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EFFECT OF WHEAT GRASS ON BIOCHEMICAL AND LIPID PROFILE IN BREAST CANCER PATIENTS ON CHEMOTHERAPY

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ABSTRACT **Aim and Objective:** To evaluate the effect of wheat grass (WG) on biochemical and lipids parameters in breast cancer patients on chemotherapy.

Material and Methods: The present prospective, randomized, open label study was conducted in a tertiary care hospital on breast cancer patients randomized in two groups Both groups received standard anticancer drugs. Group A served as control and Group B as test which in addition received wheat grass two tablets (wheat grass ingredient 500 mg) three times a day. Patients were followed up to 9 weeks.

Results: The increase of sugar, uric acid and lipid parameters were observed and these parameters recorded statistically better in the WG group in comparison to non WG group. These results may not be clinically that much significant but WG prevented these parameters to deteriorate.

Conclusion: WG prevented the increase of sugar, uric acid levels and lipid parameters in patients of breast cancer on anticancer treatment

KEYWORDS : Wheat grass, Lipids, Breast cancer, Chemotherapy

INTRODUCTION:

Breast cancer is the most common type of cancer in women. Breast Cancer patients require chemotherapy which aims to improve overall survival. These cytotoxic drugs primarily target proliferating cancer cells but also destroy the other rapid proliferating normal cells and tissues of bone marrow, GIT, skin, though even slow proliferating cells in liver and kidney concerned with detoxification and excretion of these drugs are also exposed to their toxic effects. [1]

Reports suggest that anticancer drugs worsen lipid profile. [2] Alterations in lipids and direct cardio toxicity by them even result in cardiovascular disorders. [3] Whereas some studies suggested the association between dyslipidemia and cancer. High cholesterol is shown to increase the breast cancer chances. [4] However, others have failed to show any such association. [5]

There are efforts to find alternative to avert the anticancer drug caused toxicities by using the herbal medications. Wheat Grass (Triticum Aestivum) is one such option as it has a wide range of health benefits. Its components include chlorophyll, flavonoids, vitamin C and vitamin E. Wheat grass (WG) has demonstrated benefits in cancer prevention in animal experiments [6] and as an adjunct to cancer treatment as well as benefits to chemotherapy and may attenuate chemotherapy related side effects. WG has been reported to treat hematotoxicity caused by anticancer drugs and reduced need for GCSF support and dose of chemotherapeutic agents. [7] Selenium in WG may contribute anti –carcinogenic and anti-inflammatory properties as it is essential element for physiological and non enzymatic antioxidants. [8] In our recent research work WG has shown promising results in results in chemotherapy induced hematotoxicity in breast cancer patients. [9] Couple of studies have shown lipid lowering effect of WG. [10, 11] However, there is a paucity of research in evaluating effect of WG on serum lipids and biochemical parameters in carcinoma breast on chemotherapy. Therefore, in the present work WG effect on lipids, blood sugar and uric acid was evaluated.

MATERIALS AND METHODS:

A prospective, randomized, open label, comparative study was conducted in department of Pharmacology in collaboration with department of Oncology and Radiotherapy in GMC Jammu over a period of one year. Study was approved by Institutional Ethics Committee. A written informed consent was obtained from the patients. AYUSH physician running OPD in GMC Jammu was consulted before allocating present herbal treatment. Clinical evaluation with complete medical history general, physical and systemic examination with baseline investigations were done.

Inclusion and exclusion criteria: Newly diagnosed unilateral breast cancer, biopsy confirmed, Age between 40-70yrs, with or without co morbidities, without metastasis were included. While bilateral breast cancer, moderate to severe hepato-renal impairment, metastatic carcinoma, anaemia due to other reasons, other haematological disorders, patients with left ventricular ejection fraction <50% were excluded.

Study Design: Patients were randomized into two groups (A and B). Both groups were given the standard anticancer therapy 5-Flourouracil (500mg/m^2), Adriamycin (50mg/m^2)/Epirubicin (100 mg/m^2), Cyclophosphamide (500mg/m^2) or Doxorubicin (60mg/m^2) and Cyclophosphamide (600mg/m^2) plus GCSF (300µgm).Group A served as control arm and Group B test arm. Randomization was done by block permutation method. WG two tablets (500 mg) three times a day were added in group B. Dose of WG was based on study by Jigisha MS et al, 2015. [12]

The basic supportive treatment in form of multivitamins (vitamin B12 and folic acid) and iron supplements of same composition and strength were allowed in both treatment arms.

Baseline values of blood sugar, cholesterol, triglycerides, low Density lipoproteins, very low density lipoproteins, high density lipoproteins, and uric acid were evaluated. Patients were followed up at 3, 6 and 9 weeks.

Statistical Methods: The data obtained was analyzed by using paired student t-test for changes in the baseline (pre drug score) from post drug values within group while the unpaired student t-test was applied intergroup comparison**.**

Results: A total of sixty breast cancer patient were included in the study and were between 40-70 yrs. of age. Blood sugar and uric acid levels revealed increase by chemotherapy. While WG addition largely prevented this, though statistically significant, it may not be clinically important. [Table 1 & 2]

Table 1: Biochemical Parameters in Both Groups (n=30 each)

Parameter	BLOOD SUGAR(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	104.87±2.28	109.40±1.83 P=0.0004***	111.10±2.11 P<0.0001****	113.83±1.90 P<0.0001****
Group B	104.40±3.29 NS	100.63±2.71 NS	101.47±1.99 NS	101.60±1.78 NS
Parameter	**SERUM URIC ACID (Mean±SEM) (mg/dl)**			
Weeks	**Baseline**	**3 Weeks**	**6 Weeks**	**9 Weeks**
Group A	5.01±0.802	5.43±0.128	5.77±0.122	6.01±0.110

Group B	5.06±0.152	5.39±0.124	5.40±0.117	5.42±0.085
P value	=0.951 NS	=0.820 NS	=0.036*	<0.0001****

*The data is shown in Mean SEM. Paired Student 't' test in comparison to respective baselines. * P<0.05, ** P<0.01, ***P<0.001, ****P<0.0001, NS-Non Significant.*

Table 2: Intergroup Comparison of Biochemical Parameters of Both Groups (n=60)

Parameter	BLOOD SUGAR(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	104.87±2.28	109.40±1.83	111.10±2.11	113.83±1.90
Group B	104.40±3.29	100.63±2.71	101.47±1.99	101.60±1.78
P value	=0.9069NS	=0.0095**	=0.0016**	<0.0001****
Parameter	SERUM URIC ACID (Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	5.01±0.802	5.43±0.128	5.77±0.122	6.01±0.110
Group B	5.06±0.152	5.39±0.124	5.40±0.117	5.42±0.085
P value	=0.951 NS	=0.820 NS	=0.036*	<0.0001****

*Comparison between two groups with unpaired student 't' test was statistically * P<0.05, ** P<0.01,***P<0.001,****P<0.0001, NS-Non Significant.*

Serum lipids – The worsening of lipid levels was observed in Group A. However, addition of WG in group B did not allow further deterioration compared to group A [Table 3] although statistically significant it may not be clinically significant except that WG prevented further worsening.

Table 3: Comparison of Lipid Profile of Both Groups (n=30 each)

Parameter	CHOLESTEROL(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	185.40±7.40	194.83±7.52	201.77±8.01	202±8.14
Group B	190.70±7.41	188.60±7.21	183.40±7.08	179.47±7.09
P value	=0.6147NS	=0.5521 NS	=0.0911 NS	=0.0413*
Parameter	TRIGLYCERIDE(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	133.37±10.09	145.40±11.41	151.20±12.62	153.47±11.88
Group B	158.17±15.50	146.70±13.32	148.27±13.82	134.73±10.79
P value	=0.1851 NS	=0.9412 NS	=0.8760 NS	=0.2478 NS
Parameter	Serum LDL(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	83.27±4.64	87.57±4.70	91.40±4.71	92.63±4.48
Group B	84.30±4.79	78.50±4.46	77.47±4.02	74.63±3.89
P value	=0.8773 NS	=0.1672 NS	=0.0283*	=0.0036**
Parameter	Serum VLDL(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	53.67±3.48	59.03±3.31	63.63±3.17	66.20±3.22
Group B	43.43±3.99	41.33±3.66	40.83±3.24	40.93±3.13
P value	=0.0583 NS	=0.0007***	<0.0001****	<0.0001****
Parameter	Serum HDL(Mean±SEM) (mg/dl)			
Weeks	Baseline	3 Weeks	6 Weeks	9 Weeks
Group A	42.23±1.11	41.23±0.99	41.13±1.14	41.10±1.04
Group B	42.50±1.52	46±1.31	48.70±1.03	51.93±0.98
P value	=0.8877 NS	=0.0052**	<0.0001****	<0.0001****

*The data is shown in Mean SEM.Unpaired Student 't' test in comparison to respective baselines. * P<0.05, ** P<0.01,***P<0.001,****P<0.0001, NS-Non Significant. Comparison between two groups with unpaired student't' test was statistically significant at 9 weeks for Cholesterol,at6 and 9 weeks for LDL, at 3,6 and 9 weeks for VLDL and HDL. Unpaired student't' test was statistically non significant for Triglycerides*

DISCUSSION:

The WG has up to 70% of chlorophyll (known as green blood), magnesium which is beneficial for about 30 enzymes. Chlorophyll also contains enzymes and superoxide dismutase has antioxidant action. [13]

The anticancer drugs have potential to cause hyperglycemia they alter the immune system by reducing the number of helper T cells and increase in cytotoxic T cells. These alterations may probably cause destructive effect on beta cells of pancreas and result in hyperglycemia. [14]

In the present study increase blood sugar levels from the baseline was observed with chemotherapy though levels remained within normal range. However, in WG added group there was no such increase in blood sugar. The WG has potent antioxidant activity due to presence of tannins, flavonoids, saponins and sterols attributed to their redox properties, hydrogen donators and singlet oxygen quencher [15] and have ability to regenerate beta pancreatic cells.

In present study, anticancer drugs increased uric acid levels from their baseline values (P<0.0001).WG addition of wheat grass did not show further deterioration in uric acid compared to non WG group .High nucleic acid content and a very active purine metabolism are characteristic of tumor cells. The metabolism of nucleic acid occurs in the liver, where purines are reduced to xanthine and then degraded to uric acid by the enzyme xanthine oxidase. Thus the destruction of tumor cells by anticancer drugs yields a large amount of uric acid. The presence of hyperuricemia may induce the crystallization of uric acid in kidneys may lead to acute renal failure. [16]

Analysis of results revealed that anticancer drugs led to worsening in of lipid parameters and WG addition led to positive effects on lipid parameters, although statistically significant it may not be clinically significant except it prevented largely deterioration of lipid profile in test group. WG is used as health improving adjuvants in several diseases including coronary heart disease in India as folk medicine. Hyperlipidemia is major risk factors for CAD due to its potential to cause atherosclerosis. WG may prove beneficial due to the presence of phytochemicals responsible for hypolipidemic action. [17]

WG contains choline which prevents the deposition of fats in liver. The lipotropic action of choline has been attributed to its conversion to active compound which is retained within the hepatic cells and enhances oxidation of fatty acids and formation of tissue lecithin [18]. The lecithin augments lipoprotein synthesis which acts as a transport form of fatty acids in plasma and helps in removal of lipids from fatty liver.

These findings suggest that wheat grass holds great promise in treatment of the carcinoma breast along with anticancer. However, current trial suffers from few limitations as open label study, less number of patients were studied. In view of this the results of current study may not be generalized. This was a short duration study followed up to nine weeks only, covering three cycles of chemotherapy.

What will be the behaviour of these antineoplastic drugs in combination with wheat grass on long term basis in breast cancer patients needs further investigation as to elucidate effects of the wheat grass in such situation.

CONCLUSIONS:

Patients with carcinoma breast on chemotherapy were studied for blood Sugar, uric acid, and serum lipids. These parameters recorded statistically better in the WG group in comparison to non WG grass arm. These results may not be clinically that much significant but WG prevented these parameters to deteriorate the results of the present study are encouraging but require larger adequately powered clinical trials in future to substantiate these findings before it can be recommended in general.

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