Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com/sjams/

OPEN ACCESS

Physiology

Assessment of Parasympathetic Function Test in Breast Cancer Patients after Chemotherapy Treatment by Anthracycline Group of Drug (Doxorubicin)

Ms. Islam Khan[1*], Dr. Raghuveer Choudhary[2], Dr. Kamla Choudhary[3], Dr. Garima Jeswani[4], Dr. Vihan Chawdhary[5]

[1]PhD Scholar, [2]Professor & Head, [3]Assistant Professor, [4]Senior Demonstrator, Department of Physiology, Dr. S. N. Medical College, Jodhpur, Rajasthan, India
[5]Assistant Professor, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, Rajasthan, India

DOI: 10.36347/sjams.2020.v08i06.004 | **Received:** 26.05.2020 | **Accepted:** 01.06.2020 | **Published:** 10.06.2020

***Corresponding author:** Ms. Islam Khan

Abstract **Original Research Article**

Breast cancer, one of the most common malignancies affecting women worldwide. Treatment of breast cancer by Anthracycline group of drug which are the most effective anticancer treatments ever develops. However, cardio toxicity is a well-recognized side effect of anthracycline treatment and can cause heart failure. The aim of the study was to Assessment of Parasympathetic function test in breast cancer patients after chemotherapy treatment. We enroll 125 symptomatic breast cancer patients (Before and after chemotherapy treatment) who treated with anthracycline group of drug. To assess the Parasympathetic functions CAN Win device was used. The result showed that E/I ratio, Valsalva manoeuvre is highly significantly decreased in breast cancer patients after chemotherapy treatment, but 30:15 Ratio is Non-significantly (NS) decreased in breast cancer patients after chemotherapy treatment.

Keywords: Breast cancer, anticancer, anthracycline, chemotherapy treatment.

INTRODUCTION

Breast cancer, one of the common malignancies affecting women worldwide [1], account for 25% of all new cases of cancer. However, it ranks as the fifth most common cause of death, because of the relatively more favorable prognosis (mortality to incidence ratio, 0.35) making it the most prevalent cancer in the world today in the incidence of early onset breast cancer cases which varies between 12.33 cases per 100,000 women [2]. Breast cancer is the most commonly diagnosed cancer and the second leading cause of death for women in the United States [3]. Anthracyclines (or anthracyclines antibiotics) are a class of drugs used in cancer chemotherapy [4]. Anthracycline antibiotics were recognized for their antibacterial properties in 1939, their chemical characterization experienced a substantial increase only after the therapeutic value of their antitumor activity was described in the early 1960s [5]. Anthracyclines are listed among the world health organization (WHO) model list of essential medicines [6] fifty years on from its discovery, anthracycline anti-tumor and cardiotoxic mechanisms alike continue to evoke considerable interest in basic science and clinical trials research.

MATERIAL AND METHODS

The present study was conducted in Department of Physiology, in consort with Department of Radiotherapy, Dr. S. N. Medical College, Jodhpur. Before starting study all ethical consideration for the subjects were taken in accounts permission was obtained from ethical committee of College. A written consent was obtained from each subject. Total 250 samples were collected of diagnosed breast cancer female patients age ranges between 25 to 70 years in present study.

Study Period

As sample were collected before and after treatment in same female breast cancer patient who received 6 cycles of Chemotherapy (Anthracycline group of drug particular Doxorubicin), with Dose 450 - 550 mg/m2 so approximately it took one and half year period to collect the 250 samples.(125 before chemotherapy treatment and 125 after chemotherapy treatment) sample size was calculated by using Open-Epi software with power 80%, significance level alpha at 0.05.

Participants: All the subjects were divided into two groups.

Group-1: (N=125) It consist of diagnosed breast cancer patients before chemotherapy treatment.

Group–II: (N=125) It consist of same above mentioned breast patients which have received chemotherapy (Anthracycline group of drug particular Doxorubicin) treatment.

Inclusion Criteria

- 25-70 year aged same female breast cancer patient who received 6 cycles of Chemotherapy (Anthracycline group of drug particular Doxorubicin), with Dose 450 mg/m^2
- Consent will be taken from all the participants before conducting the study.

Exclusion Criteria

- Any other diseases which affecting autonomic functions and cardiac functions.
- Drugs affecting the autonomic functions and cardiac functions.
- Non-cooperative subjects and not able to communicate.

To assess the autonomic (Para Sympathetic) functions CANWin device was used. This device is PC windows based Cardiac Autonomic Neuropathy (CAN) Analysis System with interpretation. It is used to analyses.

Parasympathetic Function Test

- HR response to deep breathing (E/I ratio)
- HR response to standing (30:15)
- HR response to Valsalva manoeuvre

Analysis Mean and Standard Deviation & T-test. Sample size was calculated by using Open-Epi software with power 80%, significance level alpha at 0.05.

Statistical Analysis

Mean and standard deviation of all measured parameters of all subjects were calculated by Microsoft Excel. The data were computed by student t test in 'Open Epi' software. The $p<0.05$ was considered as statistically significant.

RESULTS

Are showing the comparison of E/I ratio in breast cancer patients before and after chemotherapy treatment. The result showed that E/I ratio, Valsalva manoeuvre ishighly significantly decreased in breast cancer patients after chemotherapy treatment. 30:15 Ratio is Non-significantly (NS) decreased in breast cancer patients after chemotherapy treatment The statistical analysis was done by student's t-test.

OBSERVATIONS AND RESULT

Comparison of Parasympathetic Function Test in Breast Cancer Patients Beforeand After Chemotherapy Treatment

Parameter	*Before Chemotherapy* (Mean±SD)	*After Chemotherapy* (Mean±SD)	Students –t test *p- value*
E/I ratio	1.27±0.23	1.01±0.13	<0.0000001 (HS)
30:15 ratio	1.10±0.15	0.88±0.13	0.09 (NS)
Valsalva Maneuvers	1.51±0.58	1.00±0.12	<0.0000001 (HS)

All value expressed as mean & SD; *p value > 0.05 (NS) ** p value < 0.05 (S) ***p value <0.01 (HS).

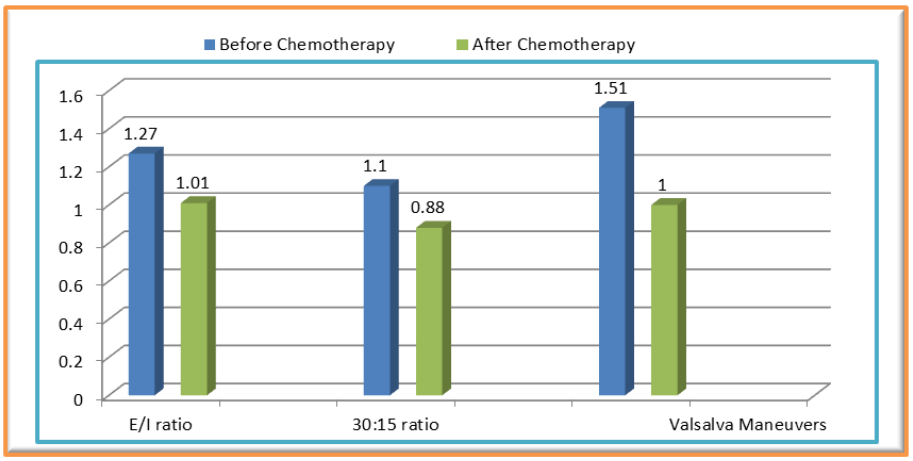

Fig: Parasympathetic Function Test in Breast Cancer Patients before and After Chemotherapy Treatment

DISCUSSION

Anthracycline chemotherapy affecting any level of neural axis can impact on ANS and causes symptoms of autonomic dysfunctions. Cardiovascular autonomic neuropathy is a common form of autonomic neuropathy, causing abnormalities in heart rate and central and peripheral vascular dynamics. As the heart and great vessels received significant amount of autonomic innervations, so dysfunction of some portion of ANS can affect cardiovascular control. Therefore cardiovascular reflex test has been most widely used as they are non-invasive, results are easy to produce and they reflect the state of ANS throughout the body. Interaction of sympathetic and parasympathetic nervous system is important in cardiovascular regulation [8]. It innervates heart and major blood vessels. The sympathetic system controls energy expenditure in stressful conditions whereas parasympathetic system conserves energy through relaxation at rest. In the resting state the cardiovascular system is influenced by both the divisions of autonomic nervous system. In parasympathetic test we institute that E:I ratio is lower in Breast cancer patients after chemotherapy. The decreased in the E/I ratio in the breast cancer patients after chemotherapy may be due to the decreased vagal tone to the heart (Bradycardia phase) during the expiration. Deep breathing test that is specific for parasympathetic activity found out that E/I ratio isstatistically highly significantly (P<0.0000001) less in after chemotherapy then before chemotherapy in breast cancer patients.

In our study 30:15 ratio is significantly decreases (P=.09) in breast cancer patients after chemotherapy. Valsalva ratio was statistically highly significantly (P<.0000001) reduces in breast cancer patients after chemotherapy than before treatment this reflects decreased parasympathetic function due to decreased vagal tone. Valsalva ratio was less in after chemotherapy than before treatment. Similar studies observed by Maria Viniegra a, Marcelo Marchetti *et al*., they pragmatic chemotherapy with anthracycline is associated with a significantly higher percentage of abnormal tests for cardiovascular function. Abnormal variations in heart rate on standing and in diastolic blood pressure during handgrip [7]. Viniegra M, Marchetti conducted autonomic function test in anthracycline treated patients. Chemotherapy with anthracycline is associated with a significantly higher percentage of abnormal tests for cardiovascular autonomic functions [7].

CONCLUSION

After chemotherapy (Anthracycline group of drug) treatment breast cancer patients (1.01±0.13) showed a statistical highly significant (P<0.0000001) decrease in heart rate response to deep breathing (E:I Ratio) as compared to breast cancer patients before chemotherapy treatment (1.27±0.23).

- HR response to standing 30:15 ratio showed a statistical non-significant decrease (P= 0.09) in breast cancer patients after treatment (0.88±0.13) compared to before treatment (1.10±0.15) in breast cancer patients.
- HR response to Valsalva manoeuvre (VM) after chemotherapy treatment(Anthracycline group of drug) (1.00±0.12) in breast cancer patients showed a statistical highly significant (P<0.0000001) decrease as compared to breast cancer patients before chemotherapy treatment (1.51±0.58).

REFERENCES

1. Parkin DM. International variation. Oncogene. 2004 Aug; 23(38):6329-40.
2. Parkin DM, Iscovich J. Risk of cancer in migrants and their descendants in Israel: II. Carcinomas and germ- cell tumours. International journal of cancer. 1997 Mar 17;70(6):654-60.
3. DeSantis C, Ma J, Bryan L, Jemal A. Breast cancer statistics, 2013. CA: a cancer journal for clinicians. 2014 Jan;64(1):52-62.
4. Anthracycline from Wikipedia the free encyclopedia.
5. Fujiwara A, Hoshino T, Westley JW. Anthracycline antibiotics. Critical Reviews in Biotechnology. 1985 Jan 1;3(2):133-57.
6. World Health Organization. WHO Model list of essential medicines. April 2015 ed 2015.
7. Viniegra M, Marchetti M, Losso M, Navigante A, Litovska S, Senderowicz A, Borghi L, Lebron J, Pujato D, Marrero H, Repetto MG. Cardiovascular autonomic function in anthracycline-treated breast cancer patients. Cancer chemotherapy and pharmacology. 1990 Jun 1;26(3):227-31.
8. Rosenblueth A, Simeone FA. The interrelations of vagal and accelerator effects on the cardiac rate. American Journal of Physiology-Legacy Content. 1934 Oct 31;110(1):42-55.