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BREAST CANCER SURVIVAL AFTER SURGERY AND OTHER TREATMENTS: A LITERATURE REVIEW

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ABSTRACT

Background: Breast cancer treatment has changed over the years, both surgically and medically. **Purpose:** This study aims to conduct a literature review on survival in breast cancer patients after undergoing surgery and other treatments. **Methods:** A literature review was conducted from the databases PubMed, ScienceDirect, and Google Scholar using the keywords "breast cancer," "surgical treatment" (OR surgery OR treatment option OR preference), and "survival analysis." The articles were identify using PICO approach with the study population were female breast cancer patients undergoing surgical intervention from all age groups and nationalities. The inclusion criteria were articles with free full text access in English and Bahasa with the range of the studies 2019-2024. The exclusion criteria were articles discussing surgical interventions for other type of cancer, breast cancer surgical intervention in male population, and qualitative studies or non-original research. **Results:** There were 39,299 articles reported in the PRISMA flowchart, 9,049 articles were duplicated articles, and 136 articles were excluded based on PICO. Ten articles were selected and included in this literature review to observe the survival between surgical treatment and other treatment among breast cancer patients. This study indicated differences in survival among breast cancer patients after receiving treatment. The combination of breast cancer surgery (BCS) and radiotherapy showed a better outcome compared to the combination of mastectomy and radiotherapy. **Conclusion:** Our review shows that survival of breast cancer patients may vary depending on the type of treatment given, hormonal status and cancer severity level.

Keywords: breast cancer, cancer treatment, surgical treatment, survival

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INTRODUCTION

Breast cancer is malignant from the disruption of DNA integrity and genetic mutations induced by estrogen exposure. In certain conditions, hereditary predisposition can be inherited, such as changes in breast cancer gene 1 (BRCA1) and breast cancer gene 2 (BRCA2) (Alkabban & Ferguson, 2024). From its histology, breast cancer encompasses various subtypes including lobular cancers, ductal cancers, Paget's disease of the breast from the nipple, phyllodes tumor, and angiosarcoma within lymphatic vessels (American Cancer Society, 2021).

The classification of breast cancer indicates the distinction between invasive tumors to surrounding tissues and in situ carcinoma comprises lobular carcinoma in situ (LCIS) and ductal carcinoma in situ (DCIS). Whereas invasive breast carcinoma encompasses tumors that have been spread beyond the ducts or lobules into surrounding tissues, including invasive ductal carcinoma (IDC) and invasive lobular carcinoma (ILC) (American Cancer Society, 2021; Corradini *et al*., 2021).

Breast cancer is the most frequently diagnosed cancer among women. It represents a main cause of cancer-related mortality in women globally, with an estimated 2.3 million new cases and 666,000 deaths in 2022 (Bray *et al*., 2024). In the United States, the incidence of breast cancer occurs in women aged over 40 caused by factors such as obesity and post-menopause conditions at the local stage with high mortality rates occurring in groups with limited access to screening, primary prevention, and inequality in access to cancer treatment related to low social and economic status (Bazzi *et al*., 2023). There was an increase in the incidence of breast cancer in 2010-2018 in the US women among the 20–49-year age group caused by obesity as a modifiable factor in breast cancer (Ellington *et al*., 2022).

Significant association has been shown between tumor stage and lymph node status with patient's survival (Min *et al*., 2021). Patients with cancer spreading to the chest wall and/or skin as lymph node metastasis increase the risk of mortality of patients (Novrial *et al*., 2020). The treatment of breast cancer depends on its type and stage. According to the National Cancer Institute, several factors are considered in determining cancer treatment, such as the stage and severity of cancer, the overall health condition of the patient, and the patient's preference in selecting the type of cancer treatment such as chemotherapy, surgical treatment, radiation, hormonal or endocrine therapy, and biological therapy as the main treatment of breast cancer (Center for Disease Control and Prevention, 2023; National Cancer Institute, 2024).

Surgery has been found to be more effective in improving survival of breast cancer patients compared to mastectomy (Mburu *et al*., 2022). Mastectomy or breast cancer surgery (BCS) is an option for breast cancer treatment in early-stage and often followed by a combination of treatments such as radiation, chemotherapy, and/or endocrine therapy (Wang & Wu, 2023). Mastectomy or breast conservation surgery can lead to several long-term effects, such as vascular, nerve, and lymphatic damage, fibrosis, and gait disturbances, particularly following unilateral mastectomy, as well as lymphedema in the upper extremities (Tommasi *et al*., 2022). Local recurrence after BCS is more common in DCS than mastectomy with specific breast cancer-related deaths within 10 years being relatively low regardless of the surgical therapy received (Pawloski *et al*., 2021). From all local recurrences after BCS, half are invasive and half are DCIS, while the majority of recurrences after mastectomy are invasive (Co *et al*., 2024; Pawloski *et al*., 2021). Therefore, establishing the diagnosis of breast cancer at the tumor stage can influence a patient's survival.

The survival is a measure to calculate the probability of individuals still alive with the same stage and type of cancer over a certain period (5 or 10 years) after diagnosis (American Cancer Society, 2024). Factors influencing survival in breast cancer patients include axillary lymph node metastasis, TNM stage (tumor, nodes, metastasis), as well as hormone receptor levels such as ER+ (estrogen receptor positivity), PR+ (progesterone receptor positivity), and HER 2+ (human epidermal growth factor receptor 2 positivity) (Englander *et al*., 2023).

Breast cancer treatment strategies are diverse, often involving a multi-modality approach tailored to the tumor's stage, biology, and the patient's preferences (Cheung, 2020).

Nowadays, surgical treatment is widely conducted as local control, prevent local recurrence, and improve survival (Riis, 2020). The results of previous studies have not reached a consensus regarding the survival of breast cancer patients who undergo surgery treatment compared to those who undergo non-surgery treatment. Furthermore, patients who undergo surgery may experience a higher incidence of local recurrence, which is also related to survival rates. Therefore, this study aims to compare the survival after surgery and various other treatments to examine the survival of each treatment given to breast cancer patients in women with breast cancer.

METHOD

Study Design

This research was a literature review study using articles that have been published and passed ethical review. Humans were not directly involved in this research.

Search Strategy

The articles were identified using PICO approach (population, intervention, comparison, and outcome). Relevant articles were retrieved based on keywords from the databases PubMed, Google Scholar, and ScienceDirect. The study population was female breast cancer patients undergoing surgical intervention from all age groups and nationalities. Title and abstract were searched by relevant keywords combinations "breast cancer," "surgical treatment" (OR surgery OR treatment option OR preference), and "survival analysis." Research articles on breast cancer patients who received surgical treatment as intervention were collected in this study along with patients who received non-surgical treatment as comparisons group to determine the survival between breast cancer patients who undergo surgical treatment and non-surgical treatment.

Study Criteria

The Authors determined the study criteria for this literature review. The inclusion criteria were articles with free full text access in English and Bahasa with the range of the studies published in 2019-2024. The exclusion criteria were articles discussing surgical interventions for other types of cancer, breast cancer surgical intervention in male population, and qualitative studies or non-original research.

Article Selection and Data Extraction

The study selection was conducted independently by six researchers (Ismaya Ramadhanti, Mutiara Nur Izzati, Asti Elysia Rahmatul Fitri, Verina Lutfiah Rahmayanti, Endah Nurhalimah Hamid, and Laily Hanifah). Articles were screened based on abstract and title. Relevant studies were downloaded for further selection based on inclusion criteria. This literature review excluded irrelevant articles based on inclusion and exclusion criteria. Discussion was held to reach an agreement between researchers if there were issues during the study selection process. A majority vote was conducted to reach a final decision.

Researchers extracted and summarized relevant study information to a table form with the information of author's name, study years, title, study location, study design, data source, study population, sample size, and study result. Selection of articles from each database was performed to avoid duplication of articles. Plagiarism was prevented by referencing articles used in this literature review. To ensure accuracy and avoid bias, clear presentation of the results of the studies included was conducted.

RESULT

The study selection process consisted of four steps (Figure 1). This literature review yielded 10,300 articles from Google Scholar, 1,893 articles from PubMed, and 27,106 articles from ScienceDirect based on searches based on keywords. There were 9,049 duplicates articles and 136 articles were excluded based on PICO (population, intervention, comparison, outcome) and studies for more than five years.

Ten articles were selected and included in this literature review. The included studies which explored the survival among breast cancer patients undergoing surgical treatment compared to breast cancer patients with no surgical intervention. Ten articles were conducted in this study. Nine articles were conducted with cohort study design, and one article was conducted with randomized clinical trial (RCT). These studies indicated differences in survival among breast cancer patients after receiving treatment (Table 1).

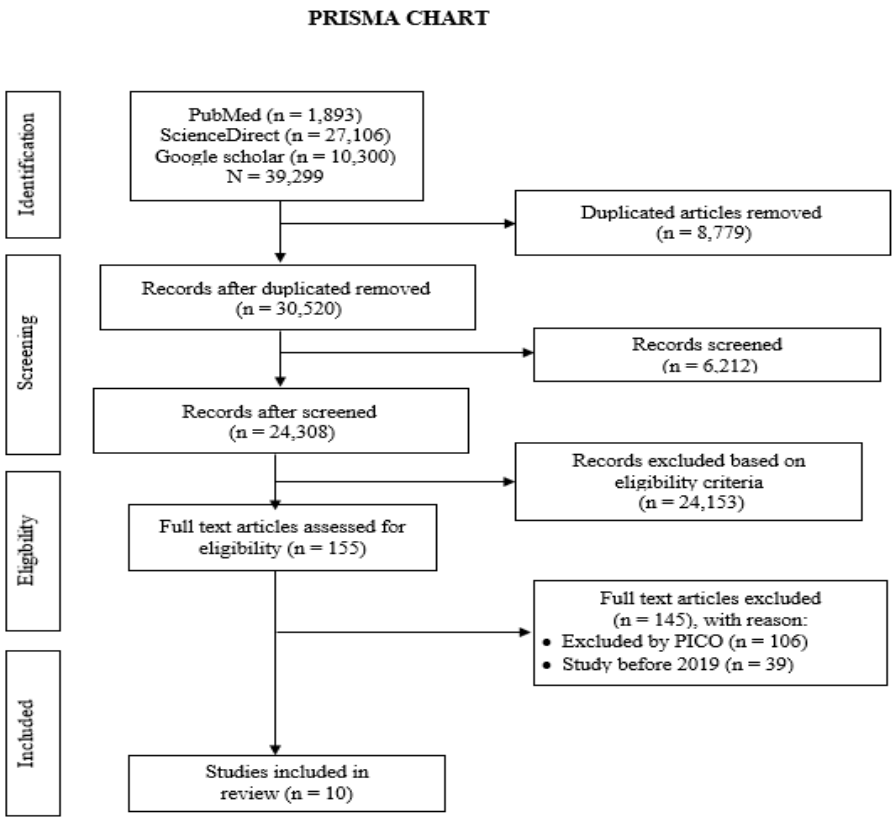

Figure 1. PRISMA Flowcharts for Study Selection

Table 1. Included Studies Synthesis

Authors (year)	Title	Study Location	Study Design	Study Population	Data Source	Sample	Result
Kumilau et al. (2022)	Short term recurrence and survival rate of breast cancer patients post-surgical treatment; North Borneo experience	Kinabalu, Sabah, Malaysia	Cohort	Women patients with breast cancer underwent surgical treatment	A registry of breast cancer in the tertiary hospital at Breast Clinic in Kota Kinabalu from 2016 to 2019	482 women underwent breast cancer surgical procedure	1. Among 482 breast cancer patients who underwent surgical treatment 2016-2019, the 2-year recurrence rate was 11.8% (95% CI: 8.5-16.4) and the 2-year survival rate was 94.8% (95% CI: 91.8-96.7). 2. Lymph node involvement ($p < 0.001$) and a high lymph node ratio ($p < 0.001$) were significantly associated with higher cumulative recurrence rates. 3. Lower survival rates were significantly linked to higher categories of tumors ($p = 0.011$), stage 4 breast cancer ($p = 0.001$), specific tumor types ($p = 0.018$), and greater tumor sizes (>5 cm) ($p = 0.005$).
de Boniface, Szulkin and Johansson (2021)	Survival After Breast Conservation vs Mastectomy Adjusted for	Swedish	Cohort	Women with primary invasive T1-2N0-2 type of breast cancer who underwent breast surgical treatment	Swedish National Breast Cancer Register (NKBC)	48,986 women with breast cancer	1. The 5-year OS was 91.1% (95% CI 90.8-91.3) and BCSS was 96.3% (95% CI 96.1-96.4). 2. Women with Mx-RT were older and had a lower education and income.

Continuation of Table 1. Included Studies Synthesis

Authors (year)	Title	Study Location	Study Design	Study Population	Data Source	Sample	Result
	Comorbidity and Socioeconomic Status			in Sweden from 2008-2017 were included to this cohort			3. After adjusting to the covariates, Mx-RT with HR=1.66 (95% CI 1.45-1.90) and Mx+RT with HR=1.26 (95% CI 1.08-1.46) had worse OS and BCSS compared to BCS+RT.
Corradini et al. (2019)	Mastectomy or Breast-Conserving Therapy for Early Breast Cancer in Real-Life Clinical Practice: Outcome Comparison of 7565 Cases	München, Germany	Cohort	The first primary unilateral invasive breast cancer that were diagnosed in women and received a treatment at either the Red Cross Hospital or LMU Munich, Germany in 1998-2014	The data were collected from the Munich Cancer Registry	7,565 women with breast cancer in early-stage invasive stage	1. BCT was identified as an independent predictor after adjustment for tumor characteristics, age, and therapies (HR = 1.517 95% CI 1.092-2.108) compared to mastectomy alone. 2. 10 years cumulative incidence of lymph node recurrences: 2.0% in the BCT group and 5.8% in the mastectomy group. 3. 10-year distant-metastasis-free survival: 89.4% in patients who received BCT compared to 85.5% in those who had mastectomy alone (p= 0.013). 4. 10-year overall survival: 85.3% for patients who received BCT, compared to 79.3% for those who underwent mastectomy alone. (p < 0.001).
He et al. (2024)	Long-term overall survival of patients who undergo breast-conserving therapy or mastectomy for early operable HER2-Positive breast cancer after preoperative systemic therapy: an observational cohort study	Texas, United States	Cohort	HER2+ breast cancer patients with early operable stages who received pre-surgical treatment (PST) followed by either mastectomy or BCT between January 1998-October 2009	Tumor registry system and M.D Anderson's electronic medical records	625 patients in early operable stage of HER2+ breast cancer stage who underwent surgical treatment	1. Mastectomy showed worse overall survival compared to BCT at 9.9 years follow-up (HR = 1.66, p = 0.02). 2. In patients with axillary lymph node pathological complete response, mastectomy had worse survival than BCT (HR = 2.12, p = 0.02). 3. Survival was similar between mastectomy and BCT in patients with a pathological complete response. 4. BCT improved overall survival in patients with axillary lymph node pathological complete response.
Zhang et al. (2021)	Survival outcomes after breast-conserving therapy compared with mastectomy for patients with early-stage metaplastic x	United States	Cohort	Early-stage metaplastic breast cancer patients	Surveillance, Epidemiology, and End Results (SEER) database	2,412 breast cancer patients	1. A total of 2412 MBC patients were identified, 881 (36.5%) of whom underwent BCT and 1531(63.5%) underwent mastectomy. 2. Most patients had larger tumors, aged ≥50 years, were hormone receptor negativity, and had cancer stage. 3. After adjusting, it was shown there was a significant OS improvement in BCT patients

Continuation of Table 1. Included Studies Synthesis

Authors (year)	Title	Study Location	Study Design	Study Population	Data Source	Sample	Result
	with 10-year OS of 73.0% and 5-year OS of 84.3%.						with 10-year OS of 73.0% and 5-year OS of 84.3%. 4. Compared to mastectomy, BCT was associated with better OS and BCSS with adjusted HR=0.76 (95% CI 0.59-0.97, p = 0.028) and adjusted HR=0.72 (95% CI 0.53-0.96, p = 0.026). 5. BCT conferred improved OS and BCSS compared with mastectomy for patients with early-stage MBC, and the improvement persisted in almost all of the subgroups of different T and N stages.
Kunkler et al. (2023)	Breast-Conserving Surgery with or without Irradiation in Early Breast Cancer	United Kingdom, Greece, Australia, and Serbia	Randomized clinical trial	Women aged ≥65 years who had been diagnosed with T1 or T2 primary breast cancer and undergone breast-conserving therapy in conjunction with axillary staging, were also administered adjuvant or neoadjuvant endocrine therapy	Scottish Cancer Trials Breast Group (SCTBG)	1,326 women with primary breast cancer stage	1. This study included 1326 women; 658 were randomly received whole-breast irradiation and 668 received no irradiation. 2. The median follow-up period was 9.1 years. In the no-radiotherapy group, the cumulative incidence of local breast cancer recurrence within 10 years was 9.5% while it was 0,9% in the radiotherapy group with HR = 10.4 (95% CI 4.1-26.1, P<0.001). 3. There was similarity in the overall survival at 10 years of both groups, with 80.8% (95% CI = 77.2-84.3) in groups without radiotherapy and 80.7% (95% CI = 76.9-84.3) in group with radiotherapy. 4. The omission of radiotherapy was linked to a higher occurrence of local recurrence, but it did not negatively affect distant recurrence as the first event or overall survival in women aged 65 or older
Lee et al. (2023)	Survival outcomes of breast cancer patients with recurrence after surgery according to period and subtype	Seoul, Republic of Korea	Cohort	Women who were diagnosed and received breast cancer surgery between January 2000 and December 2013 in Seoul, Republic of Korea at Asan Medical Center	Database Asan Medical Center	2,407 patients	1. This study analyzed 2,407 patients who had recurrent breast cancer with treated between January 2000 and December 2013. 2. The median follow-up period was 30.6 months with the range 0-223.4 after relapse, with a median survival duration of 42.3 months. 3. The SAR (survival after recurrence) was improved in period II (49.7 months) compared to period I (38.0 months).

Continuation of Table 1. Included Studies Synthesis

Authors (year)	Title	Study Location	Study Design	Study Population	Data Source	Sample	Result
							4. The study found a significant improvement in SAR for breast cancer patients between the two periods.
Dyer et al. (2024)	Survival outcomes for women with a solitary extracranial metastasis from breast cancer	Melbourne, Australia	Cohort	Women who received active management at the PMCC from 2000-2019 with metastatic cancer or a solitary extracranial metastasis	The database was from Research Electronic Data Capture (REDCap)	70 women with breast cancer	1. The study included 40 HR+HER2- patients, with a median follow-up period of 9.4 years. Subgroup composition included 14 HR+HER2+, 3 HR-HER2+, 4 unclassified breast cancer, and 9 triple-negative breast cancer (TNBC) patients. 2. The 5-year overall survival (OS) rate was 46%, local progression-free survival (LPFS) was 56%, and distant progression-free survival (DPFS) was 20%. 3. A significant association was found between OS and DPFS rates and tumor receptor groups, with TNBC patients experiencing worse OS and DPFS compared to HR+HER2- patients.
Nogi et al. (2024)	Impact of neoadjuvant chemotherapy on the safety and long-term outcomes of patients undergoing immediate breast reconstruction after mastectomy	Japan	Cohort	Breast cancer patients treated by IBR (immediate breast reconstruction)	The data source consisted of the medical records from 12 institutions of 4,726 consecutive breast cancer patients who received IBR from January 2008 to December 2016.	A total of 4,726 women with breast cancer underwent IBR consecutively between January 2008 and December 2016	1. A total of 4,726 patients were analyzed, with 473 (10.0%) receiving neoadjuvant chemotherapy (NAC). 2. Among those with complications, 96 patients (20.3%) received NAC compared to 744 patients (17.5%) who did not. NAC did not significantly increase the risk of complications after immediate breast reconstruction (IBR), with an odds ratio (OR) of 0.96 (95% CI 0.74–1.25). 3. There were 47 local recurrences in the control group and 36 in the NAC group, with a median follow-up time of 76.5 months. The 5-year local recurrence-free survival rates were 93.1% for the NAC group and 97.1% for the control group ($P < 0.001$). 4. No significant differences were observed between the NAC and control groups after matching.
Sun et al. (2021)	Breast surgery for young women with early-stage breast cancer	United States	Cohort	Young patients with breast cancer aged ≤40 years old	Surveillance, Epidemiology, and End Results (SEER) database	23,810 breast cancer patients	1. The total number of evaluated breast cancer patients is 23,810, with a median follow-up period of 116 months. 2. Breast-Conserving Therapy (BCT) was received by 44.9% of patients, while 55.1% underwent a mastectomy.

Continuation of Table 1. Included Studies Synthesis

Authors (year)	Title	Study Location	Study Design	Study Population	Data Source	Sample	Result
							3. Mastectomy patients were typically younger and had a more serious tumor burden. 4. BCT showed a Hazard Ratio (HR) of 0.917 for Breast Cancer-Specific Survival (BCSS) and 0.925 for Overall Survival (OS) compared to mastectomy. 5. BCT provides superior survival outcomes compared to mastectomy for patients aged 36 to 40, whereas no significant difference is observed in those aged 18 to 35.

DISCUSSION

For decades, surgical treatment has been an option for breast cancer treatment. Several studies conducted have shown beneficial effects of surgical treatment improving survival among breast cancer patients. Findings from the study by Kumilau *et al*. (2022) in Kinabalu, Sabah, Malaysia showed 94.8% an overall 2-year survival among female breast cancer patients after surgery. Study by Lee *et al.* (2023) in Seoul, Republic of Korea indicated 66.9% 5-year overall survival (OS) and 48.% survival after recurrence (SAR) with a median survival time 42.3 months. Stage four breast cancer, higher tumor, tumor size (>5 cm), and tumor type were shown to have lower survival. However, in HR+ or human epidermal growth factor receptor negative (HER2-) patients, hormonal therapy after recurrence was linked to improved survival. Therefore, targeted therapy after recurrence significantly enhanced OS across all subtypes (Kumilau *et al*., 2022; Lee *et al*., 2023). The findings are consistent with the study conducted by Olfatbakhsh *et al*. (2022) in Iran showed that out of 3,443 patients, the overall 2, 5, 7, 10 and 15 year survival were 93.0%, 82.0%, 78.0%, 74.0% and 66.0%. Involvement of lymph nodes, a tumor size of ≥ 5 cm, and having less than a high school education were significantly associated with lower survival (Olfatbakhsh *et al*., 2022).

There are several types of surgeries commonly used as treatment options for breast cancer (American Cancer Society, 2021). Surgical treatment options that are often used include BCT, mastectomy, and BCS (Yuan *et al*., 2023). Research by Zhang *et al*. (2021) in the United States found that BCT had an 84.3% of 5-year OS and 73.0% of 10-year OS, with a better survival compared to mastectomy. The study by He *et al*. (2024) found that, in Texas, the 10-year OS for BCT was slightly higher (86.0%) (He *et al*., 2024). Survival of BCT might be influenced by HER2+, where individuals with HER2+ breast cancer who receive PST (preoperative systemic therapy) are more likely to have better survival outcomes following BCT treatment, particularly if they have achieved a complete response in the axillary lymph nodes (He *et al*., 2024). It can be concluded that patients undergoing BCT have a higher life expectancy compared to those undergoing mastectomy treatment (Chu *et al*., 2021; Corradini *et al*., 2021; He *et al*., 2024; Sun *et al*., 2021; Zhang *et al*., 2021).

Furthermore, other research in Sweden has similarly found that the combination of BCT and radiotherapy treatment has a positive impact on BCSS (breast cancer specific survival) and OS (overall survival), with higher value for BCSS (5-year was 98.2% and 10-year was 96.1%) (de Boniface *et al*., 2021). The study by Xiang *et al.* (2022) from the Surveillance, Epidemiology, and End Results (SEER) database in US with 24,590 samples indicates that the combination of BCS and radiotherapy showed a better outcome compared to the combination of mastectomy and radiotherapy, as evidenced by the higher 5-year and 10-year survival for stage 2 breast cancer (Xiang *et al*., 2022).

The conditions at the time of diagnosis influenced the survival of breast cancer patients. These include patient characteristics

and tumor severity (Xiang *et al*., 2022). Other factors that influence survival showed that unmarried status, older age, positive lymph node spread, and larger tumor size (>2 cm) were correlated with decrease of the overall survival rate (Jung *et al*., 2021) while hormone receptor positivity and breast chemotherapy were linked to higher overall survival. In research conducted by Dyer *et al*. (2024) in Melbourne, Australia, the tumor receptor group factor showed a statistically significant relationship with both OS and disease progression-free survival (DPFS).

Based on research by Lee *et al*. (2023) the treatment regimen depends on the cancer subtype which influences the overall survival (OS) result . The overall survival was measured from the time from surgery until the death or the last follow up (Truty *et al*., 2021). The study showed that for the HR-/HER2- subtype, the adjusted survival rate (SAR) increased, while for the HR-/HER2+ subtype, the improvement occurred only in OS (American Cancer Society, 2021). Research conducted by Corradini *et al*. (2019) in München, Germany, shows that the use of mastectomy is linked to the less favorable outcomes, with an HR of 1.268 (95% CI, 1.055–1.525, p = 0.011). In summary BCS combined with radiation is more effective than mastectomy alone (Corradini *et al*., 2019).

The treatment provided to breast cancer patients, whether radiotherapy or chemotherapy following by mastectomy or BCS shows an increase in the occurrence of local recurrence and most deaths occur not due the breast cancer itself but rather due to other conditions (de Boniface *et al*., 2021; Kunkler *et al*., 2023; Nogi *et al*., 2024). This is in line with the theory that cancer treatment with chemotherapy or radiotherapy may pose risk of congestive heart failure, endothelial dysfunction, arrhythmias, coronary artery disease, valvular disease, chronic pericardial disease, and other cardiac conditions (Nabiałek-Trojanowska *et al*., 2020). Other study in Seoul, Republic of Korea, suggests that overall patients' survival are not influenced by radiotherapy sequence base on subtype of cancer experienced and there are no significant differences in patients receiving chemotherapy and radiotherapy (Woo *et al*., 2022). Therefore, further research is needed to investigate the side effects of breast cancer treatment through surgery, chemotherapy, and radiotherapy, as well as the combinations of existing treatments of patients' survival.

The advantage of this study is to examine the survival of each treatment given to breast cancer patients, which can be considered when choosing breast cancer treatment. This study included cohort, case-control study, and randomized control trial study to evaluate the survival of the breast cancer patients with specific population in women who underwent the surgical treatment of breast cancer. However, this study's limitation is that it does not specifically discuss the impact of one type of treatment on breast cancer survival and does not connect treatment with the degree of breast cancer. This study only reviews articles in English and Indonesian with a research range published in 2019-2024, so it has limitations in determining the survival of other populations and is susceptible to publication bias.

CONCLUSION

Breast Conservation Treatment (BCT), mastectomy, and Breast Conservation Surgery (BCS) are commonly chosen surgical options. The statistical results show that the 10-year OS in BCS is slightly higher compared to BCT. Additionally, the 10-year OS value for mastectomy is smaller compared to both of these treatments. However, the choice of treatment is made according to the patient's condition, including hormonal status and cancer severity level.

SUGGESTION

Further clinical research is needed to evaluate other complications and side effects of each breast cancer treatment on the patients. Therefore, the authors suggest that further research could examine the specific impact of breast cancer treatment on type of treatment and stage.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

DECLARATION OF ARTIFICIAL INTELLIGENCE (AI)

The authors affirm that no artificial intelligence (AI) tools, services, or technologies were employed in the creation, editing, or refinement of this manuscript. All content presented is the result of the independent intellectual efforts of the authors, ensuring originality and integrity.

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AUTHOR CONTRIBUTION

The authors Ismaya Ramadhanti, Mutiara Nur Izzati, Asti Elysia Rahmatul Fitri, Verina Lutfiah Rahmayanti, and Endah Nurhalimah Hamid contributed to the conceptualized writing, searching strategy and collecting all articles needed. The author Laily Hanifah oversaw writing-reviewing, editing, and supervision.

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