RESEARCH ARTICLE

Prevalence and Associated Factors of Depression Symptoms in Women Newly Diagnosed with Breast Cancer in Kazakhstan

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Abstract

   Introduction: Diagnosis of breast cancer is associated with the presence of psychological disorders including depression. There is a lack of study examining the prevalence of depression among newly diagnosed breast cancer patients in Kazakhstan. **Objective:** This study aims to assess the prevalence and associated sociodemographic and clinical factors of depression symptoms in women newly diagnosed with breast cancer. **Methods:** 162 newly diagnosed breast cancer patients at the oncology center in Almaty were recruited for this study. Data were collected using a structured questionnaire on sociodemographic and clinical information and the Beck Depression Inventory-II scale. **Results:** The mean age of the patients was 54.41 years (SD=8.1). 95% of participants had unilateral breast cancer, and 79% of participants had stage I or stage II breast cancer. 73% of patients said that they do not have reliable social support. 46% of patients had symptoms of moderate depression, and 31% of patients had symptoms of severe depression. According to the multivariate analysis, factors associated with depression symptoms were: social status, household income level, reliability of social support, and stage of breast cancer. **Conclusion:** The prevalence of depression symptoms is very high among newly diagnosed breast cancer patients. Unemployed or retired patients, with a lower household income, and no reliable social support diagnosed with an advanced stage of breast cancer are especially at high risk for developing depression.

Keywords: Psychological distress- cancer patients- social support- income

Introduction

   Breast cancer was the most prevalent cancer type in 2021. According to the World Health Organization (WHO), breast cancer accounted for 12% of all new annual cases of cancer globally (World Health Organisation, 2022). At the same time, the global survival rate of women with breast cancer is alarmingly low, with a 5-year pooled survival rate of 73% (95% CI [71-75]), and a 10-year pooled survival rate of 61% (95% CI [54-67]) (Maajani et al. 2019). Previous studies show that the breast cancer burden (incidence and mortality rate) significantly increased in different populations (Huang et al., 2021). In general, there is wide variability in breast cancer prevalence worldwide, with more developed countries having a higher number of cases and lower survival rates in less developed countries (Wilkinson and Gathani, 2022). This difference could partly be explained by the implementation of the early screening programs, genetic factors, environmental factors, and lifestyle factors (Luo et al., 2022).

   Furthermore, diagnosis of breast cancer is often associated with the presence of psychological disorders including depression (Zainal et al., 2013). In the development of depression and cancer, there are some similarities on a molecular and immunologic level (Faye, 2021). Depression in women with breast cancer is associated with greater disability, poorer quality of life, and lower survival rate (Ng et al., 2017; von Heymann-Horan et al., 2013; Mols et al. 2013). In a 13 year follow up study, cancer patients with depression at baseline had a lower survival rate (Saini et al., 2021). The overall prevalence of depression among breast cancer patients varies significantly from 3.0% to 95.9% (Pilevarzadeh et al., 2019). Different studies reported that the prevalence of depression is especially high during the first year after diagnosis (Zainal et al., 2013).

   Despite the huge burden of depression, most of the

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patients do not receive adequate treatment and are at increased risk for longer depressive episodes and shorter remission periods (Halfin, 2007).

Even though the incidence of breast cancer in Kazakhstan has been thoroughly studied and monitored (Toguzbayeva et al., 2021;Igissinov et al., 2019; Shamsutdinova et al., 2020), there is a lack of study examining the prevalence of depression among newly diagnosed breast cancer patients in Kazakhstan.

This study aims to assess the prevalence and associated sociodemographic and clinical factors of depression symptoms in women newly diagnosed with breast cancer, to identify independent predictors of depression risk.

Materials and Methods

Study design and sample

This analysis is a part of the descriptive, cross-sectional study that was conducted between May 2021 and February 2022 in the oncology hospital in Almaty. The sample consisted of 214 randomly selected newly diagnosed breast cancer patients who came to the oncology department and met the inclusion criteria. The inclusion criteria: female adults with a histologically confirmed diagnosis of breast cancer within six months; stage I to IV breast cancer according to the TNM classification of malignant tumors; Russian or Kazakh language proficiency; ability to provide informed consent. Exclusion criteria: current psychotic disorder, manic episode, serious neurological disorder, intellectual disability, or developmental disorder; current active suicidal ideation; referral to palliative care. Out of 214 approached patients, 162 agreed to participate and met the inclusion/exclusion criteria (response rate = 75.7%). The Ethics Committee of the Kazakh Medical University of Continuing Education approved this study protocol. All participants were given a full explanation of the study purpose and scope and signed an informed consent form. The study was conducted following the principles of confidentiality, anonymity, and informed consent according to the Declaration of Helsinki and its revisions.

Assessment Instruments

Data were collected by face-to-face interview using a structured and pretested questionnaire and a self-report Beck Depression Inventory-II (BDI - II) form.

The questionnaire had two sections. The first section included individual sociodemographic variables such as age, place of residence, marital status, number of children, social status, educational level, income level, social support, and reliability of social support. We used nominal average income per person rate in 2020 (116 126 kzt) to range the income level. Availability of social support and the reliability of social support were bipolar questions. The second section included clinical variables such as clinical diagnosis, histopathological diagnosis, and stage of breast cancer. There were no treatment questions for newly diagnosed patients.

The BDI – II is a 21 item self-administered survey that has a list of four statements arranged in increasing severity about a particular symptom of depression or a characteristic attitude. Each of the 21 items is rated on a four-point scale ranging from "0" (symptom is minimal) to "3" (symptom is severe). The BDI-II total score is calculated as a sum of all items as a single score. The BDI-II score of 0-13 is considered a minimal range, 14-19 is mild, 20-28 is moderate, and 29-63 is a severe range of depression symptoms.

Statistical Analyses

To present breast cancer patients' socio-demographic and clinical characteristics (independent variables) we calculated mean and standard deviation for continuous data, and frequency with percentage for categorical data. The occurrence of depression was used as an outcome (dependent variable). We used univariate logistic regression analysis to investigate the association between potential prognostic determinants and the outcome, and we calculated the odds ratio with a 95% confidence interval. Those prognostic determinants that were univarietely associated with depression were included in a multivariate logistic regression model and were used as a measure of association. The fit of the multivariate model was tested with the Hosmer-Lemeshow goodness-of-fit test. All p-values were two-tailed, and statistical significance was accepted with a p-value under 0.05. Data analysis was performed using IBM SPSS for Windows (version 21.0, SPSS INC., Chicago, IL, USA) statistical software.

Results

Sociodemographic and Clinical Characteristics

A total of 162 newly diagnosed breast cancer patients were included in this study. The mean age of the patients was 54.41 years (SD=8.1). Most of the patients were between 50 and 59 years of age (47%), married (52%), employed (41%), had 3 to 4 children (57%), had either a bachelor's degree (39%), were urban residents (54%), had a household monthly income between 116, 126 – 232,252 kzt (57%), did not drink (41%), did not smoke (67%), did not engage in physical activity (54%), and had social support (91%). Only 27% of participants said they could rely on their social support person or persons. 95% of participants had unilateral breast cancer, 85% of participants had invasive ductal carcinoma, and 79% of participants had stage I or stage II breast cancer. Sociodemographic and clinical characteristics of the study participants are provided in Table 1.

Prevalence of Depression Symptoms among Newly Diagnosed Breast Cancer Patients

The mean total score of the BDI-II questionnaire was 22.34 (SD=9.65). According to the cut-off score of BDI-II between 20 and 28, 46% of patients had symptoms of moderate depression, and the cut-off score of BDI-II was between 29 and 63, 31% of patients had symptoms of severe depression. Total scores of the BDI-II questionnaire are presented in Table 2.

Factors Associated with Depression

Fifteen sociodemographic and clinical characteristics of newly diagnosed breast cancer patients were analyzed in logistic regression to find their association with

Table 1. Characteristics of the Study Participants (n=162)

Variable	n (%)
Age (years)	
< 40	5 (3%)
40-49	34 (21%)
50-59	76 (47%)
60-69	41 (25%)
≥ 70	6 (4%)
mean ±SD	54.41 ±8.1
Marital status	
Married	84 (52%)
Divorced	43 (27%)
Single	10 (6%)
Widowed	21 (13%)
Cohabitate	4 (2%)
Social status	
Employed	66 (41%)
Retired	50 (31%)
Self Employed	16 (10%)
Unemployed	30 (18%)
Number of children	
0	14 (9%)
1 – 2	92 (57%)
3 – 4	54 (33%)
≥5	2 (1%)
Schooling	
High school	23 (14%)
Technical / Special degree without bachelor's degree	47 (29%)
Bachelor's degree	63 (39%)
Not completed bachelor's degree	12 (7%)
Master's degree	6 (4%)
Doctorate degree or equivalent	11 (7%)
Residence	
Rural	19 (12%)
Suburban	56 (34%)
Urban	87 (54%)
Monthly income level (kzt)	
less than 116 126	24 (15%)
116 126 – 232 252	92 (57%)
232 252 – 348 378	32 (20%)
348 378 and higher	14 (8%)
Alcohol use	
Never	67 (41%)
Once in a while	60 (37%)
Several times a months	19 (12%)
Several times a week	16 (10%)
Smoking	
Do not smoke	108 (67%)
Electronic cigarettes	22 (13%)
Regular cigarettes	32 (20%)

Table 1. Continued

Variable	n (%)
Physical activity	
Never	88 (54%)
Once in a while	51 (32%)
Several times a months	19 (12%)
Several times a week	4 (2%)
Social support	
Yes	148 (91%)
No	14 (9%)
Reliability	
Yes	43 (27%)
No	119 (73%)
Clinical diagnosis	
Unilateral breast cancer	154 (95%)
Bilateral breast cancer	8 (5%)
Histopathological diagnosis	
Invasive ductal carcinoma	137 (85%)
Invasive lobular carcinoma	6 (4%)
Invasive lobular duct	8 (5%)
Low differentiated adenocarcinoma	4 (2%)
No diagnosis in medical records	7 (4%)
Stage	
I or II	128 (79%)
III	23 (14%)
IV	11 (7%)

depression symptoms. Univariate analysis showed that the factors associated with moderate and severe depression symptoms were social status, number of children, schooling, place of residence, household monthly income rate, alcohol use, smoking, social support, reliability of social support, clinical diagnosis, histopathological diagnosis, and stage. Those factors were included in the stepwise logistic regression model – the backward LR method. This analysis identified social status, monthly income level, reliability of social support, and stage as significant predictors of moderate and severe depression symptoms risk. Unemployed or retired patients had a significantly higher risk of developing moderate or severe depression symptoms than those who were employed. Those patients whose household monthly income was the highest had almost two times (OR -1.55 (95% CI: -0.49, -2.61)) fewer odds of experiencing moderate and severe

Table 2. Prevalence of Depression Symptoms in Breast Cancer Patients (n=162)

Depression symptom's severity (BDI-II scoring)	n (%)
Minimal (0 – 13)	23 (14%)
Mild (14 – 19)	14 (9%)
Moderate (20 – 28)	74 (46%)
Severe (29 – 63)	51 (31%)
mean±SD	22.34±9.65

BDI-II, Beck Depression Inventory – II; SD, standard deviation

Table 3. Association between Social and Clinical Variables and Depression in Breast Cancer Patients

Variable	Presence of Depression n (%)	Absence of Depression n (%)	COR (St.Er)	AOR (St.Er)
Age (years)				
< 40	4 (80%)	1 (20%)	1.39 (1.12)	
40-49	20 (58.8%)	14 (41.2%)	-1.03 (1.17)	
50-59	62 (81.6%)	14 (18.4%)	Reference	
60-69	33 (80.5%)	8 (19.5%)	0.03 (1.18)	
≥ 70	6 (100%)	0	15.2 (979.61)	
Marital status				
Single	10 (100%)	0	0.74 (2.23)	
Married	57 (67.9%)	27 (32.1%)	Reference	
Divorced	37 (86.0%)	6 (14.0%)	16.82 (1251.05)	
Widowed	17 (80.9%)	4 (19.1%)	0.70 (0.60)	
Cohabitate	4 (100%)	0	16.82 (1978.09)	
Social status				
Employed	45(68.2)	21 (31.8%)	Reference	Reference
Retired	42 (84.0%)	8 (16.0%)	0.9 (0.47)*	2.62 (0.94)**
Self Employed	13 (81.3%)	3 (18.7%)	0.7 (0.69)	1.13 (0.99)
Unemployed	25 (83.3%)	5 (16.7%)	0.84 (0.47)	2.68 (1.07)*
Number of children				
0	13 (92.9%)	1 (7.1%)	1.46 (1.06)*	
1- 2	69 (75.0%)	23 (25.0%)	Reference	
3 – 4	41 (75.9%)	13 (24.1%)	5.00 (3.99)	
≥5	2 (100%)	0	1.45 (1.02)	
Schooling				
High school	21 (91.3%)	2 (8.7%)	2.35 (0.74)*	
Technical / Special degree without bachelor's degree	41 (87.2%)	6 (12.8%)	1.30 (0.51)*	
Bachelor's degree	41 (65.1%)	22 (34.9%)	Reference	
Not completed bachelor's degree	9 (75.0%)	3 (25.0%)	0.48 (0.72)	
Master's degree	5 (83.3%)	1 (16.7%)	0.99 (1.13)	
Doctorate degree or equivalent	8 (72.3%)	3 (27.3%)	0.36 (0.73)	
Place of residence				
Urban	66 (75.9%)	21 (24.1%)	Reference	
Suburban	47 (83.9%)	9 (16.1%)	0.51 (0.44)	
Rural	12 (63.2%)	7 (36.8%)	-0.61 (0.54)	
Monthly income level (kzt)				
less than 116 126	23 (95.8%)	1 (4.2%)	1.91 (1.05)	2.08 (1.57)
116 126 – 232 252	71 (77.2%)	21 (22.8%)	Reference	Reference
232 252 – 348 378	26 (81.3%)	6 (18.7%)	0.25 (0.52)	1.26 (0.74).
348 378 and higher	5 (35.7%)	9 (64.3%)	-1.80 (0.61)**	-1.55 (1.06)*
Alcohol use				
Never	49 (73.1%)	18 (26.9%)	Reference	
Once in a while	49 (81.7%)	11 (18.3%)	-1.27 (1.07)	
Several times a months	12 (63.2%)	7 (36.8%)	-2.17 (1.14).	
Several times a week	15 (93.7%)	1 (6.3%)	2.71 (1.03)**	
Smoking				
Do not smoke	89 (82.4%)	19 (17.6%)	Reference	
Electronic cigarettes	13 (59.1)	9 (40.9%)	-0.46 (0.50)	
Regular cigarettes	23 (71.9%)	9 (28.1%)	1.03 (0.28)***	

Table 3. Continued

Variable	Presence of Depression n (%)	Absence of Depression n (%)	COR (St.Er)	AOR (St.Er)
Physical activity				
Never	70 (79.5%)	18 (20.5%)	Reference	
Once in a while	38 (74.5%)	13 (25.5%)	1.07 (1.05)	
Several times a months	15 (78.9%)	4 (21.1%)	1.32 (1.14)	
Several times a week	2 (50%)	2 (50%)	1.51 (1.03)	
Social support				
Yes	112 (75.7%)	36 (24.3%)	Reference	
No	13 (92.9%)	1 (7.1%)	1.43 (1.06)	
Reliability of social support				
Yes	16 (37.2%)	27 (62.8%)	-2.91 (0.46)***	-4.18 (0.86)***
No	109 (91.6%)	10 (8.4%)	Reference	Reference
Clinical diagnosis				
Unilateral breast cancer	117 (76.0%)	37 (24.0%)	Reference	
Bilateral breast cancer	8 (100%)	0	16.41 (1398.7)	
Histopathological diagnosis				
Invasive ductal carcinoma	108 (78.8%)	29 (21.2%)	Reference	
Invasive lobular carcinoma	3 (50.0%)	3 (50.0%)	-1.31 (0.84)	
Invasive lobular duct	5 (62.5%)	3 (37.5%)	-0.80 (0.76)	
Low differentiated adenocarcinoma	4 (100%)	0	15.25 (1199.7)	
No diagnosis in medical records	5 (71.4%)	2 (28.6%)	-0.39 (0.86)	
Stage				
I or II	92 (71.9%)	36 (2.1%)	Reference	Reference
III	22 (95.6%)	1 (4.4%)	2.15 (1.04)*	3.92 (1.67)*
IV	11 (100%)	0	16.63 (1192.83)	18.08(1625.02)

*, p<0.05; **, p<0.01, ***, p<0.001; COR, Crude Odds Ratio; AOR, Adjusted Odds Ratio; Hosmer-Lemeshow test, p=0.917, Adjusted Nagelkerke R2 = 58.7%, Overall Predictive Ability=77.2%

depression symptoms than those whose household's income level was 116 126 – 232 252 kzt monthly. Newly diagnosed breast cancer patients who had reliable social support had four times (OR -4.18 (95% CI: -3.32, -5.04)) lower risk of developing moderate and severe depression symptoms than those whose social support was not reliable. Not surprisingly, patients with stage III cancer had a significantly higher risk for moderate or severe psychiatric disorder symptoms presence. The final model seems to explain 58.7% of the variation in depression symptoms and it can properly classify 77.2% of breast cancer patients. The fit of the multivariate model was flawless (p=0.917). The results of univariate and multivariate logistic analyses are presented in Table 3.

Discussion

Study objectives were to determine the prevalence and associated factors of depression symptoms among newly diagnosed breast cancer patients to identify independent predictors of depression risk. According to our results, 77.2% of patients had moderate or severe depression symptoms based on the BDI-II. Social status, reliability of social support, and stage of breast cancer were significant predictors of moderate and severe depression symptoms. There was only one predictor adversely associated with

depression symptoms: high household income.

The prevalence of depression symptoms in newly diagnosed breast cancer patients was higher than in previous studies on depression in this population (Tsaras et al., 2018; Purkayastha et al., 2017; Chen et al., 2009). One explanation may be the different methods used in the studies. Alternatively, it may be because we did not focus on clinical depression diagnosis, but rather screened patients for depressive symptoms.

In our study, social status was significantly associated with moderate and severe depression symptoms. Unemployed women were almost three times more likely than employed patients to experience moderate or severe depression symptoms. The number of retired patients with depression symptoms was also twice as high as that of employed women. According to previous research, breast cancer patients who are unemployed or retired are more likely to experience depression, anxiety and fatigue more often than employed patients (Lindbohm et al., 2014).

The higher-income level was associated with fewer depression symptoms. 15% of study participants had a household monthly income below the nominal average income per person rate in 2020. In contrast, only 8% of the participants had a household monthly income three times and above the nominal average income per person rate in 2020. Patients who were in the highest income group

were less likely to have moderate or severe depression symptoms. This was compared to the lower income group. Our findings are in line with previous studies on income level and depression prevalence among breast cancer patients. Having a lower household income is one of the independent predictors for clinical depression among breast cancer patients (Chen et al., 2009). The lower level of household income was associated with lifetime mental disorders and suicidal attempts among patients with posttraumatic stress disorder (Sareen et al., 2007).

The results of our study show that the majority of patients have access to social support. However, the lack of reliability of the support person or persons was significantly associated with moderate or severe levels of depression symptoms. One of the explanations for the high numbers in the availability of social support is the fact that 91% of our study participants had children. In addition, 54% of participants were married or had a partner. Nevertheless, newly diagnosed breast cancer patients were four times less likely to experience moderate or severe depression symptoms when they could rely on their social support. A prospective cohort study also showed that perceived social support was positively associated with a better quality of life and lower psychological distress (Ng et al., 2015).

Most of the patients included in our study were stage I or stage II patients. The breast cancer screening program plays a huge role in the early diagnosis of breast cancer. A study on the screening program in Kazakhstan from 2009 to 2018 found that the incidence rate of breast cancer increased from 39.5 per 100,000 population of females in 2009 to 49.6 in 2018 due to this screening program implementation (Toguzbayeva et al., 2021). The association between the stage of breast cancer and the prevalence of depression was assessed in a recent meta-analysis, where the findings show that the prevalence of depression among advanced breast cancer patients varied from 17.9% to 60.9%, and according to the random-effects model was equal to 38.2% (95% CI [30.9, 45.8]) (Karibayeva et al., 2020). Another meta-analysis showed that the prevalence of depression among the broader population of breast cancer patients (stage I to IV) was lower at 32.2% (95% CI [28.9, 35.4]) (Pilevarzadeh et al. 2019). According to our study, the advanced stage of breast cancer (stage III) was significantly associated with moderate and severe depression symptoms when compared to patients in stage I or stage II.

In conclusion, the prevalence of moderate and severe depression symptoms among newly diagnosed breast cancer patients was high. The World Health Organization conducted the World Health Survey in 2002-2003, which reported that income levels of countries played a major role in access to depression care (Araya et al. 2018). The authors of this article think this is still true today in Kazakhstan. By early detection and timely referral, depression can be effectively managed and the quality of life and overall survival of breast cancer patients can be improved.

References

Araya R, Zitko P, Markkula N, Rai D, Jones K (2018). Determinants of Access to Health Care for Depression in 49 Countries: A Multilevel Analysis. *J Affect Disorders*, **234**, 80–8

Chen X, Zheng Y, Zheng W, et al (2009). Prevalence of Depression and Its Related Factors among Chinese Women with Breast Cancer. *Acta Onco*, **48**, 1128–36.

Faye A (2021). Shared Pathogenesis in Depression and Cancer Depicting the Anti-cancer Properties of Anti-depressants. *Asian Pac J Cancer Biol*, **6**, 3–4.

Halfin A (2007). Depression: The Benefits of Early and Appropriate Treatment. *Am J Manag Care*, **13**, S92.

Huang J, Chan PS, Lok V, et al (2021). Global Incidence and Mortality of Breast Cancer: A Trend Analysis. *Aging*, **13**, 5748–803.

Igissinov N, Toguzbayeva A, Turdaliyeva B, et al (2019). Breast Cancer in Megapolises of Kazakhstan: Epidemiological Assessment of Incidence and Mortality. *Iran J Public Health*, **48**, 1257–64.

Karibayeva I, Turdaliyeva B, Zainal NZ, Bagiyarova F (2020). The Prevalence of Depression Symptoms among Advanced Breast Cancer Patients: A Systematic Review and Meta-Analysis. *Arch Balk Med Union*, **55**, 651-60

Lindbohm ML, Kuosma E, Taskila T, et al (2014). Early Retirement and Non-employment after Breast Cancer. *Psycho Oncol*, **23**, 634–41.

Luo C, Li N, Lu B, et al (2022). Global and Regional Trends in Incidence and Mortality of Female Breast Cancer and

Associated Factors at National Level in 2000 to 2019. *Chinese Med J*, **135**, 42–51.

Maajani K, Jalali A, Alipour S, et al (2019). The Global and Regional Survival Rate of Women With Breast Cancer: A Systematic Review and Meta-Analysis. *Clin Breast Cancer*, **19**, 165–77.

Mols F, Husson O, Roukema JA, van de Poll-Franse LV (2013). Depressive Symptoms Are a Risk Factor for All-Cause Mortality: Results from a Prospective Population-Based Study among 3,080 Cancer Survivors from the PROFILES Registry. *J Cancer Surviv*, **7**, 484–92.

Ng CG, Mohamed S, Kaur K, et al (2017). Perceived Distress and Its Association with Depression and Anxiety in Breast Cancer Patients. *PLoS One*, **12**, e0172975.

Ng CG, Mohamed S, See MH, et al (2015). Anxiety, Depression, Perceived Social Support and Quality of Life in Malaysian Breast Cancer Patients: A 1-Year Prospective Study. *Health Qual Life Out*, **13**, 205.

Pilevarzadeh M, Amirshahi M, Afsargharehbagh R, et al (2019). Global Prevalence of Depression among Breast Cancer Patients: A Systematic Review and Meta-Analysis. *Breast Cancer Res Tr*, **176**, 519–33.

Purkayastha D, Venkateswaran C, Nayar K, Unnikrishnan UG (2017). Prevalence of Depression in Breast Cancer Patients and Its Association with Their Quality of Life: A Cross-Sectional Observational Study. *Indian J Palliat Care*, **23**, 268.

Saini SM, Koon STM, Bujang MA, et al (2021). Effect of Anxiety and Depression on Survival of Cancer Patients, a 13 Year Follow-up. *Asian Pac J Cancer Care*, **6**, 9–13.

Sareen J, Cox BJ, Stein MB, et al (2007). Physical and Mental Comorbidity, Disability, and Suicidal Behavior Associated with Posttraumatic Stress Disorder in a Large Community Sample. *Psychosom Med*, **69**, 242–8.

Shamsutdinova AG, Turdaliyeva BS, Ramazanova BA, Beltenova AG (2020). Adherence to Breast and Cervical Cancer Screening Ensuring Compliance with Ethical Principles in the Republic of Kazakhstan. *Sib J Oncol*, **19**, 7–23.

Toguzbayeva A, Telmanova Z, Khozhayev A, et al (2021). Impact of Screening on Breast Cancer Incidence in Kazakhstan: Results of Component Analysis. *Asian Pac J Cancer Prev*, **22**, 2807-17.

Tsaras K, Papathanasiou IV, Mitsi D, et al (2018). Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors. *Asian Pac J Cancer Prev*, **22**, 1661-9.

von Heymann-Horan AB, Dalton SO, Dziekanska A, et al (2013). Unmet Needs of Women with Breast Cancer during and after Primary Treatment: A Prospective Study in Denmark. *Acta Onco*, **52**, 382–90.

Wilkinson L, Gathani T (2022). Understanding Breast Cancer as a Global Health Concern. *Brit J Radiol*, **95**, 20211033.

World Health Organisation (2022). Breast Cancer Facts and Statistics (2022): https://www.breastcancer.org/facts-statistics. Accessed 01 March 2022.

Zainal NZ, Booth S, Huppert FA (2013). The Efficacy of Mindfulness-based Stress Reduction on Mental Health of Breast Cancer Patients: A Meta-analysis. *Psycho Oncol*, **22**, 1457–65.

Zainal NZ, Nik-Jaafar NR, Baharudin A, Sabki ZA, Ng CG (2013). Prevalence of Depression in Breast Cancer Survivors: A Systematic Review of Observational Studies. *Asian Pac J Cancer Prev*, **14**, 2649–56.