Summary & Conclusions
Prevalence of eclampsia and the resultant maternal and perinatal deaths inspired the present worker to study in details its various aspects with special emphasis on coagulation pattern. The study was conducted in the Eden Hospital, Medical College, Calcutta (West Bengal, Eastern Coastal State of India) during July 1973 to December 1977.

294 cases of eclampsia were subjected for detailed clinical analysis and a comparison was made with the general obstetric in-patients from antenatal and labour ward. Cases of preeclampsia (36), pregnancy with nontoxaemic hypertension (10), pregnancy with epilepsy (5) and accidental haemorrhage (10) cases were also taken for other investigations. Similarly normal control subjects (40) were studied from different stages of pregnancy, labour and puerperium.

Outline of the present study:

a) Detailed clinical evaluation of the eclampsia cases with a particular stress on maternal mortality.

b) Special investigations:

i) Assessment of meteorological influence (comparison of incidence of eclampsia with variation of temperature and humidity).

ii) Assessment of nutrition (haemoglobin and plasma proteins).

iii) Assessment of renal functions (Blood Urea, Creatinine, conventional excretory IVP).
iv) Assessment of central nervous system involvement (CSF, X-ray skull and EEG studies).

v) Assessment of coagulation status (fibrinogen and euglobulin clot lysis time).

General Observations

A more or less consistent incidence of eclampsia (about 10 per thousand deliveries) during 1972 - 1976 was found in the present study at Calcutta, a coastal state city of India. Antepartum eclampsia was found to be the commonest (65%) type. The incidence of preeclampsia remained more or less same throughout India but the incidence of eclampsia was definitely higher in coastal states of India in comparison to northern part of the country.

Illiterate women from low socio-economic background suffered mostly from eclampsia which resulted from complete lack of antenatal care (76%). Primiparous mothers were the common victims of eclampsia (71% against 39% Prim admission in hospital). Young teenaged girls were found to be particularly prone (39% against 16% overall hospital admissions). Mean age of all eclampsia patients of the present study was found to be 21.7 years. In 2 cases of the present series eclampsia supervened before 20 weeks of gestation with fetus in utero. No case of molar pregnancy was found in the eclampsia series. Intrauterine growth retardation was found to be a common association of eclampsia. In eclampsia the observed height and growth of uterus did not correspond with the gesta-
Various premonitory symptoms, headache in particular, prior to the onset of convulsions were experienced by as many as 76 percent patients of the present series.

A circadian rhythm in the onset of first convulsion was an interesting observation of the present study. In 50.7 percent cases first convulsion started in the late hours of night and in early part of the morning.

Raised blood pressure, was not always the only precipitating factor of eclampsia; patients came with eclamptic convulsion even with a mean arterial pressure of 105 mm. of Hg, without any apparent features of shock.

Abnormal fundoscopic findings were found in 71.3% cases of the present series. Spasm of retinal vessels (31%), pallor of the optic disc (30%) and narrowing of retinal vessels (25%) were common ophthalmological observations; presence of retinal haemorrhage however minute, was found to be an alarming sign.

For management of the cases, apart from the resuscitative measures, Lytic Cocktail was used as a routine and in desperate cases other drugs (diazepam, paraldehyde) were also
introduced for controlling the convulsions. 76% patients delivered in the hospital, about 34% cases low forceps were applied and caesarean section were undertaken in 4.7% cases.

Mean birth weight of the babies born to 'term' eclampsia patients (2.2 kg.) was found to be statistically lower in comparison to those in preeclampsia (2.5 kg.) and in normal control group at matched gestational period (2.7 kg.).

Patients who suffered from eclampsia, especially from postpartum type were very prone to develop puerperal psychosis (14% against a negligible incidence in normal delivery group). Recovery was however satisfactory with chlorpromazine or diazepam group of drugs. Incidence of psychosis was more in elderly patients but was uninfluenced by parity.

Maternal Deaths

Incidence of maternal death from eclampsia was found to be appalingly high in the present series (17%); analysis of maternal deaths (excluding abortion) for a period of 13 years (1964-76) had also revealed that toxaemia was the prime cause of maternal death. 50 percent deaths occurred within few hours of admission and amongst them 9 patients died undelivered. Cardiorespiratory failure, renal failure and failure to control the convulsions with or without coma were the apparent causes of death in most of the cases (78%).

The following factors were found to have positive influence on maternal death:-
1) Place of occurrence of first convulsion (hospital/outside hospital/distance of the place from the hospital/convulsion hospitalisation interval).

2) Type of eclampsia (Less in intrapartum eclampsia).

3) High age and higher parity (affected adversely).

4) Number of convulsions (10 or more had adverse effect).

5) Convulsion-delivery interval - Most important contributing factor for such high maternal deaths of antepartum eclampsia in present series. Longer the intervals, more were the maternal deaths irrespective of control of convulsions.

The foetal salvage rate in eclampsia was satisfactory (65%) in good birth weight (2000 to 3500 Gms.) babies. Most of the perinatal deaths were due to prematurity and anoxia. The foetal wastage were commonest in the antepartum eclampsia (52%) followed by intrapartum (28%) and postpartum group (20%) respectively. Convulsion-delivery interval was again a prime factor in influencing the perinatal loss adversely.

Special Observations

Geographical and Meteorological influence

Eclampsia was found to be prevalent in the coastal areas of India. A summer and a winter peak of eclampsia incidence were observed. Maximum temperature and minimum temperature had positive correlation with incidence of eclampsia. Humidity however had no influence on the incidence.
Nutritional Status

Mean haemoglobin value in eclampsia group (9.5 Gm.%)
was found to be significantly lower in comparison to the
socio-economically matched normal pregnancy group (11 Gm.%).
Similarly mean plasma total protein values were also signifi­
cantly low in eclampsia (5.9 Gm.%) in comparison to pre­
eclampsia (6.3 Gm.%) pregnancy with nontoxaemic hypertension
(6.8 Gm.%) and normal pregnancy group (6.7 Gm.%). The mean
albumin and globulin values were also significantly lower
(3.8 Gm. and 2.1 Gm. respectively) than those in other groups;
however no alteration in the A : G ratio was noticed.

Renal Functions

Oedema and proteinuria was a consistent feature in
all eclampsia patients of the present series. Bacterial growth
was found in 6% of cases (30 random eclampsia) where culture
of urine was carried out. E. Coli was found to be the commo­
nest offending organism followed by Klebsiella group.

Mean blood urea level in eclampsia (35 mg.%l was
found to be significantly higher than that of the 3rd trimester
normal pregnancy (13.6 mg.%). Mean blood urea levels in
preeclampsia (30 mg.%l and pregnancy with nontoxaemic hyper­
tension (25 mg.%l groups were also found to be significantly
higher than normal pregnancy group. Serum creatinine values
remained unaffected in all the groups. Intravenous pyelogra­
phy in the puerperium did not reveal any abnormality other
than dilatations of the pelvicalicyal system which were considered as usual normal pregnancy changes.

Central Nervous System Involvement

CSF pressure was found to be significantly high in the eclampsia group (219 mm. of H₂O) in comparison to normal pregnancy (117 mm. of H₂O), pregnancy with epilepsy (127 mm. of H₂O), pregnancy with nontoxaemic hypertension (132 mm. of H₂O) and preeclampsia (145 mm. of H₂O). CSF pressure in preeclampsia also were found to be comparatively higher than other study groups.

Except in 23% cases, in all other cases of eclampsia microscopic or macroscopic haemorrhages were present as was revealed by 101 to 1000 RBC count per c.mm. of CSF in 64 percent cases of the present series, whereas 13% cases CSF showed frank haemorrhage. RBC in CSF (above 100/c.mm.) was conspicuously absent in all other groups. CSF mean protein and chloride values (40.7 mg.$, 718 mg.$ respectively) were also found to be significantly higher in eclampsia group than in normal pregnancy group (20 mg.$ & 688 mg.$) and in other study groups. In preeclampsia also the CSF protein value was found to be little higher (32 mg.$) than that of normal. CSF sugar value however did not reveal any change in any group.

EEG studies revealed high incidence of dysrrhythmia in eclampsia (83%) and in epilepsy (80%) group. But apart from this no other suggestive features could be derived from EEG. Radiological investigation of skull again did not help
much. Carotid angiography in 2 patients of eclampsia where focal lesions were detected in ECG, revealed no abnormality.

Coagulation System

A steady and significant rise in the plasma fibrinogen level was found all through the normal pregnancy which started falling from the 2nd stage of labour. Euglobulin clot lysis time also showed a delayed activity in the later half of normal pregnancy.

Mean plasma fibrinogen level and the mean euglobulin clot lysis time were found to be significantly higher in eclampsia group (963 mg.% and 161.8 minutes respectively) than in all other study and control groups. Fibrinogen levels in antepartum eclampsia, intrapartum eclampsia as well as in postpartum eclampsia were compared with the respective stages of normal pregnancy, labour and puerperium and in all the cases significantly higher values were found in eclampsia group.

Mean plasma fibrinogen level was comparatively high in preeclampsia also (691 of mg.% in comparison to 3rd trimester normal pregnancy (608.5 mg.% and nontoxaemic hypertension (652 mg.%). No significant alteration was noticed however, in the euglobulin clot lysis time in preeclampsia group.

In accidental haemorrhage cases (apparently nontoxaemic) a fall in the plasma fibrinogen level (473.5 mg.%) and shortened euglobulin clot lysis time (136.8 minutes) in comparison to those of 1st stage of normal labour (152 mg.% and 152 minutes respectively) was significant observation of the present series.
CONCLUSIONS

From the present study, following conclusions may be drawn -

1) Lack of basic education and proper medical care form the major background of high incidence of eclampsia; sincere effort should be made to bring all the expectant mothers under the perview of the antenatal care.

2) While a similar incidence of preeclampsia prevails throughout India, incidence of eclampsia is much higher in West Bengal and in other coastal regions in comparison to north India, though the socioeconomic background and antenatal attendance of these regions do not have much variation.

3) Young primigravid patients are the most susceptible subjects (mean age 21.7 years) for eclampsia.

4) Antepartum eclampsia is the commonest type of eclampsia; however, it is not always possible to correctly distinguish antepartum from intrapartum type.

5) Eclampsia is usually preceded by symptoms of preeclampsia of varying duration. Symptoms of severe headache, visual disturbance and/or pain abdomen in a preeclamptic patient are the forerunner of convulsions. Development of such symptoms necessitates immediate hospitalisation and strict supervision to bring down the incidence rate of eclampsia.

6) Onset of eclamptic convulsions maintains a circadian rhythm and is commoner during night (0-6 a.m.) hours.
7) Rise of blood pressure (MAP) is a very important precipitating factor in eclampsia, but eclamptic convolution may be seen even with a lower MAP. Occasionally eclampsia may be seen before 20 weeks of gestation with foetus in utero.

8) Routine ophthalmological examination of preeclampsia - eclampsia patients may be helpful in early detection of grave cases.

9) Eclampsia definitely predisposes to puerperal psychosis, and this occurs more often after postpartum eclampsia. The recovery is however satisfactory by treatment with chlorpromazine and diazepam.

10) High age, multiparity, increased number of convulsions and delayed convolution-delivery interval affect the maternal prognosis in eclampsia adversely. Foetal survival is also directly dependent on convolution-delivery interval.

11) Intensive care, constant supervision and active management of labour (like low rupture of membranes, timely caesarean section and forceps application) are the key factors in the management of eclampsia. For having best maternal and perinatal results, number of convulsions and convolution-delivery interval should be minimised, as far as practicable.

12) In the present series, the maternal and perinatal deaths in eclampsia were found to be very high and the following avoidable factors are responsible for such a high incidence-
Patient factor - Ignorance and negligence about antenatal care and delay in hospitalisation after the onset of convulsions.

Hospital factor - Lack of intensive care facility.

Physician factor - Failure of proper assessment of cases,
- Delay in termination of pregnancy,
- Lack of constant supervision (at least upto 24 hours after the control of convulsions).

Eclampsia varies with season; maximum and minimum temperature have got positive influence on its incidence but humidity seems to have no such effect.

Eclampsia patients suffer from lack of nutrition as revealed by low haemoglobin and total plasma protein values.

Renal function is affected in eclampsia as well as in other hypertensive disorders in pregnancy in comparison to normal pregnancy.

Routine study of cerebrospinal fluid (Pressure and RBC count) may help in prediction of prognosis in eclampsia. A rising pressure and a high RBC count of CSF in severe preeclampsia cases may indicate an oncoming convulsion, which may be averted by proper rest, sedation and termination of pregnancy. By CSF studies it is also possible to differentiate eclampsia from epilepsy and other hypertensive disorders associated with pregnancy.

Electroencephalographic studies in eclampsia are helpful
only to reveal the dysrrhythmia in a high percentage of cases but it do not have much diagnostic or prognostic value, as no specific changes could be identified by the ECG.

18) A higher plasma fibrinogen level and a prolonged euglobulin clot lysis time (ECLT) in comparison to those of respective stages of normal pregnancy are specific changes of eclampsia. Higher trend of plasma fibrinogen and ECLT values, particularly with a background of pre-eclampsia, should be regarded with great caution, as these indicate the severity of the disease and mark the footsteps of oncoming convulsions.

19) The present study proved beyond doubt that the hypercoaguable state of pregnancy is further enhanced in pre-eclampsia-eclampsia. The prognosis of preeclampsia can thus be quantitatively assessed by fibrinogen & ECLT determination. This may guide us to terminate the pregnancy in time and thus eclampsia can be averted.

The observation may be one of the initial pathological changes but whether this change is the cause or effect of the basic defect of the disease still remain unsolved. Further research may be taken up towards solving this mystery. Moreover, this background of exaggerated hypercoagubility of the disease calls for an extensive trial of anticoagulants towards prevention and management of this dreadful disease which is so prevalent in this part of country.