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Nutrition counselling: An effective measure to improve maternal and child nutrition and health

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To evaluate the effectiveness of nutrition counselling along with multiple strategy community intervention provided to pregnant women who have registered in Mother and Child Care Unit of Civil Hospital, Ludhiana, a total of 60 pregnant women in the age group of 20-40 years during 1st trimester of pregnancy were selected. The subjects were divided into two groups (Control with multiple strategy community intervention and Experimental with nutrition counselling + multiple strategy community intervention). Nutrition counselling with a holistic approach through lectures, discussions, power point presentation and demonstrations was imparted to the subjects for 5 months. The findings revealed that dietary intake of various food groups and nutrient intake of energy, protein, vitamin C, folic acid, calcium and iron significantly ($P \leq 0.05$) increased during post intervention in the experimental group but the diet still remained inadequate. A significant ($P \leq 0.05$) increase was observed in the mean haemoglobin level of the subjects from 9.22±0.75 g/dl to 10.19±0.85 g/dl in the experimental group. All the anthropometric indices of the neonates in the experimental group were significantly ($P \leq 0.05$) higher than the control group. The study recommends that counselling along with multiple strategy community intervention prove to be an effective measure to achieve maternal and child health.

Key Words : Haematological profile, Multiple strategy community intervention, Neonates, Nutrition counselling, Pregnancy

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INTRODUCTION

Pregnancy is a time of extensive anabolic movement and physiological strain, which requires extra nutrient prerequisites as most quick rate of development happens in this period. During pregnancy, dietary energy and nutrient requirements are by and large expanded to support expanded maternal metabolism, blood volume and red cell mass expansion and the transportation of nutrients to the foetus (Blumfield *et al.*, 2012). The central drivers of maternal morbidity and mortality are severe anemia, haemorrhage, pregnancy-induced hypertension (PIH), obstructed labour, infections, unsafe abortions and their critical complications (Bhutta, 2013)"

Given the extent of all the above issues and remembering the significance of maternal nutrition, a multi strategy community intervention, known as National Rural Health Mission (NRHM), propelled in India in April 2005 to enhance the ease of access to better-quality medicinal services, mainly for rustic, poor mothers and children. Government of India launched the National Rural Health Mission (NRHM), with the momentous goal to diminish maternal mortality rate (MMR) to 100/100,000 and the Janani Suraksha Yojana (JSY) is the key strategy to achieve this decrease (NRHM, 2006).

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However, it was observed that nutrition counselling a broadly utilized strategy to improve nutritional status of women during pregnancy is lacking in multi strategy community intervention. Nutrition counselling seeks out to improve nutrition practices prior to and throughout pregnancy to progress maternal nutrition and reduce the threat of deprived health results in both mothers and their children (Rush, 2000). Keeping in mind the above facts, present study has been planned with following objectives in order to determine the effectiveness of multiple strategy community intervention along with nutrition counselling:

– To develop nutrition counselling material with a holistic approach conveying various aspects of maternal and child health.

– To evaluate the effectiveness of counselling and community intervention on the nutritional and health status of pregnant women.

METHODOLOGY

A total of 60 pregnant women who have registered in Mother and Child Care Unit in Civil Hospital, Ludhiana in the 1st trimester of pregnancy were selected. The study was conducted for the time period of 5 months i.e. during 2nd and 3rd trimester. The subjects were selected on the basis of their age (between 20-40 years), known pre-pregnancy weight, willingness to cooperate with the investigator. The subjects were divided into following two groups (Control with multiple strategy community intervention and Experimental with nutrition intervention + multiple strategy community intervention). Multiple strategy community intervention is a package of supplementation of calcium, iron and folic acid tablets, immunization of pregnant women and their neonates, free medical check-up, cash benefits for institutionalized delivery, family planning counselling, free ambulance service and free meal provided at the time of delivery. All these benefits are provided to pregnant women who have registered into Mother and Child Care Unit in Civil Hospital, Ludhiana.

To accomplish the objectives of the study interview schedules was developed to obtain the desired information regarding general background information, dietary intake, anthropometric measurements, blood pressure, haematological profile, anthropometry and proportionality of neonates. The nutrition counselling was provided to the subjects twice a month for a period of 5 months through group contacts in 5th, 6th, 7th, 8th and 9th month of pregnancy. The data were analyzed with the help of various simple statistical tools such as mean, standard deviation (SD) and percentage. Z-test was applied between two proportions and t- test was used to test the significance of mean difference of various parameters related to nutrient intake, anthropometric measurements and bio chemical analyses of selected subjects.

OBSERVATIONS AND ASSESSMENT

Table 1 presents the general information of the selected subjects. The majority of the subjects in both the groups were in the age group of 19-30 years. The data revealed that in the control group, majority of the subjects (46%) were educated upto middle level while

Table 1 : Demographic and socio-economic information of the selected subjects (n=60)

Particulars	Control (n=30)	Experimental (n=30)
Age(years)		
19-24	19(63.33)	11(36.67)
25-30	8(26.67)	14(46.67)
31-36	3(10.00)	5(16.67)
Education level		
Illiterate	6(20.00)	4(13.33)
Middle	11(36.67)	6(20.00)
Matric	8(26.67)	7(23.33)
Intermediate	4(13.33)	5(16.67)
Graduate	1(3.33)	8(26.67)
Religion		
Hindu	18(60.00)	20(66.67)
Sikh	10(33.33)	9(30.00)
Muslim	1(3.33)	1(3.33)
Christian	1(3.33)	-
Family type		
Nuclear	16(53.33)	21(70.00)
Joint	14(46.67)	9(30.00)
Occupation (self)		
Working	1(3.33)	-
Non-Working	29(96.67)	30(100.00)
Occupation (husband)		
Service	11(36.67)	9(30.00)
Business	14(46.67)	10(33.33)
Labour	5(16.67)	11(36.67)
Monthly family income(Rs.)		
<10,000	21(70.00)	16(53.33)
10,000-20,000	9(30.00)	12(40.00)
20,000-30,000	-	2(6.67)
Mean±SD	12,300±5214.31	17,250±7426.24

higher percentage of subjects (26.67%) were graduate in the experimental group. National Family Health Survey 4 revealed that of the mothers who participated in the survey, more than 50 per cent provided immunization to their children, across all categories based on caste and education (NFHS 4, 2015-2016). The data on the present study pertaining to the type of family showed that majority of the subjects lived in nuclear families in both the groups. Further, it was found that in both the groups, the majority of the subjects *i.e.* 60 and 66.67 per cent belonged to Hindu religion followed by Sikh religion (33.33 and 30%) and minority of the subjects (3.33%) in control group belonged to Muslim and Christian religion while no one from experimental group belonged to Christian religion. The findings of socio economic profile of the subjects indicated that majority of the subjects were house-wives in both the groups. The occupation of the subject's husband was divided into three categories *i.e.* service, business and labour class. It was found that maximum of the husbands (46.67%) in control group were pursuing their own business while in the experimental group, 36.67 per cent worked as labourers followed by other occupations. The mean monthly family income of the subjects in experimental group (Rs. 17, 250±7426.24) was higher than the control group (Rs. 12, 300±5214.31). Poor household economic status (46%), mother's illiteracy (35%) and rural residence (15%) contributed to 96 per cent of total socio-economic inequalities in child survival at the national level (Pradhan and Arokiasamy, 2010).

The data (Table 2) revealed that the dietary intake of food groups was increased from pre intervention to post intervention period in both the groups but a significantly ($P \leq 0.05$) higher increase in the intake of cereals, pulses and legumes, GLV's, fruits and milk and milk products was observed in the experimental group in comparison to control group due to positive impact of nutrition counselling on their dietary intake. Poor dietary intake during pregnancy is a significant contributor to global maternal malnutrition in less developed countries (Black *et al.,* 2008).

Table 3 indicated mean daily intake of all the nutrients except fat was inadequate among both control and experimental group. However, the results showed that the mean daily intake of nutrients increased after nutrition counselling among the subjects of experimental group. Vahamiko *et al.* (2013) suggested that dietary counselling brought about a higher intake of β-carotene contrasted with controls. Gaganpreet (2000) also reported a significant increase in the consumption of cereals, pulses and other vegetables after nutrition education. The mean daily intake of energy was 1520.56±342.04 kcal for control group before intervention and increased to 1566.56±228.37 kcal after intervention while a significantly ($P \leq 0.05$) higher increase was recorded in the mean energy intake of experimental group from pre intervention (1508.81±327.71 kcal) to post intervention (1616.62±309.14 kcal) period. The increase in per cent adequacy of protein in experimental group (66.67 vs 70.51%) was higher than per cent adequacy of control group. Further, the data showed a decrease of 3.59 per cent in the per cent adequacy of fat in the experimental group while an increase in per cent adequacy was observed in the control group (1.45%) due to high consumption of desi ghee and hydrogenated fat by most of the subjects. The mean daily intake of iron by the subjects of control group decreased from 16.85±3.64 mg

Table 2 : Impact of nutrition counselling on the mean daily food intake of the selected subjects **(n=60)**

Food group	Control (n=30)		t-value	Experimental (n=30)		t-value	SDI
	Pre intervention	Post intervention		Pre intervention	Post intervention		
Cereals, g	178.6±8.3	185.2±8.6	3.02*	167.6±7.3	201.3±8.9	6.32*	270
Pulses and legumes, g	38.7±4.9	36.5±4.5	1.81^{NS}	41.2±6.7	46.5±7.7	2.84*	60
Green leafy vegetables, g	68.4±5.6	70.5±5.8	1.42^{NS}	75.4±7.5	96.2±12.5	7.81*	150
Roots and tubers, g	155.4±28.1	142.4±26.1	1.85^{NS}	159.3±28.5	145.7±26.8	1.90^{NS}	200
Other vegetables, g	127.3±24.5	131.5±25.3	0.65^{NS}	120.8±23.4	126.4±25.4	1.93^{NS}	200
Fruits, g	110.5±22.7	100±21.8	1.82^{NS}	125±24.8	130.6±25.1	2.86*	200
Milk and milk products, ml	400±55.8	410.5±56.5	0.72^{NS}	420.4±58.9	450±63.6	1.97*	500
Fats and oil, g	40.5±3.8	42.4±5.1	1.63^{NS}	41.2±3.6	41.8±4.8	1.65^{NS}	30
Sugar and jaggery, g	16.2±2.5	16.5±3.2	1.10^{NS}	17.3±2.9	18.2±2.3	1.11^{NS}	20

Values are Mean ± SD (ICMR, 2010)

* indicates significance of value at P=0.05 level of significance NS=Non-significant

to 15.63±4.84 mg whereas the mean intake of iron in the experimental group increased from pre intervention (17.66±4.96 mg) to post intervention period (19.85±6.54 mg) indicating a significant (P≤0.05) impact of nutrition counselling on the intake of iron in the experimental group. Grieger and Clifton (2014) reviewed that consumption of whole foods such as fruit, vegetables, low-fat dairy and lean meats throughout pregnancy appears beneficial for appropriate birth weight. Intervention studies with an understanding of optimal dietary patterns may give promising results for both maternal and perinatal health.

Additionally, weight of the mother was also recorded at an interval of 1 month through a period of 5th to 9th month of pregnancy to record the gain in body weight (Table 4). Though weight gain of subjects in the experimental group was significantly (P≤0.05) higher during 8th and 9th month of pregnancy. Ota *et al.* (2011) reported that the risk of adverse birth outcomes is increased in women with both low preconception BMI and inadequate gestational weight gain (GWG). Table 5 indicated that majority of the selected pregnant women were moderately anaemic. The haematological status of pregnant women in experimental group revealed a significant (P≤0.05) increment in haemoglobin level *i.e.* 9.22±0.75 g/dl prior to intervention to 10.19±0.85 g/dl. Godfrey *et al.* (2005) assessed that mothers had thinner skin fold thicknesses with lower haemoglobin, especially over the triceps. Nutrition counselling also had positive effect on haematological status *i.e.* R.B.C, haematocrit and MCHC confirming the results as predicted by haemoglobin levels. Similar results were observed by Singh *et al.* (2013) that haematological status of pregnant women revealed a significant increment in haemoglobin level *i.e.* 9.48 and 9.35 g/dl prior to intervention to 9.67 g/dl and 9.91 g/dl in food based intervention group (FBIG). Iron intervention also had positive effect on haematological status *i.e.* R.B.C, count, haematocrit, MCV and MCH confirming the results as predicted by haemoglobin levels.

The systolic and diastolic blood pressure of the selected subjects was noted after an interval of 1 month from 5th to 9th month of pregnancy (Table 6). There was significant (P≤0.05) increase in the mean values of systolic and diastolic blood pressure in the 9th month of both the groups. The maximum mean value of the systolic blood pressure in the control group was 113.00±7.94 mm Hg in the 9th month of pregnancy and minimum in the 7th month with 108.93±6.62 mm Hg. The maximum mean value of

Table 3: Impact of nutrition counselling on the mean daily nutrient intake of the selected subjects (n=60)

Nutrient	Control (n=30)		t-value	Experimental (n=30)		t-value	RDA
	Pre intervention	Post intervention		Pre intervention	Post intervention		
Energy, Kcal	1520.56±342.04	1566.56±228.37	0.61 NS	1508.81±327.71	1616.62±309.14	2.04*	2250
Protein, g	42.44±10.02	45.44±11.32	1.08 NS	43.99±10.82	54.72±15.57	3.09*	78
Carbohydrates, g	223.61±76.72	229.90±78.66	0.31 NS	222.69±77.02	247.69±86.13	1.46 NS	340**
Total fat, g	47.52±17.31	48.21±17.48	0.15 NS	48.59±16.63	46.84±16.56	1.92 NS	30 (visible)
β- carotene, µg	3766.6±1807.54	3896.12±1885.35	0.27 NS	3533.4±1778.4	3795.2±1810.2	1.43 NS	6400
Vitamin C, mg	34.25±8.3	34.98±12.1	0.27 NS	36.54±9.6	40.22±11.32	2.35*	60
Folic acid, µg	280.54±61.58	288.41±64.3	1.04 NS	276.52±64.3	301.42±74.3	1.98*	500
Calcium, mg	855.24±192.43	897.34±224.5	0.77 NS	832.54±198.63	902±235.64	3.36*	1200
Iron, mg	16.85±3.64	15.63±4.84	1.1 NS	17.66±4.96	19.85±6.54	2.13*	35

**Based on 60% energy from carbohydrates (ICMR, 2010)

Values are Mean ± SD *indicates significance of value at P=0.05 level of significance NS=Non-significant

Table 4 : Impact of nutrition counselling on the gain in body weight of selected subjects during pregnancy (n=60)

Months of pregnancy	Control (n=30)	Experimental (n=30)	t-value
5th month	1.21±3.83	1.96±5.29	1.07 NS
6th month	3.04±5.71	4.05±5.79	1.16 NS
7th month	5.11±5.04	7.46±7.54	1.74 NS
8th month	7.05±5.21	9.63±5.47	2.22*
9th month	10.04±5.55	12.09±3.37	3.8*

Values are Mean ± SD

* indicates significance of value at P=0.05 level of significance NS=Non-significant

the diastolic blood pressure in the control group was 77.00±7.50 mm Hg in the 8th month of pregnancy whereas in the experimental group the highest mean value of systolic blood pressure was in the 9th month with 114.33±8.58 mm Hg and lowest in 6th month with 110.17±8.35 mm of Hg. Ekezie *et al.* (2011) reported that the overall rate of obesity and hypertension in the urban sample is slightly higher (22.5%) than the rural (20.5%). The maximum diastolic blood pressure was in the 7th month with 77.33±5.83 mm Hg while minimum mean value was found in the 5th month with 75.73±7.70 mm Hg. However, the blood pressure falls in the normal range throughout the observed period. A review by Hofmeyr *et al.* (2010) assessed 13 trials and showed that calcium supplementation during pregnancy reduced the occurrence of gestational hypertension by 35 per cent.

Table 5 : Impact of nutrition counselling on the haematological parameters of the selected subjects (n=60)

Blood analysis	Standard	Control (n=30)		t-value	Experimental (n=30)		t-value
		Pre intervention	Post intervention		Pre intervention	Post intervention	
Haemoglobin (g/dl)	11-14	9.13±0.61	9.45±0.62	1.91^{NS}	9.22±0.75	10.19±0.85	4.68*
Red blood cell count (x$10^6$$mm^3$)	3.5-4.5	3.65±0.24	3.77±0.32	1.64^{NS}	3.68±0.26	3.91±0.41	2.59*
Packed cell volume (PCV) or haematocrit (%)	31-41	29.67±2.83	30.11±2.70	0.61^{NS}	29.99±2.79	32.5±2.75	3.51*
Mean corpuscular volume (MCV) (fl)	85-97.8	81.57±4.7	82.41±3.87	0.75^{NS}	83.51±4.2	85.48±4.91	1.67^{NS}
Mean corpuscular haemoglobin concentration (MCHC) (g/dl)	32-36	29.65±1.75	29.78±1.75	0.28^{NS}	28.99±1.45	32.21±2.23	5.63*

Values are Mean ± SD #Ghanavati *et al.* (2009)
* indicates significance of value at P=0.05 level of significance NS=Non-significant

Table 6: Impact of nutrition counselling on the blood pressure of the selected subjects during pregnancy (n=60)

Blood pressure	Control (n=30)	Experimental (n=30)	t-value
Systolic BP, mm Hg			
5th month	111.6±8.7	112.40±8.16	0.368^{NS}
6th month	110.67±8.28	110.17±8.35	0.233^{NS}
7th month	108.93±6.62	112.00±8.87	0.519^{NS}
8th month	112.00±8.05	112.67±8.68	0.309^{NS}
9th month	113.00±7.94	114.33±8.58	1.983*
Diastolic BP, mm Hg			
5th month	73.33±7.11	75.73±7.70	1.25^{NS}
6th month	76.63±8.05	76.00±8.14	0.301^{NS}
7th month	76.10±7.17	77.33±5.83	0.73^{NS}
8th month	77.00±7.50	76.33±7.65	0.343^{NS}
9th month	75.00±7.77	76.33±6.69	2.71*

Values are Mean ± SD Normal range: 120/80 mm Hg (WHO, 2002)
* indicates significance of value at P=0.05 level of significance NS=Non-significant

Table 7: Mean anthropometry and proportionality of neonates of the selected subjects (n=60)

Particulars	Control (n=30)	Experimental (n=30)	t-value
Weight (g)	2302.7±200.50	2639.00±362.00	5.775*
Crown heel length (cm)	44.23±2.87	48.37±3.85	4.722*
Head circumference (cm)	32.05±1.13	33.02±1.30	3.084*
Chest circumference (cm)	30.87±0.95	32.45±1.33	2.901*
Mid arm circumference (cm)	8.11±0.64	8.85±0.77	4.049*
Mid-thigh circumference (cm)	11.59±0.76	13.12±1.12	6.191*
Abdominal girth (cm)	31.52±1.29	32.35±1.35	2.435*
Ponderal index	1.98±0.31	2.35±1.32	2.36*

Values are Mean ± SD
* indicates significance of value at P=0.05 level of significance

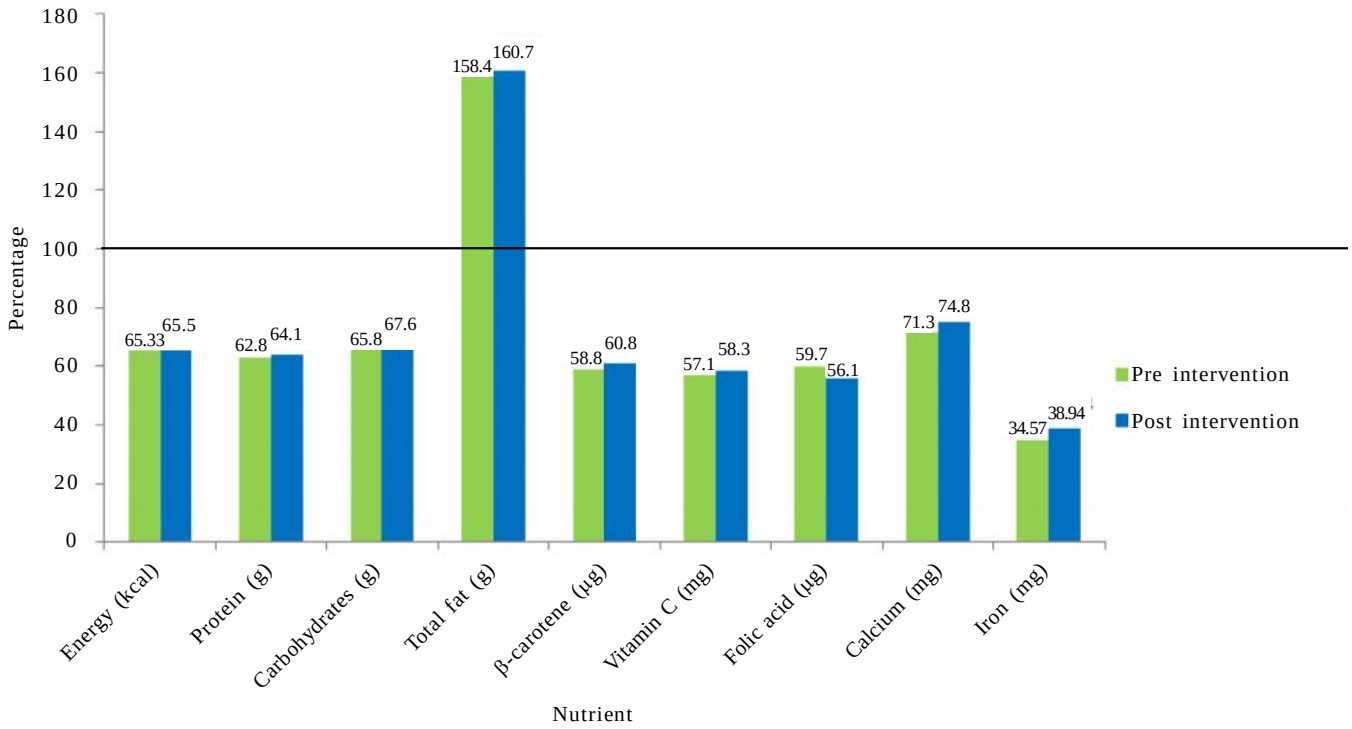

Fig. 1 : Control

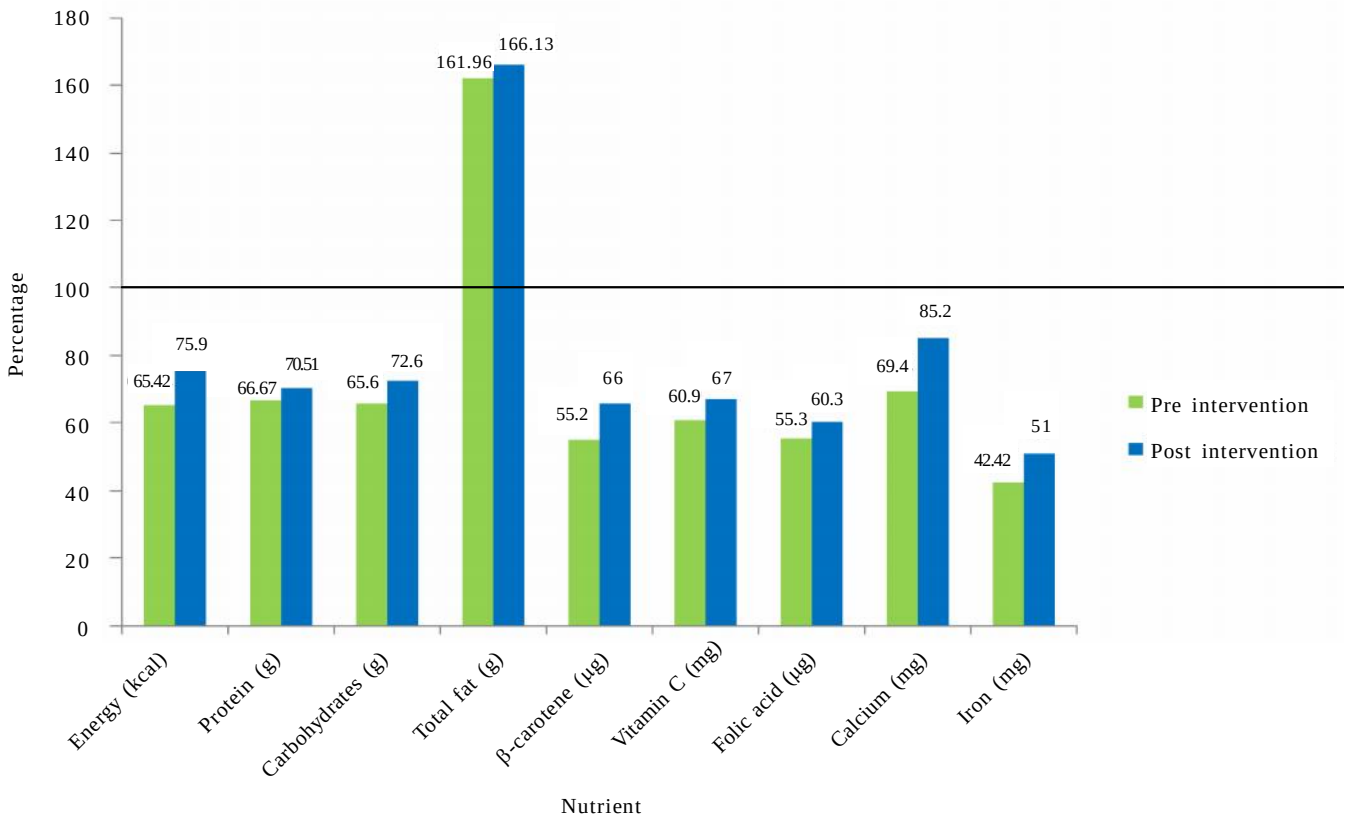

Fig. 2 : Experimental

All the anthropometric indices of the neonates (Table 7) in the experimental group were significantly ($P \leq 0.05$) higher than the control group with mean values as birth weight (2639.00±362.00 vs 2302.7±200.50 g) and crown heel length (48.37±3.85 vs 44.23±2.87cm) whereas the mean value for head circumference, chest circumference, mid upper arm circumference and mid thigh circumference were 33.02±1.30 vs 32.05±1.13cm, 33.45±1.33 vs 30.87±0.95cm, 8.85±0.77 vs 8.11±0.64cm and 13.12±1.12 vs 11.59±0.76 cm, respectively. Potdar *et al.* (2014) who reported in babies whose moms began supplementation before pregnancy (per-convention examination), birth weight was higher in the treatment amass.

However, the mean values of abdominal girth in both the groups were within the standard range *i.e.* 31-33 cm while the values of ponderal index were lower than the normal range (2.5-3) in control group and within the range in experimental group. Datti (2015) concluded that the Hausa neonate had mean birth weight (BW) of 3.37kg±0.5cm and birth length (BL) of 49.17±2.06 cm, whereas the mean value for head circumference (HC), chest circumference (CC), mid upper arm circumference (MUAC), hand length, hand breadth, foot length and foot breadth were 35.39 ± 1.80cm, 34.28 ± 2.40cm, 11.02 ± 0.80cm, 6.55 ± 0.65cm, 3.86 ± 0.39cm, 7.96 ± 0.74, 3.82 ± 0.42, respectively.

Conclusion :

Maternal nutritional status showed momentous association with health of the newborns. Therefore, all the pregnant women if given proper guidance and nutrition counselling regarding dietary pattern, food choice, cooking practices and lifestyle modifications can make significant improvements in their nutritional status. Nutrition counselling is of utmost importance in uplifting the nutritional status of the mother during pregnancy and should be considered a part of the multiple strategy community intervention.

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