Original Article

Serum Albumin Level in Pregnancy

Evaluation of Changes in Serum Albumin Level During Different Stages of Pregnancy

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ABSTRACT

Objectives: 1.To determine changes of serum albumin level during progression of pregnancy. 2. To assess hypoalbuminaemia as an early indicator of pregnancy induced hypertension.

Study Design: Comparative cross sectional study.

Place and Duration of Study: The study was conducted at Biochemistry department of Liaquat University of Medical and Health Sciences, Jamshoro with the collaboration of Gynecological and obstetric department of Liaquat University Hospital, Jamshoro/Hyderabad from 1.8.2008 to 31.7.2009.

Materials and Methods: One hundred & twenty pregnant women of different gestational stages were selected through convenient sampling. The women suffering from any systemic disease were excluded from the study. The data regarding subjects was collected on a prtested questionnaire.The blood samples were collected through sterilized disposable syringes from the anterior cubital vein by venipuncture & were transferred into test tube and allowed to clot and then centrifugeted & the readings were noted for each blood sample.Results were analyzed by SPSS version 14. Continuous predictor variable and its relationship to the outcome variable was examined to ensure its modeling as a linear term. where possible. The independent effect of each variable significantly associated with serum albumin level was assessed at significance level of P ~ .05. Students t -test was applied to compare levels of serum albumin in case and control subjects.

Results: The women of 25 years had highest percentage of 22%;the highest percent of 12% were in their 28th weeks of pregnancy. At the significant level of P= 0.05 Pearson's coefficient was -0.267 and p-value was 0.003. As the duration of pregnancy advanced, level of serum albumin decreased in our study subjects.

Conclusion: Appropriate measures should be taken to prevent fluctuation in serum albumin level which ultimately cause high maternal and neonatal mortality

Key Words: Albumin, Gestation, Pregnancy, Anthropology

Citation of article: Memon SH, Memon ZAS, Memon KN. Evaluation of Changes in Serum Albumin Level During Different Stages of Pregnancy. Med Forum 2016;27(11):5-8.

INTRODUCTION

Albumin is the most abundant protein in plasma, which accounts for about 55-60% of the total plasma protein. It is produced exclusively in liver. Half life of albumin is 20-25 days[1]. Albumin is decreased under many circumstances, such as renal disease, proteinuria, presence of stress or disease, malnutrition or Kwashiorkor[2]. In pregnancy, there is a fall of as much as 10 g/l, especially in the last trimester, due partly to increased requirements and partly to an increased plasma volume. There is a rapid return to normal levels after delivery[3]. The pregnant woman experiences physiological changes to support fetal growth and development. During the pregnancy serum estrogens and progesterone levels increase progressively and reach a maximum during the third trimester.

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Received: August 14, 2016; Accepted: September 19, 2016

These sex steroids have effects on metabolic, synthetic and excretory hepatic function. Pregnancy is associated with significant. growing fetus. There are veriety of continues physiological changes that the mother undergoes during pregnancy these occur with respect to the mothers blood compositions cardiovascular system, uteroplacental blood flow and metabolic changes[4]. renal blood flow. It also has important consequences for the interpretation of hematological indices in normal pregnanc[5]. Serum albumin level decreases during pregnancy while the concentration of most other maternal serum proteins of hepatic origin remains stable or increase[6]. Hypoalbuminaemia occurs before the early stage of toxemia of pregnancy[7].By undertaking this study we investigated the determinants associated with levels of serum albumin levels in pregnant women so that appropriate preventive measures can be recommended to avoid unwanted consequences occurring from hypoalbumenia and relevant discords.

MATERIALS AND METHODS

The comparative cross sectional study was conducted from 1.8.2008 to 31.7.2009 at Biochemistry department of Liaquat University of Medical and Health Sciences,

Jamshoro with the collaboration of Gynecological and obstetric department of Liaquat University Hospital, Jamshoro/Hyderabad.

Study population, sample size & sampling technique: The study subjects were pregnant women of different gestational stages as case subjects and non-pregnant healthy women with same age and socio-economic status as controls as per inclusion criteria.Ninty pregnant women were selected as case subjects and thirty non-pregnant women were selected as controls. The sampling technique was convenient sampling.

Inclusion criteria: Pregnant primi gravida (1st Pregnancy) upto 45 years of age with no apparent illness were selected as study subjects.

Exclusion criteria: Both cases and controls were excluded if they were having history of diabetes mellitus, hypertension, liver diseases , renal diseases, hyper & hypo thyroidism, smoking.

Sample collection procedure: The data regarding subjects was collected on a protested questionnaire. The blood samples were collected through sterilized disposable syringes from the anterior cubital vein by venipuncture & were transferred into test tube and allowed to clot and then centrifugeted & the readings were noted for each blood sample.

Data analysis: Results were analyzed by SPSS version 14. Demographic and anthropometric values and serum assay of albumin were compared across stages of gestation. Data are expressed as percentages for categorical variables (e.g., dietary habits, socioeconomic conditions, education) and means and standard deviations for continuous variables (e.g., age, serum albumin levels). Continuous predictor variable and its relationship to the outcome variable was examined to ensure its modeling as a linear term where possible. The independent effect of each variable significantly associated with serum albumin level was assessed at significance level of P ~ .05. Students t -test was applied to compare levels of serum albumin in case and control subjects.

RESULTS

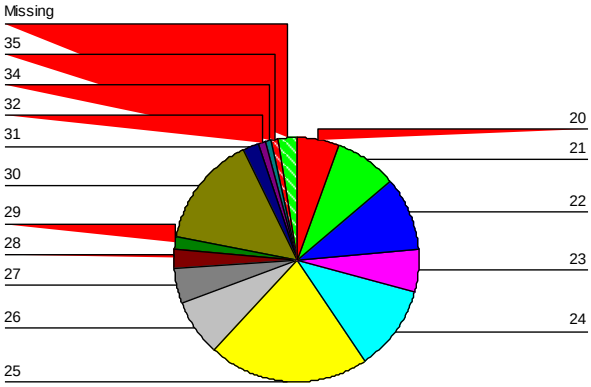

Figure No.1: Age distribution

The women of 25 years had highest percentage of 22%;the highest percent of 12% were in their 28th weeks of pregnancy. At the significant level of P= 0.05 Pearson's coefficient was -0.267 and p-value was 0.003. As the duration of pregnancy advanced, level of serum albumin decreased in our study subjects.

Table No.1: Frequency and percentage of serum Albumin level

Serum albumin	Frequency	Percent	Valid Percent	Cumulative Percent
3.20	1	.8	.8	.8
4.00	1	.8	.8	1.7
4.10	1	.8	.8	2.5
4.20	2	1.7	1.7	4.2
4.30	5	4.2	4.2	8.3
4.50	4	3.3	3.3	11.7
4.60	6	5.0	5.0	16.7
4.70	9	7.5	7.5	24.2
4.80	10	8.3	8.3	32.5
4.90	6	5.0	5.0	37.5
5.00	19	15.8	15.8	53.3
5.10	4	3.3	3.3	56.7
5.20	4	3.3	3.3	60.0
5.30	8	6.7	6.7	66.7
5.40	5	4.2	4.2	70.8
5.50	3	2.5	2.5	73.3
5.60	5	4.2	4.2	77.5
5.70	10	8.3	8.3	85.8
5.80	10	8.3	8.3	94.2
6.00	2	1.7	1.7	99.2
6.30	1	.8	.8	100.0
Total	120	100.0	100.0	

Table No.2: Gestational Age

Gesta-tional age	Frequency	Percent	Valid Percent	Cumulative Percent
0	30	25.0	25.0	25.0
8	14	11.7	11.7	36.7
9	2	1.7	1.7	38.3
10	3	2.5	2.5	40.8
12	7	5.8	5.8	46.7
14	3	2.5	2.5	49.2
16	1	.8	.8	50.0
18	1	.8	.8	50.8
20	4	3.3	3.3	54.2
21	2	1.7	1.7	55.8
22	5	4.2	4.2	60.0
24	8	6.7	6.7	66.7
25	1	.8	.8	67.5
28	12	10.0	10.0	77.5
29	3	2.5	2.5	80.0
30	4	3.3	3.3	83.3
32	8	6.7	6.7	90.0
33	2	1.7	1.7	91.7
34	4	3.3	3.3	95.0
35	2	1.7	1.7	96.7
36	4	3.3	3.3	100.0
Total	120	100.0	100.0	

Table No.3: Dietary Habits.

	Frequency	Percent	Valid Percent	Cumulative Percent
Good	16	13.3	13.3	13.3
Average	85	70.8	70.8	84.2
Poor	19	15.8	15.8	100.0
Total	120	100.0	100.0	

Table No. 4: Distribution of Trimester

	Frequency	Percent	Valid Percent	Cumulative Percent
First	30	25.0	25.0	50.0
Second	30	25.0	25.0	75.0
Third	30	25.0	25.0	100.0
Total	120	100.0	100.0	

Table No. 5: T-Test Statistics

	Test Value	Df	Sig.(2-tailed)
S.Albumin	106.365	119	.000
Gestational Period	14.324	119	.000

DISCUSSION

The results obtained from this study are in accordance with similar studies carried out by various researchers. In our study, correlation of serum albumin level with gestational period has a negative correlation. By applying Pearson co-relation co-efficient for association of serum albumin level with period of gestation, the value of Pearson's correlation coefficient was -.139 with P=0.002. This shows a strong negative correlation between level of serum albumin and period of gestation .Same observation has been claimed by Krauar B et al [8]in their study which shows a negative correlation of level serum albumin with increasing period of gestation.

In this study decrease in level of serum albumin in pregnant women was significantly proved by comparing the level of serum albumin level with non pregnant control group. This association of decrease in level of albumin in pregnant women was analyzed by applying T- test for comparing case and control groups. In this study, at significant level of P =0.05 and confidence level 95% , we found that P value was less than 0.05 , hence providing evidence that decrease in serum albumin is very much significant in pregnancy

Changes in level of serum albumin during pregnancy have been well documented in number of studies [9].These changes in level of serum albumin have been attributed to many factors. In a study decrease in level of serum albumin during pregnancy has found to be caused by harmonic changes which occurs during pregnanacy[10].Estrogen and Progesterone increase progressively during whole period of gestation These hormones reach maximum at third trimester[11]. Most of the metabolic and biochemical changes are attributed to these harmonic changes. Liver function is also effected which itself bring about changes which are manifested in number of biochemical, physiological and metabolic changes.

Other than harmonic changes, one of significant change is heamodilution during pregnancy, which is itself a cause of decrease in level of different plasma proteins, especially serum albumin which is the most abundant plasma protein. Because of heamodilution, serum albumin level decreases during all three semesters of pregnancy[12]. This study is in accordance to our results where we found a negative correlation of serum albumin and period of gestation .

Mather JE et all [13]have studied relation of level of albumin with alpha –fetoprotein and it was hypothesized that serum albumin level decreases as alpha – fetoprotein decreases.

Ma Donald[14]has described changes in total proteins during pregnancy. It was concluded in this study that serum albumin level in decreases throughout period of gestation.

The age of the participants was analyzed by descriptive statistics. It was found that 5.5 percent were in age group of 20 years, the women of 25 years had highest percentage of 22% while the age group of 29,32,34and 35 years were found to be at lowest percent of 1.1%. .The mean age was 25.3 years in 0case group with standard deviation of 3.57. It was 25.28 in both case and control groups with standard deviation of 3.38.

The rang of age in both case and control groups were 15 years, minimum age was 20 years ,maximum age was 35 years ,mean age was 25.28 years and standard deviation was 3.38 years.

Walker et all[15] in his investigation about level of hemocystine during normal pregnancy found that Homocysteine levels were directly correlated with albumin levels, which decreased during pregnancy.

T. Lind [16]et all in their study about level of zinc and magnesium during pregnancy has observed that both elements decrease during pregnancy which is a normal physiological adaptive mechanism during pregnancy .this hypothesis can be applied to serum albumin level which also decrease during pregnancy due to normal physiological adaptive mechanism for providing conducive environment for the fetal growth.

In this study we analyzed the impact of dietary habits on level of serum albumin in pregnant women. It was found that 13% of women were taking good diet .Percentage of women taking average diet were 69% and 15.5 % of women were taking poor diet.

While comparing association of dietary habits with level of albumin ,it was found that mean serum albumin level of women taking good diet was 5.3 gm/dl., women taking average diet was found to be having mean albumin level of 4.96 mg/dl and women who were taking poor diet had mean albumin level of 5.26s mg /dl.These observation are at par with study carried out by which shows that dietary habits or

supplementation trace elements have no major impact on level of these elements during pregnancy.

In a study[17]plasma concentration of total protein, albumin, immunoglobulins IgG, IgA and IgM and urinary protein were assayed in 250 pregnant Nigerian women and compared with 250 healthy pregnant women who served as controls. The mean values of plasma total proteins, albumin, IgG and IgA were found significantly lowered ($P<0.05$).the results of this study is in accordance with our study which also shows a significant change in level of pregnant women in comparison to control group.

CONCLUSION

This study has provided us the evidence that during pregnancy level of albumin is decreased in comparison to control group. This change in level of serum albumin is dependant on various factors as period of gestation, dietary habits, education and age. Impact of various factors cause changes in level of serum albumin which is related with outcome of pregnancy. Therefore appropriate measures should be taken to prevent fluctuation in serum albumin level which ultimately cause high maternal and neonatal mortality.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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