ASSESSMENT OF MATERNAL NUTRITIONAL STATUS IN RELATION TO COURCE AND OUTCOME OF PREGNANCY

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The maternal nutritional and health status is an important determinant of child's growth and development from conception onwards. Dietary inadequecies during pregnancy and lack of economic, resource contributes to a high neonatal morbidity and low birth weight in India. Average birth weight of infants born to undernourished women was found lower by 500g compared to those born to well nourished mothers. LBW infants demonstrated growth retardation upto 10 years and deficit in catch up growth persisted upto 14 years, even on provision of ideal environment and nutrition inputs[4]. In the womb fetus gets nutrition through placenta. It is an oval, spongy structure, 6" to 7" in diameter and weighs nearly 500 gms. The placenta functions as a regulator for transfer of nutrients depending on the nutrients available in the blood stream of the mother. It is also capable of synthesizing some body compunds. Undersnourishment of the mother leads to smaller placental size and thus there are fewer cells available for the transfer of oxygen, nutrients etc to the fetus, leading to lower birth weight. In such a case, placenta is also not fully capable of disposing toxic substances[7]. Keeping all these facts in mind, present study was undertaken with an aim to find out the effect of maternal nutritional status on course of pregnancy measured in terms of gestational term and weight gain, placental weight and diamter and outcome of pregnancy measured in terms of neonatal weight and length.

Materials and Methods-The study was preceded with the selection of 300 sample pregnant women through purposive sampling method from Antenatal/ obstetric clinics and hospitals, at the 3rd trimester of pregnancy. For the collection of data regarding consumption of different food itesm, a 24 hour dietary recall survey was carried out. The food and nutrient intake of subjects was assessed using a food frequency and amount questionnaire. The usual frequency and/or amount of consumption of specific items of food and drinks, including dietary supplements such as mineral, vitamin drops etc were noted carefully. The questionnaire consisted of two components - a food list and a frequency response to report how much each food was eaten during the day. Food models and series of photographs were used to help in quntify the amount of food consumed and portions weight were derived from the known weights of the portions portrayed in the photographs and/or from weighing duplicate portions of the items consumed. the nutritive value of the consumed foods was calculated using food composition table.

Height and weight of mother and baby was taken through respective standard procedures. Weight gain during pregnancy and term at delivery were taken from hospital records. Placental measurements were made within an hour of the delivery. Weight was taken by placing it on a calibarated weighing machine. For the measurement of placenta a non stretchable inch tape was placed stiffly along its periphery and crosswise without stretching or shrinking it. The observation of clinical mainfestations of nutrient deficiency was done as per ICMR clinical examination performa and classification of them was made through suggested guide of FAO/WHO/UNU expert comittee for interpretation of clinical signs. Haemoglobin was estimed through cyanmethamoglobin method. Mean and Standard Deviation, frequencies distribution and percentage, Chi-suare and 't' test and Correlation were used in making inferences. (See Table-1)

Table no. 1 clearly indicates that the mean age (24.60 + 3.54 yr), mean height (153.57+ 4.39 cm) and mean BMI (21.02 + 2.57) of the pregnant women were found within the normal recommended range. The mean weight of the pregnant women (49.32 + 6.77 kg) on the onset of pregnancy was slightly lesser than the normal reference weight for Indian non pregnant women (ICMR). Similar features were observed in case of course of pregnancy, as the mean term of pregnancy (39.29+1.29 wk), mean placental weight (498.86+64.45 gm) and mean placental diameter (19.89+11.73 cm) all were within the normal desirable values whereas only the maternal weight gain was slightly lesser than the normal recommended value. Furthermore, both the indicators of outcome of the pregnancy i.e. mean legnth of the neonate (50.25+6.04 cm) and mean weight of the neonate (2.90+0.44 kg) were also found within the normal desirable values. Above table awfully indicates that the observed mean blood heamoglobin levels of the studied pregnant women lied below WHO desirable level. (See Table-2)

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The table - 2 is clearly indicating that the obtained 'r' value of the correlations in between maternal height and BMI with placental weight, maternal weight and BMI with placental diameter and maternal BMI with length of the neonate were significant. Furthermore, the table reveals that increase in maternal age caused less weight gain, smaller term, low placental weight and diameter and lesser length of the neonate and neonate's weight showed positive correlation with the maternal age. Moreover, maternal height was found positively associated with the course and outcome of pregnancy. The maternal weight prior to pregnancy showed negative correlations with the weight gain and placental diameter; and the maternal BMI showed significantly negative correlation with the diameter of the plaenta while other features of the course and outcome of pregnancy showed reciprocal associations. The maternal hemoglobin status showed significant positive correlation with weight gain and birth weight of the neonate. (See Table-3)

Above table - 3 reveals dietary nutrient intake by the pregnant women. The table shows that the mean energy (1662.42+428.0 kcal), mean proteins (56.23+20.32 gm) and mean calcium (748.03+404.0 mg), mean iron (28.21+9.47 mg), mean vitamin A (526.85+ 483.82 mcg) and mean folic acid (185.76 + 110.52 mcg) intake were reasonably lower than the normal recommended range while the mean fats (54.94+31.29 gm) and mean sodium (2191.0 + 138.28 mg) taken by the pregnant women were found within the normal suggestive limits. (See Table-4) Above table apparently shows that the obtained 'r' values for the correlations in between maternal dietary energy intake with weight gain, term, length and weight of the neonate, proteins, iron and folic acid intake with weight gain, proteins and iron with weight gain and with placental dimaeter and fats with the later only and maternal dietary folic acid intake with weight gain and neonate's length were found statistically significant. Furthermore, the table reveals that among different nutrients the correlation of energy, protein, iron and folic acid is highly significant with the course and outcome of pregnancy.

Discussion-Thus, from the results obtained in this study it is clear that to have a healthy fetus and to get a desirable outcome of pregnancy, it is primary requisite that the mother should have good nutritional status. Researches all round frequently reveal that maternal anthropometry plays prime role in deciding the pregnancy outcome[1, 10]. Percentage of low birth weight babies was found more with maternal weight less than 50 kg[13]. Mother's weight at the term was the best predictor of birth weight, with a correlation coefficient of 0.49. Good weight mothers had higher proportion of new born with recumbent length of more than or equal to 48 cm. Moreover, maternal height of less than 145 cm is a risk factor for the new born[12]. An increased trend in mean birth weight with increasing maternal height was also obtained[14]. Maternal short stature ; low rate of gestational weight gain may lead to shortened gestation by increasing the risk of idiopathic preterm labour.

Nutrient intake value obtained in present study, when expressed in absolute term, describe the inadequate dietary status of the women[3]. Indeed, they do not indicate adequacy of the nutrients in meeting the physiological requirements of pregnancy when expressed in relation to RDA. Studies reported that mean energy, iron intake in acceptable range, mean vitamin A and ascorbic acid, and B complex intake > 100% RDA, while mean calcium intake in low level among their studied pregnant women at Nigeria[11]. Similarly in Gujarati Indian women consumed diet was found low in fat (36% calorie content), higher carbohydrate (60% calories) and fiber content 14.4 gm.[16] Poor nutritional status of pregnant women causes intranutrine growth retardation ending up in a growth retarded women thus forming a vicious cycle through generation[12]

Observations of present study regarding high prevalence of anemia with a low mean Hb level has obvious agreement to many survey studies revealing high occurence of low mean hemoglobin levels of their subject pregnant women[5, 6, 8, 9]. Study on pregnant women who received the iron supplements revealed more weight gain than the control group and even among the supplemented group, the group that had received the Vitamin A and iron recorded maximum weight gain. Even the mean birth weight of the neonate born to control group was only 2.33 kg, which was lower than the birth weight of the newborns of the supplemented groups. Similarly placental weights of the supplemented groups were much higher than the control groups, so also the diameter of placenta[10]. This directly shows that the birth weight is directly related to the weight of placenta. Thus, it is evident that a child's overall development including health and nutritional status is solely/wholly dependent on his/her mother's health and nutritional statu4s from inutero to birth. A well nourished healty baby is the outcome of combination of all the above mentioned factors.

Table - 1
Materneal Anthropometric Measurements, Hemoglobin Level Course and Outcome of Pregnancy (Mean +SD)

Variable	Indices	Mean	SD	Desirable Value
Maternal Anthropometrical Status	Age (Yr)	24.60	3.54	>18 - <30
	Height (cm)	153.58	4.39	152
	Weight (kg)	49.32	6.77	50
	BMI	21.02	2.57	16.5 - 25
Biochemical Status	Heamoglobin gm/dl	10.89	1.69	> 11
Course of Pregnancy	Weight gain (kg)	8.36	1.73	9-12
	Term (wk)	39.29	1.29	38-40
	Placental weight (gm)	498.86	64.45	450-500
	Placental diameter (cm)	19.89	11.73	15-20
Outcome of pregnancy	Length of neonate (cm)	50.25	6.04	45-50
	Weight of neonate (kg)	2.90	0.44	2.5-3.2

Table - 2
Correlations ('R' Value) among Maternal Anthropometry, and Hemoglobin level with course and Outcome of Pregnancy

Variable	Maternal Age	Maternal Height	Maternal Weight	Maternal BMI	Maternal Heamoglobin
Weight Gain (Kg)	-.166	.051	-.039	.005	.356*
Term (Wk)	-.020	-.031	.036	.025	-0.85
Placental Weight (gm)	-.006	-.249*	.082	.137**	.238*
Placental Diamter (cm)	-.055	.087	-1.37**	-.0136**	.056
Length of Neonate (cm)	-.026	.012	.063	.109*	.087
Weight of Neonate (kg)	.089	.016	.084	0.86	.057

* Correlation is significant at 0.05 levels (1 tailed)
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Table - 3
Nutrient intake of Pregnant Women (Mean + SD)

Nutrients	Mean	SD	RDA (ICMR)	RDA %
Energy (Kcal)	1662.42	428.00	2175	76.59
Proteins (gm)	56.23	20.32	65	86.15
Total Fats (gm)	54.94	31.29	50-55	102
Calcium (mg)	748.03	404.00	1000	74.8
Iron (mg)	28.21	09.47	38	73.68
Sodium (mg)	2191	138.28	2000-3000	87.64
Vitamin A (Retinol mcg)	526.85	483.82	600	87.66
Folic Acid (mcg)	185.76	110.52	400	46.5

Table - 4
Correlation of Maternal Nutrient Intake with Course and Outcome of Pregnancy

Variable	Energy	Proteins	Fats	Calcium	Iron	Sodium	Vitamin A	Folic Acid
Weight Gain (Kg)	.132*	.130*	.020	.064	.374**	-.013	.005	0.23**
Term (Wk)	.142*	.016	-.043	-.085	.077	-.023	.016	.046
Placental Weight (gm)	-.043	-.034	-.016	0.081	.099*	-.071	0.11	-.028
Placental Diamter (cm)	-.067	-.123*	.097*	0.063	-.004	-.029	0.082	.005
Length of Neonate (cm)	.214**	.077	.041	.014	.042	.038	0.24	.0181**
Weight of Neonate (kg)	.176**	-.022	.045	-.052	-.044	-.020	.041	.091

* Correlation is significant at 0.05 levels (1 tailed)
** Correlation is significant at 0.01 levels (1 tailed)

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