Original Research Article

A study of homocysteine level at the III trimester of pregnancy

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ABSTRACT

Background: Homocysteine is an amino acid which has sprung into prominence in the past few decades. Levels of maternal serum homocysteine normally decreases with gestation, either due to a physiological response to the pregnancy, increase in estrogen, haemodilution from increased plasma volume or increased demand for methionine by both the mother and fetus.

Methods: A prospective randomized controlled clinical trial of 50 patients was carried out in Kamla Raja Hospital and outpatient Department of Gajra Raja Medical College, Gwalior from October 6th to October 2007, which was further categorized into socio-demographic and clinical factors.

Results: Out of 50 patients, it was found that there were 31(62%) cases below the age of 25 years whereas 19(38%) cases were above the age of 25 years, 30(60%) cases were educated below the primary level whereas 20(40%) cases were educated above the primary level, 10(20%) cases belonged to rural areas whereas 40(80%) cases belonged to the urban areas. According to the socio economic distribution, 11(22%) cases were below class II whereas 39(78%) cases were above class II. According to distribution of parity, 22(44%) cases were below primigravida whereas 28(56%) cases were above primigravida.

Conclusions: This study concludes that mean of Serum Levels in pregnant women with socio-demographic and clinical factors was statistically insignificant which signifies that age, education, residential areas and hemoglobin are not the factors contributing to the rise in homocysteine level in pregnant women. The diastolic and systolic blood pressure is weakly correlated with serum homocysteine level.

Keywords: Estrogen, Homocysteine level, Primigravida, Methionine, Pregnant women

INTRODUCTION

Homocysteine is a sulfur containing amino acid primarily derived from demethylation of dietary methionine, which is abundant in proteins of animal origin. It is an essential amino acid required for the growth of cells and tissues in the human body. Homocysteine is becoming increasingly recognized as an important substance in the pathogenesis. Elevated circulating homocysteine is a risk factor for endothelial dysfunction and vascular diseases such as atherosclerosis and occlusive vascular disorders. Homocysteine is an amino acid which has sprung into prominence in the past few decades.[1] Elevated homocysteine levels have been shown to be deleterious on vascular endothelium.[1,2] Elevated homocysteine has also served as an early marker for insulin resistance due to the effects of insulin on homocysteine metabolism and renal clearance.[3] The vascular effects of hyperhomocysteinemia have proposed to include endothelial cell injury and thrombus formation. Levels of

maternal serum homocysteine normally decreases with gestation, either due to a physiological response to the pregnancy, increase in estrogen, haemodilution from increased plasma volume or increased demand for methionine by both the mother and fetus. Homocysteine also interferes with fibrinolytic system adding to the pathophysiology of eclampsia and pre-eclampsia.[4] In normal pregnancy serum homocysteine is normally decreased, due either to haemodilution incident to pregnancy or the relative deficiency during pregnancy.[5] Maternal hyperhomocysteinemia has been associated with a number of pregnancy associated diseases such as pre- 17 eclampsia, placental abruption, recurrent pregnancy loss and neural tube defect in newborn.[6,7] Homocysteine is metabolized via two main pathways: re-methylation to methionine or transulphuration to cystathionine and then to cysteine. A defect in either leads to an accumulation of circulating homocysteine. Recent reports indicate that concentrations of folate in maternal serum, plasma and red blood cells decrease from the fifth month of pregnancy onwards, and continue to decrease during the weeks after pregnancy such that by the second to third post-partum month a third of all mothers can have subnormal concentrations of folate in serum and red blood cells.[8] The defect may be congenital, due to an inborn error of cystathionine-B- synthetase, or to homozygosity for a C→T mutation of nucleotide 677 in the methylenetetrahydrofolate reductase (MTHFR) gene.[9]Other reasons for mild hyperhomocysteinaemia are nutrient-related: deficiencies of folate, vitamin B12 or vitamin B6 cause homocysteine to accumulate because remethylation to methionine requires folate and vitamin B12, and transulphuration to cystathionine requires vitamin B6.[10] Vollset et al, reported that hyperhomocysteinemia may be an important marker for, and possibly a cause of or contributor to, complications andan adverse outcome of pregnancy.[11] Thus, the purpose of this study is to determine the consequences of serum homocysteine levels in pregnancy so that risk of adverse pregnancy outcomes can be reduced as many studies have stated that the rise in serum homocysteine levels is a predictive marker of adverse pregnancy outcomes.

The aim of this study is to evaluate and compare the mean Serum Levels in pregnant women with socio-demographic and clinical factors and to find the correlation of systolic blood pressure, diastolic blood pressure and hemoglobin with serum homocysteine level in pregnant women.

METHODS

A prospective randomized controlled clinical trial of 50 patients was carried out in Kamla Raja Hospital and Out Patient Department of Gajra Raja Medical College, Gwalior from October 6th to October 2007. A total number of 50 patients were included in study and were classified into different demographic factors such as age, education, residential areas and socio-economic status.

Patients eligible criteria

Pregnant women who attended outpatient department of obstetrics and gynecology or admitted in Kamla Raja Hospital, Gwalior and the Patients who had completed 28 weeks of gestation which was calculated by absolute recall of her last menstrual period were included in the study. The pregnant women in their IIIrd trimester with singleton fetus were also included in the study whereas Patient in any of the group with medical disorder like jaundice, diabetes or any other systemic disorder were excluded from the study.

Patient included in the study group were subjected to the detailed history taking, through general and systemic examination and antenatal examination. Following investigations were sent-Hemoglobin, Urine (Albumin & Sugar) and Serum Homocysteine. For collecting blood samples, 3 ml blood was withdrawn from vein by syringe and poured into a vial with full aseptic precautions. Vial was immediately kept in ice box. Samples were then transferred within one hour of collection to collecting centre for estimation of serum testosterone hormone levels. Method of Direct chemiluminescence was used for estimating Serum Homocysteine levels in samples.

Statistical analysis

Data are presented as mean±SD. Comparison of hormonal levels between the groups was performed by unpaired student's t test and p value <0.05 was considered as statistically significant.

RESULTS

A total number of 50 patients were included in study. These patients were further categorized into different demographic factors according to their age, socio-economic status, education and residential areas.

Table 1: Demographic distribution of patients.

Variable	Categories	Total cases (%)
Age	≤25 years	31 (62%)
	>25 years	19 (38%)
Education	Below primary	30 (60%)
	Above primary	20 (40%)
Residential areas	Rural	10 (20%)
	Urban	40 (80%)
Socio-economic status	Below class II	11 (22%)
	Above class II	39 (78%)
Parity	Below primigravida	22 (44%)
	Above primigravida	28 (56%)

The Table 1 show the distribution of patients among different demographic factors and it was found that there were 31(62%) cases below the age of 25 years whereas 19(38%) cases were above the age of 25 years, 30(60%)

cases were educated below the primary level whereas 20(40%) cases were educated above the primary level, 10(20%) cases belonged to rural areas whereas 40(80%) cases belonged to the urban areas. According to the socio economic distribution, 11(22%) cases were below class II whereas 39(78%) cases were above class II. According to distribution of parity, 22(44%) cases were below primigravida whereas 28(56%) cases were above primigravida.

Table 2: Clinical factors.

Parameters	(Mean±SD deviation)
Systolic blood pressure	134.20±16.671
Diastolic blood pressure	87.80±13.445
Serum homocysteine level	11.3970±5.38093
Haemoglobin	8.6838±1.04248
Serum bilirubin	1.34720±0.646365

The Table 2 shows the average of the several parameters among the 50 patients. It is found that the (mean±SD) of systolic blood pressure is (134.20±16.671), the (mean±SD) of diastolic blood pressure is (87.80±13.445),

the (mean±SD) of serum homocysteine level is (11.3970±5.38093), the (mean±SD) of the haemoglobin is (8.6838±1.04248) and the (mean±SD) of serum bilirubin is (1.34720±0.646365).

The Table 3 shows the comparision of serum homocysteine level in pregnant women with respect to socio-demographic and clinical factors. It is found that the (mean±SD) in comparision with mean serum homocysteine level, below and above the age of 25 years is (11.6726±5.84307) and 10.9474±4.64475 followed by the p-value 0.648, below and above the education of primary level is 11.5855±5.70488 and 11.0895±4.94131 followed by the p-value 0.755. According to the residential areas the (mean±SD) of rural and urban areas is (13.8470±7.77139) followed by the p-value 0.108 whereas the (mean±SD) of socio economic status below and above class II is (9.8690±3.39651) and (11.7790±5.74178) followed by the p-value 0.320 and the (mean±SD) of hemoglobin level is (11.4400±5.92309) and (11.3922±5.39028) followed by the p-value 0.985, which shows that the results are statistically insignificant irrespective of all the variables.

Table 3: Comparision of mean of Serum Levels in pregnant women with socio-demographic and clinical factors.

Variable	Categories	Serum homocysteine levels (mean±SD)	p-value
Age	≤25 years	11.6726±5.84307	0.648
	>25 years	10.9474±4.64475	
Education	Below primary	11.5855±5.70488	0.755
	Above primary	11.0895±4.94131	
Residential areas	Rural	13.8470±7.77139	0.108
	Urban	10.7845±4.52963	
Socioi-economic status	Below class II	9.8690±3.39651	0.320
	Above class III	11.7790±5.74178	
Haemoglobin level	≥10	11.4400±5.92309	0.985
	<10	11.3922±5.39028	

Table 4: Correlation of systolic blood pressure, diastolic blood pressure and hemoglobin with serum homocysteine levels in pregnant women.

	Serum homocysteine level	p-value
Systolic blood pressure	0.430	0.002
Diastolic Blood Pressure	0.469	0.001
Hemoglobin	0.49	0.733

The Table 4 shows the correlation of systolic blood pressure, diastolic blood pressure and hemoglobin with serum homocysteine level. The results have shown that the correlation coefficient of systolic blood pressure and serum homocysteine level is 0.430 followed by the p-value 0.002 which is statistically significant. The

correlation coefficient of diastolic blood pressure and serum homocysteine level is 0.469 followed by the p-value 0.001 which is statistically significant whereas and the correlation coefficient of hemoglobin level and serum homocysteine level is 0.49 followed by the p-value 0.733 which is statistically insignificant.

DISCUSSION

The above study was conducted to evaluate and compare the mean serum levels in pregnant women with socio-demographic and clinical factors. It was found that among the 50 antenatal cases there were 31(62%) cases below the age of 25 years whereas 19(38%) cases were above the age of 25 years, 30(60%) cases were educated below the primary level whereas 20(40%) cases were educated above the primary level, 10(20%) cases belonged to rural areas whereas 40(80%) cases belonged to the urban areas, 11(22%) cases were below class II

whereas 39(78%) cases were above class II. According to distribution of parity, 22(44%) cases were below primigravida whereas 28(56%) cases were above primigravida. The variables of clinical factors have showed that the (mean±SD) of systolic blood pressure was (134.20±16.671), the (mean±SD) of diastolic blood pressure was (87.80±13.445), the (mean±SD) of serum homocysteine level was (11.3970±5.38093), the (mean±SD) of the haemoglobin was (8.6838±1.04248) and the (mean±SD) of S. Bilirubin was (1.34720±0.646365). The mean of serum levels in pregnant women with socio-demographic and clinical factors was statistically insignificant which signifies that age, education, residential areas and hemoglobin are not the factors contributing to the rise in homocysteine level in pregnant women. The results have also shown that the correlation coefficient of systolic blood pressure and serum homocysteine level is 0.444 followed by the p-value 0.026 which is statistically significant.

The results have shown that the correlation coefficient of systolic blood pressure and serum homocysteine level is 0.430 followed by the p-value 0.002 which is statistically significant. The correlation coefficient of diastolic blood pressure and serum homocysteine level is 0.469 followed by the p-value 0.001 which is statistically significant whereas and the correlation coefficient of hemoglobin level and serum homocysteine level is 0.49 followed by the p-value 0.733 which is statistically insignificant.

The remethylation of homocysteine into the amino acid methionine is blocked by a lack of folate, which results in hyperhomocysteinaemia however, increased homocysteine concentration can be corrected easily by low-dose folate supplementation.[12] Studies of atherosclerosis have shown that a graded risk of vascular disease is associated with increasing homocysteine level.[13]

The concentration of homocysteine in the plasma is regulated by several factors, genetic and acquired.[14,15] In a metanalysis involving 420,000 patients, a 5 mmHg difference in diastolic pressure was associated with 34% fewer strokes and 21% less coronary heart disease.[16]

CONCLUSION

From the above study it is concluded that the mean of serum homocysteine levels with socio-demographic and clinical factors is statistically insignificant which may be due to the small sample size. The diastolic and systolic blood pressure is weakly correlated with serum homocysteine level. Our study suggests that further studies can be acquired in order to obtain the specific results.

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