

Nutritional Status of Pregnant Women and Newborns in a Secondary Referral Health Care Setting of India

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ABSTRACT

Background: Maternal nutrition status is an important determinant of pregnancy outcomes since pre-pregnancy underweight has been traditionally considered a risk factor for adverse gestation outcomes. **Objectives:** The current study aims to offer updated information on the nutrition status of pregnant women and newborns to facilitate the development of health care protocols based on current knowledge. **Materials and methods:** The current prospective, observational study of six months descriptively assessed the nutrition status in a cohort sample of 220 pregnant women, in which vital parameters, treatment, laboratory parameters, anthropometric details, food habits and intake were obtained and documented during their regular clinical visits. During the study period all the health information's were documented and assessed. Statistical tool used was WHO Nutri Survey 2007 calculator. **Results:** The study observed nearly 80.45% of pregnant women were within age group of 20–30 years, illiteracy population was 35.45%. In our study, 78.19% of pregnant women were anaemic, and an overall distribution of 60.45% pregnant women within BMI of 18.5-25. In the present study the mean \pm SD calorie and protein intake of the study subjects per day was found to be 1839.8 ± 250.2 Kcal and 63.1 ± 7.2 g. The prevalence rate of low birth weight during the study period was 87.43%. **Conclusion:** Low birth weight in India has been attributed to widespread maternal undernutrition. A better understanding of the relationship of birth size to maternal nutrition is critical for planning effective intervention to improve birth weight in Indian babies unless we perform extensive researches.

Key words: Pregnant women, Newborns, Nutritional status, Maternal nutrition, Undernutrition, Low birth weight, Anaemia.

INTRODUCTION

Maternal nutrition and health is considered as the most important regulator of human fetal growth. Improved maternal nutrition has been associated with increased fetal growth and a reduction in adverse birth outcomes in developing countries and in populations with nutrient deficiencies.^{1,2} However, if women are not well nourished, they are more likely to give birth to weak babies resulting in high infant mortality rate.³ At birth, fetal weight is accepted as the single parameter that is directly related to the

health and nutrition of the mother, and on the other hand, is an important determinant of the chances of the newborn to survive and experience healthy growth and development. This is because low birth weight has been shown to be directly related to both immediate, long-term and very long-term development and well-being.⁴

Nutritional requirements may change based on maternal age, which may impact maternal nutritional status and milk composition

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to varying degrees, especially in adolescent or malnourished mothers.⁵

Breast milk must guarantee the adequate nutrition of the infant as a continuation of intrauterine nutrition, and both the mother's nutritional status as well as her diet may influence breast milk composition and therefore nutrient intake in the infant.⁶ Nutritional requirements are higher in infancy than in any other stage of development, and there is evidence that the composition of breast milk changes with time to adjust to the changing needs of the child.⁷⁻¹⁰ In the event of famines and disasters, and when there is risk of child malnutrition, the approach recommended by the WHO is to support breastfeeding, which guarantees the correct development of the baby, and to supplement the diet of the mother.¹¹⁻¹³

The age, baseline postpartum weight, level of activity and individual metabolism will influence the amount of food each woman needs to consume to achieve an optimal nutritional status and an adequate milk supply. The duration and intensity of breastfeeding also have a significant impact on maternal nutritional requirements, but are rarely taken into consideration.¹⁴

The prevalence of nutrient deficiencies varies based on geographical region, culture, dietary habits and socioeconomic level.¹⁵⁻¹⁸ Under-nutrition in pregnant women is associated with a range of detrimental effects to the developing fetus, including intrauterine growth retardation (under-growth) and low-birth weight. Maternal under-nutrition during pregnancy, IUGR and low birth weight are in turn associated with range adverse outcomes for the developing fetus and/or newborn baby, including an increased risk of still birth, premature birth, perinatal mortality, infant neurological, intestinal, respiratory and circulatory disorders, birth defects, underdevelopment of some organs, cretinism and brain damage.¹⁹

Micronutrient status at the time of conception is also determined by historic nutrient consumption, and deficiency in one or more micronutrients can detrimentally affect the health of the mother and her baby.²⁰ Women who experience deficiencies in specific micronutrients before pregnancy generally have an increased risk of iron deficiency anemia,²¹ vitamin B12 deficiency,²² vitamin K deficiency,²³ iodine deficiency,²⁴ zinc deficiency,²⁵ and Magnesium deficiency.

Fetal health risks which arise as a result of deficiency on particular micronutrients includes maternal vitamin D deficiency associated with fetal rickets, maternal folate deficiency associated with an increased risk of neural tube defects in the infant, maternal iodine deficiency is associated with congenital abnormalities, increased

risk of infant mortality, neurological cretinism, mental deficiency, Spastic diplegia and squint, myxoedymateous cretinism and dwarfism, psychomotor effect, maternal zinc deficiency associated with fetal growth retardation and congenital abnormalities.²⁶

Although there is a vast body of literature on the physiology and disease of lactating women, the professionals that care for them often lack adequate knowledge about their nutritional requirements.²⁷ This document aims to offer updated information on the nutrition status of pregnant women and newborns to facilitate the development of health care protocols based on current knowledge in a secondary referral healthcare setting of India.

MATERIALS AND METHODS

The current prospective, observational and descriptive study carried at a 300 bedded secondary care referral healthcare setting in the department of obstetrics and gynaecology, and department of neonatology for a period of six months of a rural and resource limited background of Andhra Pradesh., India. A structured process was followed for obtaining permission from hospital authority by submitting a detailed profoma of the study which includes protocol of study, evidence of critically evaluated biomedical literatures, data collection form, patient informed consent form. After the initial acceptance from the hospital, study was registered in the institutional review board (IRB) of the institution for ethical approval.

A total of 220 pregnant women as participants showing willingness towards the study were included and others were excluded. A documentation from (data collection form) was designed to collect the patient's information which was kept confidential, the information from patients were collected only after explaining the merits and demerits of the study and obtaining their consent for which an informed consent form was designed separately.

After enrolling the pregnant women in to study; vital parameters, treatment, laboratory parameters, anthropometric details, food habits and food intake and cultural beliefs were obtained and documented during their regular clinical visits. Regular monitoring of BMI was done and information's on importance of nutritional values, diet and maintenance methods were recommended. The data collection continues up to delivery of pregnant women and involves the monitoring of newborns BMI values. During the study period all the health information's (progression/issues) were documented and assessed. Statistical tool used was WHO NutriSurvey 2007 calculator.

RESULTS

The study was based on evaluating the nutritional status of 220 pregnant women regularly visiting the department of obstetrics and gynaecology of a secondary referral healthcare setting in a rural, resource limited background of India.

Demographic details of study participants

The study observed nearly 80.45% (177) of pregnant women were within age group of 20–30 years, illiteracy population was 35.45% and 63.63% of study participants were housewives and 22.73% were salaried. In our study, the first pregnancy population was 25.9% and more than 3 pregnancies were 2% and nearly 46.36% of pregnant women presented with normal delivery, results of which are summarized in Table 1. Demographic details of the study participants.

Distribution of study participants based on haemoglobin levels

Table 1: Demographic details of the study participants (N=220)

S.no	Demographic details	Number	%
Age distribution			
1	<20	9	4.1
2	20-30	177	80.45
3	30-40	28	12.73
4	>40	6	2.72
Education qualification			
5	Illiterates	78	35.45
6	Primary school	21	9.54
7	Upper primary school	33	15
8	Matriculation	48	21.82
9	Inter	14	6.36
10	Degree/ B. Tech	15	6.82
11	Other (MBA, MSc)	11	5.01
Employment / Occupation			
12	House wife	140	63.63
13	Salaried	50	22.73
14	Self employed	30	13.64
Parity			
15	0 time	57	25.91
16	1 time	110	50
17	2 times	34	15.45
18	3 times	14	6.36
19	> 3 times	5	2.27
Delivery status			
20	Normal	102	46.36
21	Caesarean	97	44.09
22	Follow of failure	21	9.55

In our study, the pregnant women were grouped as anaemic and non-anaemic based on their haemoglobin levels as per the Indian Council of Medical Research Categories of anemia,²⁸ where we observed 78.19% of pregnant women are anaemic (based on haemoglobin level < 10.9 mg/dL) and 21.81% were non anaemic are summarized in Table 2. Distribution of study participants based on haemoglobin levels.

Distribution of study participants based on BMI and anaemia

Our study observed an overall distribution of 60.45% pregnant women within BMI of 18.5-25, followed by 23.63% women < BMI of 18.5 and 15.91% of women > BMI of 25, in which 64.53% and 45.83% population of women were anaemic and non anaemic within BMI of 18.5-25, results of which are summarized in Table 3. Distribution of study participants based on BMI and anaemia.

Nutritional intake in study participants

Table 4. Nutritional intake of pregnant women with reference to RDA (ICMR), 2009 summarizes the nutritional intake of study participants (pregnant women) per day in comparison to RDA values given as per ICMR 2009, which was found very less in our study.

Distribution of newborns based on body weight

Our study observed 46.36% of normal vaginal delivery, 44.1% of caesarean delivery and 12.27% of follow-

Table 2: Distribution of study participants based on haemoglobin levels (N=220)

S. no	Haemoglobin levels (gm/dL)	Degree of anaemia	Number	%
1	10.0 – 10.9	Mild	59	26.82
2	7.0 – 10.0	Moderate	72	32.73
3	< 7.0	Severe	33	15
4	< 4.0	Very severe (decompensated)	8	3.64
5	> 11.0	Non anaemic	48	21.81

Table 3: Distribution of study participants based on BMI and anaemia

BMI	Anaemic population n = 172		Non anaemic population n = 48		Total n = 220	
	Number	%	Number	%	Number	%
< 18.5	37	21.51	15	31.25	52	23.63
18.5 – 25	111	64.53	22	45.83	133	60.45
> 25	24	13.95	11	22.92	35	15.91

Table 4: Nutritional intake of pregnant women with reference to RDA (ICMR), 2009

S.no	Nutritional intake (Per day)	Study participants (Mean + S.D Values)	RDA values as per ICMR, 2009
1	Energy	1839.8 ± 250.2 Kcal	2100 Kcal
2	Protein	63.1 ± 7.2g	80 g
3	Calcium	760.9 ± 3.4 mg	1300 mg
4	Magnesium	421.3 ± 8.6 mg	450 mg
5	Iron	9.7 ± 3.1 mg	18 mg
6	Zinc	7.1 ± 2.5 mg	15 mg
7	Iodine	102.3 ± 2.5 mcg	150 mcg
8	Vitamin A	4139.5 ± 805.2µg	8000 IU
9	Thiamine	1.02 ± 0.5 mg	1.7 mg
10	Riboflavin	1.2 ± 0.2 mg	2.0 mg
11	Niacin	11.24 ± 3.2 mg	20 mg
12	Vitamin B6	1.2 ± 0.5 mg	2.5 mg
13	Vitamin B12	4.8 ± 0.9 mcg	8 mcg
14	Biotin	221.2 ± 0.8 mcg	300 mcg
15	Vitamin C	52.2 ± 12.5 mg	60 mg
16	Folic acid	211.1 ± 35.2 µg	800 mcg

Table 5: Distribution of newborns based on body weight

S.no	Body weight (in Kilograms)	Number of newborns	%
1.	≤ 1.0	21	10.55
2.	1.1 - 1.5	29	14.57
3.	1.6 - 2.0	90	45.23
4.	2.0 - 2.5	34	17.08
5.	> 2.5	25	12.57
Total	199	100	

up failure. Out of 199 newborns only 12.57% were on normal distribution of body weight (> 2.5 kilograms), results of which are summarized in Table 5. Distribution of newborns based on body weight.

DISCUSSION

Pregnancy is an anabolic process and a woman's normal nutritional requirement increases during pregnancy to meet the needs of the growing fetus and the maternal tissues associated with pregnancy. Since the nutritional status of the expectant mother is one of the most important determinants affecting pregnancy outcomes,²⁹ good maternal nutrition is important for the health and reproductive performance of women and the health, survival, and development of their children.³⁰ The study by Mora and Nestel³⁰ showed that out of 200 million pregnant women each year, many pregnant women in developing

countries suffer from nutritional deficiencies and these nutritional problems affect a woman's and her newborn infant's quality of lives. Therefore to have optimal maternal as well as perinatal outcome, nutrition in pregnancy should be well-maintained. A study on dietary intake of expectant mother revealed that proper dietary balance of mother's diet is necessary to ensure sufficient energy and nutrient intake for adequate growth of the fetus without depleting maternal stores and damaging mother's own tissues to maintain her pregnancy.³¹

Sufficient nutrition intake during pregnancy has enormous potential for promoting the nutritional status of the mother and her child.³²

Our study observed nearly 80% (177) of pregnant women were within age group of 20–30 years; these results supported the work of MB Bellad *et al.* 2012.³³ As far as education level and occupation of study population is concerned, almost one third (35.45%) and two third (63.63%) of the respondents were illiterate and housewives, and our results are supported by the study carried by Yasmeeen Majid Khan *et al.* 2012.³⁴ High prevalence of anaemia (78.19%) was observed in the current study where as Madhavi *et al.* 2011,³⁵ Saxena *et al.* 2000³⁶ and Gautam *et al.* 2002³⁷ observed incidence of 66.67%, 36.1% and 96.5% respectively in their study. In our study, 23.63% pregnant women had BMI less than 18.5 due to rural; resource limited and reduced socioeconomic background. Similar findings were observed in Madhavi *et al.* 2011³⁵ and Saxena *et al.* 2000.³⁶ In the present study the mean ± SD calorie and protein intake of the study subjects per day was found to be 1839.8 ± 250.2 Kcal and 63.1 ± 7.2 g which were lesser than the normal value of 2100 Kcal energy intake and 80 g of protein intake per day as recommended by RDA values as per ICMR 2009 respectively. Similar finding were reported by Sachar *et al.* 2000³⁸ and Metgud CS *et al.* 2012.³⁹ The prevalence rate of low birth weight during the study period was observed to be 87.43%. But, one study done in Ballabgarh had the prevalence rate of LBW as low as 8.8% and another study conducted in West Bengal as high as 31.3%.^{40,41}

CONCLUSION

Augmentation in education and socioeconomic status are the key components of good pregnancy outcome, which are still at dwarf phase and effective antenatal care is lacking among the pregnant women, in rural and resource limited healthcare background for which a structured referral system and increased awareness in women are essential, regarding significance of maternal nutrition and risks of under nutrition. Low birth weight in India has been attributed to widespread maternal

undernutrition. A better understanding of the relationship of birth size to maternal nutrition is critical for planning effective intervention to improve birth weight in Indian babies unless we perform extensive researches. Further, study bearing large number of study subjects shall better give insight regarding the prevalence of malnutrition. It would be even better if ambispective studies are carried out for the development of strong and proper guidelines for the prevention of supremacy in malnutrition

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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ABBREVIATIONS

IUGR: Intrauterine Growth Retardation; BMI: Body Mass Index; WHO: World Health Organization; LBW: Low Birth Weight; Kcal: Kilo calories; IRB: Institutional Review Board; ICMR: Indian Council of Medical Research; RDA: Recommended Dietary Allowances.

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