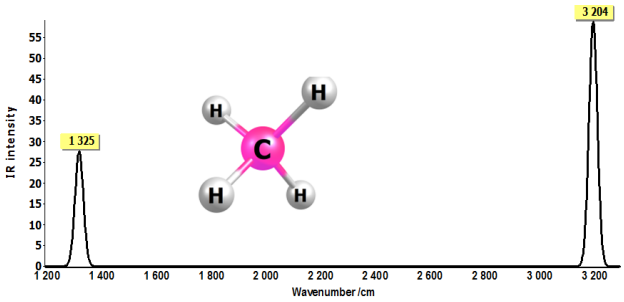
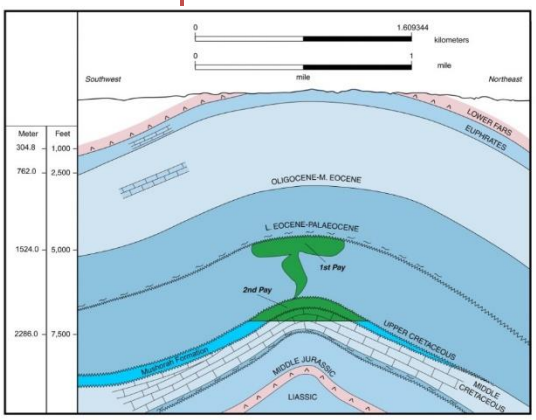
JOURNAL OF ZANKOY SULAIMANI

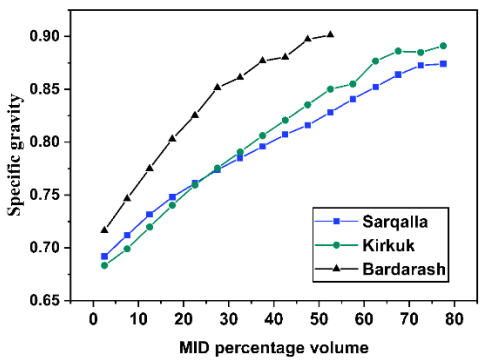
AUTHOR'S COPY

Part -A- (Pure and Applied Sciences)

VOLUME 25 ISSUE 1 June 2023
ISSN: 1812-4100
www.jzs.univsul.edu.iq







Journal homepage www.jzs.univsul.edu.iq
Journal of Zankoy Sulaimani
Part-A- (Pure and Applied Sciences)
ISSN:1812-4100

Identifying Risk Factors for the Development of Breast Cancer among Women Attending Hiwa Hematology/Oncology Hospital in the Sulaimaniyah, Iraqi Kurdistan

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Article info

Original: 10/02/2023
Revised: 25/03/2023
Accepted: 28/03/2023
Published online: 20/06/2023

Keywords:
Breast cancer, risk factors, cross-sectional study, Hiwa Hospital

Abstract

Background: Breast cancer is the commonest female malignancy that affects 1 in 20 globally, with one out of every eight women in the west being a victim of it. To our knowledge, there is limited published data regarding the effect of risk factors on the prevalence of Breast Cancer among Iraqi Kurdish women. **Objectives:** This study aims to identify the risk factors that might affect most women Breast Cancer in our region. **Patients and Methods:** This cross-sectional study was conducted on 400 women diagnosed with breast cancer at Hiwa Hematology/Oncology Hospital in the Sulaimaniyah province, Iraqi, from February 14th, 2021 to June 1st, 2022. Risk factors were studied in women who visited the Clinical Oncology Department. **Results:** Patients' mean ± SD age at an early breast cancer detection was 47.33 ± 9.9 years. Most patients (89.3%) had no smoking history, 50.7% were passive smokers, only 0.3% had a history of alcohol consumption, 78% experienced anxiety, and 58% were physically inactive. Marriage and gynecological history were not protective factors. Family history of breast cancer was negative in 72.5% of patients; lactation in 75.5%, and several children lactated (31.0%) had no protective role. Regarding dietary habits, daily consumption of sweets (49.5%) and fat (45.2%) seemed to be risk factors. Red meat and poultry (84.8%) with fast food (79.3%) >2 times weekly were particularly relevant. However, daily consumption of fruits (80.7%) and vegetables (76.0%) seemed to have a preventive role in breast cancer. **Conclusions:** Physical inactivity, passive smoking, anxiety and dietary habits were significant risk factors for the development of breast cancer among Iraqi Kurdish women. Actions aimed at enhancing physical activity and controlling other modifiable risk factors seems to be essential to reduce these risks.

Introduction

Breast cancer (BC) is the commonest cause of cancer death in women worldwide. The established risk factors are linked to estrogens, which seemed to be increased by early menarche, late menopause, and obesity in postmenopausal women (1). In the Middle East, it occurs in relatively young women and frequently presents as an advanced disease (2). Each year, 2.1 million women are impacted by this dreaded disease worldwide (3). In Kurdistan of Iraq, BC is predominantly a disease of pre-menopausal women having multiple pregnancies (2). Recently, more than four thousand BC patients have been registered at Hiwa Hematology/Oncology hospital.

The incidence of BC in Asia is increasing rapidly, conversely in Western Countries where it is relatively stable. In both areas, the level of exposure may vary among women for each specific factor due to their cultural and ethnic background and place of residence (4). Among identified risk factors include age, family history, medical history, alcohol consumption, cigarette smoking and menopausal status, nulliparity, stress, age at first birth after 30 years old, hormonal and oral contraceptive use. The other possible risk factors are high body mass index (BMI), physical inactivity, and dietary factors (5, 6).

It was proved that the incidence rate of BC varies significantly with race and ethnicity and is higher in developed countries. However, the mortality rate of BC is higher in less developed regions. Thus, various risk factors, including demographic, reproductive, hormonal, hereditary, and breast-related, such as duration of lactation, breast density, benign breast disorders, and lifestyle, contribute to the incidence of BC (7).

Studies on BC rates and risk factors in the Middle East are limited. Egypt is thought to have the highest rates in the Middle East, with the increase being primarily between 30 to 60 years of age (6). Recently, there is not enough study to assess the risk factors for BC in the Kurdistan region of Iraq. Thus, this study aimed to identify the main risk factors that positively and directly affect the prevalence of BC in our area.

Materials and Methods

Sample size and study setting

A Cross-sectional using a non-probability purposive sampling technique was conducted on 400 women diagnosed with BC at Hiwa Hematology/Oncology Hospital, Sulaimaniyah, Iraqi Kurdistan, from February 14th 2021 to June 1st 2022. This study was mostly done on retrospective patients who visited for follow-up but expanded prospectively to all new patients diagnosed and managed in this centre over the upcoming years of the data collection period.

Each woman who visited the Clinic Department at Hiwa Hematology/Oncology Hospital for follow-up or newly diagnosed BC was eligible to participate in this study. The participation rate was computed by the percentage of females who visited this department. The patient's appointment depended on the patient's situation, the stage of BC, the patient's stability, and the cancer progression. Some visited yearly or every six months, while others visited their specialist doctor every three months to check their health status and ensure that the BC did not become recurrent.

Inclusion criteria

Confirmed female BC patients, aged ≥18, who completed their chemotherapy with no history of other malignancies or psychiatric disorders, were willing to participate, and lived in Sulaimaniyah Governorate were included in this study.

Exclusion criteria

Palliative patients or those with neo-adjuvant or adjuvant chemotherapy, physical disability, or deaf were not enrolled in this study.

Patient consent

Each woman has taken oral consent as a voluntary participant in this study. Information regarding the survey, its plan, and its objectives have been explained to them thoroughly. Also, participants were informed about the confidentiality of the data, and they felt free to leave at any time without giving reasons.

Ethical approval

The proposal of the current study was revised and accepted by the Scientific and Ethical Committees, College of Medicine, University of Sulaimani (No. 63/07/03/2021).

Questionnaire

Data was collected based on a well-structured, self-designed questionnaire of two parts. Firstly, the direct interview was made to manage patients' sociodemographic characteristics. Secondly, risk factors influence the prevalence of BC. Each interview took 30 to 45 minutes. Then, any woman who visited Clinic Department at Hiwa Hematology/Oncology had a chance to be recruited for the study.

Assessment of physical activity

A short version of the International Physical Activity Questionnaire (IPAQ-SV) was used to assess physical activity before BC diagnosis. The IPAQ-SV was designed to identify the frequency and duration of walking, moderate and vigorous physical exercise at work and during recreational time, and sitting time before the diagnosis of BC. Physical activity score was calculated as the metabolic equivalent of task-minute per week (METs- min/week). Total physical activity was estimated by adding the weekly minutes of vigorous physical exercise, moderate physical activity, and walking. Respondents were classified into three groups based on the physical activity recommendations of the American College of Sports Medicine and the American Heart Association. Individuals who reported <10 minutes (<600 MET- min/weeks) of total physical activity were categorized as ‘‘inactive’’. Those who reported engaging in total physical activity from 10 to 149 minutes/week (600 – 2999 MET-min/ weeks) were denoted as ‘‘minimally active’’, and those reporting 150 minutes/ week (3000 MET-min/ weeks) or more activities were coded as ‘‘health-enhancing physical activity (HEPA)’’ (19, 20).

Statistical analysis

Data entry was performed via an excel spreadsheet then the statistical analysis was performed by Statistical Package for the Social Sciences program, version 21 (IBM SPSS, Chicago, USA). The data presented in tabular forms show the frequency and relative frequency distribution of different study variables. In addition, other types of Bar charts and pie charts were used to describe some study variables diagrammatically. A p value of less than 0.05 was considered as statistically significant.

Results

From our previously published paper (21), we demonstrated that the patient's age ranged from 28-84 years (51.24 ± 10.15) at the time of interview and 25-76 years at the time of admission (47.33 ± 9.90) years. About 60.8% of participants were aged between 45-64 years. Regarding the patient’s age on admission, 59.8% were 41-60. About 78.8% of patients were married, 61.8% lived outside the city, >70% were housewives, and the financial status of 60.8% was equal to expenditure. Regarding the level of education, 36.3% were illiterate, and the least (19.5%) graduated from Institute/University.

Table 1 indicates that 53.5% of participants had menarche between 13-14 years, 88.5% had regular cycles, and 63.8% did not reach menopause. In addition, about 43.5% of participants had five and more gravida, while parity had one-third (35.3%) of studied patients, and 84.5% had no first child after 30 years. Moreover, 54.5% of participants did not use contraceptive pills. Regarding hormonal replacement therapy, 70.3% had not used it; among hormonal users, 77.3% had not used tablets, while >80% did not use hormone therapy by injection route.

Table 1. Distribution of studied samples according to gynaecological history.

Gynecological history		Frequency	Percentage
Age of menarche (Year)	11 - 12	99	24.8
	13 - 14	214	53.5
	15 - 18	87	21.8
Regularity period	Regular	354	88.5
	Irregular	46	11.5
Menopause	Yes	145	36.3
	No	255	63.8
Gravida	None	61	15.3
	1-2	54	13.5
	3-4	111	27.8
	≥5	174	43.5
Parity	None	66	16.5
	1-2	84	21.0
	3-4	141	35.3
	≥5	109	27.3
First child after 30 years	Yes	62	15.5
	No	338	84.5
Contraceptive pill	Yes	182	45.5
	No	218	54.5
Hormonal replacement therapy	Yes	119	29.8
	No	281	70.3
Hormonal therapy (tablet)	Yes	91	22.8
	No	309	77.3
Hormonal therapy (injection)	Yes	72	18.0
	No	328	82.0
Total		400	100.0

Table 2 indicates that a family history of BC was adverse among nearly 72.5% of patients and positive among 27.5% of patients. Also, a family history of other cancer was negative among 59.5% of patients and positive among >40%.

Table 2. Distribution of studied samples according to family history of cancers.

Family history		Frequency	Percentage
Family history of breast cancer	Yes	110	27.5
	No	290	72.5
Family history of other cancers	Yes	162	40.5
	No	238	59.5
Total		400	100.0

Table 3 demonstrates that the minority (18.3%) participants were not practiced breastfeeding, while both breasts lactated 75.5%. On the other hand, 37.3% of patients were lactated for four years, and 31.0% were lactated for three to four children.

Table 3. Distribution of studied sample according to breast lactation.

Lactation variable		Frequency	Percentage
Breast lactation	None	73	18.3
	My left breast	10	2.5
	By right breast	15	3.8
	By both breasts	302	75.5
Duration of lactation	None	73	18.3
	One year	74	18.5
	Two years	48	12.0
	Three years	56	14.0
	Four years	149	37.3
Number of children lactated	None	73	18.3
	One - two children	103	25.8
	Three - four children	124	31.0
	More than four children	100	25.0
Total		400	100.0

Table 4 shows that 89.3% of patients were not current (active) smokers. Among smoker patients, 7.8% had 1 to 10 cigarettes per day, and only 3.0% had >10 cigarettes per day. The duration of smoking was 1 to 5 years in 6.3% of patients, while 4.5% had smoked for >5 years. Furthermore, 50.7% of patients had passive smokers or family member smokers, and only 0.3% were alcohol consumers.

Table 4. Distribution of studied samples according to smoking status and alcohol consumption.

Smoking and alcohol		Frequency	Percentage
Current smoking status	Yes	43	10.8
	No	357	89.3
Number of cigarettes per day	None	357	89.3
	1 - 10 cigarettes	31	7.8
	> 10 cigarettes	12	3.0
Smoking duration	None	357	89.3
	1 - 5 Years	25	6.3
	> 5 Years	18	4.5
Family members smoker (Passive)	None	197	49.3
	Yes	203	50.7
Alcohol consumption	None	399	99.7
	Yes	1	0.3
Total		400	100.0

Table 5 shows the effect of dietary habits among BC patients, 49.0% of patients liked sweets (daily), and 45.2% ate fatty meals daily. Whereas >80% of patients ate fruits and >2/3 ate vegetables daily. Conversely, most (65.8%) participants ate fish monthly, and >80% ate red meat and poultry weekly. In addition, most (88.8%) patients drank milk and milk products daily, while 79.3% ate fast food weekly.

Table 5. Distribution of studied samples according to dietary habits.

Dietary habits	Daily	>2 Times Weekly	1 Times Monthly	Never
	Number; %			
Sweet	198 (49.5)	35 (8.8)	2.0 (0.5)	164 (41.0)
Fat	181 (45.2)	39 (9.8)	0.0 (0.0)	180 (45)
Fruit	323 (80.7)	67 (16.8)	0.0 (0.0)	10(2.5)

Vegetables	304 (76.0)	80 (20.0)	6.0 (1.5)	10 (2.5)
Fish	0.0 (0.0)	52 (13.0)	263 (65.8)	85 (21.3)
Red meat and poultry	32 (8.0)	339 (84.8)	28 (7.0)	1 (0.25)
Milk & milk products	355 (88.8)	27 (6.8)	2.0 (0.5)	16 (4.0)
Fast food	18 (4.5)	317 (79.3)	56 (14.0)	9 (2.3)

Anxiety was observed in 78.0% of the participants, 38.3% had angriness, 10.5% had depression, 5.5% had shyness, and only a few (0.5%) of them had restlessness (Figure 1).

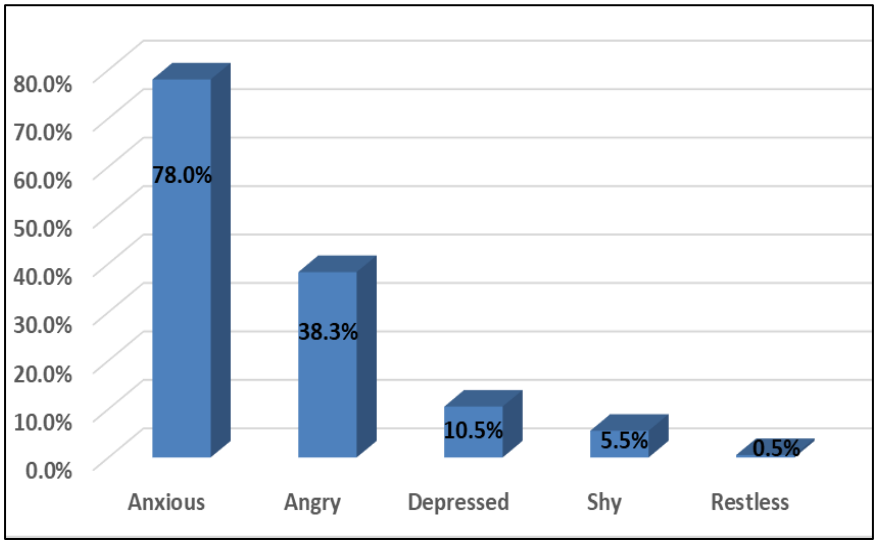

Figure 1. Psychological expression among patients with breast cancer.

Finally, 58% of the participants were physically inactive, 32% were minimally active, and 11% had health-enhancing physical activity (HEPA) on a weekday (Figure 2).

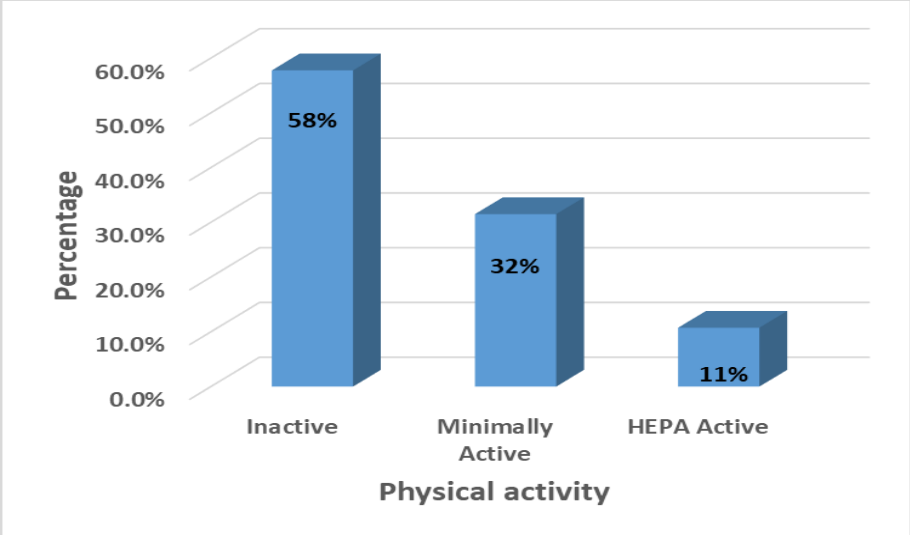

Figure 2. Demonstrates the physical activity of the studied patients.

Discussion

This cross-sectional study was conducted among Kurdish women in Sulaimaniyah, Iraq, aged ≥18 years, to determine the influence of risk factors that might increase the incidence of BC development. This study shows that the patient's age was 28-84 years (51.24±10.15) at the time of interview and 25-76 years at the time of admission (47.33 ± 9.90), while 59.8% were aged 41-60 years on admission.

These results proved that BC was common among middle age woman in our region. The study undertook in United State, explained that more youthful women diagnosed with BC had poorer prognoses and higher mortality than older women (8). In other developing countries, such as Ethiopia, the mean age of participants was 43.80±12.63 years and 39.64±12.91 years for cases and controls, respectively (5). At the same time, a study in the USA explained that the mean age at initial breast cancer diagnosis was 61.2±11.8 years (9).

Concerning the contributing factors related to BC, 53.5% of participants had menarche between 13-14 years, 88.5% had regular cycles, and 63.8% did not reach menopause. Whereas 43.5% of participants had ≥5 gravida, 35.3% had parity, 84.5% had their children before 30 years, and 54.5% did not use contraceptive pills. Regarding hormonal replacement therapy, 70.3% had not used it; while among hormonal users, 77.3% had not used tablets, while >80% did not use hormone therapy by injection route. A similar study was carried out in Ethiopia in which 90.9% of cases and 91.8% of controls reached their menarche after 12 years of age conversely. Moreover, 67(60.9%) of patients and 91(82.7%) of the controls in their study used oral contraceptive pills in their lifetime ***[5].*** While in a prospective cohort study in Denmark, proved that the risk of BC was higher among women who currently or recently used contemporary hormonal contraceptives than among those who had never used hormonal contraceptives, and this risk increased with longer durations of use; however, absolute increases in risk were small (10). Another inconsistent study in Saudi Arabia proved that the determinant of BC was associated significantly with using of hormonal contraceptives (11).

In this present study, the majority (80%) of participants had no previous breast disease. The family history of BC in studied patients was adverse among 72.5% of patients and positive among 27.5% of patients. Also, a family history of other cancers was negative among 59.5% of patients and positive among >40%. A similar study in Ethiopia demonstrated that 14(12.3%) of cases and 8(7.3%) of controls had a family history of BC (5).

Regarding the history of breastfeeding, 75.5% of participants were lactated by both breasts, 37.3% were lactated for four years, and 31.0% of patients were lactated with 3-4 children. These outcomes were inconsistent with Duche et al. study, they found that breastfeeding was never associated with higher chances of BC (5). Another uneven study in Saudi Arabia found that BC was associated significantly ($p<0.05$) with the duration of breastfeeding (11).

In this study, the majority (89.3%) of participants were not active smokers. Among smoker patients, 7.8% had 1 to 10 cigarettes per day, and only 3.0% had >10 cigarettes per day. About 6.3% of patients were smokers for 1 to 5 years and 4.5% for >5 years, while 50.7% were passive smokers or had a smoker family member. Finally, only 0.3% of participants had alcohol consumption. These results were inconsistent with a cohort study conducted on 1815 women. They found that smoking was associated with a modest but significantly increased risk of BC, particularly among women who started smoking at adolescent or peri-menarcheal ages. The relative risk of BC associated with smoking was more significant for women with a family history of the disease (12). A review study undertook in the United Kingdom, proved that women who commence tobacco at a young age have a higher lifetime BC risk than those who take up smoking in later life (13). Another inconsistent study in Saudi Arabia found that BC was associated significantly ($p<0.05$) with smoking (11). On the other hand, our findings are similar to a prospective cohort study on 17,435 women, which found no significant association between smoking status or alcohol consumption with

BC risk. At the same time, they mentioned that moderate alcohol intake was associated with increased BC risk, particularly for women with ER-positive BC, but only for those at lower predicted familial BC risk. Also, they reported that women with a high family risk profile who also consumed alcohol and were a current smoker were associated with increased BC risk (14). A review study undertook in Iran is another similar study, proved that spouses' exposure to passive smoking is a risk factor for developing BC (7).

Regarding the effect of dietary habits among BC patients, in our study found that 49.0% of patients liked daily sweets, 45.2% consumed fatty meals, 80% ate fruits, and >2/3 ate vegetables daily. Conversely, most (65.8%) of the participants consumed fish monthly, and >80% ate red meat and poultry weekly. In addition, most (88.8%) patients drank milk and milk products daily. Regarding fast food, 79.3% of the participants ate fast food weekly. A review study was conducted regarding modifiable risk factors of BC and found that lower red meat intake and higher intake of plants appear to decrease the risk of developing BC among adolescents and young adult females (15). A prospective cohort study on postmenopausal BC proved that a more anti-inflammatory diet after BC diagnosis was associated with lower risks of all-cause and BC-specific mortality. They concluded that a long-term anti-inflammatory diet might improve the survival of Breast Cancer (16).

In this study, the patient's psychological status before occurring BC; 78.0% of the participants had anxiety, 38.3% had angriness, 10.5% had depression, 5.5% had shyness, and only a few (0.5%) had restlessness. A cross-sectional study in Malaysia mentioned that the prevalence of anxiety was 31.7%, and depression was 22.0% among BC patients. Age group, monthly income, and several visits per month were significantly associated with stress. For depression, marital status accompanying a person, financial support and felt burden were significantly associated. They concluded that in the management of BC, more care or mounting should be given to the young and low socioeconomic status as they are at high risk of anxiety and depression (17).

Regarding the physical activity of studied patients, 58% of the participants were physically inactive, 32% were minimally active, and 11% of patients had HEPA on a weekday. The results of our study were consistent with the study carried out in Kurdistan-Iraq, who proved that 61.64% of patients were inactive, 35.85% were insufficiently active, and sufficiently active were 2.52% (18). A similar study in Ethiopia proved that physical activity was associated with reduced risk of BC; the odds of developing BC among women who perform high physical activities decreased by 80% compared to those who practiced low physical activities (5). Furthermore, a review study in Mayo Clinic is another similar study found that higher levels of physical activity were associated with a decrease in the risk of developing BC among adolescents and young adult females (15).

Conclusions

The essential findings of this study are that various factors, including physical inactivity, passive smoking and anxiety, were positively related to the incidence of BC among females in Sulaimaniyah, Kurdistan-Iraq. While marriage, gynecological history, such as age at menarche, regularity period, menopausal status, parity and first child after 30 years, breast lactation, and the number of children lactated appeared to be not protective factors. Using contraceptive pills with hormonal replacement therapy also does not have a strong association with BC. Previous disease, family history of BC and other cancers, smoking status and alcohol consumption, are not significant risk factors. Regarding the effect of dietary habits, differences were seen according to the amount of consumption and types of diet. There was a strong association between consumption of daily sweets and fat with red meat, poultry and fast food > 2 times weekly with increased development of BC. At the same time, daily consumption of fruits and vegetables has a preventive role on BC. The action aimed at enhancing physical activity, decreasing stress, awareness about the risk of passive smoking and keeping a balanced diet will aid in controlling the incidence of BC.

Acknowledgements

The authors would like to thank the authorities of the University of Sulaimani and the healthcare staff of Hiwa Hematology/Oncology Hospital for the support and help offered to this study.

References

1. Britt K.L., Cuzick J. & Phillips K.A. (2020). Key steps for effective breast cancer prevention. *Nature Reviews Cancer*. 20(8):417-436.
2. Majid R.A., Mohammed H.A., Saeed H.M., Safar B.M., Rashid R.M. & Hughson M.D. (2009). Breast cancer in Kurdish women of northern Iraq: incidence, clinical stage, and case-control analysis of parity and family risk. *BMC Women's Health*. 9(1):1-6
3. World Health Organization, Breast cancer. https://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/
4. Thakur P., Seam R.K., Gupta M.K., Gupta M., Sharma M. & Fotedar V. (2017). Breast cancer risk factor evaluation in a Western Himalayan state: A case–control study and comparison with the Western World. *South Asian Journal of Cancer*. 6(03):106-109.
5. Ghalib H.H.A., Ali D.H., Karim S.A.M., Gubari M.I.M., Mohammed S.A., Marif D.H. & Othman H.M. (2019). Risk factors assessment of breast cancer among Iraqi Kurdish women: Case-control study. *Journal of Family Medicine and Primary Care*. 8(12):3990-3997.
6. Duche H., Tsegay A.T. & Tamirat K.S. (2021). Identifying Breast Cancer Risk Factors Among Women Attending Selected Hospitals of Addis Ababa City: Hospital-Based Unmatched Case-Control Study. *Breast Cancer: Targets and Therapy*. 13:189-197.
7. Momenimovahed Z. & Salehiniya H. (2019). Epidemiological characteristics and risk factors for breast cancer worldwide. *Breast Cancer: Targets and Therapy*. 11:151-164.
8. Shoemaker M.L., White M.C., Wu M., Weir H.K. & Romieu I. (2018). Differences in breast cancer incidence among young women aged 20–49 years by stage and tumour characteristics, age, race, and ethnicity, 2004–2013. *Breast Cancer Research and Treatment*. 169(3):595-606.
9. Feigelson H.S., Bodelon C., Powers J.D., Curtis R.E., Buist D.S., Veiga L.H., Bowles E.J., Berrington de Gonzalez A. & Gierach G.L. (2021). Body mass index and risk of second cancer risk among women with breast cancer. *Journal of the National Cancer Institute*. 113(9):1156-1160.
10. Mørch L.S., Skovlund C.W., Hannaford P.C., Iversen L., Fielding S. & Lidegaard Ø. (2017). Modern hormonal contraception and the risk of breast cancer. *New England Journal of Medicine*. 377(23):2228-2239.
11. Alsolami F.J., Azzeh F.S., Ghafouri K.J., Ghaith M.M., Almaimani R.A., Almasmoum H.A., Abdulal R.H., Abdulaal W.H., Jazar A.S. & Tashtoush S.H. (2019). Determinants of breast cancer in Saudi women from Makkah region: a case-control study (breast cancer risk factors among Saudi women). *BMC Public Health*. 19(1):1-8.

12. Jones M.E., Schoemaker M.J., Wright L.B., Ashworth A. & Swerdlow A.J. Smoking and risk of breast cancer in the Generations Study cohort. *Breast Cancer Research*. 2017; 19(1):1-14.
13. Daly A.A., Rolph R., Cutress R.I. & Copson E.R. (2021). A review of modifiable risk factors in young women to prevent breast cancer. *Breast Cancer: Targets and Therapy*. 13:241-257
14. Zeinomar N., Knight J.A., Genkinger J.M., Phillips K.A., Daly M.B., Milne R.L., Dite G.S., Kehm R.D., Liao Y., Southey M.C. & Chung W.K. (2019). Alcohol consumption, cigarette smoking, and familial breast cancer risk: findings from the Prospective Family Study Cohort (ProF-SC). *Breast Cancer Research*. 21(1):1-14.
15. Cathcart-Rake E.J., Ruddy K.J. & Johnson R.H. (2018). Modifiable risk factors for the development of breast cancer in young women. *The Cancer Journal*. 24(6):275-284.

16. Wang K., Sun J.Z., Wu Q.X., Li Z.Y., Li D.X., Xiong Y.F., Zhong G.C., Shi Y., Li Q., Zheng J. & Shivappa N. (2020). Long-term anti-inflammatory diet about improved breast cancer prognosis: a prospective cohort study. *NPJ Breast Cancer*. 6(36):1-11.
17. Hassan M.R., Shah S.A., Ghazi H.F., Mujar N.M.M., Samsuri M.F. & Baharom N. (2015). Anxiety and depression among breast cancer patients in an urban setting in Malaysia. *Asian Pacific Journal of Cancer Prevention*. 16(9):4031-4035.
18. Amen M.R. (2016). Assessment of Physical Activities of Breast Cancer Patients Attending Hiwa Hospital in Sulaymania City. *Kufa Journal for Nursing Sciences*. 6(3):75-84.
19. Salvo D., Torres C., Villa U., Rivera J.A., Sarmiento O.L., Reis R.S. & Pratt M. (2015). Accelerometer-based physical activity levels among Mexican adults and their relation with sociodemographic characteristics and BMI: a cross-sectional study. *International Journal of Behavioural Nutrition and Physical Activity.* 12: 1-11.
20. Haskell W.L., Lee I.M., Pate R.R., Powell K.E., Blair S.N., Franklin B.A., Macera C.A., Heath G.W., Thompson P.D. & Bauman A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*. 116(9):1081.
21. Saeed D.A. & Sheikha A.K.I. (2023). Impact of breast size and body mass index on the prevalence of the breast cancer in the Sulaimaniyah province of Iraq. *Bahrain Medical Bulletin*. 45.