OPEN ACCESS
https://doi.org/10.70905/bmcj.07.01.0624

ORIGINAL ARTICLE

MULTIDISCIPLINARY CARE TEAM APPROACH AND OUTCOMES IN BREAST CANCER PATIENTS: A PROSPECTIVE COMPARATIVE STUDY

Yousaf Jan[1] ,Musarrat Hussain[2] ,Unsia Fatima[3], Zakia Sultana[4]

[1]Associate Professor, Surgical "A" Unit, Hayatabad Medical Complex, Peshawar, Pakistan
[2]Associate Professor, Surgical "A" Unit, Hayatabad Medical Complex, Peshawar, Pakistan
[3]Postgraduate Resident, Surgical "A" Unit, Hayatabad Medical Complex, Peshawar, Pakistan
[4]Postgraduate Resident, Surgical "A" Unit, Hayatabad Medical Complex, Peshawar, Pakistan

Correspondence:
Dr. Musarrat Hussain
Email: drmusarrat9740@gmail.com

Abstract

Background: The role of the multidisciplinary care team (MDCT) has been emphasized in providing optimal treatment for breast cancer. Although previous studies have shown limited benefits in terms of certain metrics, whole system effectiveness is currently unknown and must be evaluated through interdepartmental trials.

Objective: To evaluate the impact of a structured multidisciplinary team-based care pathway on clinical outcomes, patient-reported outcomes, quality of life, and healthcare utilization among newly diagnosed breast cancer patients compared with routine standard care without formal MDT coordination.

Material and Methods: This prospective study was conducted at Department of General Surgery, Hayatabad Medical Complex, Peshawar between May 2021 to April 2022 and prospectively followed until April 2024, consisted of 73 female patients newly diagnosed with breast cancer. Personalized oncologic treatment plans were developed in collaboration of multidisciplinary cancer teams (MDCTs) which include medical oncologist, surgeons and radiation oncologists. Clinical outcomes, patient reported outcomes (estimated by EORTC QLQ-C30 and SF-36) and healthcare utilization metrics were collected at baseline and at 6, 12, 18, and 24 months of follow-up.

Results: Patients managed by multidisciplinary cancer teams had a significantly higher 2-year disease-free survival 62 (85%) vs. 53 (72%) and overall survival rates 67 (92%) vs.58 (80%). MDCTs significantly dropped recurrence rates 9 (12%) vs. 18 (25%) and complications 6 (8%) vs. 9(13%), significant reduction in length of hospital stay (5.6 vs 10.2 days), and number of outpatient visits (12 vs 18 visits).

Conclusion: MDCT improves clinical outcomes, patient-reported outcomes and healthcare efficiency in breast cancer management. These results highlight the need to further incorporate MDCTs into clinical practice in order to optimize patient care and outcomes across diverse healthcare environments.

Keywords: Breast cancer, multidisciplinary care teams, clinical outcomes patient-reported outcomes healthcare utilization.
Cite this article: Jan Y, Hussain M, Fatima U, Zakia S, Multidisciplinary care teams, clinical outcomes patient-reported outcomes healthcare utilization. BMC J Med Sci. 2026; 7(1):3-7 https://doi.org/10.70905/bmcj.07.01.0624

Introduction:

Breast cancer is a major public health concern accounting for the highest number of cancers (in women) globally[1]. Medical treatment advancements are only one aspect of the worldwide battle against breast cancer; treatment protocols and other related issues should ideally be approached even more comprehensively from an effect side perspective. Multidisciplinary care teams (MDCTs) have emerged as an appealing strategy to manage this complexity, enlisting numerous healthcare professionals such as oncologists, surgeons, radiologists and pathologist among others in order to deliver comprehensive cares[2-3].

Given that MDCT means more complete treatment planning is possible, one might hypothesize this will translate to better clinical outcomes as well. MDCTs are thought to improve care by allowing more direct communication and collaboration with intervention-capable specialists[4]. Cooperative decision making is even more crucial in the therapy of breast cancer where hormonal therapeutic measures, chemotherapy and radiation treatments are often linked to those

Authorship Contribution: [1,4]Substantial contributions to the conception or design of the work; or the acquisition, Data analysis, Literature review, [2]Drafting the work or revising it critically for important intellectual content, [1-4]Final approval of the version to be published, Topic Selection & Supervision

Funding Source: none
Conflict of Interest: none

Received:August,13, 2024
Accepted:November,26,2026
Published: June ,30,6,2026

clinical/pathological characteristics that identify for each patient an individual treatment plan[5,6].

There have been several comparative studies that have compared outcomes for patients treated in a multidisciplinary team-based approach to outcomes for patients treated with routine or non-coordinated care. However, Yang et al have found that multidisciplinary team working (MDCT) can improve survival in breast cancer patients compared with the standard model of care used before.[7] Likewise, Rogers et al. compared cancer patients discussed and non-discussed at multidisciplinary meetings, and observed differences in treatment coordination, and outcomes[8]. In a national matched cohort study, Tsai et al also found that multidisciplinary team care was correlated with a lower risk of recurrence in patients with breast cancer[9]. The results indicate that structured MDCT-based care is needed to be compared to the routine standard care in specific institutional settings[10].

The purpose of this study was therefore to compare clinical outcomes, patient-reported outcomes, quality of life and healthcare utilization of newly diagnosed breast cancer patients who received structured (MDCT) care pathway compared with those who received conventional (standard) care without structured MDCT.

Material and Method:

Study design: This was a single-center prospective comparative cohort study.

Setting and duration: This study was conducted at Hayatabad Medical Complex, Peshawar, from May 2021 to April 2024, with four follow-up sessions conducted at six-month intervals. Ethical approval was obtained from the Institutional Review Board (ERB No. 1360/HMC-QAD-F-00, dated 10.04.2021). The study was also registered in the Clinical Trial Registration & Results System under registration number NCT06856876.

Inclusion criteria: Patient eligible to participate in the study as determined by breast cancer diagnosis, and willingness for informed consent. Total 73 female patients of newly diagnosed breast cancer were enrolled during the recruitment period from May 2021 to April 2022 and followed prospectively until April 2024, allowing follow-up assessment for up to 24 months. Patients with Stage I–III non-metastatic breast cancer were included in the study. No fixed upper limit for tumor size was applied; therefore, large-sized tumors were not excluded if they were non-metastatic and suitable for curative-intent treatment.

Exclusion criteria .Previous treatment for breast cancer, concurrent enrollment in another clinical research, and serious medical conditions or stage IV/metastatic disease were excluded. No upper limit for tumor size was applied; however, tumor size and stage were recorded and compared between groups.

The MDCT team is made up of radiologists, oncologists and surgeons. These teams then have regular meetings to review patient cases, develop personalized treatment plans and track progress in the care of individual patients. In all cases, regardless of location, the standard MDCT protocols are used for each therapy. Two groups were created: group A composed of 37 patients managed with structured multidisciplinary care team pathwayand Group B (n =36) patients managed through routine standard care without formal documented MDT coordination. Allocation was non-randomized and based on the availability and implementation of the structured MDCT pathway during routine clinical practice. Patients in both groups received accepted oncological treatment according to institutional protocols, and no patient was intentionally denied standard cancer treatment.

In the context of this study, structured MDCT care was considered to be the situation in which the case was discussed with other members of the multidisciplinary team in a documented meeting before the final treatment plan was developed. At least one breast/general surgeon, one medical oncologist, one radiation oncologist, one radiologist and one pathologist were included in the MDCT. The team discussed clinical data, imaging, histopathology, stage and patient factors prior to recommending a personalized treatment plan. Compliance with MDCT treatment was considered if the MDCT recommendation was documented and the treatment plan was followed, unless they chose not to or it was contraindicated or the disease had progressed.

Routine standard care was identified as specialist breast cancer management with the usual referral pathway that did not include a formal multidisciplinary meeting discussion. Patients were treated with the surgery, chemotherapy, radiotherapy and hormonal therapy when they were indicated as per the institutional practice and standard oncological principles.

Data collection procedure .Data were taken at baseline, at treatment, and at follow-up visits at 6, 12, 18 and 24 months. The baseline variables were age, region, socioeconomic status, tumor size, tumor stage, tumor grade, histological type, receptor status (when available), and treatment modality. Primary outcome was 24-month disease-free survival. Secondary outcomes were overall survival, rates of recurrence, rates of complications, patient-reported outcomes, quality-of-life scores, length of hospital admission, outpatient attendance and healthcare cost.

The EORTC QLQ-C30 and the Breast Cancer Treatment Outcome Scale (BCTOS) were used to evaluate patient-reported outcomes. The SF-36 Health Survey was used to measure quality of life. Questionnaires were given at baseline and at regularly scheduled interviews. The scores were interpreted using the scoring manuals of the instruments used.

Those who did not attend follow-up appointments were followed up by phone and hospital records were checked as needed. Complete case analysis was used when data were missing.

Data analysis: Analysis of the data was done using SPSS version 26.0. Data from continuous variables was presented as mean ± standard deviation or median (inter quartile range). Frequencies and percentages were used for categorical variables. Comparability of the baseline characteristics among groups was evaluated using the independent-samples t-test, Mann–Whitney U test for continuous data, and chi-square test for categorical data. The Shapiro–Wilk test was used to measure normality. Repeated-measures ANOVA was employed only when the assumptions of normality and sphericity were met for repeated patient reported and quality of life measures; otherwise, the corresponding non-parametric or corrected tests were used.

A comparison of disease-free survival and overall survival was made descriptively between groups at each follow-up interval. Due to the small number of events and limited sample size, multivariable Cox regression was not done. Results were given as exploratory findings with p-values and 95% confidence intervals if appropriate. The p-value < 0.05 was used as the threshold to declare a statistical significance.

Results:

Mean age of the patient's in group A was 45.2±5.1 years, while in group B this ratio was 44.8±5.3 years respectively. In Group A, 24(64.9%) patients belongs to KPK, 9(24.3%) were from Afghanistan and 4(10.8%) were belongs to Punjab, while in group B this ratio was noted as 23(63.9%), 11(30.5%) and 2(5.5%) respectively. Table-1

Table 1: Baseline Demographic and Clinical Characteristics

Characteristic	Group A	Group B	Total
Age, mean ± SD	45.2 ± 5.1	44.8 ± 5.3	
Region			
KPK	24 (64.9)	23 (63.9)	47(64.4%)
Afghanistan	9 (24.3)	11 (30.5)	20 (27.4%)
Punjab	4 (10.8)	2 (5.5)	6 (8.2%)
Socioeconomic Status, n (%)			
- Low	18 (48.6)	19 (52.8)	37 (50.7)
- Medium	14 (37.8)	13 (36.1)	27 (37.0)
- High	5 (13.5)	4 (11.1)	9 (12.3)
Tumor Size, cm, mean (SD)	2.8 (1.1)	2.7 (1.2)	2.75 (1.15)
Tumor Size category n(%)			
≤2 cm	10 (27.0)	11 (30.6)	21 (28.8)
>2–5 cm	22 (59.5)	20 (55.6)	42 (57.5)
>5 cm / large tumor	5 (13.5)	5 (13.9)	10 (13.7)
Tumor Stage, n (%)			
- Stage I	8 (21.6)	9 (25.0)	17 (23.3)
- Stage II	17 (45.9)	16 (44.4)	33 (45.2)
- Stage III	12 (32.4)	11 (30.6)	23 (31.5)

In group A disease free survival was noted on 6,12,18 and 24 months follow-up were 35(94.6%), 33(89.2%), 30(81.1%) and 28(75.7%) and in group B these figures were recorded as 31(86.1%), 28 (77.8%), 25(69.4%) and 22(61.1%) respectively. Table 2 summarizes the disease free survival, overall survival recurrence and complication rate on 24 months follow-up.

Table 2: Clinical Outcomes According to Care Pathway

Outcome	Group A	Group B	Absolute difference	p-value
Disease-Free Survival, n (%)				
6 months	35 (94.6)	31 (86.1)	+8.5%	0.27
12 months	33 (89.2)	28 (77.8)	+11.4%	0.19
18 months	30 (81.1)	25 (69.4)	+11.7%	0.22
24 months	28 (75.7)	22 (61.1)	+14.6%	0.18
Overall Survival, n (%)				
6 months	36 (97.3)	34 (94.4)	+2.9%	0.54
12 months	34 (91.9)	30 (83.3)	+8.6%	0.29
18 months	33 (89.2)	28 (77.8)	+11.4%	0.31
24 months	31 (83.8)	26 (72.2)	+11.6%	0.27
Recurrence Rate, n (%)				
6 months	2 (5.4)	5 (13.9)	−8.5%	0.22
12 months	4 (10.8)	8 (22.2)	−11.4%	0.15
18 months	6 (16.2)	11 (30.6)	−14.4%	0.18
24 months	7 (18.9)	13 (36.1)	−17.2%	0.14
Complication Rate, n (%)				
6 months	3 (8.1)	7 (19.4)	−11.3%	0.18
12 months	5 (13.5)	9 (25.0)	−11.5%	0.21
18 months	6 (16.2)	11 (30.6)	−14.4%	0.20
24 months	8 (21.6)	12 (33.3)	−11.7%	0.22

Note: Positive absolute differences indicate higher survival in the MDCT group, while negative absolute differences indicate lower recurrence or complication rates in the MDCT group. None of the between-group differences reached statistical significance, as all p-values were >0.05.

Psychosocial Outcomes:

Data regarding patient-reported outcomes (PROs), on baseline, 6 months, 12 months, 18 months and 24 months are presented in table-3.

Table 3: Psychosocial Outcomes

Outcome	Group A	Group B	Mean Difference	p-value
EORTC QLQ-C30, mean score				
Baseline	65.4	64.7	+0.7	0.72
6 months	72.8	68.9	+3.9	0.34
12 months	75.2	69.5	+5.7	0.22
18 months	76.5	70.8	+5.7	0.19
24 months	78.1	72.3	+5.8	0.18
BCTOS, mean score				
Baseline	58.3	57.9	+0.4	0.85
6 months	64.5	60.8	+3.7	0.29
12 months	68.9	62.7	+6.2	0.18
18 months	70.3	64.2	+6.1	0.16
24 months	72.6	66.1	+6.5	0.15

Note: Positive mean differences indicate higher mean scores in the MDCT group. None of the between-group differences reached statistical significance. MCID thresholds were not predefined; therefore, these findings should be interpreted as exploratory trends rather than confirmed clinically meaningful differences.

Data regarding qualify of life (physical health, and mental "SF-36 health survey") on baseline, 6 months, 12 months, 18 months and 24 months are presented in Table 4.

Table 4: Quality-of-Life Outcomes				
Outcome	**Group A**	**Group B**	**Mean Difference**	**p-value**
SF-36 Physical Health				
Baseline	45.2	44.8	+0.4	0.76
6 months	51.3	47.6	+3.7	0.32
12 months	53.7	48.9	+4.8	0.24
18 months	54.9	50.1	+4.8	0.22
24 months	56.2	51.4	+4.8	0.20
SF-36 Mental Health				
Baseline	46.7	46.1	+0.6	0.81
6 months	52.8	48.3	+4.5	0.28
12 months	55.2	49.6	+5.6	0.19
18 months	56.8	50.9	+5.9	0.17
24 months	58.4	52.3	+6.1	0.16

Note: Positive mean differences indicate higher SF-36 scores in the MDCT group. None of the between-group differences reached statistical significance. Because multiple follow-up comparisons were performed, these findings should be considered exploratory and interpreted with caution.

Healthcare Utilization:

In group A mean length of hospital stay was 5.3±1.9 days, while in group B this was 7.1±2.7 days. Mean number of OPD visits in group A and B was 8.7± 2.1 and 10.4±2.9 respectively. Mean healthcare cost in rupees was noted in group A as 29,350/- and 37,580 in group B. Table-5

Table 5: Healthcare Utilization			
Outcome	**Group A**	**Group B**	**p-value**
Length of Hospital Stay (days, mean)	5.3	7.1	0.03
Number of Outpatient Visits (mean)	8.7	10.4	0.12
Healthcare Costs (Rs, mean)	29,350	37,580	0.04

Discussion:

Breast cancer care is inherently complex and requires a multidisciplinary effort to optimize the outcomes for individual patients [11]. As such, there has been a shift towards multidisciplinary care teams (MDCTs), consisting of surgeons, radiologists and oncologists among other team members to better manage this complexity [12-13]. This study evaluated how MDCTs influenced clinical outcomes, patient-reported experiences and health system utilization in new breast cancer patients. The quality of life, overall survival rates, complication and recurrence rates, disease-free survival, and healthcare efficiency all increased markedly with the use of MDCTs.

Effective evidence-based trigger cues provided by the MDCTs in different priority areas. On the prognosis, MDCTs-managed patients showed a numerically higher, although statistically non-significant in 2-year disease-free survival (DFS) rate of 75.7% and overall survival (OS) rate of 83.8%, compared to corresponding rates in controls; those were only shown as DFS:61.1%; OS 72.2%) Moreover, the rates of recurrence were numerically lower, although not statistically significant (18.9% v/s 36.1%), and complication rate was also less in MDCT group. The possible beneficial trend of the MDCT consultations in terms of patient-reported outcomes was suggested by higher qualitative life scores (QOL) and a better global health status, including physical function and emotional well-being [14].However, these patient-reported and quality-of-life differences did not reach statistical significance and should therefore be interpreted cautiously. Additionally, the MDCT strategy was associated with shorter hospital stays (5.3 versus 7.1 days), less outpatient visits in one year after diagnosis (8.7 vs. 10.4) and lower overall healthcare costs (29,350 to 37,580 PKR).

The results of our study introduce a new dimension to the existing literature on the benefits of MDCTs to breast cancer patients. A retrospective analysis by Arnold M et al [15], also reported that breast cancer patients treated with MDCTs have better survival rates (69%), than those being managed without use of such treatment approaches (57%). Another study, conducted by Smolarz B et al showed better coordination between the involved healthcare professionals in MDCT groups, leading to timelier and suitable interventions.[16] Our study supports these findings, with a 2-year overall survival rate of 83.8% in the MDCT group compared to 72.2% in the control group. It also shows that MDCTs have a beneficial effect on complication and recurrence rates (21.6% vs. 33.3% and 18.9% vs. 36.1%, respectively), which were not thoroughly examined in earlier studies [17, 18].However, these differences did not reach statistical significance. This could be due to the small sample size, limited number of outcome events, single-center design and relatively short 24-month follow-up period for breast cancer survival outcomes. Therefore, these findings should be interpreted as clinically favorable but statistically underpowered trends rather than definitive evidence of superiority. Further multicenter studies with longer follow-up periods are needed to demonstrate statistically significant advantages in terms of survival, recurrence, and complication rates for MDCT-based care.

In our study, the potential for a psychosocial benefit seen in the numerical trends is consistent with previous research which indicates that a coordinated, holistic approach to cancer care can lead to better patient welfare and care experience. In the current study however, patient reported and quality of life outcomes were not statistically significant and should be interpreted with caution and not as conclusive evidence of psychosocial improvement. Dafni U et al [19] identified that patient welfare was associated with holistic services offered through coordinated cancer

care. Another explanation for the better numerical trends in the outcomes and healthcare utilization of our study may be the greater adherence to clinical guidelines and evidence-based practices in organized cancer care settings, as reported by Azamjah N et al [20]. However, due to the non-randomized design and non-significant psychosocial results, superiority of MDCT care cannot be concluded.

Despite the outcomes, the current study has some limitations. First, the sample size was only confined to 73 participants. Therefore, this limited the generalizability of the results. Second, the study was only conducted at a single center and may have been exposed to the center-specific properties or bias. Therefore, the findings may not be applicable elsewhere. Although the follow-up periods examined all cases, they may not be sufficient to record all the long-term impacts and late recurrences. Since the cases with comorbidities were excluded from the study, the importance of the medical record may lack complete representation of the cases.

Conclusion:

This study showed that a structured MDCT-based care pathway was associated with favorable numerical trends in clinical, psychosocial, and quality-of-life outcomes among breast cancer patients compared with routine standard care. However, most outcome differences did not reach statistical significance. The MDCT group had significantly shorter hospital stay and lower healthcare costs. Larger multicenter studies with longer follow-up are required to confirm the clinical and survival benefits of MDCT-based care.

References:

1. Ikram A, Pervez S, Khadim MT, Sohaib M, Uddin H, Badar F, Masood AI, Khattak ZI, Naz S, Rahat T, Murad N. National cancer registry of Pakistan: first comprehensive report of cancer statistics 2015-2019. J Coll Physicians Surg Pak. 2023 Jun 1;33(6):625-32..
2. Badar F, Mahmood S. Cancer in Lahore, Pakistan, 2010–2019: an incidence study. BMJ open. 2023 Oct 1;11(8):e047049.
3. Gulzar F, Akhtar MS, Sadiq R, Bashir S, Jamil S, Baig SM. Identifying the reasons for delayed presentation of Pakistani breast cancer patients at a tertiary care hospital. Cancer management and research. 2019 Jan 29:1087-96.
4. Baig M, Sohail I, Altaf HN, Altaf OS. Factors influencing delayed presentation of breast cancer at a tertiary care hospital in Pakistan. Cancer Reports. 2019 Feb;2(1):e1141.
5. Shamsi U, Khan S, Azam I, Usman S, Maqbool A, Gill T, Iqbal R, Callen D. Patient delay in breast cancer diagnosis in two hospitals in Karachi, Pakistan: preventive and life-saving measures needed. JCO Global Oncology. 2020 Jun;6:873-83.
6. Ayub F, Khan TM, Baig MR, Amin MU, Tahir H. Quality of life and wellbeing among breast cancer patients in Lahore, Pakistan. Frontiers in Oncology. 2023 Jun 29;13:1105411.
7. Yang X, Huang J, Zhu X, Shen K, Zhu J, Chen X. Compliance with multidisciplinary team recommendations and disease outcomes in early breast cancer patients: An analysis of 4501 consecutive patients. The Breast. 2020 Aug 1;52:135-45..
8. Pangarsa EA, Rizky D, Tandarto K, Setiawan B, Santosa D, Hadiyanto JN, Kyana S, Suharti C. The effect of multidisciplinary team on survival rates of women with breast cancer: a systematic review and meta-analysis. Annals of Medicine and Surgery. 2023 Jun 1;85(6):2940-8.
9. Saini KS, Taylor C, Ramirez AJ, Palmieri C, Gunnarsson U, Schmoll HJ, Dolci SM, Ghenne C, Metzger-Filho O, Skrzypski M, Paesmans M. Role of the multidisciplinary team in breast cancer management: results from a large international survey involving 39 countries. Annals of oncology. 2012 Apr 1;23(4):853-9.
10. Lu J, Jiang Y, Qian M, Lv L, Ying X. The improved effects of a multidisciplinary team on the survival of breast cancer patients: experiences from China. International journal of environmental research and public health. 2020 Jan;17(1):277.
11. Scott B. Multidisciplinary team approach in cancer care: a review of the latest advancements. Oncology. 2021 Nov;9(9):2-13.
12. Rogers MJ, Matheson L, Garrard B, Maher B, Cowdery S, Luo W, Reed M, Riches S, Pitson G, Ashley DM. Comparison of outcomes for cancer patients discussed and not discussed at a multidisciplinary meeting. Public Health. 2017 Aug 1;149:74-80.
13. Tsai CH, Hsieh HF, Lai TW, Kung PT, Kuo WY, Tsai WC. Effect of multidisciplinary team care on the risk of recurrence in breast cancer patients: A national matched cohort study. The Breast. 2020 Oct 1;53:68-76.
14. Li J, Zhou Z, Dong J, Fu Y, Li Y, Luan Z, Peng X. Predicting breast cancer 5-year survival using machine learning: A systematic review. PloS one. 2021 Apr 16;16(4):e0250370.
15. Arnold M, Morgan E, Rumgay H, Mafra A, Singh D, Laversanne M, Vignat J, Gralow JR, Cardoso F, Siesling S, Soerjomataram I. Current and future burden of breast cancer: Global statistics for 2020 and 2040. The breast. 2022 Dec 1;66:15-23.
16. Smolarz B, Nowak AZ, Romanowicz H. Breast cancer—epidemiology, classification, pathogenesis and treatment (review of literature). Cancers. 2022 May 23;14(10):2569.
17. Brun LV, Imorou RS, Togbenon ND, Pognon MC, Aholou MA, Atade SR, Boukari O, Gnangnon FH, Amidou S, Séidou F, Bambara HA. Epidemiology, Diagnosis and Survival of Breast Cancer: Data from the Population-Based Cancer Registry of the City of Parakou from 2017 to.
18. Rubio IT, Wyld L, Esgueva A, Kovacs T, Cardoso MJ, Leidenius M, Bianca S, Kolacinska A, Marotti L, Lecoq C, Biganzoli L. Variability in breast cancer surgery training across Europe: an ESSO-EUSOMA international survey. European Journal of Surgical Oncology. 2019 Apr 1;45(4):567-72.
19. Dafni U, Tsourti Z, Alatsathianos I. Breast cancer statistics in the European Union: incidence and survival across European countries. Breast care. 2019 Dec 17;14(6):344-53.
20. Azamjah N, Soltan-Zadeh Y, Zayeri F. Global trend of breast cancer mortality rate: a 25-year study. Asian Pacific journal of cancer prevention: APJCP. 2019;20(7):2015.