

Effect of Maternal Nutritional Status on Birth Weight of Baby

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ABSTRACT

Introduction: Low birth weight is associated with increased incidence of new born morbidity and mortality. Aims and objective of the research were to correlate the effect of maternal nutritional status of mother during her pregnancy on baby's birth weight.

Material and methods: The present study was done over a period of one year including 1034 antenatal patients of 28 weeks of gestation at Deptt. of Obstetrics and Gynecology, G R Medical College and JA Group of Hospital, Gwalior. The assessment of nutritional status of all antenatal patients was done by interrogation with a pretested and predesigned structured questionnaire. Hemoglobin level was determined in laboratory. All the patients were followed till term for pregnancy outcome particularly for baby weight.

Results: Most of the women (51.47%) had caloric intake between 1601-1800 Kcal, and 34.04% of patients had protein intake between 51-60 grams. Hemoglobin level was between 9.1-10gm% (44.49%). 61.90% of women who were taking 1401-1600 Kcal/day, delivered baby with weight of \leq 2000 grams; while patients who had total calorie intake above 1800 Kcal delivered baby $>$ 3000 grams. About 42.87% of patients with protein intake of about 70 gm had baby weight \leq 2000 grams while 35.48% had baby weight above 3000 grams with in same group. Most of the patients had haemoglobin level \leq 7.0 gm% had baby weight \leq 2000 grams whereas babies with weight above 3000 grams were delivered by patients with Hb above 10 gm%.

Conclusion: Maternal nutrition had direct effect on birth weight of new born, as less nourished mother are found to deliver higher percentage of low birth weight babies as compared to mother who are well nourished.

Keywords: Maternal nutritional, baby weight, pregnancy, hemoglobin level

INTRODUCTION

Child and mother both are believed as a single unit whether it is socially, culturally or most important biologically. The biologic support which a child receive from its mother in course of its development and growth through pregnancy and lactation, totally depends on the kind of nourishment a mother received during her pregnancy.¹ In developing countries like India, most of the women fall in the reproductive age group of 15-44 years, which constitute 20-22% of whole population. In India, health status of mother in this group decides the health of the society, which finally determine the health of the community.¹

Low birth weight (LBW) infants (bay weight $<$ 2500 g) are at risk of morbidity and mortality at birth and during early days of life. Infant weight is directly linked to status of maternal nutrition. Lower calorie and protein intake by a mother throughout the pregnancy can result in small size of baby.² The present study was done to investigate and correlate the role of calorie and protein intake as well as the level of haemoglobin of mother with baby weight.

MATERIAL AND METHODS

The present prospective study included 1034 antenatal patients of 28 weeks of gestation. The study was done at Dept of Obstetrics and Gynecology, G R Medical College and JA Group of Hospital, Gwalior between September 2004 to August 2005.

A detailed personal history including last menstrual period (LMP), immunization status, previous medical and obstetric history and interval between last births was recorded.

A detailed dietary history by a 24 hour recall method was obtained by interview technique on a pretested proforma. Protein and calorie intake of cooked food of each case was estimated by simple household measures like bowl/Katori, cup and spoon.

In laboratory investigations haemoglobin estimation and urine routine/microscopic (specially urine albumin) were done.

Anaemia was classified as mild (10-11 gm%), moderate (7-10 gm%) and severe ($<$ 7 gm%) as per WHO classification.

All cases registered were from urban area as it was easier to follow them as compared to the rural population.

After registration at 28th weeks of gestation, antenatal follow up was carried out at every two weeks interval i.e. 30, 32, 34, 36, 38 and 40 weeks of gestation. Each time mother's weight and blood pressure were recorded. All cases were followed up till delivery. All deliveries were institutional deliveries and baby weight was recorded soon after birth on an electronic weighing machine by a trained personnel.

Patients who have migrated to some other place and high risk cases except for anaemia were excluded from the present study.

All the data were analyzed using IBM SPSS- ver.20 software. Analysis was performed using chi-square test and independent sample student t test. P values $<$ 0.05 was considered to be significant.

RESULTS

In present study, most [648 (62.70%)] of the women belonged to the maternal age group of 18-25 years followed by 352 (34%) patients who were between 26-30 years of age. Majority of the patients were literate [910 (88.01%)], 41.4 % belonged to socio economic class II and 98.5 % were house wives by occupation.

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How to cite this article: Suman Verma, Rajani Shrivastava. Effect of maternal nutritional status on birth weight of baby. International Journal of Contemporary Medical Research 2016;3(4):943-945.

Parameters		Baby Weight (grams)			
		≤2000 (n=21)	2100-2500 (n=455)	2600-3000 (n=313)	>3000 (n=62)
Caloric Intake (Kcal)*	≤1400	6 (28.57)	0 (0)	0 (0)	0 (0)
	1401-1600	13 (61.90)	176 (38.68)	10 (3.19)	6 (9.68)
	1601-1800	2 (9.53)	259 (56.92)	164 (52.40)	7 (11.30)
	>1800	0 (0)	20 (4.40)	139 (44.41)	49 (79.02)
Protein Intake (gm)#	≤50	3 (14.29)	27 (5.93)	16 (5.11)	0 (0)
	51-60	4 (19.04)	204 (44.84)	65 (20.77)	12 (19.35)
	61-70	5 (23.80)	114 (25.05)	105 (33.55)	28 (45.17)
	>70	9 (42.87)	110 (24.18)	127 (40.57)	22 (35.48)
Hb (gm%) ^s	≤7	7 (70)	3 (30)	0 (0)	0 (0)
	7.1-8	5 (18.52)	21(77.78)	1 (3.70)	0 (0)
	8.1-9	6 (7.23)	68 (81.93)	4 (4.82)	5 (6.02)
	9.1-10	2 (0.53)	232(61.38)	136 (35.98)	8 (2.12)
	>10	1 (0.28)	131(37.11)	172 (48.73)	49 (13.88)

Data is expressed as no of patients (%), ^s $\chi^2=358.22$; $df=12$; $p=0.00001$, # $\chi^2=71.56$; $df=9$; $p=0.000001$, * $\chi^2=588.12$; $df=9$; $p=0.000001$

Table-1: Distribution of different parameters of mother and correlation with baby weight

Distribution of parity revealed that maximum cases were primigravida [491 (47.49%)] followed by 328 (31.72%) patients belong to gravida 2. Most of the primi's [375 (36.27%)] belonged to age group of 18-25 years and also most of multigravida [273 (26.40%)] were in age group of 18-25 years. Most of the cases [502 (48.55%)] were having height between 151-155 cm followed by 270 (26.11%) patients who had height between 146-150 cm. Distribution of patients according to maternal weight (kgs) at last visit revealed that 58.63 % patients were having weight between 51-60 kgs.

In present study, 43.52 % patients gained weight between 3.1 – 4 kg whereas 36.36% patients gained weight more than 4 kgs.

51.85 % patients of age group 18-25 years showed weight gain between 3.1-4 kg, patients of age group 26-30 years had weight gain between 3.1-4 kg and patients of age group 31-35 years had weight gain of more than 4 kg [22 (70.97%)] ($\chi^2=21.23$; $df=6$; $p=0.001$).

In present study, most of the mothers delivered babies with weight between 2100-2500 grams [455 (53.44%)]. 26.3 % patients had inter pregnancy interval > 18 mths.

In present study, most of the women had spontaneous vaginal delivery [667(78.34%)]. Out of 1034 women, only 851 (82.30%) followed up till delivery. Out of these 851 women 846 (99.4%) delivered live babies, while 5(0.6%) delivered still born babies.

Most of the women reported caloric intake between 1601-1800 Kcal [535 (51.47%)] followed by 249 (24.08%) patients who had caloric intake between 1401-1600 Kcal.

Most of the patients were having protein intake between 51-60 grams [352 (34.04%)] followed by 321 (31.04%) patients had protein intake more than 70 grams. Most of the women had Hb between 9.1-10gm% [460 (.44.49%)] and 13(1.26%) patients were having Hb of 7 gm%.

DISCUSSION

Low birth weight (LBW) is associated with increased risk of new born morbidity and mortality.³ Women who is well nourished during her pregnancy can easily fulfill the demand

of growing fetus. Well nourished fetus will result in to a healthy baby with optimum body weight. Hence it is essential that mother's diet must contain adequate nutrients during her pregnancy so that chances of LBW baby can be avoided.⁴ Present study had showed that current nutritional status of women as indicated by calorie intake is directly related to birth weight of the baby. Total caloric intake between 1601-1800 Kcal was recorded in 51.74% of women while 24.08% and 23.60% of women were taking calories between 1401-1600 and above 1800 Kcal respectively. When calorie intake of mother was correlated with the baby weight, it was found that more than half of patients who were taking calories between 1401 – 1600, delivered baby with body weight of ≤ 2000 grams, while those who were taking > 1800 calories delivered baby with weight > 3000 grams.

Study done by Raman et al reported that inadequate calorie intake can results in LBW babies and even supplementation given for anaemia correction would not be able to increase the birth weight.⁵ Whereas study done by Kennedy et al found that birth weight of baby can be improved with the help of supplementations.⁶ Gaigi et al in their study involving 1233 antenatal patients of 28 weeks of gestation did not find any significant relation of baby weight with calorie intake. The reason for non-significant relation was not explained by the author.⁷

The present study has observed a direct relation between protein intake and baby weight but with protein intake more than 70 g daily had not shown any further significant increase in baby weight rather it resulted in baby weight reduction. Rush et al did a similar study and reported that high protein intake might reduce the baby weight.⁸

In present study, 34.04% patients were consuming 51-60 grams of protein daily while 31.04% had above 70 grams of protein intake. About 42.87% of patients with total intake above 70 gm had baby weight ≤ 2000 grams while 35.48% had baby weight above 3000 grams with in same group.

Rama et al reported a decrease in abortions, preterm deliveries and still births with increase in dietary protein.⁹ Raman et al also reported that protein consumption in the range of

30-50% of total diet would reduce chances of LBW babies.⁵ In Asian countries like India pregnancy induced anaemia is most common complication. Dickman et al also reported a reduction in haemoglobin level by 20% between 16th and 35th weeks of pregnancy.¹⁰ Reports have shown that severe anaemia can lead to low birth weight.³

In present study 44.49% of patients had haemoglobin level between 9.1-10 gm% and there was an inverse relationship between age and parity with haemoglobin level. But haemoglobin level has direct relation with baby weight. Most of the patients who had haemoglobin level ≤ 7.0 gm%, had baby weight ≤ 2000 grams whereas babies with weight above 3000 grams were delivered by patients with Hb above 10 gm%.

Amosu et al did a study on 512 patients and reported that mothers with haemoglobin level less than 7 g% found to have 9.96% incidence of LBW whereas incidence of LBW was only 0.59% with mother having haemoglobin level of more than 10 gm %.³

Gogoi et al in their study observed that 50-60% of the women had nutritional anaemia in later months of pregnancy. Studies have recommended that haemoglobin level of normal women should be around 80% in order to avoid complication.¹

Giles et al reported a progressive fall of haemoglobin level during the course of pregnancy, the magnitude of fall was influenced by age and parity to a lesser extent.¹¹

CONCLUSION

Present study has found that nutritional status (calorie, protein and haemoglobin level) of mother can significantly influence the weight of the new born baby and may lead to LBW. Poorly nourished mother were found to deliver LBW babies as compared to women who were better nourished.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 05-02-2016; **Published online:** 06-03-2016