



## BREAST CANCER CHEMOTHERAPY-INDUCED COMPLEX CARDIOTOXICITY EFFECTS IN THE INTENSIVE CARE UNIT (ICU): A CASE REPORT

N. Doondi Phani Kumar, L. Srilatha\*

Doctor of Pharmacy, Nirmala College of Pharmacy, Atmakur, Guntur (Dist), A.P, India

\*Corresponding author E- mail: Lakhinanasrilatha999@gmail.com,

### ARTICLE INFO

#### Key words:

Epirubicin,  
Cardiotoxicity,  
Breast cancer

Access this article online

Website:

<https://www.jgtps.com/>

Quick Response Code:



### ABSTRACT

In the inception of the disease, most breast cancers identified themselves by self-examination. Later if any suspicious on their breast go for mammography or Radiological imaging (CT scan or MRI). As per the national cancer registry program, India reports revealed that males were 6, 79, 421 (94.1 per 100,000) and females were 7, 12,758(103.6 per 100,000) for the year 2020. One in 29 females (Breast cancer) and 1 in 9 Indians will get cancer their entire life. A 60 years old patient (height-146cms, weight-65 kgs) was admitted to the hospital with the chief complaints of chest pain and it's radiating towards the left arm as well complains the mid-chest pain. We can detect with formal complaints of the patient and later sort out the condition which depends on the professional experience of the clinical practitioner.

### INTRODUCTION

Cancer is one of the massive fields in Science and technology which is exploring more innovations to eradicate the problems in that field[1]. Breast cancer (BC) is one of the leading causes of mortality, especially in females while in their early life[2]. In the inception of the disease, most breast cancers identified themselves by self-examination. Later if any suspicious on their breast go for mammography or Radiological imaging (CT scan or MRI)[3]. If we want to know more about clinical evidence of the cause choose a histopathological test or biopsy test. In India, BC cases are surprisingly increasing year by year due to the lack of awareness as well as medical allowance [4]. As per the national cancer registry program, India reports revealed that males were 6, 79, 421 (94.1 per 100,000)

And females were 7, 12,758 (103.6 per 100,000) for the year 2020. One in 29 females (Breast cancer) and 1 in 9 Indians will get cancer their entire life[5,6,7]. BC can manage through a wide range of therapeutic regimens which includes chemotherapy, radiation therapy and stem cell therapy [8]. Each regimen has individual protocols used depending on the condition of the disease severity. However, most of the therapeutic regimens have a wide range of complications, which include alopecia, nausea, vomiting as well as some systemic complications that are raised while they are in treatment [9, 10].

**Case report:** A 60 years old patient (height-146cms, weight-65 kgs) was admitted to the hospital with the chief complaints of chest

pain and it's radiating towards the left arm as well complains the mid-chest pain, she thought "would be its epigastric pain" for four days, Past history interviewed by duty doctor they said to him "Ten days ago she had been diagnosed with carcinoma of the breast with the size of 10 x 7cm, with nipple restriction, right axillary in ~5cm, right Supraclavicular lymph node (SCLN) enlarged, As per the Tumor Necrosis and Metastasis classification tumour is T4N3M0 in the right breast. They suggested a protocol of ECOG-2 (which includes cyclophosphamide, Epirubicin). After two days she had complained of chest pain, Insomnia, and appetite declined. Then she was admitted to intensive care for the management of chest pain, while in this process lab tests revealed that troponin-I - 88ng/dl. Intensivist managed her symptoms later and she got a normal position.

#### **DISCUSSION:**

In this case, based on the evidence of the treatment ECOG-2 induced cardio toxicity because of the combination of the chemotherapy regimen is which prescribed as wrong dose (1500mg) as per the body surface area (BSA), the Actual therapeutic regimen of Epirubicin is 100 mg/m<sup>2</sup> [11] which equals to 130 mg/m<sup>2</sup> then increase the dose of epirubicin which may impact on cardiac functions. Most of the effects of cardio toxicity are Myocardial infarction, fatal congestive heart failure, left ventricular ejection dysfunction and pulmonary edema also was observed [12]. Anthracyclines are the class of drugs which are used for cancer chemotherapy which are extracted from Streptomycin species. Cause of cardio toxicity anthracyclines are generating reactive oxidative species (ROS) which is common in all anthracyclines. Another approach is anthracyclines inhibits the function of Topoisomerase-IIB it leads to DNA double strand breakage results to activation of P-53 tumor suppressor protein, decrease the biogenesis of Mitochondria, generation of ROS, it leads to death of cardiac cell.

**Mechanism of Cardio toxicity of Anthracyclines:** The exact mechanism of

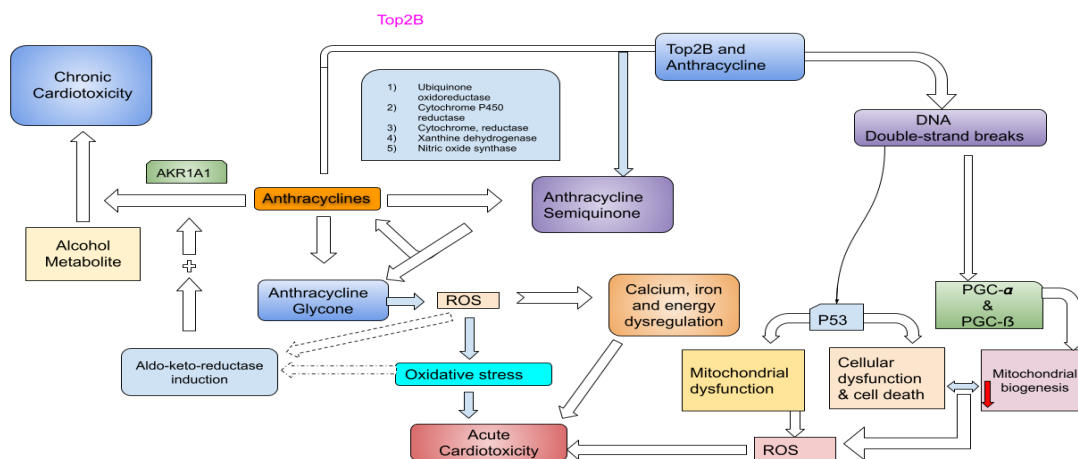
anthracyclines most widely accepted hypothesis was cardiotoxicity, anthracyclines is due to reactive oxidative species (ROS) which is generated by the compound moiety common to all too many anthracyclines. Moreover, a recent study supports an alternative method, report that the toxicity is aetiology as anthracyclines inhibit the function of topoisomerase beta (TopIIB) breaks the double-stranded DNA, it leads to activation of p53 tumour suppressor protein, mitochondrial dysfunction, and generation of reactive oxidative species that progression to cardiac cell death(fig.1). Few studies suggested that anticancer drugs, especially anthracycline, influence cardiotoxicity mediated by the hERG channel, which is one of the voltage-gated potassium channels involved in the electrical activity of the heart. Systemic therapy of malignancies with hERG inhibitors may affect cardiac myocytes, it leads to heart failure and apoptosis[13]. Alters the cardiac action potential, alters the hERG channel function it leads to severe cardiac disorders, symptoms altered by QT intervals [14].

#### **Prevention of cardiotoxicity:**

Monitoring parameters of cardiotoxicity while using the anthracycline compounds, cardiotoxicity must be strengthened to achieve detection in the early stage. To prevent occurrence of cardiotoxicity there are various methods such as ecg, myocardial biopsy and echocardiography, Cardiac myocardial biopsy, myocardial backscatter integration parameters, tissue Doppler imaging, ischemia modified albumin, troponin, brain natriuretic peptide and the tie Index[15].

#### **CONCLUSION:**

This is one of the rare events of chemotherapy, usually various types of adverse effects were observed while in their therapeutic regimen. However, we can detect with formal complaints of the patient and later sort out the condition which depends on the professional experience of the clinical practitioner.



**Fig.1: Anthracyclines**

## REFERENCES

1. New technology is making a difference in the fight against cancer [Internet]. Pvhomed.com. [cited 2021 Jun 3]. Available from: <https://www.pvhomed.com/new-technology-is-making-a-difference-in-the-fight-against-cancer/>
2. Breast cancer [Internet]. Who.int. [cited 2021 Jun 3]. Available from: <https://www.who.int/news-room/fact-sheets/detail/breast-cancer>
3. Breast cancer early detection and diagnosis [Internet]. Cancer.org. [cited 2021 Jun 3]. Available from: <https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection.html>
4. Shet T, Pai T, Wadasawala T, Nair N, Gulia S. Grossing and reporting of breast cancer specimens: An evidence-based approach. *Indian J Cancer*. 2020;57(2):144–57.
5. Sharma S. One in 10 Indians will develop cancer during their lifetime: WHO. *The Hindustan Times* [Internet]. 2020 Feb 5 [cited 2021 Jun 3]; Available from: <https://www.hindustantimes.com/india-news/one-in-10-indians-will-develop-cancer-during-their-lifetime-who/story-NcNQhPTS01YWI9Qovfey5J.html>
6. Report of National Cancer Registry Programme 2020 [Internet]. Ncdirendia.org. [cited 2021 Jun 3]. Available from: [https://www.ncdirindia.org/All\\_Reports/Report\\_2020/default.aspx](https://www.ncdirindia.org/All_Reports/Report_2020/default.aspx)
7. Mathur P, Sathishkumar K, Chaturvedi M, Das P, Sudarshan KL, Santhappan S, et al. Cancer statistics, 2020: Report from National Cancer Registry Programme, India. *JCO Glob Oncol*. 2020;6(6):1063–75.
8. Falzone L, Salomone S, Libra M. Evolution of cancer pharmacological treatments at the turn of the third millennium. *Front Pharmacol*. 2018; 9:1300.
9. Chemotherapy side effects [Internet]. Cancer.org. [cited 2021 Jun 3]. Available from: <https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy/chemotherapy-side-effects.html>
10. Side effects of cancer treatment [Internet]. Cancer.gov. 2015 [cited 2021 Jun 3]. Available from: <https://www.cancer.gov/about-cancer/treatment/side-effects>
11. Medscape.com. [cited 2021 Jun 3]. Available from: <https://reference.medscape.com/drug/epirubicin-342251>

12. Banke A, Fosbøl EL, Møller JE, Gislason GH, Andersen M, Bernsdorf M, et al. Long-term effect of epirubicin on incidence of heart failure in women with breast cancer: insight from a randomized clinical trial: Long-term effect of epirubicin on heart failure. *Eur J Heart Fail.* 2018; 20(10):1447–53.
13. Sanguinetti MC, Tristani-Firouzi M. hERG potassium channels and cardiac arrhythmia. *Nature.* 2006; 440(7083):463–9.
14. Curran ME, Splawski I, Timothy KW, Vincent GM, Green ED, Keating MT. A molecular basis for cardiac arrhythmia: HERG mutations cause long QT syndrome. *Cell.* 1995;80(5):795–803.
15. Cai F, Luis MA, Lin X, Wang M, Cai L, Cen C, Biskup E. Anthracycline-induced cardiotoxicity in the chemotherapy treatment of breast cancer: Preventive strategies and treatment. *Molecular and clinical oncology.* 2019 Jul 1;11(1):15-23.