

# ELECTROCARDIOGRAPHIC STUDY IN PREGNANT WOMEN IN NORMAL AND TOXAEMIA OF PREGNANCY

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## SUMMARY

The ECG changes during normal pregnancy and pre-eclampsia were comparable. The abnormalities of significance were detected in only 3 cases of eclampsia and two cases of hypertension.

It is concluded that the study of electrocardiographic changes in normal and toxæmia of pregnancy is of great value as it helped to establish the normal electrocardiographic pattern of pregnant women. As a matter of fact this method of diagnosing the pregnant women with heart disease can be detected in the earliest period, so that adequate precaution can be taken. Similarly ECG should be done as a part of investigation in toxæmic women to detect any myocardial strain or lesion at the earliest moment so that the required pre-caution could be taken.

### *Introduction*

Pregnancy although a physiological phenomena brings about remarkable changes in the heart in the pregnant women. Signs and symptoms of pregnancy as a matter of fact simulate heart disease.

The objective of the present study is to determine electric cardiographic changes in normal and toxæmia of pregnancy as electrocardiograph redesents the condition of the heart which in turn is regulat-

ed by haemodynamic alterations in their conditions.

### *Material and Methods*

In the present series there were 90 pregnant women for study and 25 non-pregnant control cases. These cases were selected from the women attending the antenatal clinic and also from the indoor admissions of the hospital for women Patna Medical College, Hospital Patna.

The electrocardiographic study was made on 90 pregnant women, 30 of them had normal pregnancy and 60 had pregnancy complicated with toxæmia.

A complete physical and systemic examination were made and all the investigations were done to exclude ana-

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mia and renal disease to account for cardiac changes.

Serial electrocardiogram in all the 12 leads was taken in all three trimester of pregnancy. The last ECG was taken on post-partum period varying from one week to four weeks after delivery.

The cases under study was devided into the three main groups. The age varied between 18-40 years.

Group A—Control cases consisted of 25 non-pregnant women of similar age group of (18-40 years) to rule out any electrographic changes peculiar to that age.

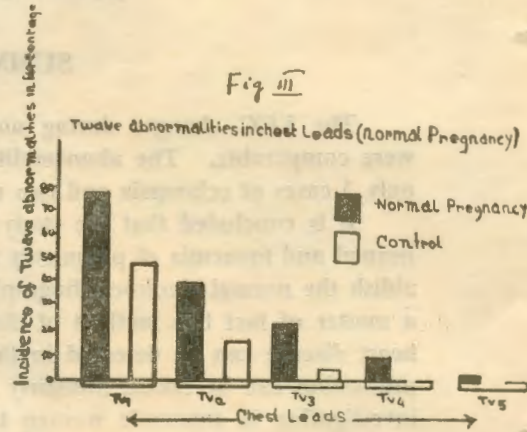
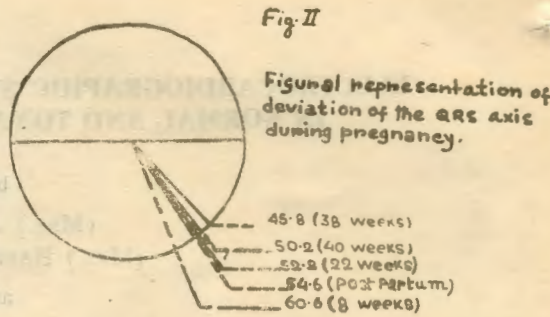
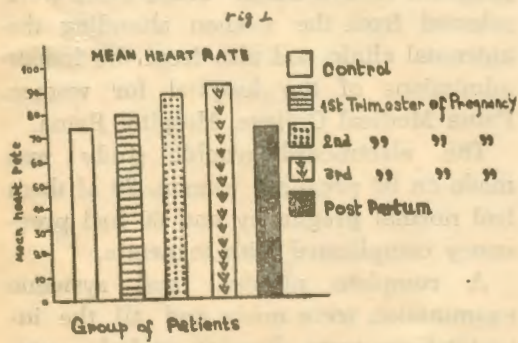
Group B—Consisted of 30 normal pregnancy cases.

Group C—Comprised of 60 cases of toxæmia of pregnancy. There were 40 cases of pre-eclampsia, 16 cases of eclampsia and 4 cases of hypertension with pregnancy.

There was, however, no case of chronic nephritis.

**Results**

The results are analysed according to the abnormalities in the ECG tracings in normal pregnancy and toxæmia of pregnancy, in Figs. I, II and III.



**Discussion**

The present study of electrocardiographic change in normal and toxæmia pregnant women is under taken to establish electrocardiographic pattern of normal pregnancy and to detect the presence of myocardial lesion, if any in cases of toxæmias of pregnancy.

The electrocardiographic changes of normal pregnancy has been studied by various workers in past and even in the recent years but a precise electrocardiographic pattern of normal pregnancy is yet to be established.

*Normal pregnancy and toxæmia of pregnancy:* In the present series, heart rate was found to be fairly steady throughout pregnancy with a tendency to gradual rise in the 2nd and 3rd trimesters.

The heart rate gradually settled down in the post-partum period. (Padmawati 1957; Singh, *et al* 1968) reported similar findings.

The QRS axis (electrical axis) of the heart shifted towards the left as pregnancy advanced. There is no considerable shift of the electrical axis till 12th week of pregnancy. Between 38th to 40th weeks the axis shifted to the right, a further right shift of the electrical axis was noted in the post-partum period. The term 'right shift' of the axis is comparative because it denotes return to normal of the left shifted electrical axis (see figural representation of deviation of the QRS axis during pregnancy). This finding of axis shift confirms the observations of previous workers (Carr and Palmer 1932; Feldman and Hill 1934; Zatuchni 1951). The left axis shift may be attributed to the elevation of diaphragm in late pregnancy making the heart more horizontal. In early pregnancy the left axis shift can be explained from the fact that there is increased blood volume which causes left ventricular load. The shift of the Q axis of the heart to the right after 38th week of pregnancy is probably due to the descent of the presenting part in the pelvis and consequent diminution of pressure on the diaphragm from below causing the heart to return little to the right. The further right axis shift noted in the postpartum period was actually a relation right shift bringing the heart to more or less in its normal position.

A q wave of less than one quarter of the length of R wave was noted in lead III in 40% of the cases in the present series. The appearance of q III may be attributed to pregnancy. Although the presence of q III during pregnancy has been widely accepted its etiology still remains obscure. Carr *et al* (1933) state that occurrence of

q III is due to left axis deviation of the heart.

Prominent q III in the present series occurred only in 6.66% of the cases and in all cases it persisted in the postpartum record, hence it is thought to be not of much significance as far as pregnancy is concerned. But Singh *et al* (1968) got quite a high percentage of prominent q III (36%).

In the present work, a negative T wave in lead III could be recorded in 70% of normal pregnancy of which in 23.33% this negative T became positive in postpartum records. T wave inversion was also detected in the series of Padmawati (1957) and Singh *et al* (1968). The above finding may be explained by temporary increased work load on heart due to increased blood volume during pregnancy which may cause a temporary ischaemia, represented by T wave inversion.

In the present work, the T wave abnormalities in the normal pregnant women could be detected in almost all the chest leads. ECG changes in pre-eclampsia were comparable to that of normal pregnancy. Hamilton and Thomson (1941) could not detect any significant ECG abnormality in their pre-eclamptic patients. Whereas Wallace, Kaz, *et al* (1946) found quite remarkable changes in the ECG pattern of 6 of their 12 patients under study. They describe that ECG changes suggested focal necrosis, oedema and inflammation of myocardium. McCartney (1965) also mentions about ECG changes denoting myocardial changes in pre-eclampsia. Szekely and Snaith (1974) studied 12 cases of gestational hypertension and found inversion of T wave in both standard and chest lead in 5 of them. Chesley (1978) reported that there is no good correlation of changes with the level

of blood pressure and electrocardiographic changes in pre-eclampsia.

Szekely and Snaith (1974) suggested that the ECG changes in eclampsia are due to focal myocarditis. Burwell and MetCalf (1958) describes heart failure as cause of death in many cases of eclampsia. All these authors seem to have concentrated on the patients of eclampsia of severe degrees.

In the present work severe cases were not taken. Fits were controlled with drugs and ECG was taken when patients were well sedated. As such major myocardial changes were detected in the present series.

The only significant change worth mentioning was depression of S-T. segment in lead I, II, avl and in chest leads V<sub>1</sub> to V<sub>5</sub> and could be detected in 3 cases out of 16 women under study. S-T. segment elevation was also detected in 1 case. The finding of S-T. segment depression and elevation denote myocardial ischaemia. This may be due to increased myocardial work as it has to pump against the raised blood pressure to which the heart is not accustomed.

Out of 4 cases of hypertension associated with pregnancy, in 2 cases evidence of

left ventricular hyper trophy was detected by ECG findings.

By and large electrocardiograph can be used as comprehensive investigation to detect the state of myocardium in toxæmic pregnancy and any precaution if necessary can be taken at the earliest.

#### References

1. Chesley, L. C.: Hypertensive disorder in pregnancy, 362, Appleton, Century Crofts, New York (1978).
2. Feldman, L. and Hill, H. A. A.: Heart Journal. 10: 110, 1934.
3. Hamilton, B. E. and Thomson, K. J.: The heart in pregnancy and the child bearing age, BOSTON, Little Brown and Co., 1941.
4. Mc Cartney, C. P.: Toxaemias of pregnancy 501, Obstetrics. W. B. Saunder Co. London 1965.
5. Padmawati, S.: Indian Heart Journal, 9: 132, 1957.
6. Singh, R., Ganlout, D. S., Kishore, N. and Hingirani, P.: J. Obstet. Gynec. India. 18: 35, 1968.
7. Szekely, P. and Snaith, L.: Heart disease and pregnancy 149, Churchill Livingstone, Edinburgh (1974).
8. Wallace, L., Katz, L. N., Langendorf, R. and Buxbaum, H.: Arch. Int. Medicine. 77: 405, 1946.
9. Zatuchni, J.: Heart Journal. 42: 11, 1951.