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A Study To Assess The Effectiveness Of Vit C Foods Supplementation On Influence Of Iron Absorption Factors and Hemoglobin Status Of Pregnant Women In Selected Non Govt Maternity Hospital In Tirupati.

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Introduction

Iron deficiency development is widely common among women especially pregnant ones since iron should be supported to the mother and her fetus which makes the intake crucial and important. And regarding that iron (heme and non-heme) has a low bioavailability, food enhancers and supplements are necessary for pregnant women especially in the begging and end of their pregnant period for support and growth. Enhancers of iron include meat, fish, and vitamin C as the most common ones, while polyphenols, phytates in tea and coffee, and calcium represent the most important inhibitors of iron absorption. Good sources of iron should be taken with enhancers so that the absorption of iron increases. Pregnant women should be educated enough and well informed from their doctors to avoid or lessen the occurrence of such problem. This study was conducted in Lebanon to determine the prevalence and risk factors of low haemoglobin levels in pregnant women and the importance of iron intake in aiming changing these levels to decrease its risks.

MATERIALS AND METHODS: This was a experimental design were used. 120 antenatal pregnant mothers were selected through purposive sampling technique. as study subjects from a private maternity hospital. 24 hrs food recall method was adapted to know the iron absorption factors. supplementation of vit C foods for pregnant mothers in second trimester beginning and conducted pretest the investigator follows up the experiment through continuous monitoring till they reached to the delivery. In Posttest collect the blood sample for biochemical analysis in 3rd trimester. The initial and final analysis was done and compared with control group. data were analysed by descriptive and inferential statistics.

RESULTS: pregnant mothers age below 25 were 74 (61.7%) in experimental group 21(52.5%) were control group, pregnant mothers in primi gravida were 51 (63.8 %) Multi gravida were 29 (36.2%) in experimental group. Antenatal mothers among in primi gravida were 26 (65.0%) Multi gravida were 14 (35.0%) in Control group. pregnant mothers in Non-Anaemic pregnant woman were 2 (2.5 %) Anaemic Pregnant woman were 78 (97.5%) in experimental group. pregnant mothers among mild to moderate were 39(48.8%)moderate to severe were 39 (48.8%) non-anaemic were 2(2.5%) in experimental group. vegetarian anaemic pregnant woman were 24(30 %) non -vegetarian Anaemic Pregnant woman were 56 (70%) in experimental group. Vit

C among antenatal pregnant mothers pre test mean 20.675 post mean 87.485, standard deviation 47.376 t value 8.67 with significance0.000** antenatal pregnant mothers among bio chemical analysis of 3rd trimester pre-test Hb status of mean +SD were 9.484+1.114 RBC status of mean +SD were 2.728+0.304 HCT status of mean +SD were 22.23 +1.732 MCV status of mean +SD were 76.85+2.975 MCH status of mean +SD were 22.30+1.454 Platelets status of mean +SD were 140.83+4.494 WBC status of mean +SD were 54.65+2.637 serum Iron status of mean +SD were 52.65+1.748 total Iron binding capacity status of mean +SD were 394.88+27.538 Total iron .saturation status of mean +SD were 23.75+3.477 serum ferritin status of mean +SD were 92.55+ 18.121 erythropoietin status of mean +SD were 107.10+ 10.690 pregnant mothers among bio chemical analysis of 3rd trimester post-test Hb status were mean+SD are 10.59+0.06 RBC status were mean+SD are 4.357+0.238 HCT status were mean+SD are 32.80+1.870 MCV status were mean+SD are 82.83+1.920 MCH status were mean+SD are 24.85+1.027 platelets status were mean+SD are 149.85+3.262 WBC status were mean+SD are 59.28+4.273 serum Iron status were mean+SD are 58.88+4.345 total Iron binding capacity status were mean+SD are 319.78+41.793 Total iron. saturation status was mean+SD are 23.15+0.73 serum protein status were mean+SD are 130.40+24.402 erythropoietin status were mean+SD are 85.18+7.987.

CONCLUSION: To be concluded are phytates, tannins, calcium, polyphenols inhibiting iron absorption during pregnancy Vit c enhances the iron absorption. After supplementation of vit c there is significance improvement of post biochemical analysis when compare to pre-test analysis. There is improvement of iron absorption and haemoglobin status among anemic pregnant women.

INTRODUTION

The pregnancy is a sensitive period in women life; pregnant women should avoid any risk factor that can affect their health as well as the growth and development of their baby. One of the critical problems that pregnant women may face is iron deficiency and its anemia which represents a risk factor for preterm delivery, prematurity and small for gestational age, birth, and weight. The world health organization (WHO) estimates that an average of 56% of pregnant women in developing countries is anemic. This percentage ranges from 35-75% in specific areas, and is much higher than the 18% of pregnant women diagnosed with anemia in developed countries. Iron deficiency during pregnancy is thought to be caused by combination of factors such as previously decreased iron supply, the iron requirements of the growing fetus, and expansion of maternal plasma volume.[1]

Iron deficiency development is widely common among women especially pregnant ones since iron should be supported to the mother and her fetus which makes the intake crucial and important. And regarding that iron (heme and non-heme) has a low bioavailability, food enhancers and supplements are necessary for pregnant women especially in the begging and end of their pregnant period for support and growth. Enhancers of iron include meat, fish, and vitamin C as the most common ones while polyphenols, phytates in tea and coffee, and calcium represent the most important inhibitors of iron absorption. Good sources of iron should be taken with enhancers so that the absorption of iron increases. Pregnant women should be educated enough and well informed from their doctors to avoid or lessen the occurrence of such problem. This study was conducted in Lebanon to determine the prevalence and risk factors of low hemoglobin levels in pregnant women and the importance of iron intake in aiming changing these levels to decrease its risks.Women of fertile age and pregnant-lactating as well as their infants and young children are particularly affected with iron deficiency and its anemia resulting in serious health and functional consequences. It is estimated that about 2,150million people are iron deficient, and that this deficiency is severe enough to cause anemia in 1,200million people globally. About 90% of all anemias have an iron deficiency component. Roughly 47% of non-pregnant women and 60% of pregnant women have anemia worldwide, and including iron deficiency without anemia the figures may approach 60 and 90% respectively. In the industrial world as a whole, anemia prevalence during pregnancy averages 18%, and over 30% of these populations suffer from iron deficiency.[2]The woman's diet is the main source of nourishment for the baby. In fact, the link between what the mothers consumes and the health of the baby is much stronger than once. Eating a healthy, varied diet in pregnancy will help get most of the vitamins and minerals that are essential during the period of pregnancy including iron and folic acid. It is best to get vitamins and minerals from the food, but pregnant women are in need of many supplements that are essential to their body as well to their babies including iron and folic acid. Iron is an essential mineral in the pregnancy period to the mother and to the baby as well. Supplementation of pregnant women with iron and folic acid reduces the incidence of hemoglobin <110 g/l to under 5%.

The hemoglobin concentration, hematocrit and red cell count fall during pregnancy because the expansion of the plasma volume is greater than that of the red cell mass. However, there is a rise in total circulating hemoglobin directly related to the increase in red cell mass. This in turn depends partly on the iron status of the individual. That's why pregnant women are recommended to have a hemoglobin level of 12-16g/DL and any value below 12 is considered as iron deficiency and below 10.5 as anemia.Iron deficient anemic women have shorter pregnancies than non-anemic or even anemic but not iron deficient pregnant women. All anemic pregnant women had a higher risk of pre-term delivery in relation to non-anemic women. The iron-deficient, anemic group has twice the risk of those with anemia in general.[3] There a five to sevenfold increase in preterm delivery and low birth weight if the lowest hemoglobin concentration during pregnancy.

Need for the study Dietary factors affecting iron status

The amount of iron that is absorbed in the body can be influenced by a number of enhancers and inhibitors present in the diet. Among those enhancers, vitamin C (ascorbic acid) is one of the most important factors. It is well known that vitamin C can enhance iron absorption by reducing ferric iron to ferrous iron, a form of iron that is more soluble and therefore better absorbed by the body . In addition, vitamin C can help to overcome some of the negative effects of iron inhibitors and also has an active role in supporting the body's iron metabolism by enhancing the solubility of iron . The addition of ascorbic acid to a juice enhanced Fe absorption and Recent evidence suggests that regular oily fish consumption may also have a role in improving iron status. The oily fish appears to be acting as an enhancer to release iron from a phytate-rich meal . There are also many factors present in the diet that inhibit the absorption of non-heme iron. The first one is phytate. Phytates are components found in plants that can interfere with the body's absorption of nutrients such as iron, generally in a dose dependent fashion. The typical Chinese diet rich in wholegrain can decrease the rate of iron absorption, thereby increasing the risk of iron deficiency. Eating cereals and foods that are fortified with extra iron may help to compensate for some of these effects . Iron-binding phenolic compounds (polyphenols) are important inhibitors of iron absorption too. It is shown that tea drinking, a common practice in China, can limit iron absorption, especially from nonheme sources, which is mainly attributed to its polyphenol content.Fruits, vegetables, cereals and dry legumes are also rich in polyphenols. Women, who lose iron through their menses and particularly those who eat a predominantly plant-based diet, may benefit from taking a daily multivitamin and mineral supplement that contains iron [4].

iron deficiency

Anemia is the most common disorder during pregnancy with estimates of global prevalence reaching over 40% .Iron deficiency anemia (IDA) is the most frequent micronutrient deficiency disease in developing countries heavily affecting pregnant women.

Iron is an essential micronutrient because it plays a vital role in oxygen transport, oxidative metabolism, cellular proliferation and many other physiological processes. Iron requirements are met by dietary iron or from existing body iron stores. Increased iron requirements, limited external supply, and increased blood loss may lead to iron deficiency (ID) and iron-deficiency anemia (IDA). Inadequate dietary iron intake eventually results in depleted body iron stores, which is presumed to indicate iron deficiency. ID occurs when iron stores mostly found in the liver, start to become depleted, while IDA arises when the production of red blood cells starts to diminish once the iron stores have been depleted.

Iron deficiency in pregnancy

Anemia in pregnancy, defined as a haemoglobin concentration (Hb) < 110 g/L, affects more than 56 million women globally, two thirds of them being from Asia . Some women are already anemic before pregnancy and some others become progressively anemic during pregnancy. The causes of iron deficiency and iron General Introduction 13 deficiency anemia can be multifactorial, but common causes are low dietary iron intake, poor absorption of iron from the diet, parasitic infections, which are more common in developing regions, and disease states such as intestinal bleeding. Anemia can be mild, moderate or severe and can cause weakness, tiredness and dizziness. A healthy non-anemic woman could progress to a state of low iron stores, then to iron deficiency (ID). Pregnancy requirements of iron are low in the first trimester, but progressively increase to reach a maximum in the third trimester. It has been estimated that the daily iron requirement of a 55 kg pregnant woman increases from approximately 0.8 mg in the first trimester to 4–5 mg during the second trimester and >6 mg in the third trimester . IDA can lead to reduced work capacity, intellectual capacity and productivity and increased susceptibility to infection of pregnant women.It is estimated that anemia resulted in 3.7% of the cases of maternal death in Africa and 12.8% in Asia .Severe anemia is associated with adverse perinatal outcomes such as small for gestational age babies and preterm deliveries. The harmful effects of ID at birth also have long term consequences such as poor physical and mental growth continuing throughout childhood and adolescence, and even permanent neurophysiological deficiencies. So, it is important to improve iron status during pregnancy.

Prevention of iron deficiency in pregnancy

In view of high prevalence of iron deficiency in pregnancy, it is postulated that weekly iron (60 mg of ferrous sulphate) and folic acid (3 mg) supplementation for women of reproductive age, including adolescent girls between 10–19 years old could be an effective strategy to achieve good iron stores before a woman becomes pregnant . It was demonstrated that a weekly iron and folic acid supplementation program for women of reproductive age has been effective in reducing the prevalence of anemia in some districts in Vietnam, the Philippines and Cambodia .In order to prevent adverse perinatal outcomes resulting from iron and folic acid deficiency in pregnant women, according to WHO a daily supplement of 60 mg of elemental iron and 400 μg of folic acid should be started as soon as possible by all pregnant women in communities where anemia during pregnancy is a significant problem. This should be given throughout pregnancy and continued for six months postpartum to ensure adequate iron stores in the woman[5].

METHODOLOGY

3.1 RESEARCH APPROACH

An evaluative research approach is appropriate for the study.

3.2 RESEARCH DESIGN

Experimental design is appropriate for the study

3.3 SELECTION OF TOPIC

A study to assess the effectiveness of supplementation of vit c foods on influence of iron absorption factors on haemoglobin status of pregnant women in selected non Govt maternity hospital in Tirupati

3.4 RESEARCH AREA

In this research area was Non-Government maternity hospitals in Tirupati.

3.5 SAMPLE SELECTION

Third trimester of Anemic, non-anemic pregnant women .

3.6 SAMPLE TECHNIQUE

purposive sampling technique

SAMPLE SIZE

Antenatal pregnant women in second and third trimester with anemic, non-anemic. The sample size was for this study is 120.

3.7 CRITERIA FOR SAMPLE SELECTION

The study sample is selected the following pre-determined criteria

❖ **Inclusion criteria**

- Antenatal Pregnant women who are attending antenatal OPD in local to Tirupati.
- Pregnant women who are able to speak Telugu and English.
- During pregnancy there is no medication changes as prescribed by the doctor.

❖ **Exclusion criteria**

- Avoiding pregnant women with complications
- Antenatal pregnant women who were not interested in intervention studies.

❖ **VARIABLES** **Independent variables**

Supplementation of vit c

Dependent variables

Anthropometric measurements for pregnant women ,biochemical analysis, iron absorption factors.

3.9 SELECTION OF TOOLS AND TECHNIQUE DESCRIPTION OF TOOLS

With help of a extensive reviews and various text books, journals, website and experts, the tool developed.

PART A GENERAL INFORMATION

Name, Age (Years), Education, Occupation, Type Of Family, Income, Gravidity Parity, Gestational Age.

PART B ANTHROPOMETRIC MEASUREMENTS

Height, weight, BMI, weight gain during pregnancy, Height, weight of the new born.

PART C

Dietary iron intake pattern in a whole day menu (24hrs Recall method) among antenatal pregnant women

PART D BIO-CHEMICAL ANALYSIS

Lab investigation were done to subjects**. (annexure IV)**

- Complete blood count (CBC)
- Hemoglobin (HB)

- Serum iron
- Trans ferritin saturation(Tfs)
- Erythrocyte protoporphyrin (EP)
- Total iron binding capacity(TIBC)
- Serum ferritin(STORAGE)

Bio chemical analysis among pregnant women beginning,3rd trimester, before delivery, for non-pregnant women initial reading and final readings and cord blood readings for newborn were done.

PART E

Supplementation

- Supplementation of ascorbic acid rich foods supplemented for selected samples. The day of 3rd trimester beginning to till they reached to delivery. Supplemented 100 ml of lime juice after food in the afternoon for pregnant mothers.

3.10 DATA ANALYSIS Data pool up

The collected data was pooled up according to the objectives of the study

** Statistical analysis**

The collected data were subjected to statistical analysis by using tools

- Cross tabulation
- Percentage of parameters
- Mean and standard deviation Anova for blood profile
- Comparison of means using t-test, other statistical tools for blood profile and supplementation

Result and interpretation:

Table 1 Frequency and percentage distribution of demographical variables among antenatal pregnant women in experimental and control group.

Age	Antenatal mothers				Total antenatal mothers
	Experimental		Control		
	f	%	f	%	f and %
below 25	53	66.2%	21	52.5%	74 61.7%
26& above	27	33.8%	19	47.5%	46 38.3%
Total	80	100.0%	40	100.0%	120 100.0%
Education					
Primary Education	21	26.2%	9	22.5%	30 25.0%
Secondary Education	32	40.0%	17	42.5%	19 40.8%
Graduate	27	33.8%	14	35.0%	41 34.2%
Total	80	100.0%	40	100.0%	120 100.0%
occupation					
Homemakers	14	17.5%	3	7.5%	17 14.2%
Self-employed/ Daily Wagers	18	22.5%	13	32.5%	31 25.8%
Govt. Employment	33	41.2%	15	37.5%	48 40.0%
Private Employment	15	18.8%	9	22.5%	24 20.0%
Total	80	100.0%	40	100.0%	120 100.0%
Type of family					
Nuclear Family	51	63.8%	18	45.0%	69 57.5%
Joint Family	29	36.2%	22	55.0%	51 42.5%
Total	80	100.0%	40	100.0%	120
					100.0%
Income					
30000 & less	44	55.0%	27	67.5%	71 59.2%
30001 & above	36	45.0%	13	32.5%	49 40.8%

Total	80	100.0%	40	100.0%	120 100.0%

The above table shows that antenatal pregnant mothers age below 25 were 74 (61.7%) in experimental group 21(52.5%) were control group and antenatal pregnant mothers above age 26 were 46(38.3%) in experimental group and the control group were 19 (47.5%). primary education 21 (26.2) % secondary education were 32 (40.0%) graduates were 27(33.8%) in experimental group. primary education were 09 (22.5%) secondary education were 17(42.5%) graduates were 14(35%) in control group. The Home makers were14 (17.5)% Self-employed/ Daily Wagers were18 (22.5%) Govt. Employment were 33(41.2%) Private Employment were 15(18.8%) in experimental group. Antenatal mothers Home makers were 3 (7.5)% Selfemployed/ Daily Wagers were13(32.5%) Govt. Employment were 15(37.5%) Private Employment were 9 (22.5%) in control group. Among Nuclear Family were 51 (63.8) % Joint family were29 (36.2%) in experimental group. Antenatal mothers among in Nuclear Family were 18 (45.0%) joint family were 22 (55.0%) in control group. The above table shows that antenatal pregnant mothers income less then 30000 were44 (55.0%) above 30001 were 36 (45.0%) in experimental group. Antenatal mothers among in income less then 30000 were 27 (67.5%) above 30001 were 13(32.5%) in control group.

Table 2 Frequency and percentage distribution of gravidity among antenatal pregnant mothers

	Experimental		Control		Total
	f	%	f	%	
Primi	51	63.8%	26	65.0%	77 64.2%
Multi	29	36.2%	14	35.0%	43 35.8%
Total	80	100.0%	40	100.0%	120 100.0%

The above table shows that antenatal pregnant mothers in primi gravida were 51 (63.8 %) Multi gravida were 29 (36.2%) in experimental group. Antenatal mothers among in primi gravida were 26 (65.0%) Multi gravida were 14 (35.0%) in Control group.

Table 3 Frequency and percentage distribution of Haemoglobin status among antenatal pregnant mothers

	Experimental		Control		Total
	f	%	f	%	
Non-Anaemic PW	2	2.5%	2	5.0%	4 3.3%
Anaemic PW	78	97.5%	38	95.0%	116 96.7%
Total	80	100.0%	40	100.0%	120 100.0%

The above table shows that antenatal pregnant mothers in Non-Anaemic pregnant woman were 2 (2.5 %) Anaemic Pregnant woman were 78 (97.5%) in experimental group. Antenatal mothers among in Non-anaemic pregnant woman were 2 (5.0%) Anaemic Pregnant woman were 2 (95.0%) in Control group.

Table 4 Frequency and percentage distribution of Haemoglobin status among antenatal pregnant mothers.

Degrees of anemia	Experimental		control		Total
	f	%	f	%	
Mild to moderate anaemia	39	48.8%	19	47.5%	58 48.3%
Moderate to severe anaemia	39	48.8%	21	52.5%	60 50.0%
Non anaemic pregnant	2	2.5%	0	0.0%	2 1.7%
Total	80	100.0%		100%	120 100.0%

The above table shows that antenatal pregnant mothers among mild to moderate were 39(48.8%)moderate to severe were 39 (48.8%) non-anaemic were 2(2.5%) in experimental group. antenatal pregnant mothers among mild to moderate were 19(47.5%)moderate to severe were 21 (52.5%) non-anaemic 0 % in control group.

Table 5 frequency and percentage distribution of type of food among antenatal pregnant women in experimental group and control group.

Sno	**Type of food**	**Antenatal p.w**	**Frequency**	**percentage**
1	vegetarian	Control experimental	18 24	45% 30%
2	Non vegetarian	Control experimental	22 56	55% 70%
	total		120	100%

The above table shows that antenatal pregnant mothers in vegetarian pregnant woman were 24(30 %) non -vegetarian Anaemic Pregnant woman were 56 (70%) in experimental group. Antenatal mothers among in Non-vegetarian anaemic pregnant woman were 22 (55%) vegetarian Anaemic Pregnant woman were (95.0%) in Control group.

Table 6: mean and SD of diet in pre-test among antenatal pregnant women in third trimester and comparison with recommended dietary allowance.

NUTRIENTS	MEAN		SD	RDA
	Pre test	Post test		
Total energy kcl	2220.064	2900.78	480.934	2200kcl
Vit A	390.826	700.34	254.558	900mcg
Folic acid	500.372	634.493	94.823	600 mcg
B_{12}content	1.444	2.634	0.8442	2.6 mcg
Dietary fiber	20.453	32.592	8.583	30 gms

Above table shows total energy in pre test mean 2220.06 post test mean 2900.78 and SD 480.934.Vit A pre test mean were 390.826 post test mean 700.34SD was 254.558 Folic acid SD 94.823 B_{12}content SD was 0.8442 Dietary fiber SD were 8.583.

Table7 mean and SD of diet in post-test among antenatal pregnant women in third trimester ending .

NUTRIENTS	MEAN		SD	t value	P value
	Pre test (N=80)	Post test (N=80)			
Total energy kcl	2220.0643	2900.78	480.934	4.1436	0.001**
Vit A	390.8268	700.34	254.558	7.156	0.000**
Folic acid	500.3728	634.493	94.823	6.964	0.001**
B_{12}content	1.444	2.634	0.8442	4.540	0.001**
Dietary fiber	20.453	32.592	8.583	4.143	0.001**

The above table shows total energy t value 4.14 p value 0.001** Vit A t value 7.156 p value 0.000** Folic acid t value4.540 p value0.001** among antenatal mothers .

Table 8 mean and SD of iron absorption enhancing factors of diet in pre-test among antenatal pregnant women in third trimester beginning and comparison with recommended dietary allowance

Nutrients	Mean	SD	RDA
	Pre test	Pre test	
Vit C	20.675	0.70	85 mg /day

The above table shows that Vit C among antenatal pregnant mothers pre test mean 20.675 and SD 0.07 with recommended dietary allowance per day is 85mg.

Table 9 mean and SD of iron absorption enhancing factors in diet of post-test among antenatal pregnant women in third trimester ending and comparison with recommended dietary allowance.

Nutrients	Mean		SD	t value	P value
	Pretest	**Posttest**			
Vit C	20.675	87.485	47.376	8.6724	0.000**

The above table shows that Vit C among antenatal pregnant mothers pre test mean 20.675 post mean 87.485, standard deviation 47.376 t value 8.67 with significance0.000**

Table 10 mean and SD of iron absorption inhibiting factors of pre-test among antenatal pregnant women in second trimester and comparison with recommended dietary allowance

Nutrients	Mean	SD	RDA
	Pre test	**Pre test**	
Pytates	700.976	348.096	100-400mg
Tannin	476.826	190.175	< 200mg
sCalcium	923.73	235.128	1200mg
polyphenols	560.44	179.792	650-1000mg

Table11mean and SD of iron absorption inhibiting factors among antenatal pregnant women in post test of experimental group

Nutrients	Mean		SD		t value	P value
	Pre test	**Post test**	**Pre test**	**Posttest**		
Pytates	700.976	390.826	348.096	132.174	42.672	0.000**
Tannin	376.826	70.568	190.175	41.45	21.239	0.000**
Calcium	923.73	1389.09	235.128	156.76	19.560	0.001**
polyphenols	560.44	783.72	179.792	239.34	20.549	0.001**

The above table shows that phytates among antenatal pregnant mothers pre test mean 700.976 post mean 390.826, standard deviation 132.174 t value 42.672 with significance0.000** Tannin pre test mean 376.826, SD 190.175 post test mean were70.568,and SD 41.45 significance0.000**

Table 12 Mean and standard deviation of haemoglobin status of biochemical analysis among antenatal pregnant women when they are in third trimester beginning for pre-test

Total Blood Count	Reference Value			
	Mild to Moderate Aneamic (>10-11mg/dl)	Moderate to Severe aneamic (<10mg/dl)	Normal >11 mg/dl	Recommended values
	Mean± S D	Mean± S D	Mean± S D	
HB	10.11 ± 0.59	9.25 ± 1.01	12.01 ± 1.07	12-14gm/dl
RBC	3.19 ± 0.43	2.98 ± 0.49	4.09 ± .62	3.2-4.4mil/mm^3
HCT	24 ± 2	23 ± 3	38 ± 7	30-39%
MCV	80 ± 3	79 ± 8	86 ± 3	82-99fl
MCH	24 ± 2	23 ± 4	28 ± 2	27-32pg
Platelets	142570 ± 6956	138280 ± 5114	154083 ± 5299	1,50,000-4,50,0000mcl
WBC	5578 ± 275	5474 ± 500	5558 ± 309	5000-14800mm^3
Serum Iron	55 ± 2	53 ± 3	63 ± 4	60-170mcg/dl
Total Iron Bid. Cap.	375 ± 29	390 ± 31	361 ± 23	240-450mcg/dl
Transferrin sat	24 ± 3	24 ± 3	24 ± 3	25-35%
Serum ferritin	105 ± 22	100 ± 23	140 ± 57	24-307mcg/l
Ery. Pro.	99 ± 11	99 ± 12	85 ± 19	16-65 microgram/dl

The above table show mean and standard deviation of HB in mild to moderate anemia10.11 ± 0.59,moderate to severe anemia 9.25 ± 1.01,normal 12.01 ± 1.07 the recommended HB value is 12-14gm/dl.serum iron mesan and standard deviation were 3.19 ± 0.43 in mild to moderate anemia , 2.98 ± 0.49 in moderate to severe anaemia, 12.01 ± 1.07 was in normal pregnant women. Serum ferritin mean and SD was 105 ± 22 in mild to moderate anemia100 ± 23 in moderate severe anemia.

Table 13 Mean and Standard Deviation of bio chemical analysis of pre test of vitC supplementation third trimester beginning and post-test in third trimester ending of Experimental group among antenatal pregnant mothers .

Bio chemical analysis	Frequency	Mean		Standard deviation	
		Pre test	Post test	Pre test	Posttest
HB	80	9.4843	10.590	1.11401	.6605
RBC	80	2.7288	4.3577	.30449	.23821
HCT	80	22.23	32.80	1.732	1.870
MCV	80	76.85	82.83	2.975	1.920
MCH	80	22.30	24.85	1.454	1.027

Palates	80	140.83	149.85	4.494	3.262
WBC	80	54.65	59.28	2.637	4.273
Serum Iron	80	52.65	58.88	1.748	4.345
Total Iron Binding.Cap.	80	394.88	319.78	27.538	41.793
Total iron saturation	80	23.75	23.15	3.477	.736
Serum ferritine	80	92.55	130.40	18.121	24.402
Ery.Pro.	80	107.10	85.18	10.693	7.987

The above table 9 shows that antenatal pregnant mothers among bio chemical analysis of 2nd trimester pre-test Hb status of mean +SD were 9.484+1.114 RBC status of mean +SD were 2.728+0.304 HCT status of mean +SD were 22.23 +1.732 MCV status of mean +SD were 76.85+2.975 MCH status of mean +SD were 22.30+1.454 Platelets status of mean +SD were 140.83+4.494 WBC status of mean +SD were 54.65+2.637 serum Iron status of mean +SD were 52.65+1.748 total Iron binding capacity status of mean +SD were 394.88+27.538 Total iron .saturation status of mean +SD were 23.75+3.477 serum protein status of mean +SD were 92.55+ 18.121 erythropoietin status of mean +SD were 107.10+ 10.690

The above table 9 shows that antenatal pregnant mothers among bio chemical analysis of 3rd trimester post-test Hb status were mean+SD are 10.59+0.06 RBC status were mean+SD are 4.357+0.238 HCT status were mean+SD are 32.80+1.870 MCV status were mean+SD are 82.83+1.920 MCH status were mean+SD are 24.85+1.027 platelets status were mean+SD are 149.85+3.262 WBC status were mean+SD are 59.28+4.273 serum Iron status were mean+SD are 58.88+4.345 total Iron binding capacity status were mean+SD are 319.78+41.793 Total iron. saturation status were mean+SD are 23.15+0.73 serum protein status were mean+SD are 130.40+24.402 erythropoietin status were mean+SD are 85.18+7.987.

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