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Survival among Breast Cancer Patients in a Tertiary Cancer Center in Brunei Darussalam

B. Eclarinal[1,*], R. Patnaik[2]

[1]Mount Sinai South Nassau Hospital, New York USA
[2]The Brunei Cancer Centre, Brunei Darussalam

Abstract

Background

In Brunei Darussalam, cancer has been the leading cause of death, and breast cancer as the leading cause of death among women. With a nationally-funded cancer treatment, it is essential to determine the survival rates among breast cancer patients which can serve as a basis for comparison across timelines with the end view of improving healthcare delivery, hence, survival among the patient population.

Methods

This study was conducted from January – May 2019. Medical records data were abstracted for breast cancer patients treated between years 2011-2016 in a tertiary specialist cancer center. Kaplan-Meier Product Limit estimation was used for the over-all observed survival rates within 5 years after diagnosis. STATA Version 15 was used for statistical analysis. Ethical approval was obtained.

Results

Over-all, five-year breast cancer survival rates was favorable at 88.89%. . Survival rates according to TNM staging showed lowest at stage IV at 59% five-year survival. Survival rates according to age at the time of diagnosis showed favorable survival across age groups except for age groups 30-39 years and 80 years old and above. Survival rates according to treatment combinations were highest in surgery (mastectomy) and hormonal therapy.

Conclusions

The Center's 5-year breast cancer survival rates were relatively high and comparable to survival figures of developed countries. The Center's high survival rates could have been related to the 'treatment factors' due to the following: prompt treatment of early stage breast cancer stages, responsive coordination, government-funded cancer treatment which allowed patients uninterrupted, free access to standard treatment.

Corresponding Author: B. Eclarinal, Mount Sinai South Nassau Hospital, New York USA, Email: brian_eclarinal@yahoo.com

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Editor: Sasho Stolesk, II Makedonska brigada 43, 1000 Skopje, Macedonia. Phone: +389 71 314 435.

Introduction

Cancer is the second leading cause of death worldwide and the most common cancer among women was breast cancer [1]. In Brunei Darussalam, cancer has been the leading cause of death, and breast cancer as the leading cause of death among women. In fact, with a population of just more than 400,000 in the year 2015, cancer has been the leading cause of death in Brunei Darussalam since 2011 with deaths totaling 1,441 [2].

Cancer and its treatment result in the loss of economic resources and opportunities for patients, families, employers, and society overall; these losses include financial loss, morbidity, reduced quality of life, and premature death [3]. Such that the financial burden of cancer care was substantial and mostly borne by the patient or the family, most of the time, the monthly average cost of the treatment far exceeded the monthly household income and a significant proportion of patients perceived the financial burden as overwhelming [4].

In Brunei Darussalam, however, cancer treatment is provided for 'free' to its citizens and permanent residents, as a welfare state. Health care services in Brunei are primarily funded by the General Treasury with the budget for health care is allocated by the Ministry of Finance and administered by the Ministry of Health; user fees currently constitute a very small percentage of the total funds available to health care [5].

Cancer survival rates is a public health concern as this reflects the effectiveness of healthcare delivery system particularly on health promotion and cancer prevention, early detection, screening and diagnosis, treatment, and surveillance. Measuring survival across hospitals and regions is critical to understanding the state of cancer treatment nationally and the effect of quality and therapy advances on patients across a variety of clinical settings; survival is dependent on patient characteristics, disease specifics, and care received (surgery, systemic therapies, radiation) with some argue survival is the ultimate measure of cancer care quality [6].

Neither there are published data nor trends that exist on the survival of breast cancer patients in Brunei. With a nationally-funded cancer treatment, it is essential to determine the survival rates among breast cancer patients which can serve as a basis for comparison across timelines, amongst Brunei's neighboring countries and worldwide data, between treatment options, with the end view of improving healthcare delivery, hence, survival among the patient population.

This study determined survival rates among breast cancer patients according to patient's tumor, nodes, and metastasis (TNM) staging, age at the time of diagnosis, and most frequent treatment options provided.

Methods

This study was conducted from January – May 2019. Medical records data were abstracted for female patients with primary diagnosis of breast cancer seen and treated between years 2011-2016 in a tertiary specialist cancer center referred to here as the Center in Brunei. All medical records of breast cancer patients which meet certain inclusion criteria were used or abstracted in obtaining the essential data related to the computation of survival rates.

Patient list was obtained from the Center. Abstracted data included Medical Record Number, first date seen by the Center, date of birth, age at the time of diagnosis, TNM staging, treatment provided, chemotherapy regimen, status (whether alive or expired), and date of death in case patient expired. To ensure accuracy of abstracted data, secondary abstractors were utilized for data validation.

Kaplan-Meier Product Limit estimation was used to compute for the over-all observed survival rates among breast cancer patients within 5 years after diagnosis. Summary statistics such as frequency, percentage, mean, and median were used to present and analyze the profile of abstracted patient's data in terms of mean age, TNM initial staging, treatment options, and their status whether patients were alive within five years after diagnosis. The study was not able to cover patient's co-morbidities, tumor characteristics, and other demographics such as patient's ethnicity and prognosis in the survival data analysis.

STATA Version 15 was used to analyze the data on survival. Ethical approval was obtained from the Brunei Ministry of Health Medical and Health Research and Ethics Committee.

Results

There were 382 patient files which were

reviewed. All breast cancer patients were female. The mean age of patients at the time of diagnosis was 53 years old. Youngest patient subject was 26 years old while the oldest patient subject was 90 years old. Many of the subjects belonged to the age group of 40-49, and 50-59 age brackets. Fifty-eight percent (58%) of the subjects had advanced and metastatic breast cancer diseases at the time of initial consultation (as per Table 1).

Treatment modalities provided to breast cancer patients included chemotherapy, mastectomy, hormonal therapy, radiation, monoclonal antibodies, wide local excision, and other treatment.

Most frequent treatment combinations provided to patients comprised of surgery (mastectomy), chemotherapy; surgery (mastectomy), hormonal therapy; chemotherapy and hormonal therapy; surgery (mastectomy), chemotherapy, and hormonal therapy; chemotherapy and radiation, and chemotherapy and monoclonal antibodies.

The over-all 5-year survival rates for breast cancer patients diagnosed between years 2011-2016 at the Center stood at 88.85 or 89%. This means that among patients with breast cancer, 89 of every 100 have the chance to be alive within 5 years after being diagnosed.

In terms of 5-year survival for breast cancer patients according to their initial staging, Table 2 shows a decreasing survival rate as the stage advances with the poorest survival at metastatic stage IV with 59.42% survival rate after five years of diagnosis.

Survival rates according to age at the time of diagnosis showed favorable survival across age groups except for age groups 30-39 years (85.69%) and 80 years old and above (66.67%) as shown in Table 3.

Survival rates according to treatment combinations were highest in surgery (mastectomy) and hormonal therapy (92.31%) as shown in Table 4.

Table 1. TNM Stage at Initial Diagnosis

TNM Stage	Frequency	Percentage	Classification
Stage 0	15	3.9	In Situ (4%)
Stage 1A	59	15.4	Early stage breast cancer (38%)
Stage 1B	1	0.3	
Stage 2A	85	22.3	
Stage 2B	36	9.4	Locally advanced breast cancer (39%)
Stage 3A	59	15.4	
Stage 3B	14	3.7	
Stage 3C	39	10.2	
Stage 4	74	19.4	Metastatic breast cancer (19%)
Total	382	100.0	

Table 2. Five-year survival rates according to TNM staging

Breast Cancer Stage	Survival Rates
Stage 0	100%
Stage IA	100%
Stage IB	-
Stage IIA	96.81%
Stage IIB	95.65%
Stage IIIA	100%
Stage IIIB	90.91%
Stage IIIC	93.38%
Stage IV	59.42%

Table 3. Five-year survival rates according to Age at the time of diagnosis

Age at the time of diagnosis	Five-year survival rates
Less than 30 years old	100%
30-39 years old	85.69%
40-49 years old	91.88%
50-59 years old	87.64%
60-69 years old	89.92%
70-79 years old	87.77%
80 years old and above	66.67%

Table 4. Five-year survival rates according treatment combinations

Treatment Combinations	5-year survival rates
Surgery (Mastectomy), Chemotherapy	90.21%
Surgery (Mastectomy), Hormonal Therapy	92.31%
Chemotherapy, Hormonal Therapy	91%
Surgery (Mastectomy), Chemotherapy, Hormonal Therapy	91.17%
Chemotherapy, Radiation	89.75%
Chemotherapy, Monoclonal Antibodies	91.34%

Discussion

There is no published country data on breast cancer survival which could have been used as benchmark for analysis. This study served as a baseline data for the 5-year survival rates among breast cancer patients in the Center.

In terms of TNM breast cancer staging, from the Table 1 it can be discerned that more than half of Center's breast cancer patients were diagnosed initially at locally advanced and metastatic stage. This means that they were able to have medical consultation at the time when their breast cancer disease has progressed to an advanced stage. From the point of view of patients, it could either reflect the knowledge or awareness or lack of awareness/knowledge on when to seek doctor's consult. Despite knowledge on breast cancer, however, patients may refuse healthcare check due to various personal reasons such as anxiety or fear, stigma, attitude towards cancer, and other socio-cultural factors which encourage or discourage breast cancer patients in seeking professional help. The delay in presentation of breast cancer was attributed to a strong belief in traditional medicine, the negative perception of the disease, poverty, and poor education, coupled with fear and denial [7].

The Center's survival rate of 59.42% for stage IV breast cancer which is the lowest amongst the stages is consistent with available literatures that have proven that survival is worsening as cancer stage becomes more advanced. In a given study [8], the 5-year survival rate for early stage was higher than for late stage. Disease stage was the most important determinant of survival with those diagnosed with distant and regional breast cancer having poorer survival [9]. Stage at diagnosis was a key explanation of differences in breast cancer survival [10]. It was also noted that larger tumor size and higher tumor grade were found to have larger negative effect on survival [11]. Furthermore, studies [12, 13] similarly concluded that survival rates were lower among advanced stage of breast cancer stages.

Breast cancer survival according to age at initial diagnosis is partly explained by stage of diagnosis wherein international differences were widest for women who were older [12]. In the Center, there was poor survival among women with age less than 40 and 80

years old. Similarly, a study [14] found that women under 40 years of age had a poor prognosis, and this association was strongest among young women with axillary lymph node negative breast cancer. In terms of older age groups, a study [15] describes the increasingly poor prognosis and short life expectancy observed among women aged ≥80 diagnosed with metastatic breast. The Center's survival rate among 80 years old and above was reported at 66.67% consistent with low survival rates among this age group. This survival rate, however, could have been related to the small sample size of the age group in this study.

The Center's survival rate with treatment combinations involving surgery were favorable such as in combination with chemotherapy, surgery with hormonal therapy and surgery with chemotherapy and hormonal. Stage IV breast cancer who had definitive surgical treatment of their primary tumors had more favorable disease characteristics [16].

Chemotherapy treatment has effectively improved mortality and survival among breast cancer patients and these are consistent with cited literatures. Chemotherapy has also improved survival time on the order of 3 months, representing a survival time that is about 20%–30% longer [17].

The Center's survival rate for treatment involving radiation was also favorable at 89.75%. Similarly, patients who received radiation had improved overall survival, with 5-year survival rates of 81.0% versus 61.7% without radiation [18]. Surgery with hormonal therapy offered the highest breast cancer survival in the Center. In the same manner, a study [19] reported that tamoxifen (hormonal) increased the survival rate or increase the rate of freedom from distant metastases; for these reasons, tamoxifen alone is a reasonable choice for adjuvant treatment in such women. In addition, the Center's survival rate with combination involving monoclonal antibodies was favorable at 91.43% and in agreement with findings of cited study where trials with chemotherapy and trastuzumab have demonstrated substantial improvements in overall survival ranging from 4 to 8 months, representing increases of 24% and 37% in survival time [17].

This study, however, is unable to conclude as to which specific treatment combinations will be recommended for breast cancer patients to improve their survival rates as treatment options are highly individualized in terms of patient's TNM stage, prognosis, disease factor, and other factors that affect survival among breast cancer patients.

In terms of the over-all survival for breast cancer, the Center's survival rate of 89% reflect that of survival rates from highly developed economies in which 5-year survival rate is at least 80%. The Center's survival rate almost mirror though slightly higher than the survival rates of United Kingdom which stood at 86.6% [20], and Canada which was at (87%) [21].

To date, major studies attempting to explain cancer survival differences have focused on four main areas: stage at diagnosis and diagnostic delay, treatment factors, patient factors, including age and co-morbidities, and tumor biology and physiological/ biological factors; all these factors relate to and influence each other [22]. This study, however, only covered stage of diagnosis, age at the time of diagnosis, and treatment options as to its impact on survival rates.

Among these factors, however, this study postulates that "treatment factor" could have primarily led to high survival rates among breast cancer patients in the Center. This refers to the availability and quality of treatment options such as surgery, radiotherapy, cancer drugs, and over-all coordination of treatment. It is to be emphasized that the mere availability of treatment options for cancer does not make a difference in survival as other countries have available facilities too. The Center's high survival rate for breast cancer patients is anchored on the fact that available treatment options are provided for free which enables patients better access to healthcare specialists, access to latest and quality chemotherapy drugs, surgical procedures, radiation, and other medications, that improve their survival. With patients able to access treatment without worrying on the financial burden of these from their own funds, their treatment will likely be completed, and their chance of survival is thereby improved. Breast cancer patients at the Center enjoy this healthcare privilege throughout all phases of cancer treatment.

Access and availability of resources such as quality treatment facilities improve cancer survival rates. The World Health Organization [23] claims the importance of these resources among patients such that low survival rates in less developed countries can be explained mainly by the lack of early detection

programs, resulting in a high proportion of women presenting with late-stage disease, as well as by the lack of adequate diagnosis and treatment facilities. Despite major advances in the early detection, diagnosis, and treatment of breast cancer, health care ministries face multitiered challenges to create and support health care programs that can improve breast cancer outcome; in addition to the financial and organizational problems inherent in any health care system, breast health programs are hindered by a lack of recognition of cancer as a public health priority, trained health care personnel shortages and migration, public and health care provider educational deficits, and social barriers that impede patient entry into early detection and cancer treatment programs [24]. Moreover, a study [25] supported this postulate in which, among others, the provision of more public facilities for breast cancer treatment, can be expected to bring about the much-needed improvement in breast cancer care in low- and middle-income regions.

Without available treatment programs and patients able to access them or afford them, breast cancer patients will not be able to adhere to the treatment regimen. The full etiology of this observed financial disparity in breast cancer care is complex and multifactorial. However, one identified factor for this phenomenon is the barrier to appropriate preventative and therapeutic care faced by individuals with fewer economic resources. Studies have demonstrated that people with limited or no access to health care are less likely to receive appropriate cancer preventative services and standard-of-care therapy. Patients in the lowest income brackets are less likely to be insured, receive early intervention for disease, and complete recommended treatments. Cancers associated with a moderate-to-good prognosis if diagnosed and adequately treated early (colorectal, breast and cervical cancers), suggests that the stage at diagnosis and quality of treatment are important determinants of survival [26]. Increased availability of healthcare resources improves colorectal outcomes among non-Hispanic White patients [27]. Hence, adherence to recommended treatment standards was effective in improving survival outcomes in women with breast cancer [28].

In Brunei, with government support and funding, breast cancer patients are able to continuously and timely seek medical consultation with their specialists, able to complete their treatment regimen as scheduled, follow-up care is made possible, and that additional patient interventions and support are provided without the financial burden amongst the patients and their families.

Conclusion

The Center's 5-year breast cancer survival rates were relatively high and comparable to survival figures of developed countries. While survival rates can be attributed to patient factor and tumor factor, the Center's high survival rates could have been related to the 'treatment factors' due to the following: prompt treatment of early stage breast cancer stages, responsive coordination between the government hospital and the Center in dealing with new cases of breast cancer, government-funded cancer treatment which allowed patients uninterrupted, free access to available standard treatment, services, and resources at the Center.

To further sustain the favorable survival rates among patients, the Center can intensify its breast cancer awareness campaign to capture patients at an early stage of disease. The Center can maximize the potentials of multi-media agencies, government offices, social media, to reach out to the public on the importance of screening and early detection. Further studies can be done such as a follow-through study of patients' survival for 10-year, 15-year, and succeeding year survival rates among breast cancer patients, correlation of patient and disease factors with breast cancer survival rates, and other parameters of quality of cancer services.

Declaration

Ethics Approval and Consent to Participate

The Brunei Ministry of Health Medical and Health Research and Ethics Committee has given ethics approval for the study.

In its letter it stated: "Thank you for submitting and making amendments to your research proposal. Following review of the amendments made, the MHREC Committee has decided to give full approval to your research proposal."

Consent for Publication

The authors hereby grant consent to publish the article in the BMC Applied Cancer Research Journal.

Availability of Data and Material

Data are available.

Competing Interests

No competing interest to be declared.

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Authors' Contributions

Both the authors have equally contributed to the preparation of manuscript, literature search, data collection, data analysis, and interpretation.

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