

Relationship of Maternal Nutrition, Education, Ordinal Position and Socioeconomic Status with Birth Weight of Young Children

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Abstract

Introduction: Sustainable Developmental Goal 3 aims to reduce the under-five mortality to as low as 25 per 1,000 live births. Low birth weight is among the major determinant of perinatal and infant mortality and morbidity and is also a leading cause for the global burden of diseases (Risnes *et al.*, 2011; Forouzanfar *et al.*, 2016). The correlation between socioeconomic status (Martinson & Reichman, 2016), maternal education (Rahman *et al.*, 2016) and maternal anemia (Haider *et al.*, 2013) with low birth weight is well recognized.

Aim: The present study was done in Jaipur City to study the role of maternal nutrition, education and socioeconomic status on birth weight of children.

Methodology: Three hundred and thirty seven infant and mother duos were selected based on a baseline survey at vaccination centre of JK Lon Hospital Jaipur. An interview schedule was developed and pre tested to collect information from the women under study.

Results: The average age of mothers was 27.3 ± 4.8 years. The mean gestational weight gain and mean Hb status across SES was observed to be 5.11 ± 4.29 kg low SES, 7.96 ± 4.39 kg middle SES, 12.22 ± 5.76 kg high SES and 9.64 ± 2.0 g/dl, 10.43 ± 1.8 g/dl, 11.37 ± 1.7 in low, middle and high SES. The birth weight also followed similar increasing trend with 2.41 ± 0.62 kg in low, 2.70 ± 0.61 kg in mid and 2.84 ± 0.53 kg in high SES. The birth weight in both the genders were significantly associated with the maternal health parameters like their gestational weight gain, hemoglobin levels, maternal education, ordinal position of the child and also the socio economic status at ($p < 0.001$).

Conclusion: The birth weight of the infants depends on not only the nutritional status of the mother, but is also related to her education and socioeconomic status.

IndexTerms - Maternal Nutrition, Infant and Young Child Feeding, Birth Weight, Anemia, Gestational weight, Socioeconomic Status

Introduction

Goal number 3 of Sustainable Developmental Goals aims “to reduce under-five mortality to at least as low as 25 per 1,000 live births”. The estimated numbers of children under 5 years of age that will not grow to their optimal potential are more than 200 million in developing countries (Grantham-McGregor, Cheung & Cueto, 2007). Fifty two million children around the world are wasted or severely wasted due to undernutrition. They contribute to 45% of deaths in under five adding to 3.1 million children per year (UNICEF, 2018).

Birth weight lower than 2500g is termed as low birth weight (LBW) (WHO, 2014), having lower weights at birth is a major determinant of perinatal morbidity and mortality, the infants are also at risk. LBW is also one of the leading causes for the global burden of non communicable diseases (Risnes *et al.*, 2011; Forouzanfar *et al.*, 2016). The correlation between socioeconomic status (Martinson & Reichman, 2016), maternal education (Rahman *et al.*, 2016) and maternal anemia (Haider *et al.*, 2013) with low birth weight is well recognized. The global incidence of LBW in 2013 was 16% and this was 28 % in South Asia (UNICEF, 2018). LBW in India was 25.2% as reported by NFHS-1 to and NFHS-4 data has reported it to be reduced to 18 %. The percentage of children that are low birth weight is high in India (Bhat & Adhisivam, 2013). The World Health Assembly resolved that out of targets for improving nutrition globally, birth weight lower than 2.5 kg needs to be reduced by 30 % till 2025 (WHO, 2014).

Two important indicators of maternal nutrition are body mass index (BMI) and anemia, both of which can affect health of a mother and her fetus. Weight gain during pregnancy has a strong association with birth weight and fetal growth (Vila-Candel *et al.*, 2015).

The first 1000 days of life of an infant is key to his/ her cognitive and physical development this is the time period between conception till the child turns two years old (Gopalan, 1961). The other factors influencing the child’s development include nutrition of the mother both prior to and during pregnancy, the gestational age of the child, birth weight, breast feeding pattern, malnutrition and childhood infections and other psychosocial factors, such as economic status, education and environmental exposures of the parents (Maste & Powell, 2003). Maternal education and knowledge plays an important link here as it has strong association with child well-being in many populations worldwide.

Methodology

The study was conducted in the urban settings of Jaipur City, 337 infant (0-2 years) and mother duos were selected for the study based on a baseline survey at vaccination centre of JK Lon hospital Jaipur. Efforts were made so as to include equal number of mothers from each socioeconomic group i.e. low, middle and high and to include equal number of boys and girls from each age group. A written consent was taken from the mothers for the data collection.

The inclusion criteria were mothers of children 0-2 years of age, children without any serious health problem and willingness to participation. Information of demographic profile were collected by open questionnaire and SES details are collected using upgraded scale by Tiwari and Kumar (2012).

An interview schedule was developed to collect information on maternal education, maternal health, her knowledge on a scale of 0-20 about Infant and young child feeding by personal interrogation with the subjects. The data was collected and analyzed using PASW-SPSS 18.0 trial version.

Objective

To study the impact of maternal nutrition, education and socioeconomic status on birth weight of children.

Ethical Approval

The study is approved by the Departmental Ethics Committee, Department of Home Science, University of Rajasthan, Jaipur.

Results

There were 337 mother- infant duos included in the study. The average age of mothers was 27.3 ± 4.8 years ranging from 18-45 years. The mean gestational weight gain was observed to be 8.98 ± 5.8 kg. Mean hemoglobin level were 10.61 ± 2.01 g/dl, which indicated anemia in the majority of women. The mothers' were having poor health and nutritional status.

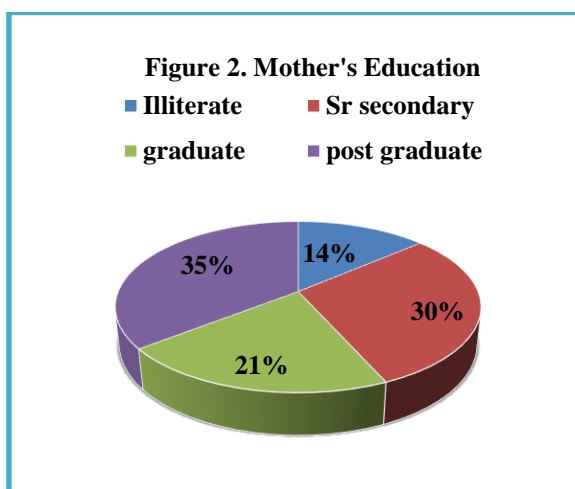
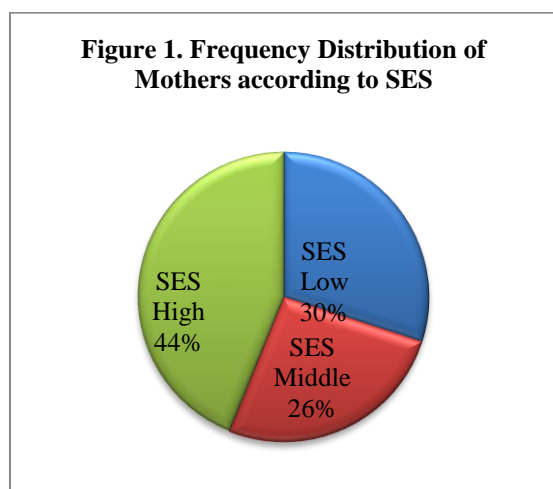


Figure 1 & Figure 2 shows the distribution of mothers on basis of SES and education status. The distributions across SES can be seen as 44%, 26% and 30% in high, middle and low SES. It was found that the education status of mothers was 35.6 % post graduation, 21.1 % graduation, 29.7 % senior secondary and 13.6 % illiteracy.

Table 1: Mean Gestational Weight Gain in Mothers across SES

	Group	N	Mean Gestational Weight Gain in Kgs	± S.D.	ANOVA	
					F	Sig.
Gestational weight gain in pregnancy	Low SES	101	5.11	4.29	62.564	.000
	Mid SES	88	7.96	4.39		
	High SES	148	12.22	5.76		
	Total	337	8.98	5.86		

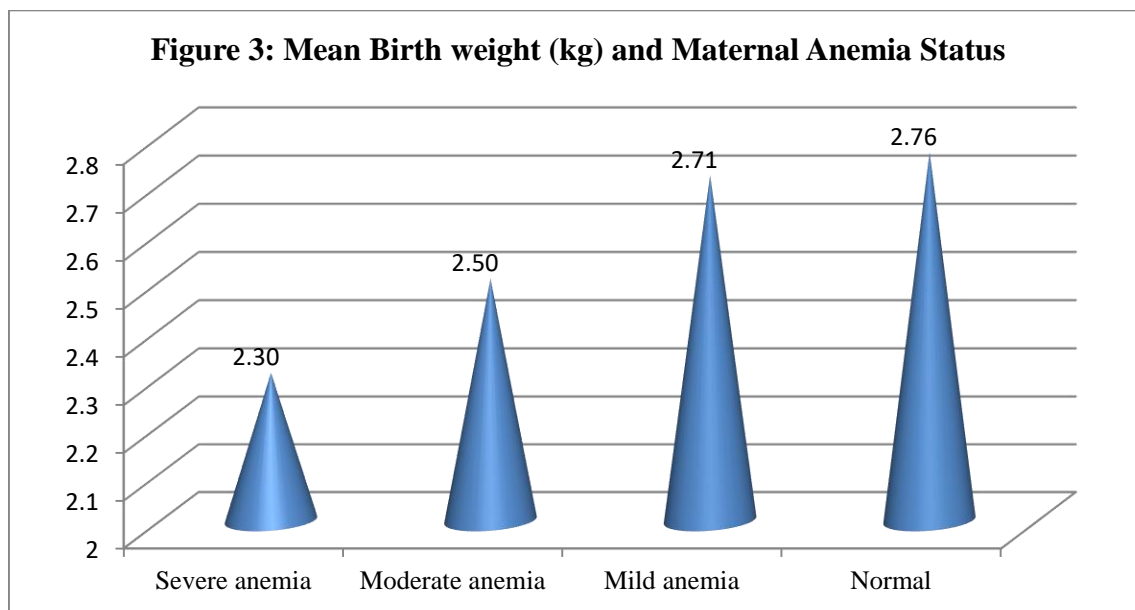
The gestational weight gain (Table 1) in the mothers across SES was seen to be 5.11 ± 4.29 kgs in low SES, 7.96 ± 4.39 kgs in mid SES and 12.22 ± 5.76 kgs in high SES. There was significant difference in means of gestational weight gain across SES groups in mothers at $P < 0.001$ using ANOVA.

	Group	N	Mean Hemoglobin levels during Pregnancy (g/dl)	± S.D.	ANOVA	
					F	Sig.
Maternal Hemoglobin Status	Low SES	101	9.64	2.05	25.924	.000
	Mid SES	88	10.43	1.82		
	High SES	148	11.37	1.77		
	Total	337	10.61	2.01		

The maternal hemoglobin status across SES was recorded as 9.64 ± 2.05 g/dl in low SES, 10.43 ± 1.82 g/dl in mid SES and 11.37 ± 1.77 g/dl in high SES reflecting the anemic status in majority of them (Table 2). The difference in means of maternal hemoglobin in the three SES groups were found to be significant at $p < 0.001$.

	Group	N	Mean Birth Weight in Kgs	± S.D	ANOVA	
					F	Sig.
Birth weight	Low SES	101	2.41	0.62	16.311	.000
	Mid SES	88	2.70	0.61		
	High SES	148	2.84	0.53		
	Total	337	2.68	0.60		

Out of the total 337 infants and young children 51.3% were boys and 48.7% were girls. The mean birth weight of the children in low SES was 2.41 ± 0.62 kgs, in middle SES it was 2.70 ± 0.61 kgs and in high SES it was 2.84 ± 0.53 kgs (Table 3). There was a statistically significant difference of means of birth weight across the SES groups at $p < 0.01$.



There was a significant difference in means in birth weight of children and severity of anemia in mothers using ANOVA at $p < 0.01$. Figure 3 depicts that the infants born to severely anemic women had the lowest mean birth weight of 2.30 ± 0.53 kgs as compared to the mean birth weight of 2.76 ± 0.56 kgs in women having normal hemoglobin levels.

Maternal parameters	Spearman's rho	Birth weight	
		Boy (173)	Girl (164)
SES	r value	0.287	0.327
	P value	0.000**	0.000**

Gestational weight gain in pregnancy	r value	0.329	0.332
	P value	0.000**	0.000**
Maternal Hemoglobin Status	r value	0.242	0.234
	P value	0.001**	0.003**
Mother's Education	r value	0.325	0.238
	P value	0.000**	0.002**

The birth weight in both the genders were significantly associated with the maternal health parameters like their gestational weight gain and hemoglobin status and also with the SES at ($p < 0.01$) except for mothers' knowledge and the birth weight of girls. The findings indicate that SES was one factor that underpins many other etiological factors and therefore the birth weight was associated with it, similar findings were made by Tyagi, Toteja & Bhatia, 2017 in their study. The maternal education also shows a significant strong positive correlation with the birth weight.

Table 5: Correlations between Birth Weight, Ordinal Position of Children, Gestational Weight Gain, Maternal Hemoglobin Status and SES

		Birth weight	Ordinal Position of child	Gestational weight gain	Maternal Hb Status	SES
Birth weight	Pearson Correlation	1	-.150**	.319**	.243**	.298**
	Sig. (2-tailed)		0.006	0	0	0
Ordinal Position of child	Pearson Correlation		1	-.214**	-.223**	-.302**
	Sig. (2-tailed)			0	0	0
Gestational weight gain	Pearson Correlation			1	.284**	.525**
	Sig. (2-tailed)				0	0
Maternal Hb Status	Pearson Correlation				1	.380**
	Sig. (2-tailed)					0
SES	Pearson Correlation					1
	Sig. (2-tailed)					
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The correlation table reflects a statistically significant negative correlation between the ordinal position of the children and their birth weight signifying that with an increase in birth order the tendency of low birth weight increases. Gestational weight gain and improved hemoglobin status are statistically correlated with improved birth weight at $p < 0.01$.

Anemia during pregnancy plays a major role by affecting birth weight and is influenced by dietary intake before and during pregnancy. These dietary habits also influence the gestational weight gain. Although Government of India started supplementary nutrition program to improve the nutritional status of women in reproductive age group but under nutrition still continues to be a major health problem leading to the vicious cycle of malnutrition.

Conclusions

As Gandhiji quoted that when you educate a man you educate one person and when you educate a woman you educate a family. It holds true in the present scenario in terms of status of women and child nutrition in the country. The birth weight of infants can be improved by working towards improving the SES of mothers and empowering them with right education and knowledge. Nutrition plays a very crucial role in influencing maternal health and fetal growth and is a modifiable risk factor of public health importance. With the right knowledge a

multigravida will also be able to maintain a good health and will be able to support the healthy pregnancies. It is important to provide educational interventions along with the supplementary nutrition program so that the services provided can be properly utilized. This empowerment can bring a positive change in their health and ultimately is a boon for their children.

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