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Correlative Study Between AT III Level in Pre Eclampsia and Maternal Morbidity

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Abstract

This study was conducted on 40 cases including 20 preeclamptic patients, and 20 healthy subjects as a reference group who were further classified into 2 subgroups. The first subgroup included 10 healthy non-pregnant females, and the second included 10 healthy pregnant females in the last trimester. All cases were subjected to laboratory investigations including haemoglobin and haematocrit levels, platelet count and plasma antithrombin III (AT III) activity level. It was concluded that AT III Activity was decreased in most of the pre-eclamptic group compared to the reference groups who dad normal levels. There was a significant correlation between AT III and both haemoglobin and haematocrit levels, as well as platelet count in the preeclamptic group. AT III depression in pre-eclampsia correlates with the degree of maternal morbidity as determined by diastolic blood pressure, haemoglobin and haematocrit levels, and thrombocytopenia. The significant decrease in At III level was explained by increased consumption of AT III within the maternal vascular tree in the process of generalized fibrin deposition in pre-eclampsia. It was further recommended that AT III determination be carried out in early pregnancy to detect changes in its level.

Introduction

AT III is a plasma protein which inactivates all activated clotting enzymes, except factor VIIa, and is thought to be the main physiologic inhibitor of blood coagulation [1]. It belongs to the class of serine protease inhibitors [2]. Both inherited and aquired AT III deficiency are associated

with an increased risk of thromboembolism [1]. AT III plasma levels are in the normal range during normal pregnancy [3,4].

There have been many reports showing that AT III levels were decreased in patients with pre-eclampsia compared with patients who are normotensive or who had chronic hypertension [5, 6, 7, 8].

The aim of the present study was to determine whether AT III levels correlate with maternal morbidity in pre-eclampsia. Morbidity will be assessed by maximal diastolic blood pressure, proteinuria, haemoglobin, haematocrit and platelet counts. Estimation of the level of AT III activity in plasma of patients with pre-eclampsia will be performed and if there is any detectable decrease in this activity, this will be correlated with maternal morbidity parameters.

Material and Methods

Forty females were included in this study. They were categorized into 3 groups:

A) Control group of normal females (non-pregnant):

This group included 10 adult non-pregnant females, clinically healthy. Their ages ranged between 20 and 35 years with a mean of 29.9 ± 5.5.

B) Control group of pregnant females:

This group included 10 adult pregnant females. Their ages ranged between 18 and 35 years with a mean of 26.5 ± 6.33. They were all healthy with no clinical or laboratory evidence of preeclampsia.

C) Patient group:

This group included 20 adult pregnant females. Their ages ranged between 19 and 44 years with a mean of 30.15 ± 6.09. They all presented with manifestations of pre-eclampsia, both clinical and laboratory.

All subjects in the control group and patient group were subjected to the following investigations:

A) Full clinical examination:

This included thorough history taking, age, recording of blood pressure, examination of the lower limbs for oedema, prominent abdominal or leg veins, and any visual disturbances. Also, period of gestation and gravidity with any past history of pre-eclampsia.

B) Laboratory investigations:

I. General tests:

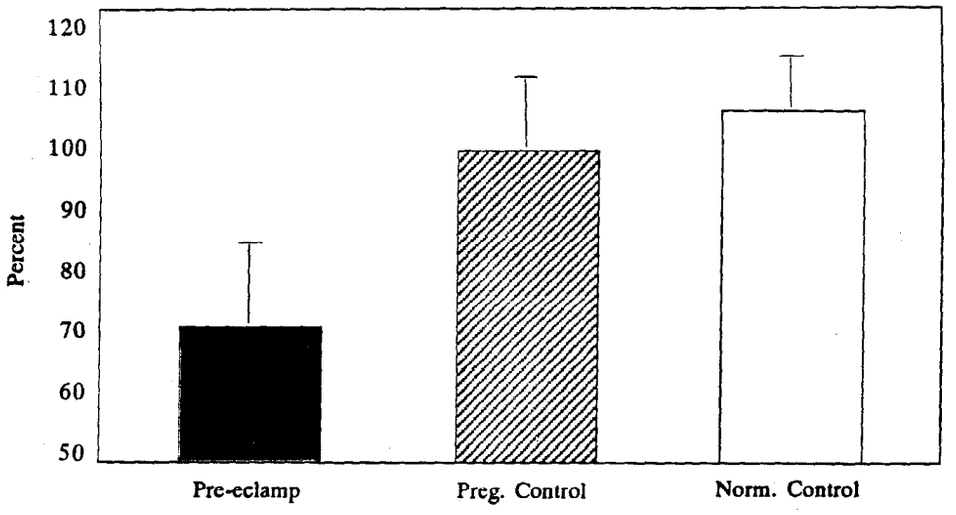
a. Total proteins in urine
b. Haemoglobin level.
c. Haematocrit value.
d. Platelet count (direct & indirect methods).

II. Specific tests:

Estimation of At III in patients plasma using radial immunodiffusion [9].

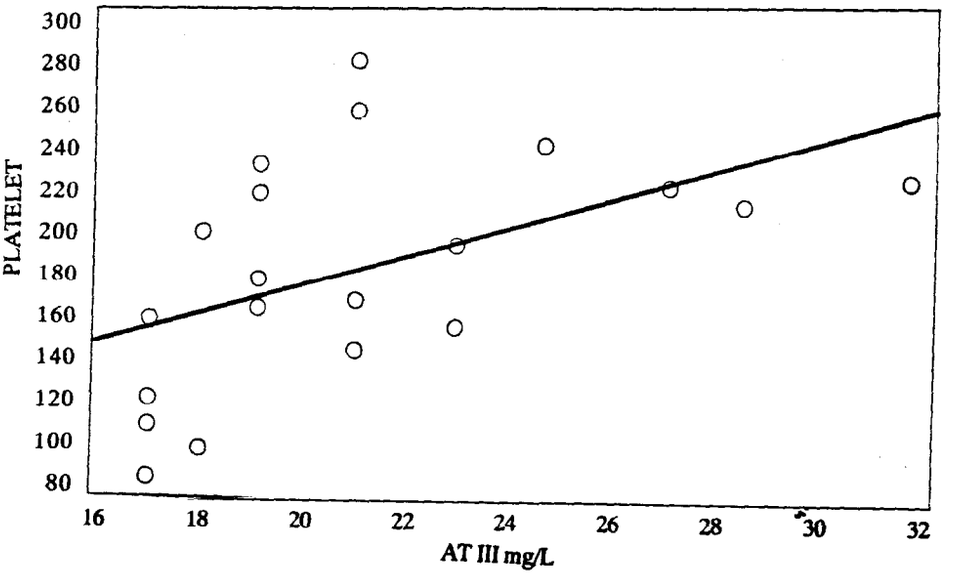
Results

The resutls are summarized in table (1), and figures (1), (2), (3) and (4).



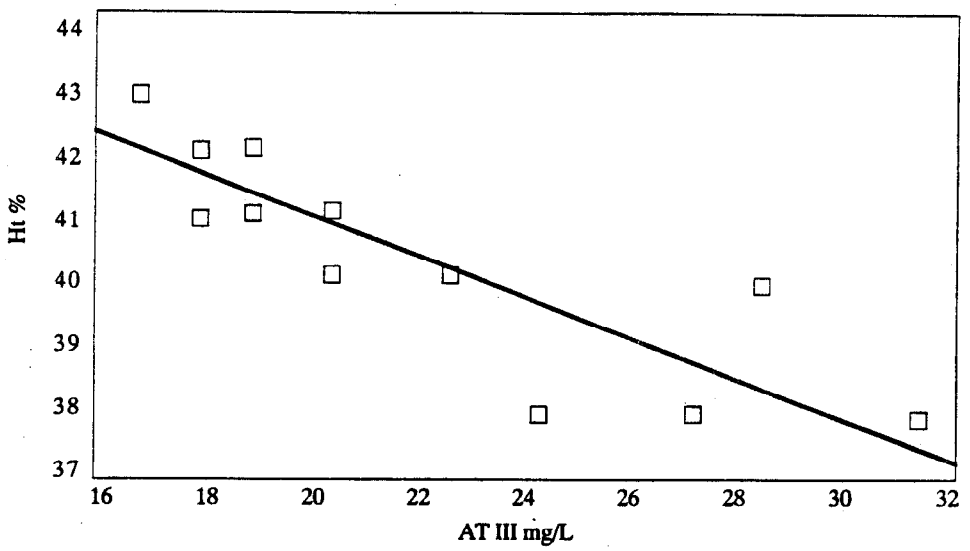
Pre-eclamp = pre-eclampsia
Preg. control = pregnant control
Horm. control = normal control

Fig. (1): Comparison between the means of antithrombin III level in the 3 studied groups.



y = 7.14x +36.59, R squared : .295 r = 0.54
AT III = Antithrombin III

Fig. (2): the correlation between AT III & platelet count in pre-eclamptic group.

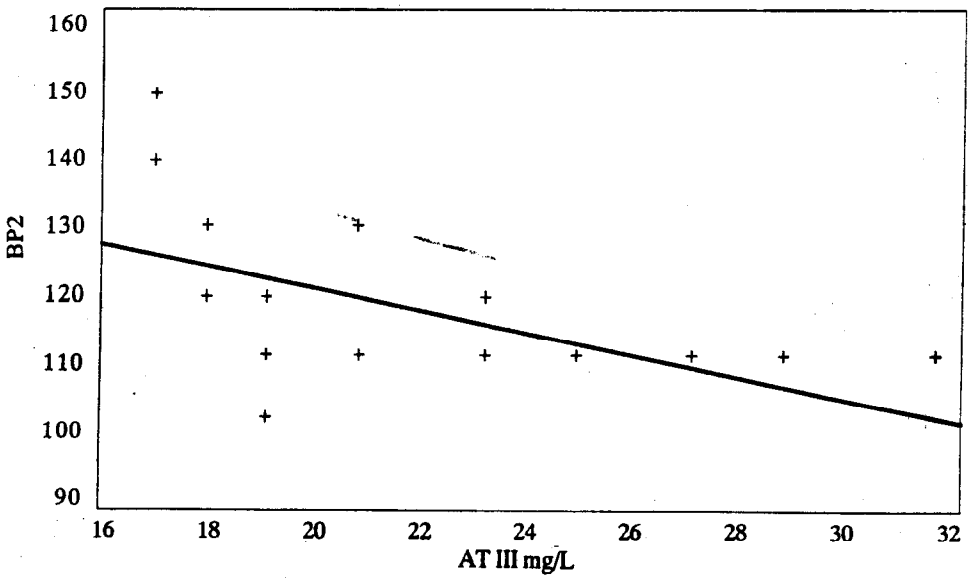


y = .331x +47.7, R squared : .725 r = 0.45

AT III = Antithrombin III

Ht% = Haematocrit

Fig. (3): The correlation between AT III & Ht% in the preeclamptic group.



y = 1.895x +159.281, R squared : .32 r = 0.57

AT III MG/L

Fig. (4): The correlation between AT III & diastolic blood pressure in the pre-eclamptic group.

Table (1): Comparison Between the Results of TA III Activity and Platelet Count in the 3 Studied Groups.

Variable	Statistical comparison	Non pregnant control	Pregnant control	Pre-eclamptic group
	Mean	31.94	30.38	20.99
AT III	S D	2.75	3.78	4.16
mgm / l	P-value		> 0.05[a)]	> 0.0001[a) b)]
	Significance		N.S.	H.S.
Platelet	Mean	262	265	186.5
Count	S D	55.74	45.77	54.70
X 10^3 / cumm	P-value		> 0.05[a)]	> 0.0002[a) b)]
	Significance		N.S.	H.S.

AT III = antithrombin III

a) = comparsion of the mean to that of non pregnant control

b) =comparsion of the mean to that of pregnant control

N.S.= Non significant H.S. = Highly significant

Discussion

Our study revealed a significant decrease in the plasma AT II activity in the pre-eclamptic group when compared to pregnant and non-pregnant female groups. This is in agreement with Weiner and Brandt [2] who reported a normal level of AT III during the third trimester. Brandt [10], speculated that AT III determination might prove useful as a screening device as well as a tool for distinguishing pre-eclampsia from other hypertensive disorders in pregnancy.

There is a significant correlation between AT III level and both haemoglobin and haematocrit levels in the pre-eclamptic group ($r = 0.85$). With increased haemoconcentration, there is reduction of AT III level. This is in agreement with MacGillivary et al [11]. Also, there is significant correlation between AT III and diastolic blood pressure, as elevation of the latter is accompanied by more reduction in AT III level ($r = 0.57$). This is in agreement with Weenink et al [7]. A significant correlation exists between AT III level and platelet count (curve 1), in agreement with Weinstein [12]. However, there is no correlation between AT III level and the degree of proteinuria, in accordance with Weeninik et al [7].

The aetiology of AT III deficiency in pre-eclampsia could be explained by urinary loss as described in the nephrotic syndrome [13]. However, patients with pregnancy hypertension without proteinuria still had decreased AT III levels while patients with chronic hypertension and proteinuria due to preexistent renal disease had normal AT III levels [6].

Patients with disturbed liver function had lower AT III levels, but in some patients with hypertension without proteinuria and with normal liver functions, AT III depression could still be demonstrated. Therefore, disturbed liver function does not probably cause AT III depression in pre-eclampsia [14]. The decrease in AT III level can be explained by an increased consumption of AT III within the maternal vascular tree in the process of generalized fibrin deposition in pre-eclampsia [6].

The haemogram in our study, including haemoglobin and haematocrit levels in the pre-eclamptic group revealed relatively higher concentration when compared with the reference groups of pregnant females and non-pregnant females.

This observation agreed with those of Weenink et al [7] of high haemoglobin and haematocrit levels in preeclampsia due to haemoconcentration. This haemoconcentration was due to decreased plasma volume due to oedema which occurs even before the onset of pre-eclampsia [11].

The platelet count was significantly decreased in preeclamptic patients in agreement with Weinstein [12]. There is increased turnover of platelets in women with pre-eclampsia, due to increased consumption in the process of chronic disseminated intravascular coagulation nature of pre-eclampsia [11].

Pritchard et al [15] reported that there is vascular damage by segmental vasospasm, followed by platelet adherance and fibrin deposition.

Total proteins in urine are increased in all cases of preeclampsia which correlates with the findings of Honger [16] of the presence of hypoalbuminaemia in pre-eclampsia. This hypoalbuminaemia is related to urinary loss and increased catabolism of total serum proteins, however, no shift to the interstitial compartment was demonstrated.

We conclude that AT III depression in pre-eclampsia correlates with the degree of maternal morbidity as determined by diastolic blood pressure and thrombocytopenia, and that AT III depression may be explained by increased consumption within the maternal vascular tree. It is recommended that AT III determination early in pregnancy should be carried out so that changes in its level later on could be detected.

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