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Safety and Toxicity Profile of Trastuzumab In Thetreatment of Her2 neu POSITIVE BREAST Cancer A Prospective Observational Study

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ABSTRACT:
BACKGROUND: *Breast cancer is an uncontrolled growth of epithelial cells that can be originating in ducts or lobes in the breast. Among the chemotherapy, Adriamycin, Cyclophosphamide, Trastuzumab, Tamoxifen, Carboplatin, Paclitaxel, Docetaxel, Letrozole, Anastrozole, etc are used to treat breast cancer.* ***MATERIALS AND METHODS:*** *Our study was a Prospective Observational that was carried out at Omega Hospitals, Guntur. Data was collected by the patient or the patient representative or by studying the patient's profile through a questionnaire. The patient proforma included key information on the patient's demographics, past medical history, diagnostic tests, treatment, 2D Echo, safety profile, Mental health assessment, and quality of life.* ***RESULTS:*** *The collected data was transported to SPSS (version-28) for analysis. Out of 84 patients, 9 patients were seen with trastuzumab-induced cardiotoxicity. Of those 8 patients had reversible cardiotoxicity (88.88%) after ACE treatment and 1 patient had irreversible cardiotoxicity (11.11%). In the safety profile, the highest grade was seen in grade 4 which consists of nausea, fatigue, and generalized pain, grade 3 consists of vomiting, headache, and grade 2 consists of fever along with the quality of life and mental health assessment was done.* ***CONCLUSION:*** *This study showed that trastuzumab is efficacious and the incidence of cardiotoxicity chances are minimal. If a patient may get cardiotoxicity i.e., mostly reversible. The quality of life of a patient affected due to cancer and factors like mental health have a greater influence on the quality of life.*
KEYWORDS: *Trastuzumab, cardiotoxicity, mental health assessment, quality of life.*

I. INTRODUCTION

Cancer comprises a intricate set of illnesses marked by the unchecked proliferation and dissemination of irregular cells. These cells possess the capability to infiltrate and harm neighboring tissues and have the ability to spread to distant body regions via the lymphatic system or bloodstream. **(Cancer., 2021).** HER2-positive breast cancer refers to a subtype of breast cancer characterized by overexpression or amplification of the human epidermal growth factor receptor 2 (HER2/neu) gene. This genetic alteration leads to an increased production of the HER2/neu protein on the surface of cancer cells, resulting in enhanced signaling through the HER2/neu pathway. HER2/neu- positive breast cancer is known to be more aggressive and associated with a poorer prognosis compared to HER2/neu- negative breast cancer **(Slamon DJ, 1987)**. Chemotherapy for HER2-positive breast cancer typically involves a combination of drugs along with targeted therapies that specifically target the HER2 protein. Anthracyclines, such as doxorubicin (Adriamycin) and epirubicin, are commonly used chemotherapy drugs in the treatment of HER2-positive breast cancer. Taxanes, including paclitaxel (Taxol) and docetaxel (Taxotere), are also commonly used in both early-stage and advanced HER2-positive breast cancer. Cyclophosphamide is another chemotherapy drug often used in combination with anthracyclines or taxanes **(Network, 2021)**. Targeted therapies play a crucial role in HER2-positive breast cancer treatment. Trastuzumab (Herceptin), a monoclonal antibody that specifically targets the HER2 protein, has shown significant benefits in blocking HER2 activity and slowing down the growth of HER2-positive breast cancer cells **(Slamon D, 2011)**. Pertuzumab (Perjeta), another monoclonal antibody targeting HER2, is frequently used in combination with trastuzumab to enhance treatment outcomes **(Baselga J, 2012)**. Ado-trastuzumab emtansine (Kadcyla) is an antibody-drug conjugate that combines trastuzumab with a chemotherapy drug (emtansine) to deliver chemotherapy directly to HER2- positive cancer cells **(Verma S M.**

D., 2012). Trastuzumab is a monoclonal antibody that targets the human epidermal growth factor receptor 2 (HER2),which is overexpressed in HER2-positive breast cancers.

The Moa of trastuzumab involves several pathways: **Inhibition of HER2 Signaling:** Trastuzumab binds to the extracellular domain of HER2, preventing the activation of downstream signaling pathways. This inhibition leads to decreased cell proliferation and survival **(Cardoso F, 2018). Antibody-Dependent Cellular Cytotoxicity (ADCC):** Trastuzumab can induce ADCC, where the antibody binds to HER2-expressing tumor cells, resulting in the recruitment and activation of immune effector cells to destroy cancer cells **(Clynes RA, 2000)**. **Downregulation of HER2:** Trastuzumab treatment can lead to the internalization and degradation of HER2 receptors, resulting in decreased HER2 expression on the surface of cancer cells. This downregulation further inhibits HER2-mediated signaling pathways **(Franklin MC, 2004)**. **Modulation of Angiogenesis:** Trastuzumab has been shown to affect angiogenesis, the formation of new blood vessels. It can reduce the production of pro- angiogenic factors, thereby impairing tumor angiogenesis **(Lu D, 2002)**. **Pharmacokinetics Of Trastuzumab**: Absorption: Intravenous administration, trastuzumab is rapidly absorbed into the systemic circulation **(Vogel CL, 2002)**. Distribution: The distribution of trastuzumab involves its binding to HER2 receptors expressed on tumor cells as well as normal tissues **(Baselga J N. L., 1998)**. Trastuzumab has a large volume of distribution, indicating extensive tissue distribution **(Lewis Phillips et al., 2008).** Metabolism: Metabolism of trastuzumab primarily occurs through catabolic pathways in the cells, leading to its degradation **(Lewis Phillips GD, 2008)**. Elimination: Trastuzumab is eliminated from the body through both renal excretion and proteolytic degradation **(Harris L, 2002)**. The clearance of trastuzumab is influenced by various factors, including patient characteristics, tumor burden, and HER2 expression levels **(Boekhout AH, 2011)**.

Trastuzumab Dose: The dose of trastuzumab in HER2-positive breast cancer varies depending on the specific treatment regimen and stage of the disease. Typically, trastuzumab is administered either as a single agent or in combination with chemotherapy or other targeted therapies. For early-stage HER2-positive breast cancer, the standard dose of trastuzumab is 4 mg/kg as an initial loading dose, followed by a maintenance dose of 2 mg/kg once a week or 6 mg/kg once every three weeks **(Cancer. N. C., 2022)**. The duration of trastuzumab treatment in the adjuvant setting is generally one year. In the metastatic setting, trastuzumab is often used in combination with chemotherapy agents or other HER2-targeted therapies. The recommended dose of trastuzumab in metastatic breast cancer is 8 mg/kg as an initial loading dose, followed by a maintenance dose of 6 mg/kg once every three weeks **(Slamon DJ E. W., 2011). Adverse Effects Of Trastuzumab: Cardiotoxicity:** Trastuzumab has been associated with an increased risk of cardiotoxicity, including congestive heart failure and decreased left ventricular function. Close monitoring of cardiac function is recommended during treatment **(Perez EA, 2008)**. **Infusion reactions:** Infusion-related reactions, such as fever, chills, and allergic reactions, have been reported with trastuzumab. Pre-medication with antihistamines and corticosteroids may be given to reduce the risk of these reactions **(Cameron D, Casey M, Press M, et al., 2008) Fatigue:** Fatigue is a common side effect of trastuzumab treatment, which can significantly impact quality of life. Proper management of fatigue with lifestyle adjustments and supportive care is important **(Marty M, 2005)**. **Diarrhea:** Trastuzumab treatment may cause diarrhea in some patients. It is important to manage and monitor for dehydration or electrolyte imbalances associated with prolonged or severe diarrheoa (**Baselga J C. X.-S., 2005**). **Hematologic effects:** Trastuzumab may rarely cause hematologic abnormalities, such as neutropenia or thrombocytopenia **(Franklin MC C. K., 2004**).

The incidence of cardiotoxicity associated with trastuzumab therapy can vary depending on several factors, including the duration of treatment, the presence of other risk factors, and whether it is used in combination with other potentially cardiotoxic chemotherapy agents. Cardiotoxicity is typically evaluated based on a decrease in left ventricular ejection fraction (LVEF), heart failure, or other cardiac-related events.

Early-stage breast cancer: In the adjuvant setting (after surgery), the incidence of symptomatic heart failure or significant LVEF decline with trastuzumab therapy ranges from approximately 1% to 4% **(RomondEH, 2005)** . Metastatic breast cancer: In the metastatic setting, the incidence of clinically significant cardiotoxicity with trastuzumab can be higher, ranging from approximately 5% to 20% **(Slamon DJ, 2001)**.

II. MATERIALS AND METHODS

AIM AND OBJECTIVESAIM:

To study the Safety and Toxicity Profile of Trastuzumab in the treatment of Her2 neu Positive Breast Cancer in a Primary care
Hospital, in Guntur.

OBJECTIVES:

- To study the incidence of cardiotoxicity induced by Trastuzumab.
- To analyze the age factor in breast cancer patients.

* To analyze the safety parameters of Trastuzumab.
* To assess the patient's mental health.
* To assess the quality of life in breast cancer patients by EORTC QLQ C30 Scale.

STUDY LOCATION AND STUDY POPULATION: The study was carried out at Omega Hospital, which is a primary care hospital in Guntur, Andhra Pradesh. The study was carried out on adult women patients who were diagnosed with Her2 neu-positive breast cancer.
STUDY DESIGN: A Prospective observational study design to achieve the study objectives.
STUDY DURATION AND SAMPLE SIZE; The study is being conducted for a duration period of 6 months i.e., from December 2021 to May 2022. A total of 84 women patients who are treated with Trastuzumab were included in the study.

INCLUSION CRITERIA:

- Female patients greater than 18yrs of age.
- Received adjuvant, Neoadjuvant therapy, or palliative therapy for patients who have only Her (humanepidermal growth factor) neu 2 positive breast cancer.
- Patients who are obese, have had hypertension, and have diabetes mellitus.
- Family history of cancer.

EXCLUSION CRITERIA:

- Female patients less than 18yrs of age.
- History of any cardiovascular disorders like Congestive Heart Failure, Myocardial Infarction,and Arrhythmias.
- Patients with Her2 neu-negative breast cancer.
- Pregnant women.

STUDY METHOD:

The study was conducted at omega hospitals, Guntur which is a primary care hospital. A total of 84 patients were enrolled in the study after obtaining consent from patients of age 18 years, who presented with breast cancer and were diagnosed using Mammography, CT scan, MRI, HRCT scan, IHC, and Histopathology reports. Patients were received with trastuzumab regimens and the dose varies from person to person based on tumor size, and BMI. The patients were followed up with cardiotoxicity induced by trastuzumab. The tools used in the study areas follows:

- ❖ PATIENT PROFORMA
- ❖ SAFETY PROFILE
- ❖ MENTAL HEALTH ASSESSMENT
- ❖ QUALITY OFLIFE was measured by using an EORTC QLQ C30 scale.

STUDY PROCEDURE:

PROFORMA: Patient proforma contains patient demographics data, past and present medical history, past medication history, social history, laboratory investigations like hematology, Diagnostic parameters like mammography, CT scan, ultrasound of breast, HRCT scan, and 2D Echo were documented.
SAFETY PROFILE: This was included in our study for monitoring the adverse drug reactions. **MENTAL HEALTH ASSESSMENT:** This scale was included in our study to assess the grades for depression and anxiety etc.
QUALITY OF LIFE: This scale is used for quality-of-life measurement and scores were given based on a questionnaire in EORTC QLQ C30 STATISTICAL ANALYSIS: Data was analyzed by using SPSS software. It was presented as Mean (SD) for quantitative variables, and the number and percentage for categorical variables. The Chi- square test was used for the determination of P value for significance.
FOLLOW-UP: Patients were counseled every 21 days i.e. when they came to take another chemotherapy cycle. Regular phone calls are made to gather some more information regarding their health condition.
SAFETY CONSIDERATIONS: The safety of research participants is foremost. We will ask all the participants to sign the informed consent form. If the subject feels any kind of embarrassment or discomfort, we

will try to make them feel free. If they have any problems we will exclude the Patient without any conflicts.

III. RESULTS

A total of 91 patients were enrolled in the study, out of which 7 patients were excluded as they did not meet the inclusion criteria. A final number of 84 patients who meet the inclusion criteria were included in the study during the period from December 2021 to May 2022.

Table 1.1: Age distribution of the participants in the study

AGE IN YEARS	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
31-40	8	9.523	9.523	9.523
41-50	26	30.952	30.952	40.475
51-60	36	42.8571	42.8571	83.3321
61-70	11	13.0952	13.0952	96.4273
71-80	3	3.5714	3.5714	99.9987
Total	84	100	100	

Out of 84 patients, the majority of breast cancer cases were diagnosed between the age of 51-60, andthe least number of cases were found in 31-40 years of age.

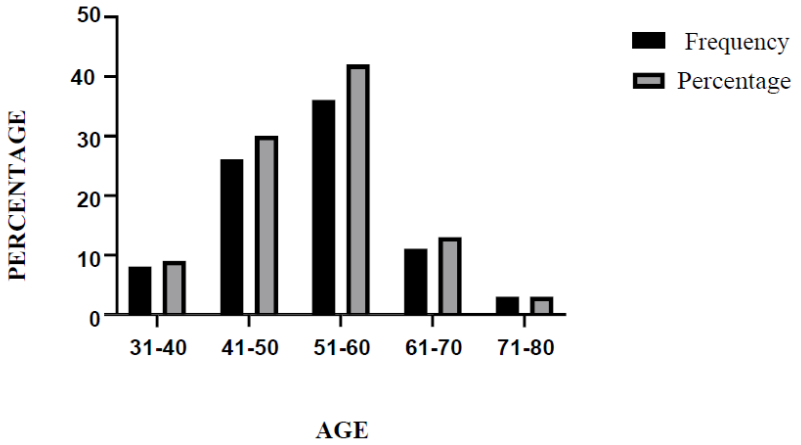

Figure 1.1: Analysis of age distribution of the participants in the study

Table 1.2 BMI (BODY MASS INDEX) distribution of participants in the study

WEIGHT STATUS	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
Underweight	5	5.9253	5.9253	5.9253
Normal weight	30	35.7142	35.7142	41.6665
Overweight	35	41.666	41.666	83.3325
Obese class I	07	8.3333	8.3333	91.6658
Obese class II	03	3.5714	3.5714	95.2375
Obese class III	04	4.7619	4.7619	99.9994
Total	84	100	100	

Body Mass Index (BMI) is classified into 6 categories which are

A. Underweight: < 18.5 Kg/M^2
B. Normal Weight: 18.5 -24.9 Kg/M^2

C. Overweight: 25-29.9 Kg/M^2

D. Obese Class I: 30-34.9 Kg/M^2

E. Obese Class II: 35-39.9 Kg/M^2

F. Obese Class III: > 40 kg/m^2

Out of 84 patients, the majority of the cases with breast cancer were in overweight and the least number were found in obeseclass III.

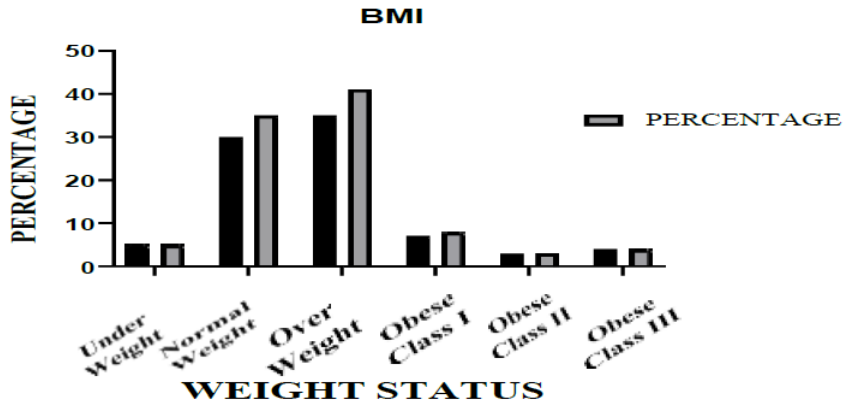

Figure 1.2: Analysis of BMI (BODY MASS IDEX) of participants in the study

Table 1.3: Occupation distribution of participants in the study

OCCUPATION	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
TAILORING	9	10.7142	10.7142	10.7142
HOUSEWIFE	59	70.238	70.238	80.9522
FARMER	11	13.0952	13.0952	94.0474
OTHERS	5	5.9523	5.9523	99.9997
TOTAL	84	100	100	

The occupation of the patients was taken into consideration. Housewives were highly diagnosed with breast cancer.

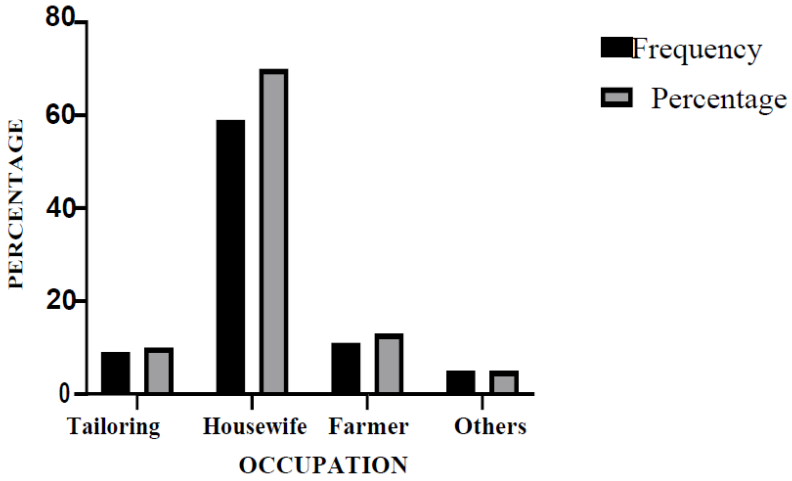

Figure 1.3: Analysis of occupation of participants in the study

Table 1.4: Food habits of participants in the study

TYPE OFFOOD	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
VEG	15	17.8571	17.8571	17.8571
NONVEG	69	82.1428	82.1428	99.9999
TOTAL	84	100	100	

The food habits were taken into consideration. The Non-veg consumed patients were the highest number in the study.

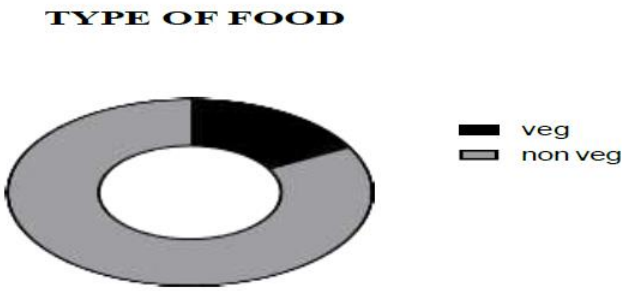

Figure 1.4: Analysis of the type of food habits in the study

Table1.5: Family history of cancer in participants in the study

FAMILYHISTORY	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
Yes	14	16.6666	16.6666	16.6666
No	70	83.3333	83.3333	99.9999
Total	84	100	100	

Out of 84 patients, the major of patients diagnosed with breast cancer had no family history of cancer.

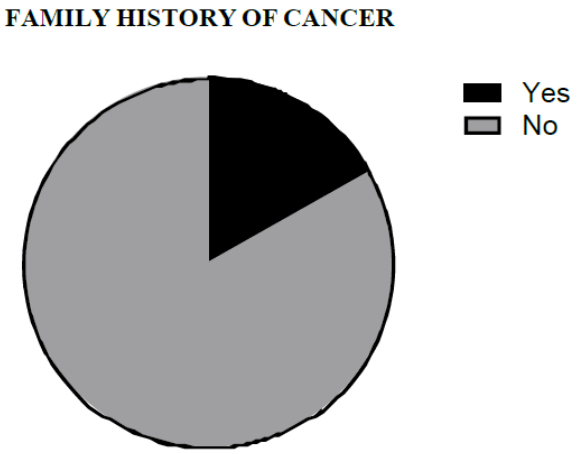

Figure 1.5: Analysis of family history of cancer of patients in the study

Table 1.6: Menopause status of participants in the study

MENOPAUSE	FREQUENCY	PERCENTAGE	VALID PERCENTAGE
YES	79	94.0476	94.0476
NO	5	5 .95238	5.95238
TOTAL	84	100	100

Out of 84 patients, the majority of patients were in post-menopause. The reasons for post-menopause can be age, chemotherapy, and hysterectomy.

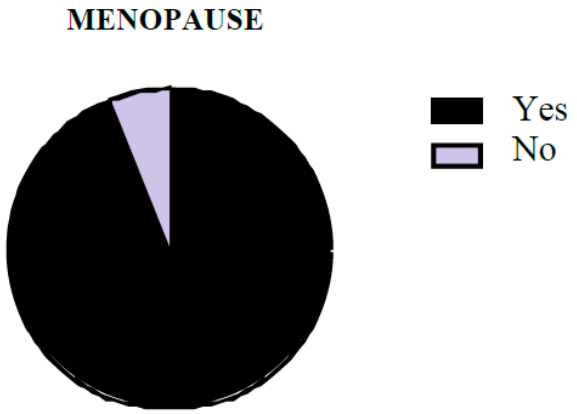

Figure 1.6: Analysis of menopause of participants in the study

Table 1.7: Analysis of stages of cancer of participants in the study

STAGES	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
STAGE I	3	3.57142	3.57142	3.57142
STAGE II	58	69.04761	69.04761	72.61903
STAGE III	19	22.619047	22.619047	95.23807
STAGE IV	4	4.76190	4.76190	99.9999
TOTAL	84	100	100	

Of all the patients, people diagnosed with breast cancer were more in stage II and the least number were found instage I.

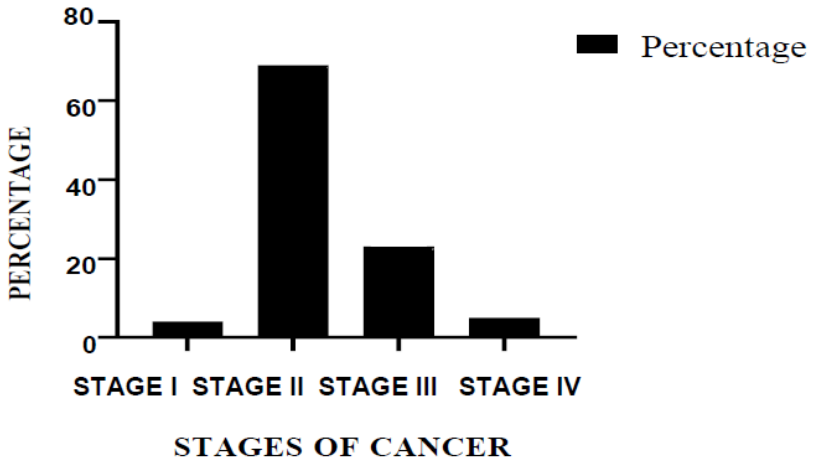

Figure 1.7: Analysis of stages of cancer in the patients included in the study

Table 1.8: Analysis of chemotherapy cycles of participants in the study

CHEMOTHERPY CYCLES	FREQUENCY	PERCENTAGE	VALID PERCENTGE	CUMULATIVE PERCENTAGE
1-4	4	4.76	4.76	4.76
5-8	26	30.9	30.9	35.71
9-12	32	38.0	38.0	73.8
13-16	1	21.4	21.4	95.2
17-20	4	4.76	4.76	99.99

A highest number of patients were received 9-12 chemotherapy cycles and in the least number of patients were in between 13-16 cycles.

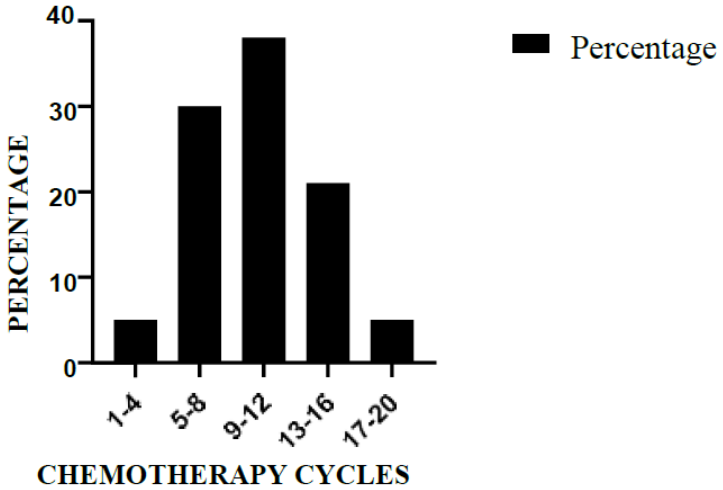

Figure1.8: Analysis of chemotherapy cycles of participants in the study

Table 1.9: Analysis of LVEF of participants in the study

EJECTION FRACTION	FREQUENCY	PERCENTAGEE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
10-20	0	0	0	0
21-30	0	0	0	0
31-40	0	0	0	0
41-50	9	10.71	10.71	10.71
51-60	66	78.57	78.57	89.28
61-70	9	10.71	10.71	99.99

The ejection fraction was observed before and after the chemotherapy. The patients showed a fall in ejection fraction with < 50%which represents cardiotoxicity.

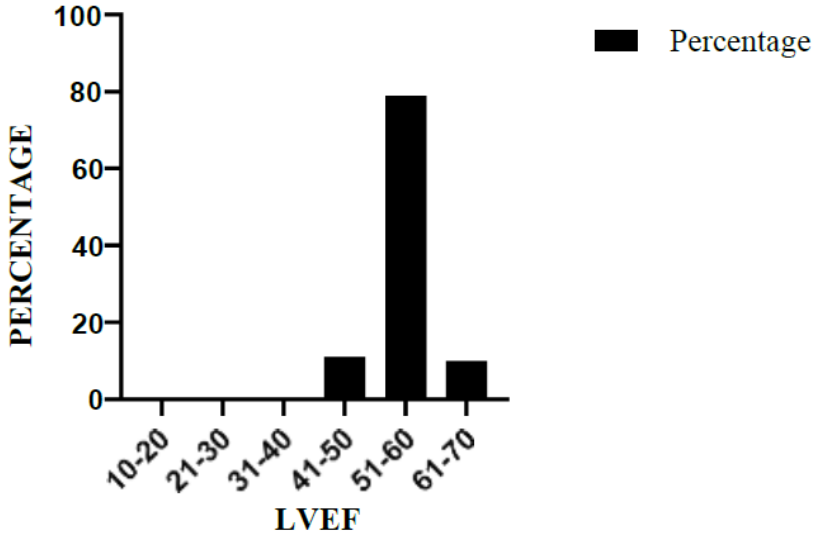

Figure 1.9: Analysis of LVEF of participants in the study

Table 1.10: Cardiotoxicity of participants in the study

PARAMETER	FREQUENCY	PERCENTAGE	VALID PERCENTAGE	CUMULATIVE PERCENTAGE
CARDIOTOXICITY REVERSIBLE	8	88.88	88.88	88.88
CARDIOTOXICITY IRREVERSIBLE	1	11.11	11.11	99.99
TOTAL	9	100	100	

The reversibility of cardiotoxicity occurred after treatment with ACE inhibitors. 8 patients had shown **c**ardiotoxicity reversible and 1 patient with cardiotoxicity irreversible.

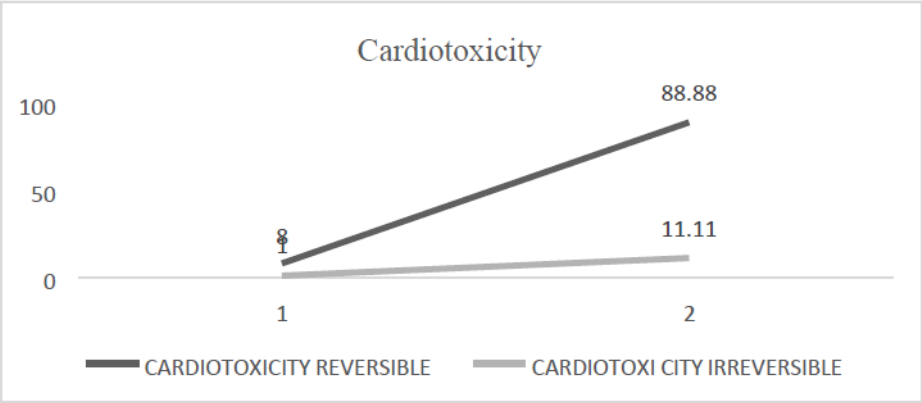

Figure 1.10: Analysis of cardiotoxicity of participants included in the study

Table 1.11: Analysis of the safety profile of participants in the study

Safety profile	grade0	grade1	grade2	grade3	grade4
Cardiomyopathy	83.33	9.52	3.57	2.38	1.19
Diarrhea	52.38	10.71	13.09	19.04	4.76
Nausea	11.9	14.28	32.14	32.14	9.52
Vomiting	15.47	14.28	28.57	39.28	2.38
Hypersensitivity	100	0	0	0	0
Fever	51.19	15.47	21.42	10.71	11.9
Chills	58.33	17.85	14.2	1.19	0
Flushing	57.14	20.23	10.71	23.8	3.57
Fatigue	8.33	35.71	22.61	14.28	9.52
Headache	60.71	10.71	13.09	1.19	1.19
Bronchospasam	96.42	2.38	0	0	0
Dyspenia	85.71	4.76	8.33	1.1	1.19
Angioedima	90.47	5.952	2.33	3.57	0
Hypotension	83.33	9.52	3.57	10.71	0
Peripheraledema	50	23.8	13.09	0	2.38
Myelosuppression	96.42	3.57	0	28.57	0
Generalized pain	15.47	22.61	19.04	11.9	14.28
Asthenia	47.61	23.8	16.66	0	0
Rhinitis	83.33	16.66	0	0	0
Sinusitis	88.33	16.66	0	0	0
Pleural effesion	100	0	0	0	0
Utricaria	90.47	5.95	2.38	8.33	0

This table represents the safety profile of each parameter of their frequencies and their grades

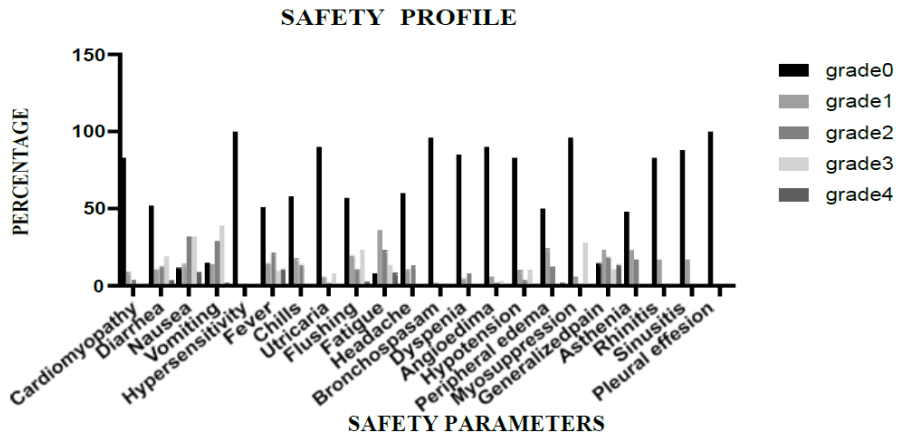

Figure 1.11 Analysis of safety profile of breast cancer patients in the study

Table 1.12: MENTAL HEALTH ASSESSMENT (MHA)of patients in the study

CONSIDERING QUESTIONNAIR EREASALPHABETS	GRADE 0	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
A	0	47.61	47.61	36.9	38.09	15.47
B	0	0	9.52	36.9	38.09	15.47
C	9.52	7.14	13.09	19.04	42.61	3.57
D	2.38	2.38	4.76	42.85	42.55	4.76
E	2.38	2.38	36.9	34.52	13.09	10.71
F	45.23	41.66	8.33	0	2.38	2.35
G	50	7.14	23.8	4.76	9.52	4.7
H	47.61	14.28	9.52	11.9	11.9	4.76
I	11.9	5.95	10.71	30.95	38.09	3.57
J	66.66	4.76	10.71	5.95	7.14	4.76
K	57.14	30.95	4.76	2.38	2.38	2.38
L	80.95	11.9	2.38	2.38	2.38	0
M	90.47	4.76	2.38	2.38	0	0
N	86.9	8.33	2.38	1.19	1.19	0
O	96.42	1.19	1.19	1.19	0	0
P	92.85	2.38	1.19	3.57	0	0
Q	91.66	3.57	1.19	1.19	2.38	0

The mental health assessment was done in breast cancer patients the questionaries likeA, B, C, D, Ihad shown grade 4.

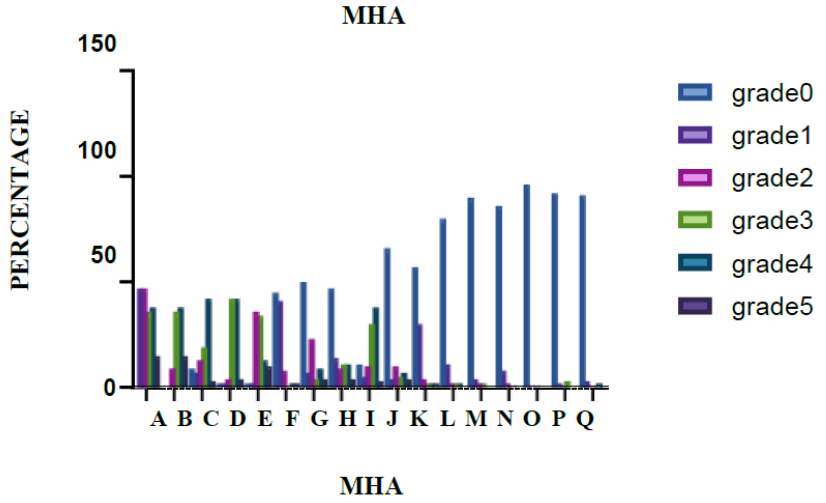

Figure 1.12: Analysis of MHA in breast cancer patients in the study

Table 1.13: Analysis of quality of life of participants in the study

EORTC QLQ C30 QUESTIONNAIRE	NOTATALL	A LITTLE	QUITEA BIT	VERYMUCH
1	11.97	60.71	10.71	16.66
2	28.57	54.76	7.14	9.52
3	51.19	19.04	22.61	7.14
4	80.95	9.52	4.76	4.76
5	85.71	7.14	2.38	4.76
6	15.44	72.61	7.14	4.76
7	70.23	20.23	4.76	4.76
8	94.04	4.76	1.19	0
9	2.38	72.61	14.28	10.71
10	0	88.09	9.52	2.38
11	10.71	15.47	55.95	17.85
12	3.57	85.71	9.52	1.19
13	54.76	44.04	1.19	0
14	11.9	10.71	60.71	16.66
15	11.9	60.71	10.71	16.66
16	94.04	1.19	3.57	0
17	84.52	0	15.47	0
18	0	4.76	90.47	4.76
19	15.47	67.85	8.33	8.33
20	90.47	5.95	3.57	0
21	8.33	57.14	14.28	20.23
22	10.71	84.52	2.38	2.38

23	2.38	80.95	14.28	2.38
24	3.57	86.9	8.33	1.19
25	94.04	4.76	1.19	0
26	94.04	4.76	1.19	0
27	96.42	3.57	0	0
28	1.19	91.66	3.57	0

Questionnaire Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29	04	05	05	03	56	04	07
30	00	02	02	38	37	03	02

The analysis of quality of life was done in breast cancer patients using the EORTCQLQ scale. The scores were represented inpercentages.

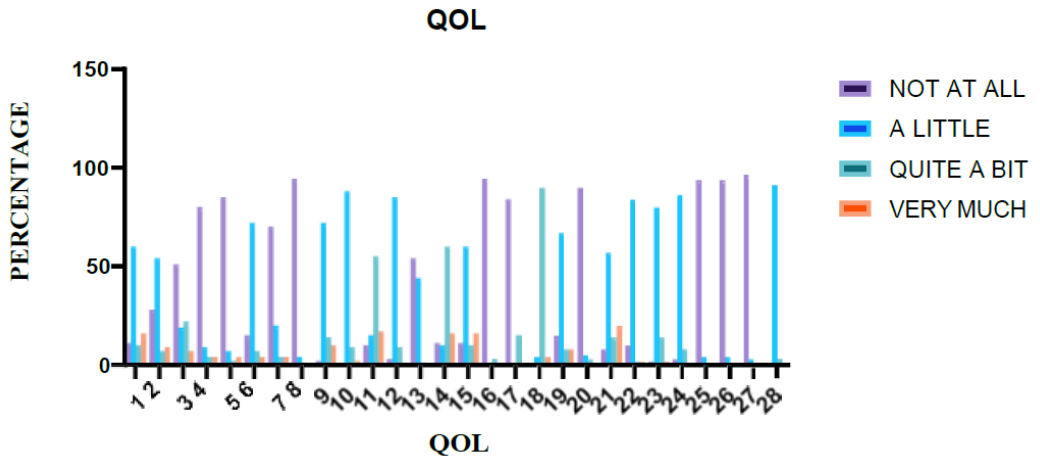

Figure 1.13 Analysis of quality of life in breast cancer patients included in the study

IV. DISCUSSION

We have conducted this study to assess the incidence of trastuzumab-induced cardiotoxicity along with safety profile parameters, MHA, and QOL. In this study trastuzumab-induced cardiotoxicity, mental health assessment, quality of life, and safety profile parameters were planned and carried out at Omega Hospitals, Guntur from December 2021 to May 2022. Out of an estimated sample size of 100, 84 Patients were included in the study.

Statistical analyses were performed by using SPSS statistical version. The variables were analyzed like LVEF, SAFETYPROFILE, MHA, and QoL.

To analyze the relationship between the different variables, the chi-square test of independence was performed.

Various studies were done on parameters like age **(Kumar RV, 2018)** where 65% of cases of breast cancer were reported below 55 years, BMI **(Singh P, 2011)**it was reported that more breast cancer cases were due to overweight, family history of cancer **(Ahmed NU, 2009)**it was reported that family history was strongly associated with breast cancer, menopause it was reported that the risk of occurrence of breast cancer was high, Trastuzumab induced cardiotoxicity**((Hussain Y, 2019)**it was reported that most of the cases had shown reversible Trastuzumab induced cardiotoxicity, mental health assessment **(Fradley MG, 2020)**it was reported that mental health status had shown significant effect on patients with breast cancer, quality of life **(Osoba D, 2016)**it was reported that patients treated with a combination of trastuzumab had shown improved quality of life.

From taking into consideration of reported data, we compared all the above-said parameters and in additional stages of breast cancer, chemotherapy cycles, safety parameters are also observed in Her2positive

breast cancer patients.

In our present study, we observed the following

1. The age distribution of the patients was found to be 31-40, 41-50, 51-60, 61-70,71-80 years and its percentage is 9.52%, 30.95%, 42.8571%, 13.095%, 3.571% respectively. This demonstrated that the population of 51-60 yrs are prone to get diagnosed with breast cancer.
2. BMI demonstrated that 5.95% were underweight,35.714% were in the normal range, 41.666 % were overweight, 8.33 % were obese in class I, 3.57% were in obese class II, and .4.76% were in obese class III. That vividly tells that most of the patients were overweight some of them were in obese classes I, II, and III. The results of their study revealed a strong association between being overweight and obesity with breast cancer in the Indian population
3. The family history of cancer, 16.66% of patients were found that they have a family history of cancer and 83.33 % did not have a family history of breast cancer. A family history of breast cancer increased the risk of breast cancer.
4. Menopause., 5.95% of patients were not in menopause despite receiving chemotherapy, and 94.04 % were in post-menopause.
5. Analysis of stages of breast cancer patients, 3.57% were diagnosed with stage I, patients 69.047% were diagnosed with stage IIA, patients 22.619 % were diagnosed with stage III, and patients 4.76190 % were diagnosed with stage IV. Patients with stage II A are more diagnosed with HER2-positive breast cancer.
6. Analysis of chemotherapy cycles in the present study showed that patients who were in between chemotherapy cycles 1-4 were 4.76 %, 5-8 cycles were 30.95%, 9-12 cycles were38.09%, 13-16 cycles were 21.42 %, 17 -20 cycles were 4.76 %.
7. Coming to the main concept of the study safety and toxicity profile of trastuzumab the treatment of HER2 neu positive breast Cancer the ejection fraction was observed during the chemotherapy.
8. The ejection fraction of patients after Chemotherapy 41-50 were 10.71 %, 51-60 were 78.57 %, 61- 70 were 10.71 %. The cardiotoxicity was observed in 9 patients. In those 8 members (88.88%) cardiotoxicity was reversible after receiving ACE inhibitors. 1 member (11.11%) was currently in ACE therapy for reversible of cardiotoxicity **(p =<0.05)** Our study was significant compared to other studies **(Hussain Y, 2019).**
9. In the safety profile we observed that nausea, fatigue, and generalized pain in grade 4, headache, vomitings , in grade 3, fever in grade 1.
10. In the present study, mental health assessment was analyzed. **(n =84) (P-value = 0.042)**, the people with breast cancer were more depressed because of disease progression and also were afraid to visit the hospital, etc. Due to this, patients were counseled to improve their mental health status.
11. The quality of life was analyzed by using the EORTC QLQ-C30 questionnaire, and the mean and standard deviation were calculated. **(n=84) mean = 82.9 and standard deviation = 24.6,** it was observed that the quality of life is poor well-being in breast cancer patients.

LIMITATIONS:

- The sample size of the study is smaller than expected.
- We did not include metastatic breast cancer patients.

SCOPE OF STUDY:

- The studywas also performed on large population size.
- The study was helpful to identify the recurrence of Her2 neu after using trastuzumab therapy**.**

V. CONCLUSION

In our study, we conclude that patients between the age of 51-60 years were diagnosed with breast cancer. Breast cancer in women was more among in-house wives because of higher BMI. The incidences of cardiotoxicity induced by trastuzumab chances are minimal. If a patient may get cardiotoxicity, it is mostly reversible by being treated with ACE inhibitors. This study also establishes the assessment of mental health and quality of life. Mental health and quality of life was more affected due to cancer and poor well-being in breast cancer patients.

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