

The Role of Steroid Drugs in the Growth of Breast Cancer

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ABSTRACT

Malignancies of the breast cells are known as breast cancer, which is characterised by a swelling/lump in the breast, pain in the breast, or a lump in the armpit, bloody discharge from the nipple, changes in the shape and/or texture of the nipple.

The aim of the study was to identify the function and responsibilities of steroid drugs used in treatment of breast cancer.

Material and method: Patients with breast cancer using steroid drugs were prospectively observational and studied for a period of 6 months (March 2022-October 2022). Primary end points of the study included steroid drug use with chemotherapy in treatment of breast cancer. Patients' data were collected and interpreted for evaluation.

Results: All patients are female presented on admission to the hospital with breast cancer and were subsequently administered known steroid drugs associated with chemotherapy. This study contained 73 patients with ages from 30-89 years old. The study showed out of 73 patients 63 patients used Dexamethasone with chemotherapy drugs and 10 patients Tamoxifen with chemotherapy.

Conclusion: The clinical research study was essential to evaluate the role of steroid drug use in the growth of breast cancer in the hospital. We have 73 patients under steroid drug and chemotherapy medication. The aim prior to carrying out this investigation was to set the patient population with breast cancer under steroid medication prescribed by the physician while the patient administered on the ward. classify the steroid drugs used and develop the chance of the patient to increase Hb.

I. INTRODUCTION

Tumors are swelling that occurs in certain parts of the body, generally without inflammation, caused by an abnormal growth of tissue. Tumor may be benign (not-carcinogenic) and malignant (carcinogenic). Benign tumors grow large but do not spread into or invade nearby tissues or other parts of

the body [1]. Malignant tumors can spread into or invade nearby tissues. We also have tumors who spread on other parts of the body through the blood and lymph systems [2].

Mostly often the body cells are regenerated automatically during the process of differentiation. Old damaged cells die and give place to the new cells, in some cases the cells don't die off as expected or new cells grow and multiply faster than they were supposed to [3]. The cells start to smarch forming a tumor. Tumor mostly affect age people including children, we can observe a lot of factor who increase the chance of developing a tumor include; gene mutation, inherited condition such as lynch syndrome and neurofibromatosis, family history of certain types of cancer like BC or prostate cancer, smoking, including exposure to second-hand smoke. Viruses like HPV (*Human papilloma virus*) [4].

Tumor symptoms depend on the location of the tumor and if it is cancerous or not. The tumor gets diagnosed by a pathologist mostly performing Biopsy to know if it is benign or malignant. Biopsy includes removing cell samples from a tumor, we can also get other tests like blood work and imaging scans such as X-ray, CT scan, MRI or PET scan [5].

Tumor approach treatments depends if the tumor is benign or malignant and the location of the tumor. Most cancerogenic tumors don't need treatment but can continue to grow. eg : benign brain tumor [6].

Cancerous tumor treatment include : Surgery to remove the tumor, chemotherapy to break the tumor before surgery or destroy lingering abnormal cells after surgery, immunotherapy to engage the immune system to fight cancer, radiation therapy to destroy abnormal cells, targeted therapy to slow or stop the growth of cancer cells [7].

Knowing that tumors are coming from unknown reasons, we can reduce the risk of developing a tumor by cutting back on alcohol, quitting smoking, eating a healthy diet, and staying physically active [8].

Over 200000 Women in India were diagnosed with Breast Cancer in 2020 according to Government data estimation of 2020, more than 76000 deaths reported [9]. Breast cancer is known as the abnormal development of a cell/ tumor on the breast BC acute in women and rarely in men, mostly symptom by the lump present in the breast bloody discharge from nipple and the changes in the Sharpe / texture of the nipple / breast [10]. BC has many stages, mostly base size and other characteristics of primary tumor, the status of bilateral lymph nodes and present /absence of distant metastases. BC etiologically the variable most strongly associated with occurrence are gender and ages, can also call genetic abnormally [11].

The stage of BC fluctuate from 0-4 based on combination of TNM :

Stage 0 : contain DCIS, LCIS and possibly non-malignant form of the disease.

Stage 1-3 : invasive stage Tumor restricted to the breast / immediate locale. Higher stages specify larger primary tumor / better color regional tumor involvement.

Stage 4 :with proof of distant metastasis considered to be in this stage [12].

The Distribution of disease stage at the time of breast cancer diagnosis varies by country depending on the healthcare system's approach to diagnosis and reporting. The best predictive factor is ER which is a significant indicator in case a tumor will respond to hormonal treatment [13-14].

Eg : Tamoxifen and other SERMs more effectif to a patient with hormone sensitive BC. Nothing when a patient is ER negative.

PR negative :Early BC trial list collaborative group EBCTCG patient who benefits from SERMs. SERMs also benefit from aromatase inhibitors.

HER-2 (HER-2/ Neu, ErbB2, C-erb B-2) is a organ of the epidermal growth factor receptor family over expressed in 20%-40% of B tumor Conveying poor prognosis .The studies BC suggested that patient with HER-2 positive tumor are more likely to benefits from Anthracycline therapy [15-16].

Treatment of Breast Cancer: Trastuzumab, a monoclonal antibody against HER-2, successful in delaying progression in stage 4 BC over exposure to Her-2.

Surgery and radiotherapy trials compared various surgical and radiotherapy approaches.

Chemotherapy cooper regimen (cyclophosphamide, methotrexate, 5-fluorouracil, vincristine and prednisone) proves sensitive to BC cells to cytotoxic agents.

Randomized trial comparing surgery followed by comb chemo-surgery and BC recurrence could be remarkably reduced using this adjutant therapy approach. New agent Doxorubicin is explaining the series of clinical trials typically combined with other drugs [17].

Hormonal therapy is mostly used when the patient is hormone receptor positive. Anti-estrogen agent Tamoxifen was introduced in 1970 s , notice the trial poiled to superior efficacy with prolonged admission in ER positive. Tamoxifen standard therapy for pre and post menopausal women with ER positive tumor.

Steroid therapies includes;

-Hydrocortisone :10-20 mg daily

-Cortisol : 10 mg/day

-Hydrocortisone : 20 mg morning + 10 mg afternoon orally

-Corticosterone : 2-4 mg/day

-Desoxycorticosterone : 2-5 mg sublingual, 10-20 mg i.m once or twice daily

-Aldosterone : 0.125 mg daily.

Methylprednisolone IV in dose 150-300 mg injected over ½ hour, once daily for 3 days for acute rejection of a renal graft, Graves exophthalmos and similar emergencies [18].

Intensive short term therapy, Prednisolone large doses 100-200 mg (1-2 mg/kg/day) last longer than 48 -72 hours.

Severe allergic reaction the corticoid may be used for short periods in anaphylaxis, angioneurotic edema, urticaria and serum sickness but IV glucocorticoid takes 1-2 hour to act and is not a substitute for Adr which acts immediately in anaphylactic shock and angioedema of larynx

Autoimmune haemolytic anemia, idiopathic thrombocytopenic purpura, active chronic hepatitis respond to corticoids. Prednisolone 1-2 mg/kg/day is given till remission followed by gradual withdrawal or low-dose maintenance depending on the response [19].

Other lung diseases the corticosteroid has profound benefits are; aspiration pneumonia and pulmonary edema from drowning but given during late pregnancy. two doses of betamethasone or dexamethasone 12 mg i.m at 24 hour intervals may be administered to the mother if premature delivery is contemplated.

Infective diseases administered under effective chemotherapeutic cover, corticosteroids are indicated only in serious infectious diseases to tide over crises or to prevent complications [20].

Nausea and vomiting: *Dexamethasone* 8-20 mg i.v is frequently used to augment the antiemetic effect of

ondansetron or metoclopramide against highly dose emetogenic cancer chemotherapy [21].

Malignancies corticoid are an essential component of combined chemotherapy of acute lymphatic leukaemia, they have a secondary place in hormone responsive breast carcinoma act probably by causing HPA suppression so as to reduce production of adrenal androgens which are converted to estrogens in the body.

Dexamethasone suppresses the pituitary-adrenal axis at doses which do not contribute to steroid metabolites in urine. Responsiveness of the axis can be tested by measuring daily urinary steroid metabolite excretion after dosing with dexamethasone [22].

The major metabolic products of testosterone are *androsterone* and *etiocholanolone* which are eliminated in urine, mostly as conjugates with glucuronic acid and sulfate. Plasma t_{1/2} of testosterone is 10-20 min.

Testosterone is inactive orally due to elevated first pass metabolism in the liver, and has a very short duration of action after i.m injection. Circulating testosterone is 98% bound to SHBG and albumin, whose SHBG bound testosterone are unavailable for action due to tight binding.

Adverse skin reaction to topical glucocorticoids are; thinning of the skin, striae, telangiectasia superficial fissures and purpura; acne, folliculitis, miliaria, hypertrichosis, hypopigmentation, making or aggravation of dermatophytosis, impetigo or scabies [23].

Adverse with oral glucocorticoid therapy includes; dyspepsia, gastric complication, bruising, striae formation, loss of muscle mass and osteoporosis are more common. Hyperglycemia which may lead to glycosuria, precipitation of diabetes

Adverse effects with ACTH are; a higher incidence of hypertension, pigmentation, hirsutism and acne.

Mineralocorticoid sodium and water retention, edema, hypokalaemic alkalosis and a progressive rise in BP. These are now rare due to availability of highly selective glucocorticoid gradual increase in BP occurs due to excess glucocorticoid action as well.

Contraindications of corticosteroids: There is some disease aggravated by corticosteroids, which are relative contraindications in the presence of which these drugs are to be employed only under compelling circumstances, and with due precautions. peptic ulcer, diabetes mellitus, hypertension, viral and fungal infections, tuberculosis and other infections, osteoporosis, herpes simplex keratitis, psychosis, epilepsy, CHF,

renal failure combination of any other drug with corticosteroid in fixed dose formulation for internal use is banned [23].

Selective estrogen receptor modulators (SERMs):

These are drugs which exert estrogenic as well as anti estrogenic actions in a tissue selective manner. These drugs have been designated SERMs and three SERMs Tamoxifen citrate, Raloxifene and Toremifene are in clinical use. Tamoxifen citrate Though chemically related to clomiphene, it has complex actions; acts as potent estrogen antagonist in breast carcinoma cells, blood vessels and at some peripheral sites, but as partial agonist in uterus, bone, liver and pituitary. Inhibition of human breast cancer cells and hot flushes reflect antiestrogenic action, while the weak estrogen agonistic action manifests as stimulation of endometrial proliferation, lowering of Gn and prolactin levels in postmenopausal women as well as improvement in their bone density.

Tamoxifen has been the standard hormonal treatment of breast cancer in both pre- and postmenopausal women, but aromatase inhibitors have now gained prominence. In early cases tamoxifen is given as postmastectomy adjuvant therapy, constituent of palliative treatment. Use of Tamoxifen for ER+ breast carcinoma in premenopausal women was more effective option than use on ER negative breast carcinoma, is usually not recommended. Tamoxifen is the only drug approved for primary as well as metastatic breast carcinoma in premenopausal women. It is also effective in surgically treating cancer of male breast [24].

Dose: 20 mg/day in 1 or 2 doses, max. 40 mg/day; TAMOXIFEN, MAMOFEN, TAMODEX 10, 20 mg tabs.

Side effects: Hot flashes, vomiting, rashes, vaginal bleeding etc. Infrequent side effect are dermatitis, anorexia, depression

Chemotherapy: The corticosteroid given at the same time with chemotherapy drugs helps to control the chemotherapy induced nausea and vomiting and also reduces inflammation and lowers the body's immune response. It is known to cause adverse effects such as anxiety, indigestion, mood change. In cancer therapy the corticosteroid is commonly used to reduce the side effects of chemotherapy and treat the symptoms related to advanced cancer, which have multiple roles. Corticosteroid modifies epidermal and dermal cell function, leukocytes participating in proliferative and inflammatory skin diseases. When passing through cell membrane

corticosteroids react with receptor proteins in the cytoplasm to form a steroid-receptor complex [25].

II. AIMS AND OBJECTIVES

Aim: To Identify the function and responsibilities of steroid drugs used in treatment of breast cancer.

Objectives

- To identify and classify the steroid drugs used in the treatment of breast cancer.
- To study the correlation between steroid drugs and chemotherapy used in breast cancer treatment therapy with or without comorbidities.
- To analyze combination chemotherapy drugs and hormonal steroids in treatment of breast cancer with and without comorbidities.
- To evaluate the efficacy and safety of using corticosteroid in the treatment therapy of breast cancer.

III. METHODOLOGY

Method: The study is an observational study done in the Oncology department.

The Patient's data will be collected from demographic details, medication charts (dose, route, frequency, no of days of drug treatment), presenting complaints along with past medication history will be assessed and compared to that recommended by Cancer WHO guidelines. A total of 73 female patients from the Oncology department ward of Bangalore Baptist Hospital were enrolled. These are documented in the proper data collection form and followed until patients are discharged from the hospital after a completed therapy cycle.

Study type and site: This was a prospective observational study. The site of study was in the Oncology ward of Bangalore Baptist Hospital, Bellary Rd, Vinayakanagar, Hebbal, Bengaluru, Karnataka-560024

Study Population: All the patients who are under steroid medication in treatment of Breast cancer in the Oncology department hospital were checked for eligibility into the study.

The inclusion criteria include adult, menopause and postmenopause women who are on steroid medications for the treatment of breast cancer.

Exclusion criteria were pregnancy and lactating women.

Study period: Study was conducted over 6 months period from March 2022- september 2022

Materials and methods:

Study design: Prospective, observational study.

Source of data and Materials:Data collection form, Medical journal and articles.

Patient case notes, treatment charts, patient interaction and previous medical files, hospital formulary, discharge medication

Statistical analysis: The collected data were entered into Microsoft Excel Spreadsheet for easy calculations and retrieval followed by the assessment with the help of SPSS software version 25.0 (Licensed to BBH)

Descriptive statistical analysis was carried out using P-value <0.05 as statistically significant with 95% confidence interval (CI). Predictors for the role of steroid drugs in the growth of breast cancer was calculated in percentages (%) and expressed using charts and graphs.

Study procedure: A prospective observational study will be conducted in the oncology department. The female patient who have breast cancer will be enrolled for the study. The procedure of study involves the collection of patient demographic details, obtaining the consent from the patient and assessment through collected data and prognosis. Select the patient who has been diagnosed with breast cancer disease using steroid drug part of the treatment therapy and patient having breast cancer with comorbidities using steroid after coming to the hospital. Obtain all the demographic details and personal detail, lab investigation from the patient case sheet. Identify the specific steroid use in the treatment therapy including the route, dose, the brand name of medication used. Obtain consent requires giving accurate information about the risk, benefit and procedure of the study. Analyze the response of the patient when the steroids are administered with chemotherapy and after the chemotherapy. Once the analysis is over, information is documented for further study and results are noted for the final report.

IV. RESULTS

Study population: The patients presented on admission to the hospital are suffering from breast cancer and are under steroid drugs with chemotherapy. We have 73(n=73) and breast cancer on male patients is not common. We have(13.6 %) who use hormonal steroids with chemotherapy and (86,30 %) that are using steroids with chemotherapy as a treatment for breast cancer. The patients admitted to ward were present with a prevalent diagnosis of hypertension(16%), followed by diabetes mellitus (21%), hypothyroid (4,1%), tuberculosis (10.9%). Majority of patients were administered with predominantly dexamethasone

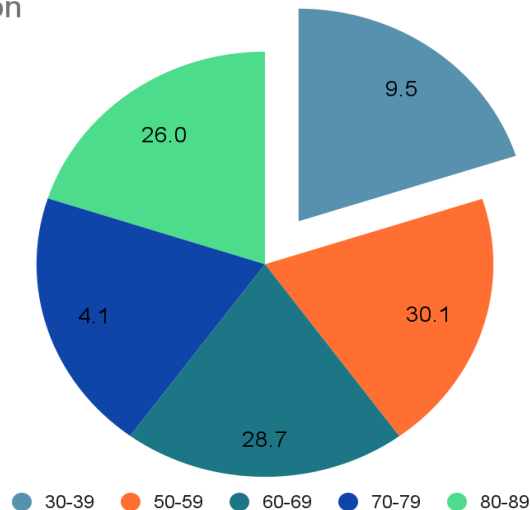
medication at n=63 (89%) number of patients. The medications in this study were in line with those prescribed and issued according to the prescription guidelines at the oncology department, Bangalore Baptist Hospital. The most frequently prescribed medications were Dexamethasone (86.30%), Tamoxifen (13.6%) associated with chemotherapy medication. Study subject were selected according

to the presence of breast cancer disease taking steroid drug as a part of the treatment therapy

Age distribution: The age group that was found to be more affected breast cancer menopause, pres and postmenopausal females are usually targeted. we notice that 30.1 percent of population in range 50-59 years are more exposed by breast cancer

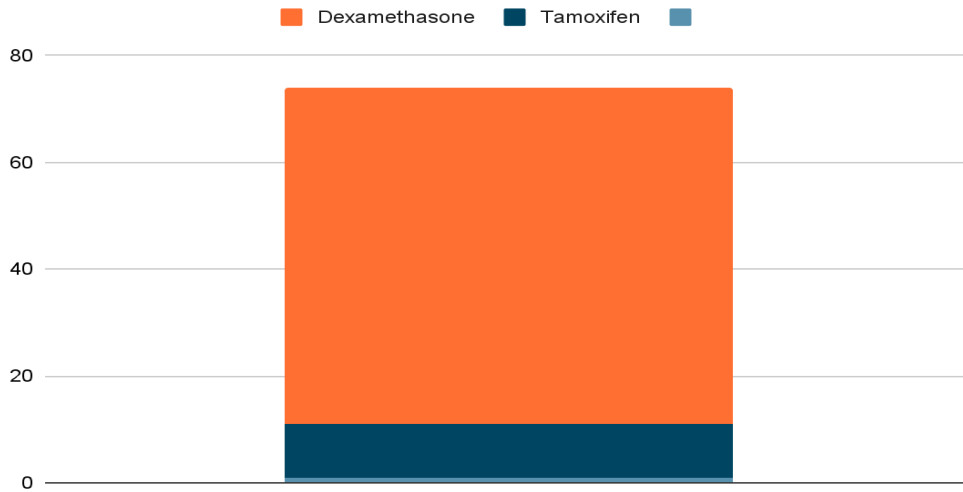
Age group	No. of Females	Total number	percentage
30-39	73	7	9.5
40-49	73	19	26.0
50-59	73	22	30.1
60-69	73	21	28.7
70-79	73	3	4.1
80-89	73	1	1.3

Age distribution



Medication distribution

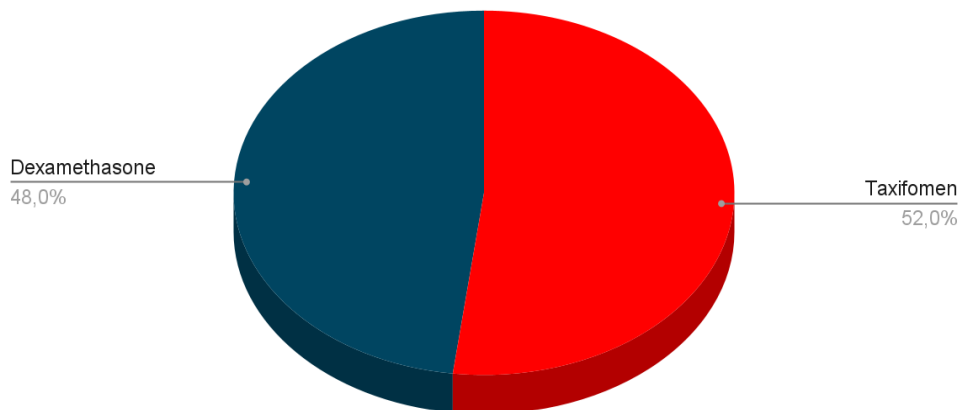
Medication	Tamoxifen	Dexamethasone
Number of patient	10	63
Percentage	13.6	86.30



Hematology

Medication	pres-medication mean HB	post medication mean HB
Tamoxifen	11.32	10.97
Dexamethasone	11.41	10.13

4-Hematology effect

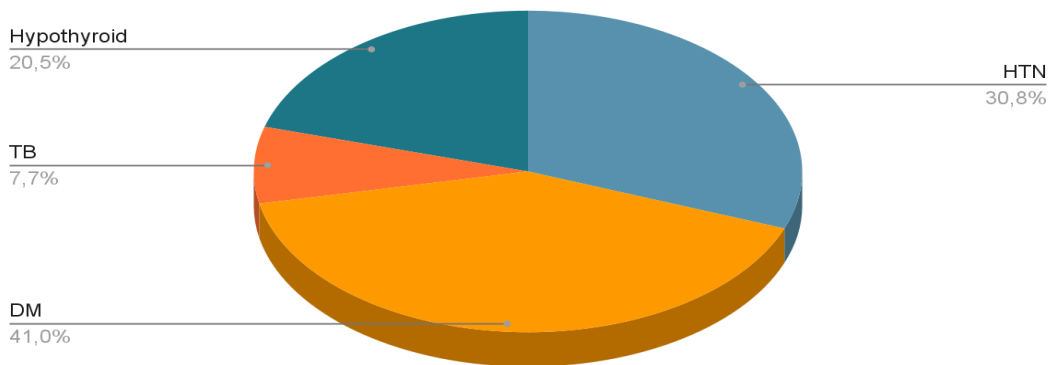


We have noticed that when steroids are used in treatment of breast cancer the mean of HB decreases during the therapy process. Before the treatment the mean value is 11.32 to 10.97 in the presence of tamoxifen and 11.41 to 10.13 when dexamethasone. showing that the presence of steroids can increase or decrease the amount of hemoglobin. Corticosteroid increase hemoglobin possible by retarding erythrophagocytosis

comorbidities distribution

Comorbidities	Number patient	percentage
HTN	12	16,4
DM	16	21.9
HYperthyroidism	3	4.1
TB	8	10.9

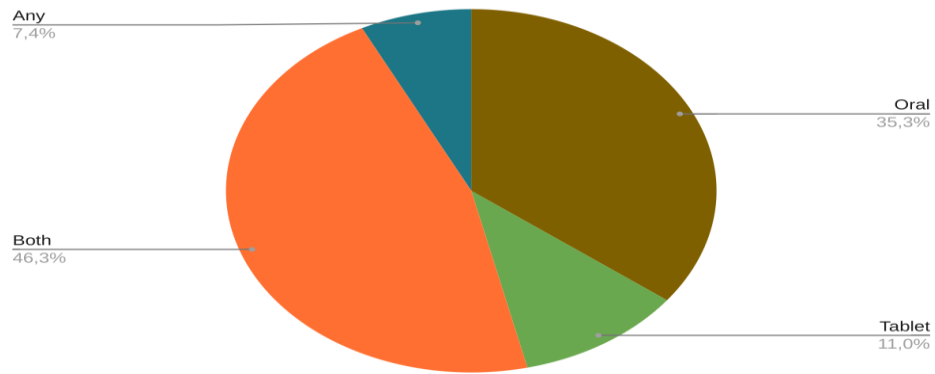
Commodities



Oral and IV dosing distribution: The use of IV dexamethasone is more high we notice that it is more used on patient present with comorbidities 35,3 percent.

Dexamethasone	Number of patient BC	Patient with Comobi
Oral	48	35,3
IV	30	11,0
Both	63	46,3
Any	10	7.4

ORAL and IV distribution

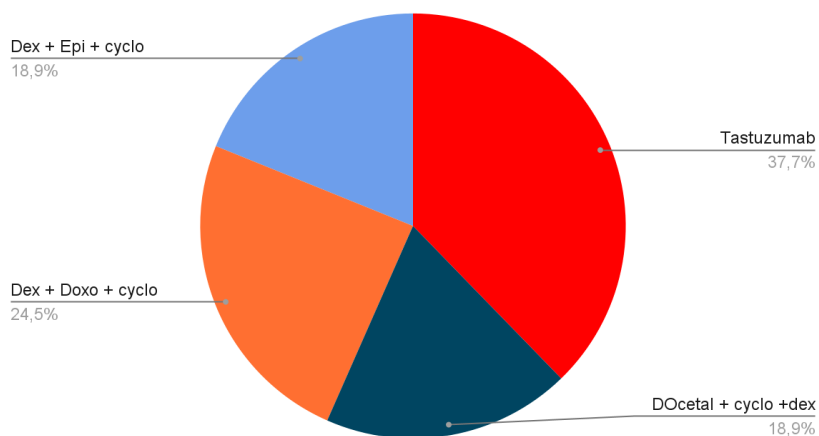


Out of 73 patient in observation group 35,3 percent are more using IV route of administration over Oral route of administration

Chemotherapy and steroid distribution

Chemo + steroid	Patient number	percentage
Trastuzumab +Dexamethasone	20	31.7
Dexamethasone + CYclophosphamide and Docetaxel	19	30.1
Dexamethasone +Doxorubicin and cyclophosphamide	13	20.63
Dexamethasone + Epirubicin and cyclophosphamide	10	15.8

Chemo + steroid



V. DISCUSSION

The aimed of this research is to proof the role of steroid drugs in therapy treatment of breast cancer based on different parameter records on therapy treatment with steroid drugs. This evaluation was done using Dexamethasone and Tamoxifen medication with chemotherapy. Using the breast cancer disease treatment as the foundation of my study, I was able to ascertain some chances in which the patients were receptive to developing drug decreasing HB based on the medication administered at the beginning of the therapy treatment at the hospital. Helping to distribute a relation effect by acquiring the process to the possibility of learning the increase of some hematology parameters.

The baseline values differ from article to article and researcher to researcher but it is generally agreed that the steroid drug can decrease the tumor with chemotherapy drug, also can ask as antiemetic drugs in treatment of tumor. The baseline value and number use during this research study of role of steroid drug in the treatment of breast cancer. Study subject was selected started by the present of the disease following this : 30-39 (adult women), 40-49 (pres-menopause women), 50-59 (menopause women), 60-69 (post- menopause)

The demographic data given information about age, gender, various comorbidities that can favor individual risk on patient and medication. helping to statistically determine the mean, percentage of the study based on ages to follow: 30-39(1), 40-49 (2), 50-59 (3), 60-69 (4), 70-79(5), 80-89(6). Evidently see. Category study subject based on gender distribution 73 patient all female Patients with breast cancer who take therapy with dexamethasone or tamoxifen and chemotherapy drugs can be helpful for the patient. We can observe that dexamethasone can be given orally or IV, mostly dexamethasone (4 or 8 mg) is given IV at the beginning of the therapy to decrease swelling or nausea and vomiting from chemotherapy and radiation. Also dexamethasone with chemotherapy helps to kill the tumor cell. Dexamethasone can be taken orally at the end of the therapy for 2 or 3 days on 4 mg to minimise the effect like nausea, redness, vomiting etc. Also can help to reduce headaches.

VI. CONCLUSION

Patients with breast cancer who take therapy with dexamethasone or tamoxifen and chemotherapy drugs have shown safety and efficacy for the control and treatment of breast cancer. Steroid medication can be effectiveness

when use with chemotherapy drug in the hospital We can observe that dexamethasone can be given orally or IV, mostly dexamethasone (4 or 8 mg) is given IV at the beginning of the therapy to decrease swelling or nausea and vomiting from chemotherapy and radiation. Also dexamethasone with chemotherapy helps to kill the tumor cell. Dexamethasone can be taken orally at the end of the therapy for 2 or 3 days on 4 mg to minimise the effect like nausea, redness, vomiting etc. Also can help to reduce headaches. The main aim prior to putting out this analyse was to determine in the a set patient population with decrease of Hb in treatment of breast cancer due to the medication that were being prescribed by the Oncologist Physician while the patient got administered in the hospital ward. Results of my study were demonstrated and built into simpler forms with the aid of graphs and tables for easier understanding.

Institutional Ethical Committee (IEC) approval:

All patients who filled the informed consent form and accepted to participate in the study were included. The study was approved by the Institutional Ethical Committee of Bangalore Baptist Hospital (IEC-BBH) Bangalore, and a certificate of clearance for the study was issued.

Availability of data and materials: The tables, figures, and other data are original, and if part is extracted from a journal paper, the papers/authors has been listed in the references.

Study limitations: Study was carried out on a small, study was limited just to 06 months, and the study was mostly done on outpatients.

Competing Interest: The authors reported no conflict of interest.

Consent for publication: Information provided for this study can be made known to the public through publication and further information can be gotten from the corresponding author via emails.

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