

ASSOCIATION OF MATERNAL SERUM TOTAL PROTEIN AND ALBUMIN LEVEL WITH BIRTH WEIGHT OF NEWBORN

Medical Biochemistry

Bhuvanesh S Panwar*

Postgraduate, Department of Biochemistry, S.M.S. Medical College, Jaipur.
*Corresponding Author

ABSTRACT

Background: Low birth weight is a leading cause of Neonatal Mortality. Lack of Nutrients and less intake of Nutrients and minerals during pregnancy is associated with Low birth weight of newborn. **Objective:** To Evaluate the Association of Maternal serum Total protein and Albumin levels with birth weight of newborn. **Methods:** A Total of 75 Healthy Mothers of Newborns with Low Birth weight (Birth weight <2.5 Kgs.) were selected as cases and 75 Healthy Mothers of Newborns with Normal Birth weight (Birth weight >2.5 Kgs.) were selected as controls. Serum Total proteins and Serum Albumins were measured in all study subjects. Serum Total proteins were done by Biuret Method and Albumins by BCG Dye Method. Birth weight of Newborns were taken by Beam Balance Scale method at the time of Birth. **Results:** The study found that the mean levels of Serum Total protein and Serum Albumin in cases (Mothers having LBW newborns) were significantly lower than the Controls (Mothers having NBW newborns). Mean Serum Total protein and Serum Albumin in cases were 4.98 ± 0.57 gm/dL and 2.65 ± 0.29 gm/dL respectively, while in controls 6.90 ± 0.61 gm/dL and 4.06 ± 0.63 gm/dL respectively. **Conclusion:** Birth weight of newborns showed a positive, Significant and strong Correlation with Maternal Serum Total Protein ($r = 0.985$, $p < 0.0001$) and Maternal Serum Albumin ($r = 0.961$, $p < 0.0001$).

KEYWORDS

Low Birth weight, Serum Total protein, Serum Albumin.

INTRODUCTION

A Healthy and Successful pregnancy is related with increased demand of nutrients¹ and minerals, which can be fulfilled by a balanced diet. Maternal Blood is the only source of Nutrients for Normal growth of fetus². According to WHO, weight of less than 2500 gm (2.5 Kg) at the time of Birth is considered low Birth weight infants.³ In India prevalence of low Birth weight (LBW) is 23%-30% and is a significant and major cause of neonatal mortality⁴. Previous studies on nutritional status of pregnant women reported that poor nutrition of mother and low albumin level in late gestation or in third trimester was associated with low birth weight of newborns⁵. It is seen that Nutritional reserves including Proteins and vitamins remains low in babies with Low Birth weight.⁶ Reduced intake of dietary protein by pregnant women during her pregnancy significantly decreases maternal albumin and cause low birth weight delivery of babies and other complications⁷ like pre term delivery, Bleeding etc. while Increased intake of dietary protein enhances the albumin levels in the blood⁸.

A study in 2013 on 168 Mother- Baby pairs found a positive Correlation coefficient between Birth weights of newborns and Maternal Total protein⁹. Another study in 2017 on two groups one with Normal serum Albumin level and the other with Low serum Albumin level found that there was significant relation between birth weight and Serum Albumin Level⁷.

It is reported that if protein rich diet is given to the mothers during pregnancy it can improve the weight of newborns¹⁰ and decrease the chance of poor outcomes of pregnancy. The present study was planned to assess the association of Birth weight of newborn with Serum Total Protein and Serum Albumin of Mother.

MATERIALS AND METHODS

A Total of 75 Healthy Mothers of Newborn with Low Birth weight (Birth weight <2.5 Kgs.) as cases and 75 Healthy Mothers of Newborn with Normal Birth weight (Birth weight >2.5 Kgs.) were selected as controls from Zanana Hospital, S.M.S. Medical college, Jaipur.

Blood samples were collected from Subjects within 24 hour of delivery and estimated for Serum Total protein and Serum Albumin. Serum Total proteins were done by Biuret Method and Albumins by BCG Dye Method at Department of Biochemistry, S.M.S. Medical College, Jaipur. Birth weight of Newborns were taken by Beam Balance Scale method at the time of Birth.

The data were statistically analyzed using Graph pad. The student T-test was used to determine the association between Birth weights of Newborns with Maternal Serum total Protein and Albumin Levels. A p value <0.05 was considered statistically significant.

RESULTS

The Mean and SD of Birth weights of Newborns with LBW was

1.99 ± 0.28 Kgs. and the Mean and SD of Birth weights of Newborns with NBW was 2.95 ± 0.31 Kgs. The Mean and SD of Serum Total protein and Serum Albumin in cases were 4.98 ± 0.57 gm/dL and 2.65 ± 0.29 gm/dL respectively, while in controls 6.90 ± 0.61 gm/dL and 4.06 ± 0.63 gm/dL respectively.

The p-value between the Birth wt. of newborns and Maternal serum Total protein and between the Birth wt. of newborns and Maternal serum Albumin are <0.0001 which are statistically significant.

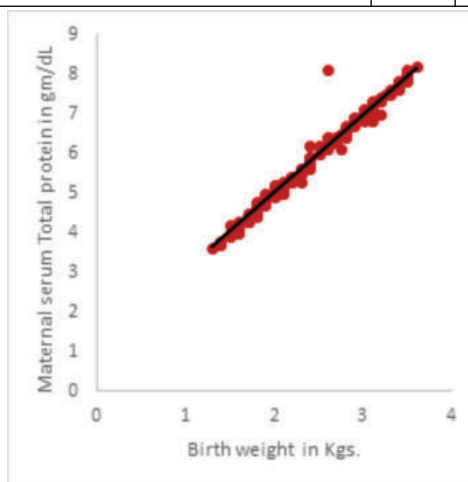
The correlation between Birth wt., Maternal Serum Total Protein and Maternal Serum Albumin were tested using bivariate correlation analysis. Birth weight shows Positive and strong correlation with Maternal Serum Total Protein and Maternal Serum Albumin.

Table 1: Comparison of Maternal Serum Total Protein and Albumin of Cases and Controls.

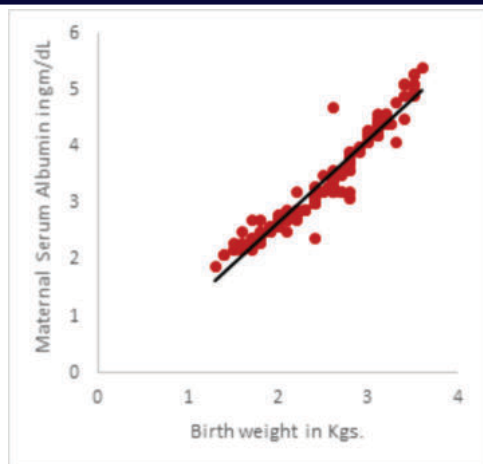
Parameters	Case (n=75)	Control (n=75)	p- value
Total Protein (mg/dL)	4.98 ± 0.57	6.90 ± 0.61	<0.0001
Albumin (mg/dL)	2.65 ± 0.29	4.06 ± 0.63	<0.0001

Table 2: Correlation of Birth wt. with Maternal Serum total protein and Albumin.

Correlation of Parameters	Pearson 'r' value	p- value
Birth wt. of Newborns vs Maternal Serum Total Protein	0.985	<0.0001
Birth wt. of Newborns vs Maternal Serum Albumin	0.961	<0.0001



Graph 1: Correlation of Birth weight and Maternal Serum Total protein



Graph 2: Correlation of Birth weight and Maternal Serum Albumin

DISCUSSION

Many previous studies have linked Birth weight with Maternal Serum Total protein and Albumin level. Total protein and Albumin were considered as good early indicators of nutritional status of Fetus thus can help to prevent poor outcomes of pregnancy. It is seen that occurrence of low birth weight cases (LBW) was significantly higher among pregnant women whose mean caloric intake was less than 70% of the RDA (Recommended Dietary Allowance)¹¹⁻¹³ and protein intake of less than 40 gm (60%), during the last trimester of pregnancy.¹² In study of Choudhry E.R. et al., 2017 it was seen that 34 newborns had low birth weight and their mothers were having serum albumin level < 3.5 gm/dl⁷. Similar observation was found by Baba usman et al., 2010 who studied high percentage of mother-baby pair with acceptable maternal albumin levels and birth weight of babies.¹⁴

According to the our results, subjects with higher Levels of Serum Total Protein and Serum Albumin give birth to healthy Babies with Normal Birth weight (NBW). Our study shows, significantly positive and strong correlation of Birth weights of Newborns with Maternal Serum Total Protein and Albumin Levels.

CONCLUSION

Based on understanding the recent studies in showing the Association between Birth weight of Newborns with Maternal Serum Total Protein and Serum Albumin levels, our study shows strong Correlation between these parameters.

This study indicates the importance of undertaking Nutrients during Pregnancy and Low Birth weight Delivery as Deficiency symptom of these nutrients. The early detection of deficiency of serum Total Protein and Serum Albumin by their timely estimation can help to prevent poor outcomes of pregnancy such as Low Birth Weight delivery.

REFERENCES:

- [1] Khoushabi F., Shadan M.R., Miri A., Rad J.S. Determination of Maternal serum Zinc, Iron, Calcium and Magnesium during pregnancy in pregnant women and umbilical cord blood and their association with outcome of pregnancy : Mater Socio med. 2016 Apr; 2892:104-107.
- [2] Allen HL. Anemia and Iron deficiency: Effects on pregnancy outcome. Am J Clin Nutr 2000; 71(5):1280S-1284S.
- [3] World Health Organization International statistical classification of disease and related health problems, tenth revision Geneva: World Health Organization; 1992.
- [4] Farias P.M, Marcelino G., Santana L.F. Minerals in Pregnancy and Their Impact on Child Growth and Development: Molecules 2020, 25, 5630.
- [5] Stephenson T, Symonds ME. Maternal nutrition as a determinant of birth weight. Arch. Dis. Child. Fetal. Neonatal. 2002; 86: 4-6.
- [6] Krishna K, Moniqa A, Wahid A. Umbilical cord blood nutrients among low birth weight and normal birth weight babies in primary health care set up in lucknow india. General of Biological and Scientific Opinion. 2013; 1: 300-3.
- [7] Choudhary E.R., Choudhary Z.R. et al. Correlation of maternal albumin levels with neonatal Birth weight. JIIMC 2017; 12:2.
- [8] Michael E. Dietary protein, serum albumin and health 2007. <https://proteinpowers.com>.
- [9] Ahmadu B U, Yakubu I N, Yusuph I H, Alfred M. Using the effects of maternal nutrition indicators (hemoglobin and total protein) on baby's birth weight outcome to forecast a paradigm shift toward increased level of non-communicable diseases in children. Annals of African medicine. 2013; 12(1):29.
- [10] Fatemeh B, Kambiz A, Shauak SK. Milk and Protein Intake by Pregnant Women Affects Growth of Foetus. Journal Health Popul Nutr. 2013; 31: 435-45.
- [11] Metgud CS, Niak V A and Mallapur M.D.; Effect of maternal nutrition on birth weight of newborn-A community based study, The Journal of Family welfare 2012; 58(2); 35-39.
- [12] Rao B T, Aggarwa A K, Kumar R; Dietary intake in third trimester of pregnancy and prevalence of LBW: A community-based study in a rural area of Haryana, Indian Journal

of community Medicine :2007; 32(4);272-276.

- [13] Choudhary AK, Choudhary A, Tiwari SC, Dwivedi R; Factors associated with low birth weight among newborns in an urban slum community in Bhopal; Indian Journal of Public health; 2013; 57(1): 20-23.
- [14] Baba U, Adebayo A, Haruna N, Usman J, Kyari S. Correlation of maternal albumin and birth weight of babies in a Nigerian Teaching Hospital. International Journal of Public Health and Epidemiology. 2012; 1: 10-13.