



Australian Government
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**ASSESSMENT OF DIETARY HABITS AND NUTRITIONAL STATUS OF PREGNANT
WOMEN VISITING SIR GANGA RAM HOSPITAL, LAHORE.**

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1. Title of the Project:	Assessment of Dietary Habits and Nutritional Status of Pregnant Women Visiting Sir Ganga Ram Hospital Lahore
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Study Location	Sir Ganga Ram Hospital Lahore Pakistan
Proposed study Duration & timeline.	3 months

INTRODUCTION

Malnourishment remains as one of the major public health concerns around the globe. Maternal micronutrient deficiencies and imbalanced dietary intake affect the health of mother and pregnancy outcome. The National Nutritional Survey (2011) indicates that 51% of pregnant women in Pakistan were anemic, 46% suffered from vitamin deficiency, 47.6% from zinc and 68.9% is suffering from vitamin D deficiency. Currently nutritional screening is not a part of routine antenatal care provided in healthcare system. To address this situation, the implementation of nutritional screening during antenatal care is needed. Nutritional screening can lead to the earlier identification of those at risk of malnutrition as well as those already malnourished and thus subsequent implementation of appropriate nutritional care can help improve the nutritional status of mothers and pregnancy outcome.

This study was designed to provide baseline data about nutritional status and dietary habits of pregnant women attending antenatal clinic and help detect the nutritional deficiency in early stages of development, allowing dietary intake to be improved through nutritional support and counseling before a more severe condition develops.

Data acquired can help in designing culturally sensitive nutrition education program and dietary recommendations on large scale thus, benefiting healthcare professionals in clinical practice to provide nutrition support, services, and clinical advice to the pregnant women for improvement of their nutritional status. Moreover, such nutrition care plan can help facilitate families with low socio-economic status to make healthier food choices and improve lifestyles by gaining knowledge and skills for improvement of their overall health and wellbeing.

OBJECTIVES

- To assess the nutritional status and dietary habits of pregnant women
- To provide nutrition education intervention to pregnant females
- To assess the effect of nutrition education intervention on dietary habits & nutritional status of pregnant females

METHODOLOGY:

Before the start of study ethical approval was taken from Institutional Ethics Review Board, Fatima Jinnah Medical University/ Sir Ganga Ram Hospital, Lahore. Pilot study was done on 15 participants and data collection tool was refined.

The study was done in two phases. In first phase Demographic data was collected, dietary assessment with usual intake record form was done. Anthropometric measurements were taken and blood samples were collected for lab tests.

In second phase, participants were reassessed for dietary habits and nutritional status.

PHASE 1

RECRUITMENT OF SUBJECTS

Initially 215 pregnant women (12 weeks to 30 weeks) visiting gynae OPD Sir Ganga Ram hospital, Lahore, for their first antenatal visit were enrolled. Pregnant women with chronic illnesses, GIT problems, excessive vomiting or those who were already taking supplements were excluded from the study.

DATA COLLECTION:

DIETARY ASSESMENT

Baseline data collection was done by faculty members and Students of BS Food Science and Human Nutrition Kinnaird College Lahore by interviewing study participants and with the help of using questionnaire. Dietary habits were recorded by using Usual Dietary Intake Form and scoring against the food guide pyramid.

ANTHROPOMETRY:

Clinical examination and anthropometric measurements were done by medical officers and lady health visitor.

Nutritional status of pregnant women was assessed by taking anthropometric measurements including weight, height, Body Mass Index (BMI) and mid upper arm circumference (MUAC). The weight of the pregnant females was obtained using the digital weighing scale following a standard procedure. Extra clothing were removed and participants were asked to stand on the weighing scale without shoes. The height was measured using stadiometer following WHO standard procedure. The height and weight of the pregnant females was used to calculate Body Mass Index. Mid upper arm circumference was measured by using adult MUAC tape.

BIOCHEMICAL ANALYSIS

Blood samples were drawn and send to Laboratory of Pakistan health research Centre in SGRH for biochemical tests including complete blood count, Hemoglobin, Iron, Ferritin, TIBC, Calcium, Glucose, Vitamin D3, Albumin and Total proteins levels.

NUTRITIONAL COUNSELLING

Based upon the dietary intake of pregnant women, nutritional counselling was done by nutritionists and generalized dietary guidelines for pregnant women were discussed. Pictorial dietary information leaflets were also handed over to each study participants. Emphasis was also given to regularly take supplements which were prescribed by gynecologist as a routine during their first antenatal visit.

DATA PROCESSING:

Dietary data collected was used to calculate baseline energy requirement including Total Caloric Intake, Basal Energy Estimation (BEE), Energy Deficit and Total Protein requirement of each participant. Total caloric intake refers to the amount of calories which study participants were taking through their diet on daily basis whereas energy requirement as per trimester with added specific calories into Basal Energy Estimation (BEE) determines the calories which study participants should be consuming on the daily basis i.e. (1st trimester=BEE+0, 2nd trimester=BEE+340calories and 3rd trimester=BEE+450 calories). Lastly, energy deficit highlights the energy in the form of calories that the study subjects are short of and should be taking according to their individualized anthropometric measurements.

PHASE 2(after 2 months)

FOLLOW UP SESSION

Out of 215 pregnant women initially enrolled in the study, only 194 participants turned up for follow up. 14 were lost to follow up due, 4 delivered and did not turn up for follow up due to cultural reasons and 3 refused to give blood samples.

During follow up session, participants were reassessed for their dietary intake with special reference to their improvement in diet compared to initial visit. Their nutritional status were reassessed taking anthropometric measurements and blood samples were collected for biochemical tests.

During this visit, based on baseline data, individualized dietary counselling was done, their lab tests results were discussed. Their compliance to supplements was also noted down. Those with confirmed micronutrient deficiencies were prescribed supplements in therapeutic doses.

RESULTS

GENERAL DEMOGRAPHICS

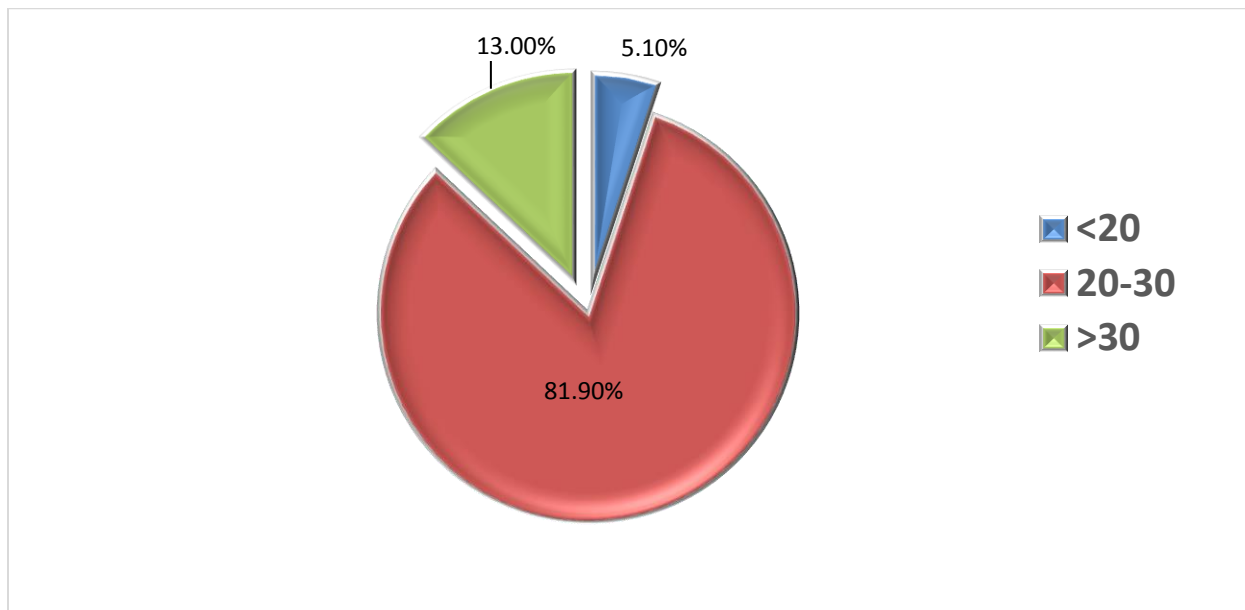


Figure 1 showing mean age of Subjects

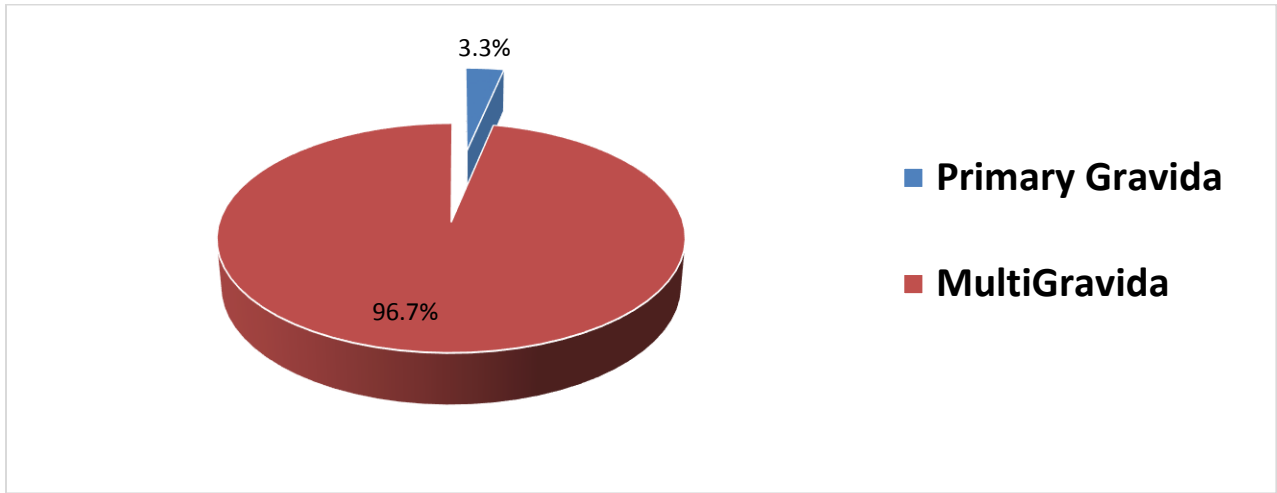


Figure 2 showing gravidity Status of Subjects

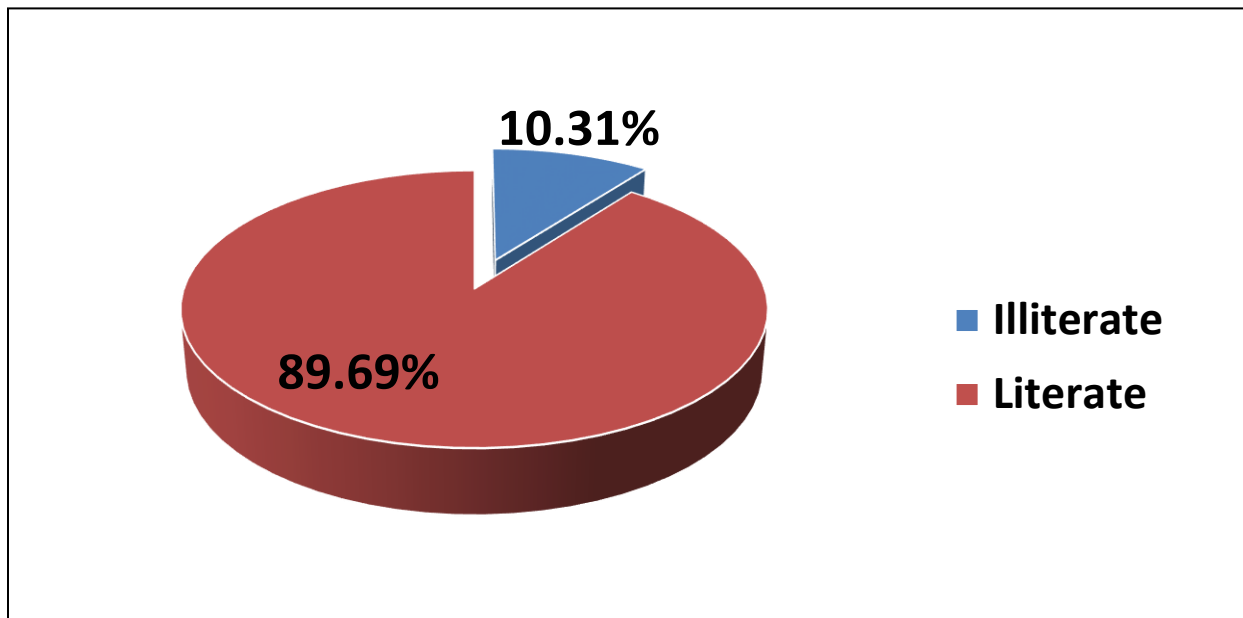


Figure 3 showing Education Status of Subjects

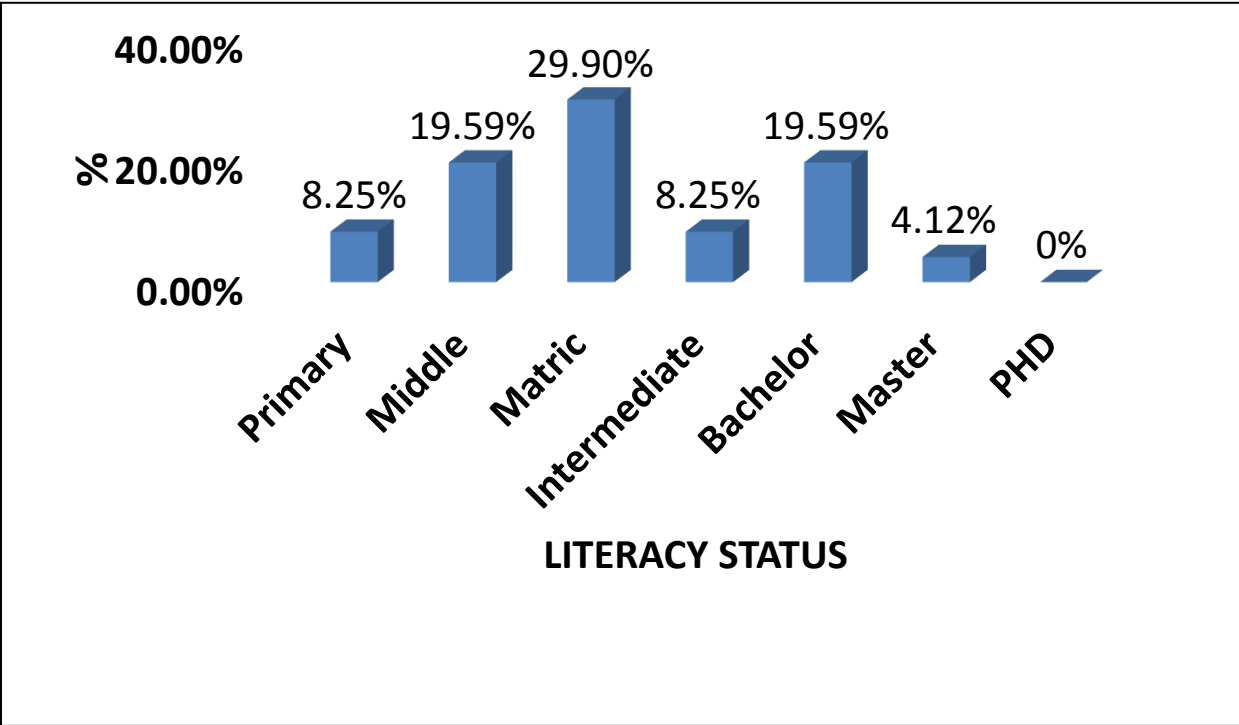


Figure 3.1 showing Literacy Status of Subjects

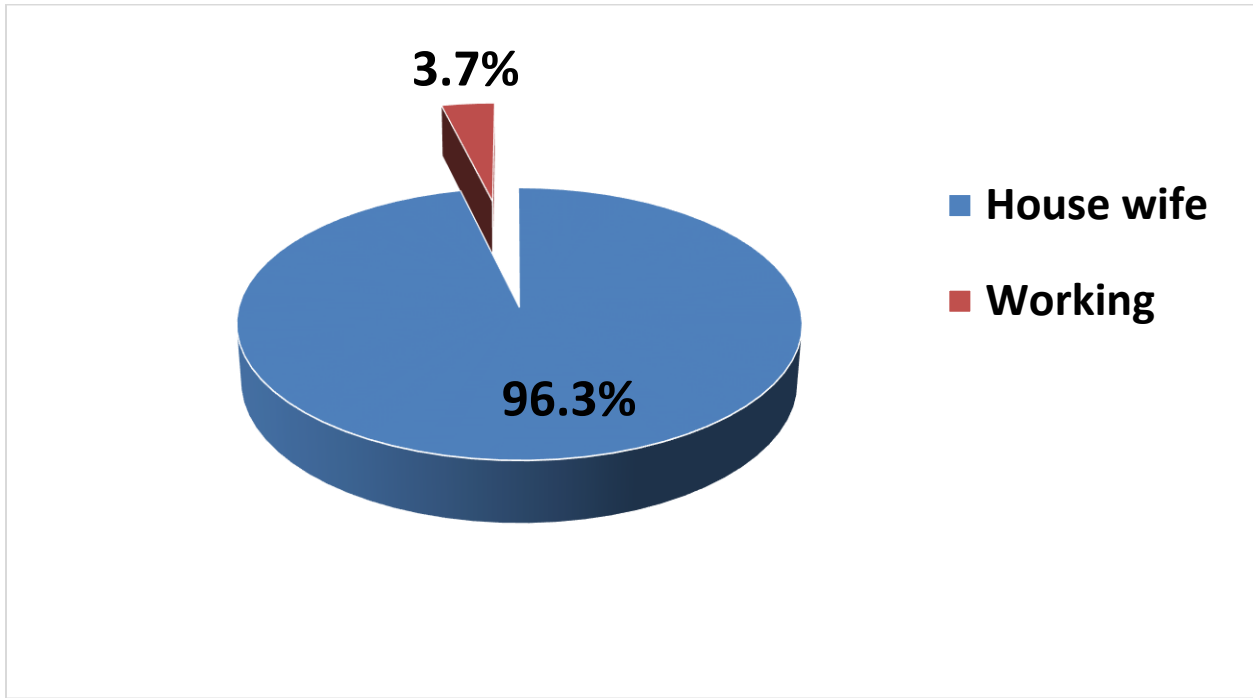


Figure 4 showing Occupational Status of Subjects

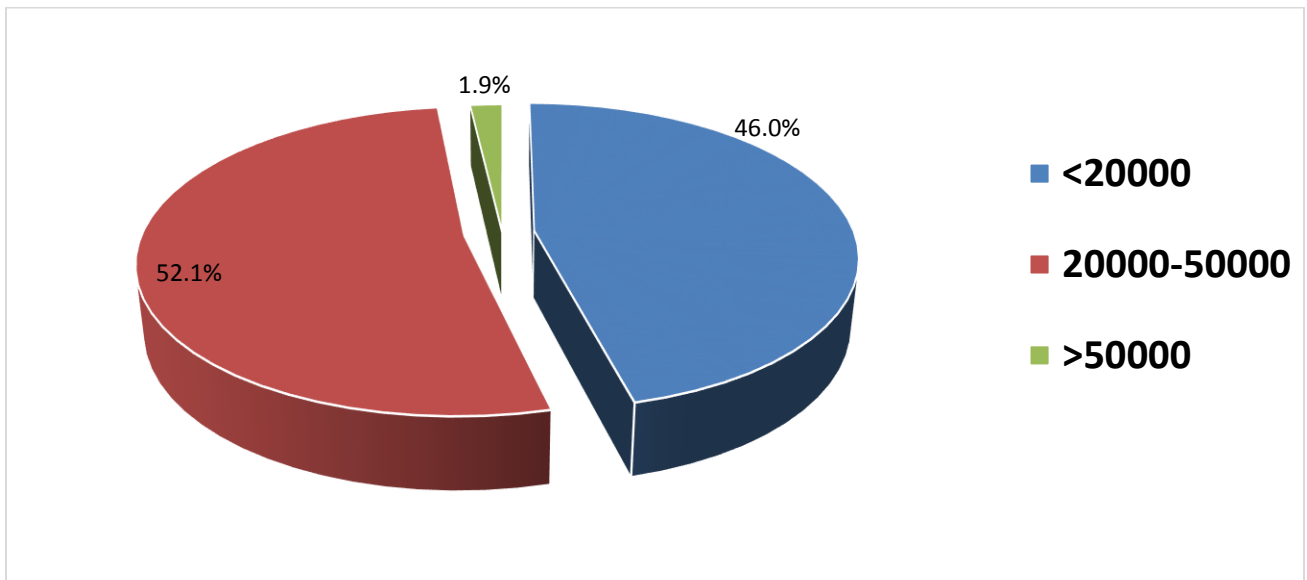


Figure 5 showing Monthly Income of Subjects

ANTHROPOMETRIC MEASUREMENTS

Table 1 Showing Anthropometric Measurements of Subjects at Baseline

Anthropometry	Mean	SD	Minimum	Maximum
Weight (kg)	62.05	12.59	35.00	110.00
Height(cm)	158.19	8.23	122.00	178.00
MUAC(cm)	27.81	4.63	18.00	44.00
BMI	24.85	5.05	15.22	43.00

DIETARY ASSESMENT

Table 2 Showing Dietary Status of Subjects at Baseline

Dietary Status	Results n=194 (%)
Appropriate	6 (3.1)
Inappropriate	188 (96.9)

Table 3 Showing Assessment of Dietary Habits of Subjects at Baseline

Food Group	According to Recommendation n=194 (%)	Below Recommendation n=194 (%)	Above Recommendation n=194 (%)
Cereal	148 (76.3)	40(20.6)	6 (3.1)
Fruit	76 (39.2)	114 (58.8)	4 (2.1)
Vegetables	84 (43.3)	96 (49.5)	14 (7.2)
Protein	168 (86.6)	20(10.31)	6 (3.09)
Dairy	68 (35.1)	120 (61.9)	6 (3.1)

BIOCHEMICAL ANALYSIS

Table 4 Showing Hemoglobin Status of Subjects at Baseline

Hemoglobin level	Result n=194(%)
≥ 11mg/dl	112(57.7)
<11mg/dl	82(42.3)

Table 5 Showing Anemia Status of Subjects at Baseline

Anemia severity	Result N=82 (%)
Severe<7.0mg/dl	2(2.4)
Moderate (7.0-10.0)	36(43.9)
Mild(10.0-10.9)	44(53.6)

Table 6 Showing Serum Ferritin Status of Subjects at Baseline

Ferritin (ug/l)	Result n=194(%)
>=15 Normal	58(29.9)
<15 Deficient	136(70.1)

Table 7 Showing Anemia Status in Association with Ferritin and Hemoglobin Levels of Subjects at Baseline

Status	Ferritin	Hb	Baseline n=194(%)
Normal	≥ 15	> 11	42 (21.6)
Iron Depletion	< 15	> 11	70 (36.0)
Iron Deficiency Anemia	< 15	< 11	66 (34.0)
Other causes	≥ 15	< 11	16 (8.2)

Table 8 Showing Vitamin D Status of Subjects at Baseline

Vitamin D (ng/ml)	Results n=194(%)
Sufficient (30-100)	14 (7.1)
Insufficient (20-29)	37 (19.0)
Deficient (<20 ng/ml)	143 (73.8)

FOLLOW UP RESULTS

Table 9 Showing Dietary Status of Subjects at baseline and after intervention

Dietary Status	Baseline n=194 (%)	Follow Up n=194 (%)
Appropriate	6 (3.1)	72 (37.1)
Inappropriate	188 (96.9)	122 (62.9)

Table 10 Showing Food Intake According to Food Guide Pyramid Recommendations of Subjects at baseline and after intervention

Food Groups		Baseline n=194 (%)	Follow up n=194 (%)
Cereal	Recommended	148(76.3)	148(76.3)
	Below Recommendation	40(20.6)	8(4.1)
	Above Recommendation	6(3.1)	38(19.6)
Fruit	Recommended	76(39.2)	106(54.6)
	Below Recommendation	114(58.8)	64(33.0)
	Above Recommendation	4(2.1)	24(12.4)
Vegetable	Recommended	84(43.3)	102(52.6)
	Below Recommendation	96(49.5)	68(35.1)
	Above Recommendation	14(7.2)	24(12.4)
Protein	Recommended	168(86.6)	169(87.1)
	Below Recommendation	20(10.31)	10(5.15)
	Above Recommendation	6(3.09)	15(7.73)
Dairy	Recommended	68(35.1)	120(61.8)
	Below Recommendation	120(61.9)	36(18.5)
	Above Recommendation	6(3.1)	38(19.5)

Table 11 Showing Caloric Intake of Subjects at baseline and after intervention

Parameters	Baseline (n=194)	Follow Up (n=194)	P-Value
Cereal Group (Caloric Intake)	469.43±142.78	646.95±215.99	0.000
Fruit Group (Caloric Intake)	91.86±99.48	136.70±109.79	0.003
Vegetable (Caloric Intake)	138.65±79.22	167.53±79.81	0.011
Meat (Caloric Intake)	167.01±109.84	459.38±225.77	0.000
Dairy (Caloric Intake)	214.76±163.85	397.53±176.43	0.000

Table 12 Showing Energy and Caloric Intake of Subjects at baseline and after intervention

Parameters	Baseline (n=194)	Follow Up (n=194)	P-Value
BEE	1765.67±133.15	1878.07±135.91	0.000
Total Calorie Intake	1081.72±272.94	1808.09±454.57	0.000
Energy Deficit	331.48±282.68	69.98±484.14	0.000
Total Protein	7.69±0.52	7.93±0.46	0.001

Table 13 Showing Hemoglobin Status of Subjects at Baseline and after intervention

Hemoglobin level	Baseline Result N=194(%)	Follow up Result
≥ 11mg/dl	112(57.7)	124(63.9)
<11mg/dl	82(42.3)	70(36.1)

Table 14 Showing Anemia Status of Subjects at Baseline and after intervention

Hemoglobin level (mg/dl)	Baseline n=194(%)	Follow up n=194(%)
Severe<7.0	2(1.0)	1(0.5)
Moderate (7.0-10.0)	36(18.6)	19(9.8)
Mild(10.0-10.9)	44(22.7)	50(25.8)
Normal(>=11.0)	112(57.7)	124(63.9)

Table 15 Showing Serum Ferritin Status of Subjects at Baseline and after intervention

Ferritin (ug/l)	Baseline n=194(%)	Follow up n=194(%)	P-Value
>=15 Normal	58(29.9)	76(39.2)	<0.001
<15 Deficient	136(70.1)	118(60.8)	

Table 16 Showing Anemia Status in Association with Ferritin and Hemoglobin Levels of Subjects at Baseline and After Intervention

Status	Ferritin	Hb (mg/dl)	Baseline n=194(%)	Follow up
Normal	≥15	>11	42 (21.6)	72(37.1)
Iron Depletion	<15	>11	70 (36.0)	52(26.8)
Iron Deficiency Anemia	<15	< 11	66 (34.0)	66(34)
Other causes	≥15	< 11	16 (8.2)	4

Table 17 Showing Vitamin D Status of Subjects at Baseline and After Intervention

Vitamin D (ng/ml)	Baseline n=194(%)	Follow Up n=194(%)	P-Value
Deficient (<20)	143 (73.8)	69 (35.7)	0.079
Insufficient (20-30)	37 (19.0)	60 (31.0)	
Sufficient (31-100)	14 (7.1)	65 (33.3)	

CONCLUSION

Results of study show that nutritional counseling has positive effect on dietary habits and nutritional status of pregnant women.

DISCUSSION

The mean weight, height, MUAC and BMI of the pregnant women under consideration was 62.05 ± 12.59 kg, 159 ± 8.23 , $27\text{cm}.81 \pm 4.63$ cm and 25 ± 5.05 respectively.

Overall improvement in most of the parameters of the study validated success of the intervention. Dietary habits and nutritional status of the pregnant females showed improvement. Before intervention, at baseline only 3 % pregnant women were taking appropriate diet, whereas after nutrition counseling and general nutrition education provided to the study participants, 37 % improved their diet and started consuming according to the recommendations of the Food Guide Pyramid. The participants who were taking diet according to recommended servings from all food groups were considered as having appropriate diet.(6).

Major improvement was seen in the Fruit and Dairy group intake of pregnant women, according to the Table 10 only 39 % women were consuming fruits in their diet at baseline according to the recommended servings, however, after intervention the percentage increased to 55%. Similarly, the percentage for Dairy group intake improved from 35% to 62 % on daily basis.

Similarly, the total caloric intake of study participants also showed marked improvement as the mean values for energy deficit shown in Table 12, depicted that pregnant women under consideration were only short of 69 calories to reach optimum caloric intake goals, whereas at baselines they were consuming 331 less calories than their recommended intake on average.

Results of study showed that 42% of pregnant women were having low hemoglobin level ($< 11\text{mg/dl}$), out of which 34% were having iron deficiency anemia. Results also showed that 36% were having iron depletion but no anemia. Follow up results showed improvement in iron storage status, with iron depletion status reduced to 26.8% as compared to 36.5 at base line.

With regard to vitamin D status, 74% of the study subject were Vitamin D deficient ($< 20\text{ ng/ml}$), 19% had insufficient amount ($20\text{-}30\text{ng/ml}$) and 7.1 % participants had sufficient amount ($31\text{-}100\text{ng/ml}$) of vitamin D in the body at baseline. Follow up result showed remarkable improvement where Vitamin D deficiency got reduced to 36% from 73.8% at baseline. This improvement could be due to supplementation prescribed during their first antenatal visit and good compliance to supplementation due to enforcement during nutritional counselling sessions.

LIMITATIONS

- Study time duration was short.
- Unavailability of Control Group due to ethical constraints

RECOMMENDATIONS

- Nutritional screening and counseling should be made compulsory as part of routine antenatal care provided in healthcare system as antenatal visit is a good opportunity to educate women about healthy diet.
- Every gynae OPD should have a registered dietitian for diet specific and individualized counseling of pregnant females.

REFERENCES

1. WHO. The Global Prevalence of Anemia in 2011. Geneva: World Health Organization; 2015.
2. WHO. Sixty-fifth world health assembly report 2012. Nutrition: Nutrition of women in the preconception period, during pregnancy and the breastfeeding period. apps.who.int/gb/DGNP/pdf_files/A65_REC1-en.pdf. pdf, accessed [23 october, 2017]).

3. World Health Organization.2006.Prevention of neural tube defects. Integrated Management of Pregnancy and Childbirth (Impac). Department of making pregnancy safer.
4. WHO. World Health Organization documents 2017.Periconceptional folic acid supplementation to prevent neural tube defects.
5. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1)(<http://www.who.int/vmnis/indicators/haemoglobin.pdf>, accessed [13 Nov, 2017]).
6. USDA. Food Guide Pyramid. The Food Guide Pyramid - Center for Nutrition Policy and Promotion. United States Department of Agriculture. (https://www.cnpp.usda.gov/sites/default/files/archived_projects/FGPPamphlet.pdf)