductive factors and breast cancer risk according to joint estrogen and progesterone receptor status: a meta-analysis of epidemiological studies. *Breast Cancer Res. 2006;8(4):R43.*
106. Breast cancer and hormone replacement therapy: collaborative reanalysis of data from 51 epidemiological studies of 52,705 women with breast cancer and 108,411 women without breast cancer. Collaborative Group on Hormonal Factors in Breast Cancer. *Lancet. 1997;350(9084):1047-59.*
107. Breast cancer and hormonal contraceptives: collaborative reanalysis of individual data on 53 297 women with breast cancer and 100 239 women without breast cancer from 54 epidemiological studies. Collaborative Group on Hormonal Factors in Breast Cancer. *Lancet. 1996;347(9017):1713-27.*
108. *Page DL, Schuyler PA, Dupont WD, Jensen RA, Plummer WD, Jr., Simpson JF.* Atypical lobular hyperplasia as a unilateral predictor of breast cancer risk: a retrospective cohort study. *Lancet. 2003;361(9352):125-9.*
109. *Ford D, Easton DF, Stratton M, et al.* Genetic heterogeneity and penetrance analysis of the BRCA1 and BRCA2 genes in breast cancer families. The Breast Cancer Linkage Consortium. *Am J Hum Genet. 1998;62(3):676-89.*
110. *Reeves GK, Pirie K, Beral V, Green J, Spencer E, Bull D.* Cancer incidence and mortality in relation to body mass index in the Million Women Study: cohort study. *BMJ. 2007;335(7630):1134.*
111. *Maruti SS, Willett WC, Feskanich D, Rosner B, Colditz GA.* A prospective study of age-specific physical activity and premenopausal breast cancer. *J Natl Cancer Inst. 2008;100(10):728-37.*
112. *Baan R, Straif K, Grosse Y, et al.* Carcinogenicity of alcoholic beverages. *Lancet Oncol. 2007;8(4):292-3.*
113. *Boyd NF, Stone J, Vogt KN, Connelly BS, Martin LJ, Minkin S.* Dietary fat and breast cancer risk revisited: a meta-analysis of the published literature. *Br J Cancer. 2003;89(9):1672-85.*
114. *Megdal SP, Kroenke CH, Laden F, Pukkala E, Schernhammer ES.* Night work and breast cancer risk: a systematic review and meta-analysis. *Eur J Cancer. 2005;41(13):2023-32.*
115. *John EM, Phipps AI, Knight JA, et al.* Medical radiation exposure and breast cancer risk: findings from the Breast Cancer Family Registry. *Int J Cancer. 2007;121(2):386-94.*
116. *Takkouche B, Regueira-Mendez C, Etminan M.* Breast cancer and use of nonsteroidal anti-inflammatory drugs: a meta-analysis. *J Natl Cancer Inst. 2008;100(20):1439-47.*
117. *Walboomers JM, Meijer CJ.* Do HPV-negative cervical carcinomas exist? *J Pathol. 1997;181(3):253-4.*

118. *Berrington de Gonzalez A, Sweetland S, Green J.* Comparison of risk factors for squamous cell and adenocarcinomas of the cervix: a meta-analysis. *Br J Cancer. 2004;90(9):1787-91.*
119. *Madeleine MM, Anttila T, Schwartz SM, et al.* Risk of cervical cancer associated with Chlamydia trachomatis antibodies by histology, HPV type and HPV cofactors. *Int J Cancer. 2007;120(3):650-5.*
120. *Smith JS, Herrero R, Bosetti C, et al.* Herpes simplex virus-2 as a human papillomavirus cofactor in the etiology of invasive cervical cancer. *J Natl Cancer Inst. 2002;94(21):1604-13.*
121. *Hemminki K, Chen B.* Familial risks for cervical tumors in full and half siblings: etiologic apportioning. *Cancer Epidemiol Biomarkers Prev. 2006;15(7):1413-4.*
122. *Pike MC, Pearce CL, Wu AH.* Prevention of cancers of the breast, endometrium and ovary. *Oncogene. 2004;23(38):6379-91.*
123. *Lukanova A, Lundin E, Micheli A, et al.* Circulating levels of sex steroid hormones and risk of endometrial cancer in postmenopausal women. *Int J Cancer. 2004;108(3):425-32.*
124. *Xu WH, Matthews CE, Xiang YB, et al.* Effect of adiposity and fat distribution on endometrial cancer risk in Shanghai women. *Am J Epidemiol. 2005;161(10):939-47.*
125. Tamoxifen for early breast cancer: an overview of the randomised trials. Early Breast Cancer Trialists' Collaborative Group. *Lancet. 1998;351(9114):1451-67.*
126. *Voskuil DW, Monninkhof EM, Elias SG, Vlems FA, van Leeuwen FE.* Physical activity and endometrial cancer risk, a systematic review of current evidence. *Cancer Epidemiol Biomarkers Prev. 2007;16(4):639-48.*
127. *Viswanathan AN, Feskanich D, De Vivo I, et al.* Smoking and the risk of endometrial cancer: results from the Nurses' Health Study. *Int J Cancer. 2005;114(6):996-1001.*
128. *Granstrom C, Sundquist J, Hemminki K.* Population attributable fractions for ovarian cancer in Swedish women by morphological type. *Br J Cancer. 2008;98(1):199-205.*
129. *Whittemore AS, Harris R, Itnyre J.* Characteristics relating to ovarian cancer risk: collaborative analysis of 12 US case-control studies. IV. The pathogenesis of epithelial ovarian cancer. Collaborative Ovarian Cancer Group. *Am J Epidemiol. 1992;136(10):1212-20.*
130. *Beral V, Doll R, Hermon C, Peto R, Reeves G.* Ovarian cancer and oral contraceptives: collaborative reanalysis of data from 45 epidemiological studies including 23,257 women with ovarian cancer and 87,303 controls. *Lancet. 2008;371(9609):303-14.*
131. *Zhou B, Sun Q, Cong R, et al.* Hormone replacement therapy and ovarian cancer risk: a meta-analysis. *Gynecol Oncol. 2008;108(3):641-51.*
132. *Lahmann PH, Cust AE, Friedenreich CM, et al.* Anthropometric measures and epithelial ovarian cancer risk in the European Prospective Investigation into Cancer and Nutrition. *Int J Cancer. 2009;126(10):2404-15.*
133. *Jordan SJ, Whiteman DC, Purdie DM, Green AC, Webb PM.* Does smoking increase risk of ovarian cancer? A systematic review. *Gynecol Oncol. 2006;103(3):1122-9.*
134. *Chen S, Parmigiani G.* Meta-analysis of BRCA1 and BRCA2 penetrance. *J Clin Oncol. 2007;25(11):1329-33.*
135. *Valenti M, Porzio G, Aielli F, et al.* Physical exercise and quality of life in breast cancer survivors. *Int J Med Sci. 2008;5(1):24-8.*
136. *Michael YL, Berkman LF, Colditz GA, Holmes MD, Kawachi I.* Social networks and health-related quality of life in breast cancer survivors: a prospective study. *J Psychosom Res. 2002;52(5):285-93.*
137. *Amichetti M, Caffo O.* Quality of life in patients with early stage breast carcinoma treated with conservation surgery and radiotherapy. An Italian monoinstitutional study. *Tumori. 2001;87(2):78-84.*
138. *Wong LY, Wong CK, Leung PC, Lam WK.* The efficacy of herbal therapy on quality of life in patients with breast cancer: self-control clinical trial. *Patient Prefer Adherence. 2010;4:223-9.*
139. *Chae YR, Seo K.* Health-related quality of life in women with breast cancer in Korea: do sociodemographic characteristics and time since diagnosis make a difference? *Oncol Nurs Forum. 2010;37(4):E295-303.*
140. *WHO.* The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties. *Soc Sci Med. 1998;46(12):1569-85.*

141. *Power M, Harper A, Bullinger M.* The World Health Organization WHOQOL-100: tests of the universality of Quality of Life in 15 different cultural groups worldwide. *Health Psychol. 1999;18(5):495-505.*
142. *Kullmann L, Harangozó J.* Az Egészségügyi Világszervezet életminőség vizsgáló módszerének hazai adaptációja.[Hungarian adaptation of the WHO QOL assessment tool]. *Orvosi Hetilap. 1999;140(35):1947-52.*
143. *Tróznai T, Kullmann L.* A WHOQOL-100 életminőség vizsgáló kérdőív magyar verziójának validálása.[Validation pf the Hungarian version of the WHOQOL-100]. *Rehabilitáció. 2006;16(2):28-36.*
144. *Skevington SM, Lotfy M, O'Connell KA.* The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. *Qual Life Res. 2004;13(2):299-310.*
145. *Paulik E, Belec B, Molnar R, et al.* Az Egészségügyi Világszervezet rövidített életminőség kérdőívének hazai alkalmazhatóságáról. [Applicability of the abbreviated version of the World Health Organization's quality of life questionnaire in Hungary]. *Orv Hetil. 2007;148(4):155-60.*
146. *Bland JM, Altman DG.* Cronbach's alpha. *BMJ. 1997;314(7080):572.*
147. *Cronbach LJ.* Test reliability; its meaning and determination. *Psychometrika. 1947;12(1):1-16.*
148. *Nagy Á, Paulik E, Thurzó L.* Az egészségügyi személyzet életmód-tanácsadó tevékenységének szerepe daganatos betegséggel kezelt nők táplálkozási szokásainak megváltoztatásában.[The role of medical staff's advice in dietary change of tumor-treated women]. *Magyar Onkológia. 2010;54:41-5.*
149. *Paulik E, Nagy Á.* A háziorvos szerepe az osteoporosis megelőzésében és kezelésében.[The role of general practitioners in the prevention and treatment of osteoporosis]. *Medicus Universalis. 2008;41(1):27-30.*
150. *Nagy Á, Paulik E.* Az életmód és az osteoporosis kapcsolata közép- és időskorú nők körében.[Osteoporosis and lifestyle in middle-and old-aged women]. *Egészségfejlesztés. 2009;5(3):8-13.*
151. *Maroti-Nagy A, Paulik E.* Factors influencing quality of life of Hungarian postmenopausal women screened by osteodensitometry. *Int J Rehabil Res.*
152. *de Felipe R, Caceres C, Cimas M, Davila G, Fernandez S, Ruiz T.* [Clinical characteristics of patients under treatment for osteoporosis in a Primary Care Centre. Who do we treat?]. *Aten Primaria. 2010;42(11):559-63.*
153. *Fatima M, Nawaz H, Kassi M, et al.* Determining the risk factors and prevalence of osteoporosis using quantitative ultrasonography in Pakistani adult women. *Singapore Med J. 2009;50(1):20-8.*
154. American Cancer Society Breast Cancer Facts & Figures. *2008-2009* [updated 2008-2009; cited]; *Available from: http://www.cancer.org/.*
155. *Karunanayake AL, Pinidiyapathirage MJ, Wickremasinghe AR.* Prevalence and predictors of osteoporosis in an urban Sri Lankan population. *Int J Rheum Dis. 2010;13(4):385-90.*
156. *Larsen SB, Olsen A, Lynch J, et al.* Socioeconomic position and lifestyle in relation to breast cancer incidence among postmenopausal women: A prospective cohort study, Denmark, 1993-2006. *Cancer Epidemiol. 2011.*
157. *Singh AK, Pandey A, Tewari M, et al.* Obesity augmented breast cancer risk: A potential risk factor for Indian women. *J Surg Oncol. 2011.*
158. *Perez JA, Garcia FC, Palacios S, Perez M.* Epidemiology of risk factors and symptoms associated with menopause in Spanish women. *Maturitas. 2009;62(1):30-6.*
159. *Tamaki J, Iki M, Sato Y, et al.* Smoking among premenopausal women is associated with increased risk of low bone status: the JPOS Study. *J Bone Miner Metab. 2010;28(3):320-7.*
160. *Demirbag D, Ozdemir F, Ture M.* Effects of coffee consumption and smoking habit on bone mineral density. *Rheumatol Int. 2006;26(6):530-5.*
161. *Ilich JZ, Cvijetic S, Baric IC, et al.* Nutrition and lifestyle in relation to bone health and body weight in Croatian postmenopausal women. *Int J Food Sci Nutr. 2009;60(4):319-32.*
162. *Ochoa EM, Gomez-Acebo I, Rodriguez-Cundin P, Navarro-Cordoba M, Llorca J, Dierssen-Sotos T.* Relationship between family history of breast cancer and health-related behavior. *Behav Med. 2010;36(4):123-9.*

163. *Winzenberg TM, Riley M, Frendin S, Oldenburg B, Jones G.* Sociodemographic factors associated with calcium intake in premenopausal women: a cross-sectional study. *Eur J Clin Nutr. 2005;59(3):463-6.*
164. *Velentzis LS, Keshtgar MR, Woodside JV, et al.* Significant changes in dietary intake and supplement use after breast cancer diagnosis in a UK multicentre study. *Breast Cancer Res Treat. 2011.*
165. *Koundi KL, Christodoulakos GE, Lambrinoudaki IV, et al.* Quality of life and psychological symptoms in Greek postmenopausal women: association with hormone therapy. *Gynecol Endocrinol. 2006;22(12):660-8.*
166. *Blumel JE, Castelo-Branco C, Binfa L, et al.* Quality of life after the menopause: a population study. *Maturitas. 2000;34(1):17-23.*
167. *Oleksik A, Lips P, Dawson A, et al.* Health-related quality of life in postmenopausal women with low BMD with or without prevalent vertebral fractures. *J Bone Miner Res. 2000;15(7):1384-92.*
168. *Salaffi F, Cimmino MA, Malavolta N, et al.* The burden of prevalent fractures on health-related quality of life in postmenopausal women with osteoporosis: the IMOF study. *J Rheumatol. 2007;34(7):1551-60.*
169. *Rostom S, Allali F, Bennani L, Abouqal R, Hajjaj-Hassouni N.* The prevalence of vertebral fractures and health-related quality of life in postmenopausal women. *Rheumatol Int. 2011.*
170. *Lai BM, Tsang SW, Lam CL, Kung AW.* Validation of the Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO-31) in Chinese. *Clin Rheumatol. 2010;29(9):965-72.*
171. *Kroenke CH, Rosner B, Chen WY, Kawachi I, Colditz GA, Holmes MD.* Functional impact of breast cancer by age at diagnosis. *J Clin Oncol. 2004;22(10):1849-56.*
172. *Sammarco A.* Psychosocial stages and quality of life of women with breast cancer. *Cancer Nurs. 2001;24(4):272-7.*
173. *Ganz PA, Guadagnoli E, Landrum MB, Lash TL, Rakowski W, Silliman RA.* Breast cancer in older women: quality of life and psychosocial adjustment in the 15 months after diagnosis. *J Clin Oncol. 2003;21(21):4027-33.*
174. *Avis NE, Crawford S, Manuel J.* Quality of life among younger women with breast cancer. *J Clin Oncol. 2005;23(15):3322-30.*
175. *Sammarco A.* Quality of life of breast cancer survivors: a comparative study of age cohorts. *Cancer Nurs. 2009;32(5):347-56; quiz 57-8.*
176. *Reid-Arndt SA, Cox CR.* Does rurality affect quality of life following treatment for breast cancer? *J Rural Health. 2010;26(4):402-5.*
177. *Kwan ML, Ergas IJ, Somkin CP, et al.* Quality of life among women recently diagnosed with invasive breast cancer: the Pathways Study. *Breast Cancer Res Treat. 2010;123(2):507-24.*
178. *Humpel N, Magee C, Jones SC.* The impact of a cancer diagnosis on the health behaviors of cancer survivors and their family and friends. *Support Care Cancer. 2007;15(6):621-30.*
179. *Kornblith AB, Herndon JE, 2nd, Zuckerman E, et al.* Social support as a buffer to the psychological impact of stressful life events in women with breast cancer. *Cancer. 2001;91(2):443-54.*
180. *Prochaska JO, DiClemente CC, Norcross JC.* In search of how people change. Applications to addictive behaviors. *Am Psychol. 1992;47(9):1102-14.*
181. *McCaul KD, Sandgren AK, King B, O'Donnell S, Branstetter A, Foreman G.* Coping and adjustment to breast cancer. *Psychooncology. 1999;8(3):230-6.*
182. *Stanton AL, Danoff-Burg S, Cameron CL, et al.* Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. *J Consult Clin Psychol. 2000;68(5):875-82.*
183. *Salminen EK, Lagstrom HK, Heikkila S, Salminen S.* Does breast cancer change patients' dietary habits? *Eur J Clin Nutr. 2000;54(11):844-8.*
184. *Salminen E, Bishop M, Poussa T, Drummond R, Salminen S.* Dietary attitudes and changes as well as use of supplements and complementary therapies by Australian and Finnish women following the diagnosis of breast cancer. *Eur J Clin Nutr. 2004;58(1):137-44.*

ACKNOWLEDGEMENTS

I would like to thank to Prof. Dr. László Nagymajtényi, Head of the Department of Public Health, for the opportunity to perform research work and prepare my thesis.

I would like to give expression to my gratitude for Dr. Edit Paulik, for her scientific guidance and consultative support throughout the whole research work.

I am thankful to Prof. Dr. László Thurzó for his collaboration in sampling and to his colleagues for their help in data collection.

I wish to acknowledge the workers of the Outpatient Bone Densitometry Center of Szeged for their cooperation in filling-in questionnaires.

APPENDICES