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ORIGINAL RESEARCH

Maternal serum ischemia modified albumin as a marker of oxidative stress in hypertensive disorders of pregnancy

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Abstract

Background: Hypertensive disorder of pregnancy is one the commonest causes of maternal and perinatal mortality. The present study was conducted to assess maternal serum ischemia modified Albumin as a marker of oxidative stress in hypertensive disorders of pregnancy.

Materials & Methods: 48 pregnancy induced hypertensive women and equal number of control were studied. Patients were put in group I and control in group II. The albumin cobalt-binding test was used to estimate the IMA levels and serum albumin levels were estimated using absorbance by Bromocresol green.

Results: The mean IMA in group I was 0.56 ABSU and in group II was 0.05 ABSU. The men albumin was 2.90 g/dL in group I and 3.86 g/dL in group II. The mean IMA/albumin was 0.23 ABSU/g/dL in group I and 0.04 ABSU/g/dL in group II. The difference was significant (P< 0.05). Gestational hypertension was seen in 4, pre- eclampsia in 30, severe eclampsia in 8 and eclampsia in 6 patients. The mean IMA, albumin and IMA/ albumin was comparable in all hypertensive pregnancies. The difference was non- significant (P> 0.05).

Conclusion: Ischemia modified albumin and the ratio of IMA to normal serum albumin are significantly elevated in hypertensive disorders of pregnancy as compared to normal healthy pregnant controls and therefore are useful biomarkers of pregnancy induced hypertension.

Key words:

Introduction

Hypertensive disorder of pregnancy is the major challenge in the field of Medical Sciences and still is one the commonest causes of maternal and perinatal mortality, it is very important to predict its possibility in antenatal period so that early detection and prompt treatment can be done.[1] Preeclampsia is characterized by systolic blood pressure of more than or equal to 140 mmHg and/or diastolic blood pressure of more than or equal to 90 mmHg, measured on 2 occasions, at least 4-6 hours apart following the 20th week of gestation in women who are otherwise normotensive.[2]

Ischemia modified albumin (IMA) is albumin which has undergone alterations in its amino terminal end consequent to ischemia, following which; it loses its capacity to bind to metal cations like cobalt ions. IMA is formed when there is an 'oxidative stress', an imbalance where there is an excess of oxidants and a decreased amount of antioxidants.[3] A number of

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researches have established the finding that IMA is elevated in acute coronary syndromes and has proved to be a useful adjunct in diagnosing myocardial ischemia.[4] IMA is one such candidate marker of oxidative stress. Markers of inflammation and oxidation are significantly elevated in PIH.[5]The present study was conducted to assess maternal serum ischemia modified Albumin as a marker of oxidative stress in hypertensive disorders of pregnancy.

Materials & Methods

The present study comprised of 48 pregnancy induced hypertensive women and equal number of control. All agreed to participate in the study.

Data such as name, age, gravid, parity etc. was recorded. Patients were put in group I and control in group II. The albumin cobalt-binding test was used to estimate the IMA levels and serum albumin levels were estimated using absorbance by Bromocresol green. Results were tabulated and assessed statistically. P value less than 0.05 was considered significant.

Results

Table I Assessment of parameters

Parameters	Group I	Group II	P value
IMA (ABSU)	0.56	0.05	0.01
Albumin (g/dL)	2.90	3.86	0.05
IMA/albumin (ABSU/g/dL)	0.23	0.04	0.02

Table I, graph I shows that mean IMA in group I was 0.56 ABSU and in group II was 0.05 ABSU. The men albumin was 2.90 g/dL in group I and 3.86 g/dL in group II. The mean IMA/albumin was 0.23 ABSU/g/dL in group I and 0.04 ABSU/g/dL in group II. The difference was significant (P< 0.05).

Graph IAssessment of parameters

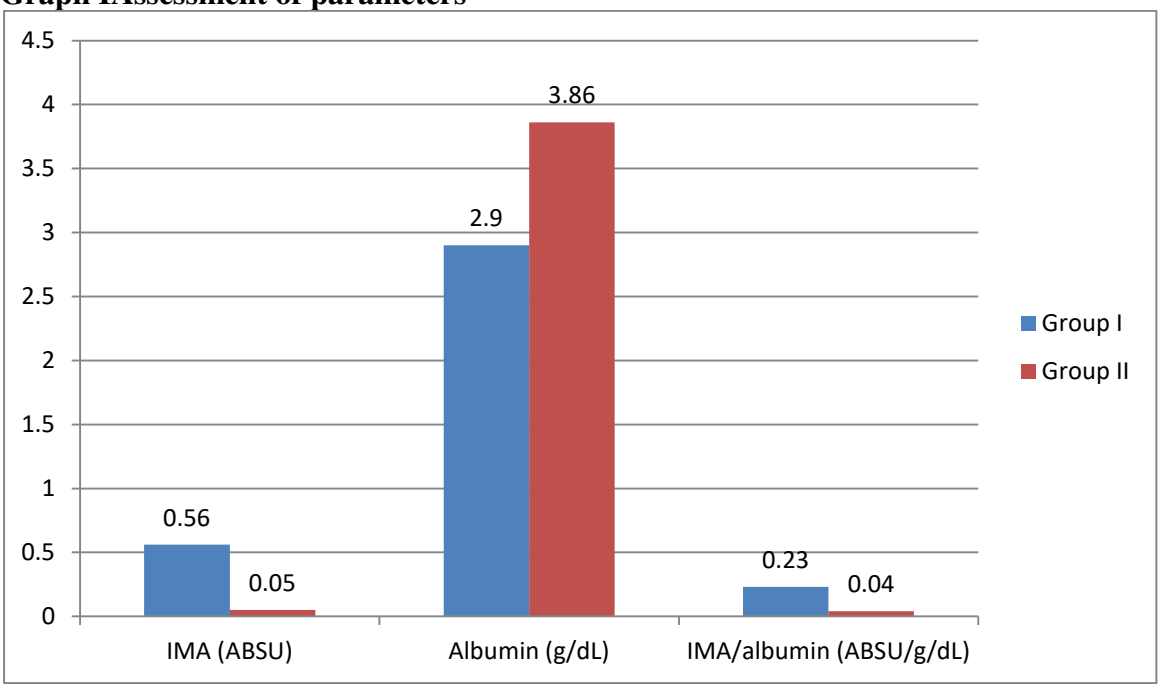

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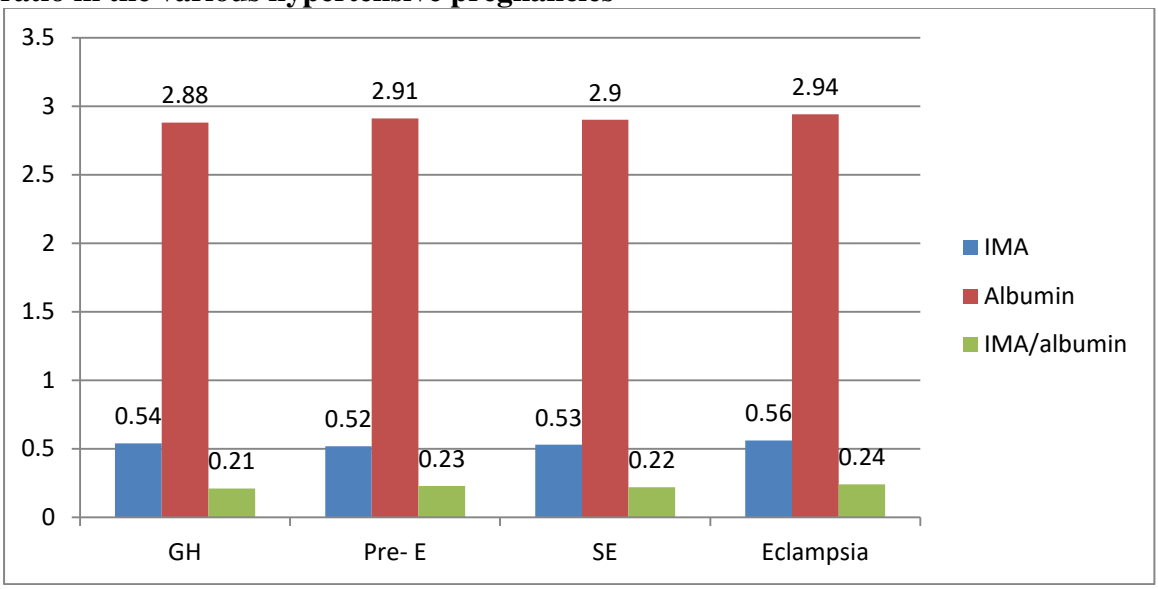
Table II Comparison of mean albumin, mean IMA levels and mean IMA to albumin ratio in the various hypertensive pregnancies

Parameters	Gestational Hypertension (4)	Pre-eclampsia (30)	Severe eclampsia (8)	Eclampsia (6)	P value
IMA (ABSU)	0.54	0.52	0.53	0.56	0.92
Albumin (g/dL)	2.88	2.91	2.90	2.94	0.98
IMA/albumin (ABSU/g/dL)	0.21	0.23	0.22	0.24	0.87

Table II, graph II shows that gestational hypertension was seen in 4, pre- eclampsia in 30, severe eclampsia in 8 and eclampsia in 6 patients. The mean IMA, albumin and IMA/ albumin was comparable in all hypertensive pregnancies. The difference was non- significant (P> 0.05).

Graph IIComparison of mean albumin, mean IMA levels and mean IMA to albumin ratio in the various hypertensive pregnancies



Discussion

The FDA has recently approved the use of Ischemia Modified Albumin as a biomarker in Myocardial Ischemia. It is also elevated in other pathological conditions such as Diabetes Mellitus, renal failure, cerebrovascular accidents and disseminated chronic liver disease.[6] However, researches on whether IMA is elevated in Pregnancy Induced Hypertension (PIH; preeclampsia, eclampsia and gestational hypertension) are still underway.[7,8] The present study was conducted to assess maternal serum ischemia modified Albumin as a marker of oxidative stress in hypertensive disorders of pregnancy.

We found that the mean IMA in group I was 0.56 ABSU and in group II was 0.05 ABSU. The men albumin was 2.90 g/dL in group I and 3.86 g/dL in group II. The mean IMA/albumin was 0.23 ABSU/g/dL in group I and 0.04 ABSU/g/dL in group II.Kavitha et al[9] in their study the IMA and IMA albumin ratio levels of 40 pregnant women with pregnancy induced hypertension of age group 18–40 years were compared with the 40 age matched healthy pregnant controls. The albumin cobalt-binding test was used to estimate the IMA levels and serum albumin levels were estimated using absorbance by Bromocresol green. Mean levels of IMA were higher in the case group as compared to control group (0.52 ±0.1 ABSU vs 0.04 ± 0.03 ABSU, p <0.05).

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We observed that gestational hypertension was seen in 4, pre- eclampsia in 30, severe eclampsia in 8 and eclampsia in 6 patients. The mean IMA, albumin and IMA/ albumin was comparable in all hypertensive pregnancies. Rijn V et al[10] compared 12 preeclampsia patients, 12 pregnant controls and 12 nonpregnant controls, they found that IMA level was elevated in pregnant and nonpregnant controls and that there was no significant difference in the IMA levels between the preeclampsia patients and pregnant controls. Such disparity in results among various studies could be due to differences in the severity of preeclampsia among different patients.

Bahinipati JT et al[11] compared 45 pre-eclamptic patients with 31 pregnant healthy controls in which, they found that IMA and MDA (Malondialdeyde, an oxidative stress marker) levels were significantly elevated in the preeclamptic group as compared to the controls' and a significant correlation was found between the two markers. Vyakaranam et al[12] in their study pregnant women ≥32 weeks of gestation were included 3 groups, 19 Normotensive Pregnant (NP) women as controls, 18 pregnant women with Pregnancy Induced Hypertension (PIH) and 19 with preeclampsia (PE). Serum IMA was estimated by Enzyme Linked Immune Sorbent Assay (ELISA). Serum IMA levels were significantly elevated in PE (56.84 ± 21.57 ng/ml) when compared with PIH (36.24 ± 14.51 ng/ml) and NP (35.47 ± 11.58 ng/ml) (P value <0.001). With a cutoff of 38.33 ng/ml, sensitivity and specificity for preeclampsia was 88.9% and 73.7% respectively.

Small sample size selection is drawback of the study.

Conclusion

Authors found that ischemia modified albumin and the ratio of IMA to normal serum albumin are significantly elevated in hypertensive disorders of pregnancy as compared to normal healthy pregnant controls and therefore are useful biomarkers of pregnancy induced hypertension.

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