
Factors Influencing the Decision of Surgical Treatment of Breast Cancer: Comparative Analysis of Survival and Death Rate

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Abstract: Breast cancer is among the three most prevalent cancer in the world. There are surgical approaches, chemotherapy, and radiation therapy available for the treatment of the breast cancer patient. This research aims to examine different surgical approaches used for treating the breast cancer. Furthermore, this research aims to compare the survival and death rates to analyse their impact on the decision of the surgical treatment of breast cancer. If the therapy is substantial for going towards the surgical approach, the decision have critical factors involved. The factors for treatment may be related to efficacy and adverse effects of the treatment, severity of the diseases, as well as the rate of survival and deaths. The choice of treatment i.e. adjuvant therapy with breast surgery, mastectomy before or after radiation therapy, chemotherapy with surgical treatment, and only chemotherapy or surgical therapy is selected on the basis of the age, menstrual changes (premenopausal or postmenopausal state), stage of the disease, and extent and location of the tumor. The survival rates for the breast cancer patients after surgery are more than those who expired. The survival rates of the patients with breast cancer who had undergone the surgical treatment have also shown the locoregional recurrences. However, this should not be the end point for the decision as the chances of recurrence remain there in cases of cancer each time.

1. Introduction

Breast cancer is among the three most prevalent cancer in the world. Breast cancer is among the most prevalent cancer which is increasing the mortality and morbidity rate in women globally [1, 2]. The risk for breast cancer doubles with passage of each decade until menopause in women, however, after menopause the risk for developing cancers slows down but remains there. Another fact is that the breast cancer is highly prevalent in the women with menopause. The survival rates for the breast cancer show variation on the global level. Generally, the rates are found to be improved. The reason is that the breast cancer is usually diagnosed at earlier stages in those countries and states where the accessibility to the healthcare service is better as well as improved treatment strategies are available. In the countries with advanced healthcare services and medical care, it is

revealed that the survival rate for the breast cancer which is diagnosed at early stage is 80-90%, and for the breast cancer with a more advanced stage diagnosis falls to 24 percent [2]. However, the breast cancer diagnosed at early stages are considered as potentially curable.

It is estimated that there are plausible risk for women to develop cancer and it is required to guide them regarding the screening procedures based on the incidences that may be the causative and quantifiable risk factors such as hormonal, environmental, genetic, or personal. Mammography is considered as the strongest test for screening and diagnosis of the breast cancer, however, ultrasound and magnetic resonance imaging also aids to the diagnosis and detection of the breast cancer in select patient populations [1]. The multidisciplinary teams for breast cancer management and treatment involves collaboration and specialization including oncologists, surgeons, nurses, radiation oncologists, reconstructive surgeons and patients. Evidences support different treatment strategies that can be followed for breast cancer management and treatment. However, the less invasive surgical approach is considerably evident with respect to the stages and axilla management in select patients.

A significant progress has been observed for treatment therapy of breast cancer over the past years with decrease in the intensity of therapy from both aspects i.e. systematic and locoregional therapy [3]. This therapy has directed towards the prevention of the overtreatment and now undertreatment has been focused on major basis. The concepts for therapy offer an intention of cure which needs to be taken in a multidisciplinary setting, undertaking into account the locoregional tumor load and molecular subtype. As the different therapies and strategies are showing improvement in the treatment as the treatments which are not relevant or less effective are also being revealed. For instance, it is revealed that primary conventional surgery is not effective and appropriate choice to be optimized for all the patients to any further extent. Similarly, neoadjuvant therapy has been the most commonly used and optimal treatment strategy for triple-negative and HER2-positive early breast cancer.

When the discussion is about the treatment on the basis of the clinical tumor subtype, the most optimum mainstays are the chemotherapy, anti-HER2 targeting, and endocrine

therapy. While in the cases of metastatic breast cancer, the goals of the therapy are about to prolong the survival of the patient and maintain the quality of life. There are advancement in the endocrine therapies and combinations, as well as HER2 targeting therapy, and the future newer targeted therapies are the strong option and prospects that will enable the long-term control of the disease in metastatic breast cancer.

There are different treatment plans and strategies with respect to the stages, location, and types of breast cancer. Likewise, different factors are there which impact on the decision for the treatment of breast cancer and the therapy which needs to be selected. If the therapy is substantial for going towards the surgical approach, the decision have critical factors involved. The factors for treatment may be related to efficacy and adverse effects of the treatment, severity of the diseases, as well as the rate of survival and deaths [4]. There are different surgical approaches such as lumpectomy, mastectomy, modified radical mastectomy (MRM), and segmental mastectomy. It is evident the combination of surgical and chemotherapy is also progressive and optimal choice for the treatment of breast cancer. However, the decision for surgical treatment of breast cancer is very dismaying for the women.

2. Literature Review

Surgical Treatments for Best Cancer

Depending on the age, stages, location, extent and characteristics of the patients, different treatment approaches are used for the breast cancer treatments. Surgical approaches are available and performed for the treatment of the breast cancer as well as chemotherapy and radiation therapy. The choice of treatment i.e. adjuvant therapy with breast surgery, mastectomy before or after radiation therapy, chemotherapy with surgical treatment, and only chemotherapy or surgical therapy is selected on the basis of the age, menstrual changes (premenopausal or postmenopausal state), stage of the disease, and extent and location of the tumor.

Mastectomy is the surgical procedure which involves the removal of the complete breast including nipple. Segmental mastectomy involves the removal of the breast cancer cells with the surrounding tissues and the remaining breast is saved. Modified radical mastectomy (MRM) is the surgical procedure which involves the removal of all the breast tissue, necessary skin, en bloc resection of the breast, the pectoralis muscle, the nipple-areola complex, and the level I and II axillary lymph nodes [4]. Lumpectomy is the surgical treatment approach which involves the removal of the tumor and the tissues surrounding the tumor leaving the breast tissues which are possible to be left.

Choice of Surgical approaches for breast cancer

The choice of surgical therapy and the decision to be made for the breast cancer treatment is a multifactorial decision. However, one of the most important factor is regarding the rate of recovery i.e. survival and death after the surgical treatment has been performed. The surgical treatment of breast cancer is required and decided in accordance with the stage and extent of the diseases. The tumor markers for breast cancer are not well-established, however, some cancer antigens such as elevated CA 27-29 and (CA) 15-3 may be helpful in investigating the level of

breast cancer [4]. When it is about to decide about the surgical treatment, the decision is a multifactorial strategy to focus on different features to be considered. Regional or local recurrences of breast cancer are highly observed in the cases of lumpectomy and mastectomy [5]. Metastasis is also accompanied or preceding in a high proportion in these cases. However, if a patient has an isolated locoregional recurrences (ILRR) means that there is no evidence about the distant metastasis is present, directs towards the high risk of developing and distant metastasis in the future with possibilities of five-year survival with rate of 45-80 percent after locoregional recurrences. A study conducted by Aebi et al. [5] revealed that it should be recommended to the patients with completely resected isolated locoregional recurrences associated with cancer of breast to avail and use adjuvant therapy, particularly in cases when the status of recurrence id found to be estrogen receptor negative.

The findings of another study conducted by Bleicher et al. [6] demonstrated that it is significant to go for surgery as soon as breast cancer is diagnosed. The survival outcomes are better in the patients with diagnosis of early-stage breast cancer and go for surgery. It is also revealed that the length of tome interval between surgery and diagnosis have strong impact on the survival outcomes in early-stage breast cancer [6]. It is certain that the efforts and intervention to reduce this time interval needs to be effective and appropriate. However, the disease-specific and overall survival are effected in the similar manner with small anticipation, but it is substantial that attainable and realistic goals must be established and considered to maintain the surgical interventions' timings so that the patients can afford a limited but clinically pertinent and survival benefit. A study was conducted by Liubota et al. [7] on the patients of primary metastatic breast cancer (PMBC) having no significant differences in age, ER status, menstrual function, metastasis site, status of HER2 receptors, and number of metastatic lesions. It was revealed that locoregional treatment have significant and favorable effect in PMBC patients [7]. However, the rate of survival was also improved in case of treating breast cancer using the LRT.

The surgical options are same for both the young women as well as older women. There are different options of partial mastectomy with radiation (breast conservation therapy (BCT) or mastectomy. However the young women diagnosed with breast cancer as well as at higher risk of local recurrences and phenotypes are more aggressive, it is suggestive to go for BCT rather than mastectomy due to no gain in survival rates. As well as there is no survival benefit reported for the contralateral prophylactic mastectomy [8]. It is the reason which is illustrative that only young females are not contraindicated for BCT. Regardless of this fact, it is also observed that females of all age majority go for the bilateral mastectomies. In fact, it is due to perception of the physician as well as patient to have improved outcomes and survival rates as well as cosmesis and improved reconstruction techniques. Control over the locoregional recurrences is on of the foremost goal to achieve the increased survival rate. If the patient will suffer from the locoregional recurrence, the death rate will increase with reduced survival rate. It is evident that the strategies and efforts for getting improved control over the locoregional recurrences can have positive impact on the overall survival rates of the patients and death rates will be reduced due to surgical treatment for breast cancer [9].

On the international level, there were not significant differences in the survival rates. For stage I breast cancer, the survival rate was same in the patients of all ages, however, for stage II, the survival rate was same in the patients of the age between 65-74 years and was different in the age category of 75-84 and patients aged ≥ 85 where there is survival rate was higher in Ireland and Germany [10]. The studies revealed that the older patients who have not undergone surgical treatment for breast cancer had poor overall and lower breast cancer-specific survival [11, 12]. However, some studies have also demonstrated that elderly women with early stage breast cancer received less extensive surgical treatment comparatively to the younger females with breast cancer [13, 14].

The study conducted by Allemani et al. [14] revealed that the surgical treatment received by patients is also dependent on the age. The patients who underwent surgical treatment were more than 90 percent. In the United States, the rate to select and undergo surgical treatment is 96 percent, and for the European countries, it is 91 percent. The women who received BCS accompanied with radiotherapy for early node-negative disease were 55 percent, while in the US, it was 49 percent [14]. The five-standardized net survival rate for the Europe and American states were significantly similar for early and node-negative tumors which was 96-98 percent and 85-90 percent for large, node-negative tumors.

3. Research Aim

This research aims to examine different surgical approaches used for treating the breast cancer. Furthermore, this research aims to compare the survival and death rates to analyse their impact on the decision of the surgical treatment of breast cancer.

4. Research Objectives

The research objectives of this study are:

- To analyse the types of the surgical approaches for curing breast cancer.
- To compare the impact of the survival and death rates on the decision for the breast cancer treatment.

5. Research Questions

This study aims to seek the answer of the following questions:

- What are the surgical treatment approaches for breast cancer?
- What are types of the surgical treatments available for breast cancer?
- How are the survival and death rates involved in the decision for the surgical treatment of breast cancer?

6. Research Hypotheses

This research aimed to test the following hypothesis.

H_0 : There is no significant impact of surgical treatments on the survival and death rates of breast cancer patients

H_A : There is a significant impact of surgical treatments on the survival and death rates of breast cancer patients

7. Methodology

This research was based on mix methodology which involves the data collection using the benefits of the interview analysis and questionnaires. It is the methodological triangulation

involving the qualitative and quantitative analysis for the collection of the robust and abundant data reliability [15]. The quantitative methodology which demonstrates the numeric-based data. The data collected using the quantitative method is considered as valid and accurate. The data which is collected using the quantitative method is the primary data as it is directly received from the participants. The assessing and examining the primary and secondary data also emphasizes on the trustworthiness, validity, and reliability of the findings of the research. It is stated by Moser and Kalton [16] that quantitative research method is the reliable and recognizable inquiry mode in contrast with other research methods. This method is used to determine the numeric data. On the other hand, the qualitative method has been recognized due to its beneficial properties in analysing narrations, views, and perspectives of the participants or respondents. The ethical issues such as confidentiality, anonymity, and privacy of the participants of the research are easier to be maintained in qualitative research methodology.

Data Collection Process

The data was collected for the electronic records and databases of the hospital. The permission was taken for the management of the hospital and confidentiality of the patients was also maintained. Data of the patients suffering from breast cancer was retrieved. On the other hand, semi-structured interview was conducted to receive the views and perspectives of the oncologists and surgeons who were dealing with the breast cancer and having expertise in this field. Conducting interview sessions is considered as the most comprehensive tool for collecting the information and descriptive data. This data collection tool can be utilized by conducting online interviews or by conducting online surveys.

The interview session is a considerable and suitable data collection tool for obtaining the views, perceptions, beliefs, and experiences of the participants involved in the research [17]. The interviews majorly follow the contextual and verbal format so that these interviews are subjective to errors and insufficiencies which perform descriptive detailing process. It is stated that the semi-structured interview sessions are responsible to summarize the qualitative methodology based on the queries and interrogations about the observations and experiences of the respondents of the research. Likewise, the use of open-ended questions while conducting the qualitative research directs the researcher towards the exploration of the deep and profound knowledge, views, and concept regarding the particular technique or process being investigated [18]. However, conducting semi-structured interview was the most suitable way for this research while looking at the context and perspectives of the objectives and aim of the research.

Research Settings and Population Sample

This research was conducted in tertiary care hospital which was situated in Saudi Arabia. This hospital provides all the medical, healthcare, and technical services to the cancer patients. This hospital was taken as the research setting for this study because it was providing all the oncological and healthcare services to the cancer patients including breast cancer patients. The sample size of the research was 740 patients. The data of the participants were collected using the electronic databases of the hospital after taking the

permission of the management. The data of only patient who were diagnosed with breast cancer and were being treated for the disease were taken. The permission for retrieving the data was taken from the management of the hospital. The participants were selected using the purposive sampling. The purposive sampling is useful to perform a qualitative research based on explorative research [19]. The theoretical purposeful sampling is also assistive in the collection of both the theory and data analysis for theory generation. This efficacy of the purposive sampling was the reason to select this method for sampling. 9 oncologists and surgeons were also selected for the qualitative phase of this research.

8. Results and Findings

Quantitative Phase

The data of approximately 740 patients were included in this research. The statistical analysis was performed by using the SPSS v. 20 software. Regression analysis was performed to find out the impact of surgical treatments on the survival and death rates of breast cancer patients.

Hypothesis Testing

H₀: There is no significant impact of surgical treatments on the survival and death rates of breast cancer patients

H_A: There is a significant impact of surgical treatments on the survival and death rates of breast cancer patients

Table 1: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1.859	1	1.859	20.195	.000 ^b
Residual	67.920	738	.092		
Total	69.778	739			

a. Dependent Variable: Survival Status

b. Predictors: (Constant), Surgical Treatment

The above table of Anova represents that the model is significant and results obtained are good-fit. The significance value of 0.00 has rejected the null hypothesis. This shows that there is a significant impact of surgical treatments on the survival and death rates of breast cancer patients.

Table 2: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.814	.021		86.299	.000
Surgical Treatment	.038	.008	.163	4.494	.000

a. Dependent Variable: Survival Status

a. Dependent Variable: Overall Survival

From the above coefficients table, the regression equation for survival status of the breast cancer patients is shown as:

$$Y = \alpha + \beta(x)$$

$$\text{Survival Status} = 1.814 + (0.038) * \text{Surgical Treatment}$$

Qualitative Phase

The qualitative phase of this research was based on the semi-structured interviews by which data was acquired from the oncologist and surgeon who were having expertise and profound knowledge in the breast cancer and its treatment. The collected data from the qualitative phase was analysing using the method of thematic analysis. Thematic analysis has the basis of categorization and figuring out the sub-groups within the findings and outcomes of the research. Thematic analysis has been proved to be utilized for recognition, evaluation, and reporting the determined patterns of the collected data [20]. Use of the thematic analysis is responsible to find out optimal association between the findings and outcomes of the raw data with the research objective.

The responses of the participants of the qualitative phase of research revealed that the time duration between the diagnosis and surgical treatment of the breast cancer. The late surgical treatment after the diagnosis direct towards the severity of the state and the chances for the recurrences also increase. Depending on the survival and death rates, the surgical treatment has positive impact on the decision of the patient, however, the majority of the patient are not able to disease free life. There are intense risk for recurrence and needs to use chemotherapy or radiation therapy after surgical treatment that increase the health as well as economic burden. The interview with the oncologists and surgeons demonstrates:

“The surgical treatment has positive impact on the breast cancer treatment. However, the choice to go for type of surgery i.e. mastectomy or lumpectomy or another one is dependent on the stage, extent, and location of the tumor. The death rate is reduced in case of surgical treatment if the option for surgical treatment is taken promptly.”

Another participant responded in such manner,

“To select a treatment option for the breast cancer is considerably a multifactorial decision as it is dependent on many factors. Such as it is related to age, location, extent, patient characteristic, and menstrual functions (whether premenopausal or postmenopausal). Some of the patient even do not consider the survival rate for surgical treatment and do not want to take chance due to the recurrences. However, chances of recurrences is present in all modes of treatment plans in breast cancer”.

When the respondents were asked related to their known death rates of the breast cancer patients after surgical treatment, one of the participants declared:

“The rate of survival is more than the death when it is about selecting the surgical approaches for breast cancer treatment in my knowledge, however, it should be considered earlier as the disease is diagnosed”.

Another respondent expressed in the following way:

“Even the death rate is low than the survival rate but the chances of recurrences are observed in the higher rates and patient are majorly spend a life with disease not completely eradicated from it. However, the patients should select this treatment as it is a considerable treatment plan for the breast cancer”

9. Discussion

The research was conducted to evaluate the impact of the survival and death rates on the decision of the patient for breast cancer treatment. It is certain that every treatment plan and approach have its benefits and disadvantages, however, it is indeed not to prolong the duration between the diagnosis and surgery for the breast cancer. The decision for the surgical treatment for breast cancer also depends on the survival and death rates however, there are also major factors which are critically importance when it is concern about the treatment plan for breast cancer. The qualitative and quantitative phases of this research also highlight some important factors that stress the importance of the surgical treatment. The data of the quantitative phase declared that from 740 patients, there were 662 patients who were alive and 78 patients were died. Accordingly, out of 740 patients there were 254 patient who were alive and remaining 486 patient were died of disease at the status of the end point. 379 patients have undergone MRM, while 226 patients were operated by lumpectomy, and remaining 135 were treated MRM accompanied with neoadjuvant therapy. The rate of the recurrence with DSS was 83.2 percent and disease free survival rate was 16.8 percent. The death rate was 10.5 percent and 89.5 percent was the survival rate. In the qualitative phase, the responses of the participant also revealed that the surgical approaches impact on the survival rate of the breast cancer patients, however, decision is also dependent on the age, location, severity, extent, and menstrual changes of the patient.

It is revealed that women diagnosed with advanced and local breast cancer are at risk of locoregional recurrence. As well as for women having primary tumors (tumor size >5 cm) and those tumors which invade the chest wall or skin, or having indications of lymph node involvement, it is recommended to have postmastectomy radiation for survival benefit however, risk of locoregional recurrence remains there [8]. In developed countries, there are high incidences of breast cancer in the older women who are 65 years and above, which are more than 40 percent of all the patients of breast cancer [10]. It is expected that if the screening and diagnostic tools for breast cancer will be improved in aging population, it will increase the survival rate for elderly patients suffering from breast cancer in the coming decades. On the other hand, literature reveals that choice of selecting mastectomy in comparison with BCS followed by radiotherapy do not have significant effects on the death rates associated with the breast cancer or overall mortality. A study conducted by Kiderlen et al. [10] was based on the comparative research for axillary and breast surgery, radiotherapy after BCS, and disease-specific or relative survival rates. This study revealed that the treatment and surgical approaches are the age-specific, location-specific, stage-specific, as well as patient characteristic and medical aspects needs to be considered critically.

10. Conclusion

Going through the findings and outcome of the research, the most important which is revealed is regarding the critical factors which are significant to be considered to take an appropriate decision for the breast cancer treatment. The list of these factors include age of the patient, characteristic features of the patient, severity of the disease such as stage,

location, an extent of the tumor. However, the death rate and survival rates have an intense impact on the decision but if accompanied with these factors. The survival rates of the patients with breast cancer who had undergone the surgical treatment have also shown the locoregional recurrences. However, this should not be the end point for the decision as the chances of recurrence remain there in cases of cancer each time.

11. References

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