

## Birth Weight of Newborn In Relation To Maternal Weight Gain and Hemoglobin Level

Dr. Nainy Singh<sup>1\*</sup>, Prof (Mrs) Pooja Talikoti<sup>2</sup>, Dr. Meenakshi Agarwal<sup>3</sup>

### ABSTRACT

Adolescent nutrition is therefore important for supporting the physical growth of the body and for preventing future health problems. For many adolescents, inadequate quality and quantity of food are the prime determinates of nutrition problems. Micronutrient malnutrition and chronic energy deficiency resulting in thinness (low body mass index or BMI). The marriage of girls at young ages in India leads to teenage pregnancy and motherhood. Young women, who become pregnant and have child births, experience a number of health, social, economic, and emotional problems. For the present study, the hospital located at Sanganeri gate Jaipur (Mahila zila chikitsalya) was selected. Present study indicates that there is positive relation between BMI of respondents and birth weight of their newborns ( $p < 0.05$ ). Birth weight of the infant is directly related with maternal weight gain and BMI. In the present study 70% of the respondents were anemic. Severe anemia was found to be 3%, which is a serious finding and this can lead to maternal and neonatal morbidity. Current study showing that, hemoglobin level of the respondents has direct impact on birth weight of new born. Babies of anemic mothers tend to be of LBW ( $p < 0.001$ ). Adolescent girls as such suffer from mild to moderate anemia. Added to this, adolescent pregnancy can become a threat to her life. Hence, there is a need for educating adolescent girls on harmful effect of teenage pregnancy and also the importance of IFA supplementation, not only during adolescence but also in pregnancy. Thus, the findings show that the entire health and nutritional factors are inter-related.

**Keywords:** BMI, Pregnancy Induced Hypertension, Intra Uterine Growth Retardation, Anemia.

Adolescence is the transition period between childhood and adulthood, a window of opportunity for the improvement of nutritional status and correcting poor nutritional practices. This is about the same period puberty sets in, typically between the ages of 10 and 13 years in girls. Adolescence is characterized by the growth spurt, a period in which growth is very fast. During

<sup>1</sup> Lecturer Department of Home Science V.M.L.G PG Girls College Ghaziabad, India

<sup>2</sup> H.O.D Department OF Home science University Of Rajasthan, Jaipur, India

<sup>3</sup> MS Gynecologist senior consultant Brijesh hospital Ramnagar U.K.

\*Responding Author

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this time, physical changes affect the body's nutritional needs, while changes in one's lifestyle may affect eating habits and food choices. Adolescent nutrition is therefore important for supporting the physical growth of the body and for preventing future health problems. For many adolescents, inadequate quality and quantity of food are the prime determinates of nutrition problems. These conditions may be due to household food insecurity, intra household allocation of food that does not meet their full range of dietary needs, livelihoods insecurity and lack of nutrition knowledge. Micronutrient malnutrition and chronic energy deficiency resulting in thinness (low body mass index or BMI). BMI is a measure of thinness in adolescents and adults; it is equal to a person's weight in kilograms divided by height in meter<sup>2</sup> or  $[\text{kg}/(\text{m})^2]$  and stunting stem primarily from poor diet. Excessive physical activity patterns (e.g. heavy workloads and walking long distances) and infection may also contribute to under nutrition.

In recent decades adolescent pregnancy has become an important health issue in a great number of countries, both developed and developing. However, pregnancy in adolescence is by no means a new phenomenon. In large region of the world, age at marriage has traditional been low in kinship based societies and economies. In such cases most of the girls married, soon after menarche, fertility was high, and consequently many children were born from adolescent mothers.

The major problems related to adolescent pregnancy are the high incidence of health problems in the babies (low birth weight and prematurity) and the impact of the pregnancy and parenthood on the mother's educational and economic future.

The marriage of girls at young ages in India leads to teenage pregnancy and motherhood. Young women, who become pregnant and have child births, experience a number of health, social, economic, and emotional problems. In addition to the relatively high level of pregnancy, there are complications among young mothers because of physiological immaturity; inexperience associated with child care practices also influences maternal and infant health. Moreover, an early start to childbearing greatly reduces the educational and employment opportunities of women and is associated with higher level of fertility.

The increase in plasma volume and the subsequent decrease in hemoglobin concentration and hematocrit in normal pregnancy complicate the assessment of anemia. WHO defines the minimum hemoglobin concentration in normal pregnant women as 11.0 g/dl, the minimum hematocrit level is 0.31 g/dl.<sup>(1)</sup> In fact there are good reasons to set the minimum hemoglobin value somewhat lower than 11.0 g/dl because hemodilution in normal pregnancies may decrease this level to 10.4 g/d. Severe anemia is hemoglobin <7.0 g/dl.<sup>(2)</sup>

Preterm birth (birth before 37 weeks) is a major cause of neonatal death and infant morbidity. Preterm births can be divided into two different groups. The first group comprises births that

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have been preceded by various complications during pregnancy, such as pre-eclampsia, serious fetal growth retardation, placenta praevia, and abruptio placentae. Because of these complications, an indication exists to artificially terminate the pregnancy before a gestational age of 37 weeks; as a consequence the infant is born preterm. The second group of preterm births is those resulting from spontaneous preterm labor, resulting in preterm delivery. Neonatal morbidity here is primarily related to birth. This morbidity includes low birth weight (LBW), but also disease caused by the immaturity of various organs, especially the lungs. The morbidity is more serious if birth occurs at a gestational age of <33 weeks; life-preserving treatment necessitates intensive care, if available.<sup>(3)</sup>

### *Objectives:*

1. To know the presence of nutritional anemia during pregnancy among the respondents.
2. Correlate the birth weight of newborn with maternal weight gain and Hemoglobin level.

## **METHODOLOGY**

### *Locale of the Study*

The hospital is at Sanganeri gate, caters to the patients living within the walled city of Jaipur and outside the walled city. For the present study, the hospital located at Sanganeri gate was selected, as majority of the hospital patients represent heterogeneous groups.

### *Selection of the respondents*

*Inclusive criteria:* 17-19 years of age group.

*Exclusive criteria:* Girls suffering from chronic diseases like coronary heart disease, renal disease, chronic hypertension, diabetes, multiple gestations, were excluded from the study. Considering the inclusive criteria, a total of 100 girls formed the final respondent.

The lady doctor (gynecologist and obstetrician) was contacted and her O.P.D. days were attended by the researcher for the data collection. The selected doctor had O.P.D. for one day per week. The researcher attended the O.P.D. once in a week for a period of 10 months. On an average 2-3 teenage pregnancies per week attended the O.P.D. Thus, the respondents were 8-9 per month and a total of 100 respondents formed the study group.

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### *Tools for the data collection*

*Table 1. Details of the selected variables*

S. No.	Variable	Tools used to measure variable
1.	Nutritional assessment (a) Height (b) Weight (c) BMI	Microtoise heightometer Calibrated libra bathroom scale Standard formula
2.	Nutritional problems and complications during pregnancy	Case file/records maintained at the hospital.
3.	Outcome of the pregnancy in terms of birth weight of new born	Hospital records

### *Procedure to Measure the Variables*

#### **Nutritional Assessment**

(a) **Height:** Microtoise heightometer with the sensitivity of 0.1 cm was used to record height. The subject was made to stand below the instrument with heels, buttocks, shoulders and back of head touching the wall and arms hanging at the sides. The head of the subject was positioned at the Frankfurt plane. The head piece was lowered till it made contact with the head, and the height was recorded directly to the nearest completed unit.<sup>(4)</sup>

(b) **Weight:** Calibrated libra bathroom scale with 500 grams sensitivity was used to record the weight. The subject was weighed with minimum clothing. The subject was made to stand bare feet straight in the centre of the machine platform without any support and weight was recorded to the nearest completed unit.<sup>(4)</sup>

(c) **BMI:** BMI was calculated by using the following formula:

$\frac{\text{Weight (kg)}}{\text{Height (mt)}^2}$

Weight in kg divided by height (mt)<sup>2</sup>.<sup>(4)</sup>

**Interpretation of BMI:** The BMI was calculated as per the following nutritional grade.

- **Hemoglobin estimation:** Hemoglobin estimation was done by the Sahli's method, where the subjects were classified according to severity of anemia.

Birth weight is an important indicator of a child's vulnerability to the risk of childhood illness and chances of survival. Children whose birth weight is less than 2.5 kilograms, or children reported to be 'very small' or 'smaller than average' are considered to have a higher than average risk of early childhood death. Maternal nutrition is one of the important factors in the outcome of pregnancy in terms of birth weight. Hence, in the present study one of the objectives was to record the birth weight of the new born. The weights of the new born was collected from the hospital records and were further classified into low birth weight, having less than 2.5 kg and normal weight i.e. 2.5 kilograms or more than 2.5 kilograms.

**RESULTS AND DISCUSSION**

The collected data was tabulated and the results obtained are presented under the following table.

**Table 2. Anthropometric measurements of the respondents (N=100)**

Age (17-19) years	Height (cm) Mean±SD	Weight (kg) Mean±SD	BMI Mean±SD
Observed value	155.55±3.24	50.31±8.70	*19.53±2.42

\*BMI of the respondents in their 2<sup>nd</sup> or 3<sup>rd</sup> trimester.

**Anthropometric measurement:** In the present study two indicators of nutritional status were taken i.e. height and BMI. The height is an outcome of several factors, including nutrition during childhood. Women's height can be used to identify women at risk of having a difficult delivery, since small stature is often related to small size of pelvis. The risk of having a baby with a low birth weight is also higher for mothers who are short. The cutoff point for height, below which a woman can be identified at risk, is 145 cm. In the present study all the respondents had mean height of 155.55 cm ±3.24.

The height and weight measurements are used to calculate the BMI. The BMI is defined as weight in Kg's divided by height in meter<sup>2</sup> (kg/m<sup>2</sup>). A cutoff value 18.5 is used to defined thinness or acute under nutrition in non pregnant females. In the present study though the BMI has been calculated, but comparative study could not be done, because standard BMI in different trimesters of adolescent pregnancies for Indian adolescent girls is not available. However, one of the striking features is that as per National Academy of Science (NAS, 1990).<sup>(5)</sup> standards for pre-pregnancy less than 19.5 are considered as low BMI. In the present study the mean BMI was 19.53±-2.42, in their 2<sup>nd</sup> /3<sup>rd</sup> trimester. This clearly shows that these adolescent girls had a very low BMI prior to pregnancy. Thus the respondents in the present study had chronic energy deficiency and higher prevalence of nutritional deficiencies.

**Table 3: Relation between BMI and birth weight of the newborn**

Mean birth weight of newborn	Mean BMI	Pearson Correlation (r)	p value
2.6±0.35	19.53±2.42	0.375	0.001

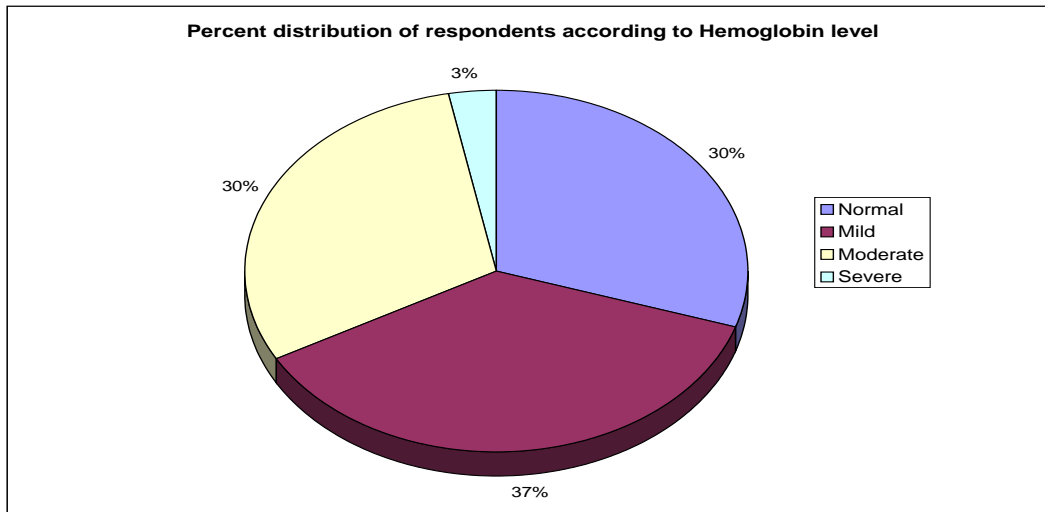
Present study indicates that there is positive relation between BMI of respondents and birth weight of their newborns (p<0.05). Birth weight of the infant is directly related with maternal weight gain and BMI <sup>(6)</sup>. Among the maternal factors: maternal malnutrition including maternal weight (<45kg) maternal height (<145cm) and BMI (< 18.5) were significantly associated with IUGR. <sup>(7) (8)(9)(10)</sup>

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**Table 4: Percent distribution of respondents according to Hemoglobin level (N=100)**

Grade	Hb level(gm/dl)	Percentage
Normal	≥11	30%
Mild	9-10.9	37%
Moderate	7.1-8.9	30%
Severe	≤7	3%

(Source: WHO, 2000)



In the present study 70% of the respondents were anemic although they regularly collected IFA tablets given at the antenatal clinic. This reflects that, just distribution of IFA tablets is not enough, and promotion of IFA tablets consumption should be encouraged. Moreover, severe anemia was found to be 3%, which is a serious finding and this can lead to maternal and neonatal morbidity.

**Table 5: Relation between hemoglobin and birth weight of the new born**

Mean birth weight of newborn	Mean hemoglobin	Pearson correlation (r)	p value
2.6±0.35	9.90±1.36	0.401	0.001

Current study showing that, hemoglobin level of the respondents has direct impact on birth weight of new born. Babies of anemic mothers tend to be of LBW ( $p < 0.001$ ). Among teenagers anemia was found to be a significant health problem<sup>(11)</sup>. The prevalence of anemia was quite high in teenage pregnancy<sup>(12)(13)(14)</sup>. In India, anemia is directly responsible for 40 percent of maternal deaths; maternal anemia is associated with poor intrauterine growth and increased risk of preterm births and low birth weights<sup>(8)</sup>. Anemia was the major indirect cause of maternal mortality.<sup>(16)</sup>

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Adolescent girls as such suffer from mild to moderate anemia. Added to this, adolescent pregnancy can become a threat to her life. Hence, there is a need for educating adolescent girls on harmful effect of teenage pregnancy and also the importance of IFA supplementation, not only during adolescence but also in pregnancy.

Thus, the findings show that the entire health and nutritional factors are inter-related. Good maternal nutrition coupled with regular ANC's, practicing the health and nutritional advice, good weight gain during pregnancy and institutional delivery, in a way can lead to healthy pregnancy and a healthy / normal weight new born. Two or more ANC had significantly lesser number of perinatal deaths as compared to those with one or no ANC. <sup>(17)</sup> Improving the general health and nutrition of the girl child, increasing the age of marriage and subsequent childbearing along with timely and quality ante-natal care reduces the incidence of anemia, PIH, IUGR, fetal loss and LBW babies. <sup>(18)</sup>

### CONCLUSION

Present study clearly reflects that a teenage pregnancy not only results in low birth weight baby, but increased tendency for caesarean section. Hence, there is a need for discouraging the teenage pregnancy through education. Further, there is urgent need for educating the girls on health and nutrition, preparing them for the ideal age of marriage and having first child. Along with the health care (ANC's), nutritional care is also important (maternal nutrition). Both health and nutritional care become complementary to each other, which can result in healthy pregnancy and its outcome.

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### Conflict of Interests

The author declared no conflict of interests.

### BIBLIOGRAPHY

1. Letsky E. The haematological system, In : Hytten F, Chambarlain G (eds.). Clinical Physiology in Obstetrics. Blackwell, Oxford 1991.
2. Van den Broek NR. Anemia in pregnancy in developing countries. Br J Obstet Gynaecol. 1998 ; 105 : 385-390.
3. Cunningham FG, Macdonald PC, Gant NF, Leveno KJ, Gilstrap LC, Hankins GDV, Clark SL. Williams Obstetrics, 20<sup>th</sup> edition, Stamford, Appleton 1997.
4. Bamji MS, Rao NP, Reddy V. 1998. Nutrition in pregnancy and lactation. Text book of Human Nutrition: New delhi, Oxford & IBH Publishing Co.Pvt.Ltd

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5. National Academy of Science (1990): Committee on Nutritional status during pregnancy and lactation, food and nutrition board: Nutrition during pregnancy, Washington, DC, National Academics Press.
6. Verma A, Santosh M, Anupa A. A study on maternal mortality. J Obstet Gynecol India.2008; 58(3): 226-232.
7. Acharya D, Nagraj K, Nair NS, Bhatt HV. Maternal determinants of intrauterine growth retardation: A case control study in Udupi District. Indian Journal of Community Medicine. 2004; 29 (4): 181-182.
8. Kalaivani K. Prevalence and consequences of anemia in pregnancy.Indian J Med Res. 2009; 130(5) : 627-633.
9. Parvathi M, Begun K. Dietary intakes, anthropometric measurements and pregnancy outcome among women from low income families. The Ind J Nutr. Dietet. 2007; 44: 484-491.
10. Sangha J, Mehta J, Kaur N. Impact of haematological profile of teenage punjabi mothers on anthropometric. Profile of Neonates. Ind. J. Nutr Dietet. 2011; 48:428-438.
11. Thekkekkara T, Verma J. Teenage pregnancy: a comparative study of the outcome and complications.J Indian Med Assoc. 2009; 107(1): 34-50.
12. Banerjee B, Pandey GK, Dutt D, Sengupta B, Mondal M, Deb S. Teenage pregnancy: A socially inflicted health hazard. Indian Journal of Community Medicine. 2009; 34 (3): 227-231.
13. Kafle PP, Pakuryal KN, Regmi RR, Luintel S. Health problems and social consequences in teenage pregnancy in rural Kathmandu Valley. Nepal Med Coll J. 2010; 12(1) : 42-44.
14. Mahavarkar SH, Madhu CK, Mule VD. A comparative study of teenage pregnancy. J Obstet Gynaecol. 2008; 28 (6): 604-607.
15. Kalaivani K. Prevalence and consequences of anemia in pregnancy.Indian J Med Res. 2009; 130(5) : 627-633.
16. Verma A, Santosh M, Anupa A. A study on maternal mortality. J Obstet Gynecol India.2008; 58(3): 226-232.
17. Sinha S. Outcome of antenatal care in an urban slum of Delhi. Indian Journal of Community Medicine.2006; 31(3): 189-191.
18. Saxena P, Salhan S, Chattopadhyay B, Kohli MPS, Nandan D, Adhish SV. Obstetric and perinatal outcome of teenage and older primigravida – A retrospective analysis. Health and population: Perspective and issues. 2010; 33 (1), 16-22.

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