

KNOWLEDGE OF PRIMARY AND SECONDARY PREVENTION OF BREAST CANCER AMONG POLISH WOMEN

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A. Study design/planning • B. Data collection/entry • C. Data analysis/statistics • D. Data interpretation • E. Preparation of manuscript • F. Literature analysis/search • G. Funds collection

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ABSTRACT

Introduction: The most common malignant cancer in women, and the second cause of female deaths by oncological reasons in Poland, is breast cancer. The aim of this study was to assess whether breast cancer prevention programs in Poland have influenced Polish women's knowledge of this subject.

Material and methods: The study was conducted through a questionnaire assessing participants' demographic and social data, verifying their knowledge of risk factors and breast cancer prevention, and determining the sources of participants' knowledge. A total of 201 Polish women aged 20-70 years took part in the study. The sole exclusion criterion was a previous history of breast cancer.

Results: Most women identified genetic mutations as a predisposing risk for breast cancer (55.2%), followed by smoking (11.4%). 79.6% of women were able to list at least one method of breast examination, with mammography being the most mentioned (62.2%). 81.1% of respondents correctly identified mammograms as the screening test of choice. Most participants (67.7%) knew that self-examination should be performed once every month. While the majority of women acknowledged the importance of regular medical examination by a specialist (85.6%), only 48.8% knew how frequently it should be performed. The study revealed a statistically significant relationship between the level of knowledge and the level of education, previous history of benign breast lesions, and family history of breast cancer.

Conclusions: Polish women's knowledge of breast cancer risk factors and prevention remains lacking. Prevention programs offering more information regarding breast cancer risk factors and screening programs are still needed.

Key words: breast cancer, breast cancer prevention, breast cancer risk factors, breast cancer knowledge.

INTRODUCTION

Breast cancer (BC) is the most common malignant neoplasm among women and the predominant cause of female death by oncological reasons in Poland [1]. According to statistics released by the International Agency for Research on Cancer (IARC) in December 2020, breast cancer has now overtaken lung cancer as the world's most commonly diagnosed cancer [2]. Therefore, it is a serious health, social, and economic problem worldwide. An upward trend is currently observed, especially in the group of perimenopausal women. The number of patients diagnosed with breast cancer in Poland is expected to increase in all age groups by 2025, according to forecasts [3]. An alarming fact is the constant increase in mortality observed during the last 2 decades despite additional financial outlays and the development of medicines.

The collected data of the Organization for Economic Co-operation and Development (OECD) show that on average 41.8 per 100,000 Polish women died of BC in 2020, whereas in 2015 and 2000 this number was 31.1 and 30.2, respectively. These alarming data suggest that widespread knowledge concerning primary and secondary prevention of BC is crucial [1]. Around 70% of cancer tumours are caused by environmental factors; in the case of BC, this percentage is even higher, estimated to be as much as 90-95% [4]. Awareness of the risk factors and possibilities of early detection of BC may lead to a change of lifestyle and consequently a reduction of morbidity and mortality among women [3]. Breast cancer risk factors may be divided into 2 groups. The first group are non-modifiable risk factors such as gender, age, family history of breast and ovarian cancer, genetics, per-

sonal history of breast cancer, chest or head and neck irradiation before the age of 30 years, race/ethnicity, dense breast, or menstrual history. The second group includes modifiable risk factors such as obesity and overweight after menopause, reproductive history, breastfeeding history, using hormone replacement therapy (HRT), hormonal contraception methods, drinking alcohol, lack of exercise, smoking, and exposure to DES (diethylstilbestrol). Lifestyle modification leading to risk reduction of BC development is called primary prevention. Secondary prevention in women of an average breast cancer risk group in Poland consists of screening mammography performed every 24 months at the age of 50 to 69 and recommendations such as breast self-examination (BSE), clinical breast examination (CBE), and breast ultrasound [3-5]. Self-examination should be performed every month, on the first day after menstruation, starting at the age of 20 years. After menopause it should be continued regularly regardless of the cycle rhythm, on the same day of the month. Medical examination (by a gynaecologist, oncologist, or surgeon) should be performed every 3 years starting at the age of 20 and annually from the age of 40 years. Breast ultrasound is recommended annually for women older than 30 years and every 2 years between the ages of 20 and 30. Lifestyle modification, and knowledge of risk factors and methods of early detection are key issues in the fight against breast cancer in women [5].

The aims of this study were to assess the level of knowledge regarding the primary and secondary prevention of BC among Polish women, to evaluate the effectiveness of actual BC prevention programs in Poland, and to identify their potential deficiencies.

We hope this study can inform further efforts to increase awareness about breast cancer among women, and lead to a decrease in morbidity and mortality of this disease in Poland.

MATERIAL AND METHODS

The study was carried out as a research survey using a specifically designed questionnaire. The questionnaire contained 19 questions. Questions 1-10 collected demographic and social data, and questions 11-18 verified participants' knowledge of risk factors and breast cancer prevention. The 19th question assessed the respondents' sources of information. The part focusing on the risk factors and BC prevention consisted of 2 open questions about the risk factors and breast examination techniques. The other 6 questions of single or multiple choice about BC prevention were available on a second form, after returning the first part of the questionnaire. Participants could receive one point for a correct answer to each question. For open questions, respondents received

one point for listing at least 2 risk factors and at least 3 methods of breast examination. In the absence of an answer to a question, it was assumed that the respondent did not know the correct answer and the question was rated at zero points. More than 70% of correct answers was determined to be a sufficient level of knowledge. The socio-demographic part concerned questions of age, education, previous history of breast lesions and breast cancer, and family history of malignancies, including breast and ovarian cancer.

The selection of the group was deliberate. The study group consisted of 201 women aged 20-70 years (median of 40), living in a region of Poland with about 3.4 million inhabitants, recruited during a routine visit to their general practitioner. The only exclusion criterion was a previous history of BC. Therefore 10 women who had breast cancer in the past and completed the questionnaire were not included in this study. The major characteristics of the studied group are shown in Table 1.

The results were partially presented as a descriptive analysis. The statistical analysis was performed with the χ^2 test using the Statistica 13.3 package. A p -value ≤ 0.05 was considered as statistically significant.

Each woman signed a consent form to participate in the study. The study was approved by the Bioethics Committee of Jagiellonian University (no. 122.6120.69.2016 of 28 April 2016).

RESULTS

More than half (65.2%, $n = 131$) the patients responded to the open question about risk factors of breast cancer. The majority of them (55.2%, $n = 111$) mentioned genetic mutations as a factor predisposing to BC. The second most commonly mentioned risk factor was smoking (11.4%, $n = 23$). Other risk factors are listed in Table 2.

Nearly one third of the respondents (31.8%, $n = 64$) mentioned more than one correct risk factor. Three correct risk factors were mentioned by 11.4% of the respondents ($n = 23$), while 4 or more were mentioned only by 6% ($n = 12$). In the next part of the survey, including knowledge of breast examination methods, 79.6% ($n = 160$) of women listed at least one of them. Mammography was the most common examination technique, which was mentioned by 62.2% ($n = 125$) of the surveyed women, 56.2% ($n = 113$) of the respondents listed BSE, 37.8% ($n = 76$) breast ultrasound, and 5% ($n = 10$) CBE. The research revealed that 48.3% of the respondents ($n = 97$) knew more than one breast examination method, 22.9% ($n = 46$) knew 3 methods, and only 2% ($n = 4$) knew 4 methods. Subsequent questions in the knowledge test concerned the prevention and early diagnosis of BC, revealing that most of the

Table 1. Characteristics of the studied population

Variables	N	%
Age (years)		
20-29	62	30.85
30-39	44	21.89
40-49	32	15.92
50-59	48	23.88
≥ 60	15	7.46
Education		
Higher education	98	48.76
Secondary education	93	46.27
Vocational education	10	4.98
Pathological lesions of breast in patient history		
Yes	27	13.43
No	174	86.57
Family history of cancer		
Yes	108	53.73
No	89	44.28
Lack of information	4	1.99
Family history of breast cancer		
First-degree relative	8	3.98
Second-degree relative	25	12.44
No	161	80.1
Lack of information	2	1.00
More than 1*	5	2.49
Family history of ovarian cancer**		
First-degree relative	4	1.99
Second-degree relative	8	3.98
No	188	43.78
Lack of information	1	0.5
Family history of both breast and ovarian cancer	2	1.49

*2 patients 2 second-degree relatives, 2 patients one second-degree relative, one first-degree relative, 1 patient 2 second-degree relatives, one first-degree relative

**3 patients had a history of ovarian cancer

respondents (67.7%, $n = 136$) knew that BSE should be performed once a month, 7.5% ($n = 15$) believed that it should be performed every 3 months, 4.5% ($n = 9$) every 6 months, 3% ($n = 6$) every 2 months, 1.5% ($n = 3$) once a year, and 3% ($n = 6$) every 2 years. Only 64.2% ($n = 129$) knew at what point in the cycle BSE should be performed. 3.5% of the respondents ($n = 7$) replied that breast self-examination is not a necessary routine, and 4% ($n = 8$) admitted a lack of knowledge about the frequency of the examination. Most of the respondents (85.6%, $n = 172$), when asked about the CBE performed by a gynaecologist, oncologist, or surgeon, stated its importance, but only 98 (48.8%) knew how frequently it should be carried out. 13.9% of the respondents ($n = 28$) replied that there is no need

Table 2. Risk factors of breast cancer mentioned by the respondents

Risk factors	N	%
Genetic mutations	111	55.2
Smoking	23	11.4
Diet	12	6
Overweight and obesity	11	5.5
Lifestyle	11	5.5
Breast trauma	10	5
Age	9	4.5
Long-term menopausal hormone therapy	9	4.5
Long-term hormonal contraception	9	4.5
History of benign breast diseases	7	3.5
History of breast cancer	6	3
Alcohol	6	3
Environment	6	3
Stress	4	2
Childlessness	4	2
Exposure to radiation	4	2
Late age of first delivery	4	2
Sex	4	2
History of other cancers	3	1.5
Late menopause	1	0.5

for breast examination performed by a specialist. In case of breast imaging techniques, 81.1% ($n = 163$) of the surveyed women responded correctly, saying that mammography is the standard breast cancer screening test, 9.5% ($n = 19$) admitted a lack of knowledge of the subject, 6.5% ($n = 13$) mistakenly believed that the standard screening test for breast cancer is ultrasound, and 3% ($n = 6$) thought that MRI was the correct answer. Most of the respondents knew that the breast cancer screening program in Poland covers women aged 50 to 69 years (67.2%, $n = 135$) and is performed every 2 years (38.3%, $n = 77$). However, 13.9% ($n = 28$) wrongly believed that the program is addressed to women aged 30-49 years, and 2% ($n = 4$) thought it was aimed at women aged 20-29 years. The other 15.4% ($n = 31$) of the respondents admitted a lack of knowledge about the correct age, and 19.4% ($n = 39$) about the frequency of the screening. A summary of the knowledge test is presented in Figure 1.

The obtained answers were converted into points according to the adopted criterion. On average, the respondents scored 4 points in the knowledge test. The highest recorded result, which was 8 points, was scored by 9 patients (4.5% of the respondents). Three out of 201 respondents did not obtain even one point. 22.9% of the respondents' ($n = 46$) results were classified as sufficient knowledge. Table 3 presents the sources of knowledge about risk factors and breast

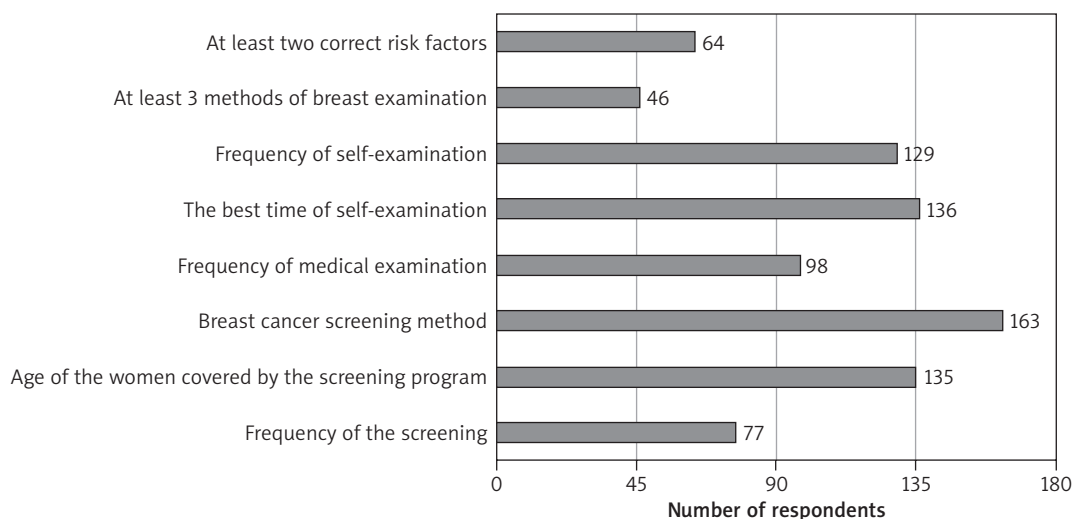


Figure 1. Summary of the correct answers

Table 3. The sources of knowledge mentioned by the study participants

Variables	N	%
Websites	99	49.3
Television	37	18.4
Books	36	17.9
Doctor	34	16.9
Magazine/Newspaper	33	16.4
Nurse	12	6
Brochures	10	5
School	10	5
Medical journals	7	3.5
Family	7	3.5
University	6	3
Friends	5	2.5
Conferences/Workshops	3	1.5

cancer prevention methods mentioned by the study participants.

Later in the study the relationships between knowledge and the socio-demographic factors, such as age, education, previous history of benign breast lesions, family history of cancer, and family history of breast cancer, were analysed. Analysis revealed a statistically significant correlation between knowledge and level of education, previous history of benign breast lesion, and family history of breast cancer. The exact data are presented in Table 4.

DISCUSSION

Despite the dynamic development of medicine and more advanced methods of diagnosis and treatment, the number of breast cancer cases is still growing [1]. The most important element that reduces the

Table 4. Statistical analysis of correlation between the level of knowledge and selected socio-demographic factors

Variables	Sufficient knowledge (%)	P
Age		
20-49	21.7	0.5694
50 and more	25.4	
Education		
Higher education	27.6	0.00019
Secondary education	12.9	
Previous history of benign breast lesions		
Yes	44.4	0.00714
No	19.5	
Family history of cancer		
Yes	27.8	0.18479
No	16.9	
Family history of breast cancer		
Yes	39.5	0.02195
No	18.6	

incidence and mortality of BC is prophylaxis. Primary prevention encompasses health promotion and risk reduction in the general population so that invasive cancers do not develop, while secondary prevention includes diagnostic tests that enable identification and treatment of premalignant lesions or subclinical cancers. Knowledge about risk factors and possibilities of early detection of breast lesions is nothing more than a first step to introduce an effective prevention of BC. In our study only 31.8% of the respondents correctly identified at least 2 BC risk factors. The respondents most frequently mentioned a genetic factor (84.7%), which according to other studies

is the most common one [6-14]. Other known factors were modifiable factors, such as smoking (17.5%), diet (9.1%), being overweight, obesity, and lifestyle (8.3%). In other studies, smoking was among the 3 most frequently mentioned factors [6, 10, 15], sometimes along with alcohol consumption. Unfortunately, lack of knowledge about the risk factors leads to underestimation of breast cancer risk. In studies carried out in Turkey and Great Britain about perception of BC risk, it was found that women are overoptimistic about their risk of getting breast cancer [12, 16]. In Turkey, only 65.5% of women with average risk perceived it adequately, while in the group of women with high risk of BC, as much as 65.7% underestimated it [16]. In the case of knowledge about secondary prevention, mammography was listed by 62.2% of our respondents, BSE by 56.2%, ultrasound by 37.8%, and CBE by 5%, which is consistent with other studies [7, 11, 15, 17]. Less than 50% of women knew more than one possibility. The most basic and always accessible method is BSE. In our study, 68% of women knew the recommended frequency and 64% the proper part of the menstrual cycle during which to perform self-examination. Even though the knowledge about BSE seems to be well established, according to other studies, most of the women do not follow this recommendation [7, 17-27]. In the Kingdom of Saudi Arabia the percentage of women performing BSE was higher only in the analysis of female health care professionals, at around 75% [28]. However, the vast majority of the respondents admitted the need for regular CBE, performed by a gynaecologist, oncologist, or surgeon; less than 50% knew how frequently it should be carried out. One Polish study revealed that 82% of women in the analysed population had never had a medical examination; in other studies most women claimed to have been examined by a specialist rarely, irregularly, or never [15, 20, 23, 25, 26, 28, 29]. The cultural differences might be the reason for not having a CBE. For example, in Saudi Arabia, women claimed a lack of female doctors as the reason [26]. In our study, over 80% responded correctly, stating that mammography is the standard breast cancer screening test in Poland. Most of them also knew that the breast cancer early detection program in Poland covers women aged 50 to 69 years. The fact that it should be performed every 2 years was known by around 40% of respondents, which is consistent with other studies [6, 15]. Unfortunately, in some populations up to 30-40% of women had never had any breast imaging [23,30]. The same situation is observed in other countries such as Saudi Arabia and Turkey [16, 24, 26]. Findings in India and Tanzania are even more concerning, with only 10% of women ever having had cancer screening in India and around 5% in Tanzania [25, 31]. Moreover, 68% of women in the

study by Najdyhor *et al.* admitted refusing screening mammography after receiving an invitation. In France, only 52% of women at the age of MMG screening participated in the program; one of the reasons was the use of opportunistic screening performed by 10% of women, which is considered to be more individually tailored and available before the age of 50 years [33]. In this study, women performing any screening expressed greater concern about their health and considered health as well-being; they felt responsible of their health and treated their breasts as the organ used for breastfeeding. Women that did not perform screening had a fatalistic attitude towards their health; they considered their breasts as a symbol of femininity, and the reason for not performing screening was the risk of radiation and fear of cancer diagnosis. In a Polish study, as much as 62.5% of the respondents claimed that the fear of the disease might be the reason for not following the secondary prevention recommendations [32]. In Tanzania, a frequent barrier to seeking care for breast concerns was also the fear of diagnosis and the fear of losing a breast. The barriers that did not occur in European studies were difficulties with organizing transportation, embarrassment, and husband disapproval [25]. In Malaysian studies, apart from barriers such as negative perception of the disease, poverty, and cultural and religious barriers, the influence of alternative medicine was a reason for a delay in detection and treatment of BC [34]. A study performed on Thai women suggests that reduction of perceived barriers may be sufficient in encouraging women to follow breast cancer screening services and perform breast self-examination, because the women with lower knowledge of breast cancer risk factors and without evidence of better knowledge about signs and symptoms of BC had considerably better breast cancer awareness behaviour [35]. Generally, in most of the studied groups of women all over the world, the level of knowledge of breast cancer was estimated as low, with the percentage of women with sufficient knowledge at the level of 50-60%, which is consistent with our study [6, 11, 14, 15, 26, 27, 29, 36, 37]. In Tanzania, only 26.1% of women had heard about breast cancer, and about 10% had received previous cancer education [25]. In Mumbai, only 49% of women were aware of the problem of BC [31]. In our analysis the level of knowledge was significantly higher among women with a higher level of education, previous history of benign breast lesion, and family history of BC. However, these results were not observed in all studies. Three other Polish studies, as well as a British study, revealed a correlation only between the level of knowledge and education [7, 10, 12]. In Brazil, only family history of breast cancer increased the level of knowledge about breast cancer risk factors [38]. In Greece, low breast

cancer awareness was associated with a low education level, low economic status, younger age, and being a single woman without a family history of breast cancer [27]. In Turkey, in a study concerning women who came to the University Hospital in Ankara for mammography, the average score in the test of knowledge about BC depended on education, age, family history, personal history of breast lesions (both benign and malignant), and a strong perceived cancer risk [36]. In the United Arab Emirates, the level of knowledge depended on the level of education, occupation, personal history of breast lesions (both malignant and benign), family history of breast cancer, and the age of the first period [26]. In a study concerning only adult female students, medical students had a significantly higher level of knowledge than students of other faculties [14]. In Tanzania, education and religion were important factors determining the level of knowledge, with Muslim women being more educated in the subject of breast cancer [25]. In Mumbai the knowledge depended on age and education, with the group of women aged 25-34 years and with at least 10 years of schooling being the most educated on the subject [31]. Almost 50% of women in our study claimed that they gained their knowledge from websites and over 18% from television; other means of knowledge that were listed by more than 10% of respondents were books, their physician, and magazines. Generally, in Poland, the main source of knowledge was media [7, 8, 10, 15, 29, 30] and brochures [7, 10]. In one study, which revealed a higher percentage of women who gained knowledge from a physician and a nurse (22.2% and 22%, respectively), 50% of the respondents were nurses. Nevertheless 56.3% of the respondents in this study claimed that they had never spoken with a physician about prevention of BC. In Saudi Arabia, the main sources of knowledge were also social media and television, and in only 8.8% of cases the source was a health care provider [26]. In Mumbai, 52.6% of women gained their knowledge from television, others from a physician, friend, family member, or a neighbour [31]. A review of studies performed on Malaysian women showed books, magazines, brochures, and television as the main sources of knowledge [33]. In one Polish study that assessed the level of knowledge about breast cancer risk factors as good in over 95% of cases, a gynaecologist was the most frequently listed source of knowledge (over 35%) [21]. Similarly, in Turkey, one study found that the leading source of knowledge was a physician, and the reason for performing a mammography was a physician's recommendation in over 50% of cases and an invitation for screening in 46.2% of cases; however, the studied group were women who had applied for mammography at the University Hospital in Ankara [3]. Generally, a minority

of the respondents learned about breast cancer from medical professionals, even though they claimed that they would prefer this source of knowledge [7, 15].

Many studies that we found, concerning the Polish population, were published in journals from the area of health sciences and nursing, which were not indexed in international databases. These papers were published in Polish language and are not easily found by a foreign researcher. This situation may apply to other countries and regions. Therefore, it is important to present the problem in an indexed, open-access format and encourage other researchers to publish their observations.

CONCLUSIONS

Knowledge about breast cancer is poor not only in Poland but all over the world. The level of knowledge is higher in more educated women, in women with a family history of breast cancer, and in women with personal history of breast lesions; nevertheless, in general, it is worse than expected. Women's knowledge is based mostly on the Internet or television. It is assumed that because of prevention programs, women are informed about breast cancer, its risk, and prophylaxis. However, their knowledge is partial; even if they know the screening methods, they do not know the technique of BSE or the process leading to breast imaging. As a result, they are not examined sufficiently. Knowing that a part of breast cancer screening is a clinical breast examination, it is alarming that most women were never examined by a physician, nor spoke with him or her about breast cancer. Because many women claimed that a physician would be their preferred source of knowledge, it seems crucial to encourage health care professionals to promote primary and secondary prevention of breast cancer during routine visits, to motivate patients to follow screening programs, and to decrease the level of perceived barriers that stop patients from seeking medical help. Education of breast health awareness should target adult women as well as girls at school. Only early education will allow for the development of correct attitudes and health habits, which in the future may have an impact on reducing breast cancer mortality.

Disclosure

The authors declare no conflict of interest.

References

1. Wojciechowska U, Didkowska J, Michałek I, et al. Nowotwory złośliwe w Polsce w 2018 roku. Centrum Onkologii – Instytut im. M. Skłodowskiej-Curie. Krajowy Rejestr Nowotworów, Warszawa 2018; 31-52.
2. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *Cancer J Clin Oncol* 2021; 71: 209-249.

3. Narodowa Strategia Onkologiczna na lata 2020-2030, Ministerstwo Zdrowia, Dz U. z 2019 poz. 969, <http://prawo.sejm.gov.pl/2019> (accessed 11 November 2021).
4. Kolak A, Kamińska M, Sygit K, et al. Primary and secondary prevention of breast cancer. *Ann Agric Environ Med* 2017; 24: 549-553.
5. Jassem J, Krzakowski M, Bobek-Billewicz B. Breast cancer. *Oncol Clin Pract* 2018; 14: 171-215.
6. Ślusarska B, Nowicki G, Łachowska E, et al. Knowledge of women concerning breast cancer prevention in selected socio-demographic conditions. *Med Og Nauk Zdr* 2016; 22: 59-65.
7. Bogusz R, Charzyńska-Gula M, Majewska A, et al. Knowledge of breast cancer prevention among peri-menopausal women. *Med Og Nauk Zdr* 2013; 9: 523-529.
8. Lewandowska A, Mess E, Kruk W. Women's knowledge on uterine cervix cancer and breast cancer prevention. *Onk Pol* 2012; 1: 5-8.
9. Florek-Łuszczki M. Level of knowledge of breast cancer risk factors and prophylactic principles among female rural inhabitants. *Med O* 2010, 3: 406-413.
10. Krajewska-Kułak E, Najdyhor E, Krajewska-Ferishah K. Knowledge of women and men about breast cancer prevention. *Ginek Pol* 2013; 84: 116-125.
11. Bogusz R, Humeniuk E, Walecka I, et al. Level and conditioning of knowledge about breast cancer displayed by women in perimenopausal age. *Ann Agric Environ Med* 2016; 23: 324-328.
12. Grunfeld EA, Ramirez AJ, Hunter MS, et al. Women's knowledge and beliefs regarding breast cancer. *Br J Cancer* 2002; 86: 1373-1378.
13. Poehls GU, Hack CC, Wunderle M, et al. Awareness of breast cancer incidence and risk factors among healthy women in Germany: an update after 10 years. *Eur J Cancer Prev* 2019; 28: 515-521.
14. Rahman SA, Al-Marzouki A, Otim M, et al. Awareness about breast cancer and breast self-examination among female students at the University of Sharjah: a cross-sectional study. *Asian Pac J Cancer Prev* 2019; 20: 1901-1908.
15. Cichońska M, Borek M, Krawczyk W, et al. Women's knowledge concerning breast tumour and cervical carcinoma prevention. *Acta Scientifica Aca Demiae Ostroviensis* 2012; 1: 15-25.
16. Kartal M, Ozcakar N, Hatipoglu S, et al. Breast cancer risk perceptions of Turkish women attending primary care: a cross-sectional study. *BMC Womens Health* 2014; 14: 152.
17. Kalinowski P, Bojakowska U. Analysis of the level of knowledge and health behaviors in terms of prevention and early breast cancer detection among female students and workers. *Nursing Problems* 2015; 23: 20-26.
18. Koczkodaj P, Mańczuk M, Gotlib J. Breast cancer risk factors – awareness and attitudes of women in perimenopausal and postmenopausal age (45+) in Poland. *Health Problems of Civilization Health* 2019; 13: 239-247.
19. Szadowska-Szlachetka Z, Baczevska B, Kulbaka Z, et al. Knowledge of women, female students of nursing, on prevention of breast cancer. *J Educ Health Sport* 2016; 6: 504-519.
20. Kurpas D, Trusz A, Steciwko A. Patients' knowledge on the subject of the breast cancer prevention, *Fam Med Primary Care Rev* 2006; 3: 670-673.
21. Stanisławska J, Janikowska K, Stachowska M, et al. Assessment of women's knowledge on prevention of breast cancer and cervical cancer. *Probl Hig Epidemiol* 2016; 97: 38-44.
22. Ponczek D, Kusińska L. The level of knowledge and health behaviours in the field of breast cancer and cervical cancer on the example of employees from PPH Emix and nurses from SP ZOZ in Rypin. *Long-Term Care Nurs* 2019; 4: 33-44.
23. Winiarska M, Matosiuk D. Knowledge of women living in Otwock county about breast cancer. *Pol J Public Health* 2016; 126: 59-62.
24. Korkut Y. Assessment of knowledge, attitudes, and behaviors regarding breast and cervical cancer among women in western Turkey. *J Int Med Res* 2019; 47: 1660-1666.
25. Chao AC, Huang L, Visvanathan K, et al. Understanding women's perspectives on breast cancer is essential for cancer control: knowledge, risk awareness, and care-seeking in Mwanza, Tanzania. *BMC Public Health* 2020; 20: 930.
26. Alshahrani M, Alhammam SYM, Munyif HASA, et al. Knowledge, attitudes, and practices of breast cancer screening methods among female patients in primary healthcare centers in Najran, Saudi Arabia. *J Cancer Educ* 2019; 34: 1167-1172.
27. Grosomanidis D, Charitidou E, Foka A, et al. Breast cancer awareness among Geek women and potential determinants. *HJS* 2015; 87: 289-297.
28. Heena H, Durrani S, Riaz M, et al. Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: a cross sectional study. *BMC Womens Health* 2019; 19: 122.
29. Przysada G, Bojczuk T, Kuźniar A. Level of knowledge of women for the purpose of prophylaxis and early recognition of breast cancer. *Young Sports Sci Ukraine* 2009; 3: 129-136.
30. Strojek K, Maślanka M, Styczyńska H. Health promoting behaviors and women knowledge about breast cancer prevention. *J Educ Health Sport* 2017; 7: 166-176.
31. Prusty RK, Begum S, Patil A. Knowledge of symptoms and risk factors of breast cancer among women: a community based study in a low socio-economic area of Mumbai, India. *BMC Womens Health* 2020; 20: 106.
32. Najdyhor E, Krajewska-Kułak E, Krajewska-Ferishah K. Wiedza kobiet i mężczyzn na temat profilaktyki raka piersi. *Ginek Pol* 2013; 84: 116-125.
33. Ferrat E, Breton JL, Djassibel M, et al. Understanding barriers to organized breast cancer screening in France: women's perceptions, attitudes and knowledge. *Fam Pract* 2013; 30: 445-451.
34. Khan TM, Leong JPY, Ming LC. Association of knowledge and cultural perceptions of Malaysian women with delay in diagnosis and treatment of breast cancer: a systematic review. *Asian Pac J Cancer Prev* 2015; 16: 5349-5357.
35. Hurst CP, Promthet S, Rakkapao N. Factors associated with breast cancer awareness in Thai women. *Asian Pac J Cancer Prev* 2019; 20: 1825-1831.
36. Guvenc I, Guvenc G, Tastan S. Identifying women's knowledge about risk factors of breast cancer and reasons for having mammography. *Asian Pac J Cancer Prev* 2012; 13: 4191-4197.
37. Tigka M, Gourounti K, Biliatis I. Knowledge of breast cancer screening of Greek and Italian student midwives. A comparative study. *HJS* 2009; 3: 72-79.
38. Freitas AGO, Weller M. Women's knowledge about risk factors of breast cancer in a Brazilian community. *Women Health* 2019; 59: 558-568.