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Electrocardiographic Profile Of Patients With Hypertensive Disorders In Pregnancy

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Abstract

Background: Preeclampsia is a multisystem progressive disorder characterized by the new onset of hypertension and proteinuria or the new onset of hypertension and significant end-organ dysfunction with or without proteinuria in the last half of pregnancy or postpartum It is caused by placental and maternal vascular dysfunction and resolves after birth over a variable period. Although approximately 90 percent of cases present in the late preterm (≥34 to <37 weeks), the term (≥37 to <42 weeks), or postpartum (≥42 weeks) period and have good maternal, fetal, and newborn outcomes, the mother and child are still at increased risk for serious morbidity or mortality.

Aim: To study Electrocardiographic profile in patients with hypertensive disorders in pregnancy.

Methodology: This is a cross-sectional study of 250 patients with gestational hypertension and preeclampsia during pregnancy at the Institute of Obstetrics and Gynaecology, Egmore and Kasturba Hospital, Chennai. ECG is available in the hospital used. If ECG is abnormal echo was taken and a cardiologist's opinion was sought. Those who had ECG changes were counseled for future cardiovascular problems based on the literature.

Result: Among250,154(62%) Subjects had ECG abnormalities and 96 (38/.) did not have any ECG abnormality. 55(22%) subjects had sinus tachycardia as an ECG abnormality followed by52(20%) subjects with left ventricular hypertrophy and 17(7%) subjects with T wave inversion. The difference in the distribution of ECG abnormalities among parity, gestational age, treatment duration, and hypertensive disorders of subjects in the study population was a statistically significant p-value($p<0.05$).

Conclusion: TO conclude among 250 patients 62% had ECG abnormalities. ECHO was done by cardiologist and same confirmed and started aspirin in few subjects. Future risk has been explained and asked for follow-up in the future. With not just immediate pregnancy outcome in mind but future cardiovascular health of pregnant women in consideration. ECG in pregnancy with preeclampsia is the first step and may improve the holistic approach in obstetrics.

Keywords: Gestational hypertension, preeclampsia, ECG

Introduction

The hypertensive disorders of pregnancy (HDP) continue as the leading causes of maternal and perinatal morbidity and mortality and are frequently encountered entities (1). Hypertensive disorders of pregnancy (HDP), comprising gestational hypertension and pre-eclampsia, distress up to 10% of all pregnancies (2). Preeclampsia and eclampsia combined a rank succeeding only to hemorrhage as a specific, direct cause of maternal mortality. These

women have on average a twofold greater risk to develop cardiovascular disease future in life as related with women with pregnancies of normal blood pressure. This enlarged risk might result from an underlying susceptibility to CVD, HDP itself, or a mixture of both. (3) ECG is a simple, cost-effective, and widely available investigation for information on cardiovascular alterations in pregnancy. A very few studies have studied the ECG changes in pregnant women with hypertensive disorders during normal pregnancy. However, there is evidence that hypertensive disorders of pregnancy can be related to changes present in P-wave morphology and QT interval. (4)

Methods

This is a cross-sectional study done among the 250 Antenatal Patients who have been diagnosed with gestational hypertension and pre-eclampsia during their pregnancy and were studied by advising ECG in the Institute of Obstetrics and Gynaecology, Egmore, and ISO &KGH CHENNAI. After taking the informed consent, history, and examination, investigations were collected. An ECG (non-portable, standard, 12 lead) available in the hospital was done and reported to the physician on-call. The report (normality or abnormality, if any) was noted. If ECG was found abnormal ECHO was taken and advice of a cardiologist was sought and further management. Patients with ECG changes were counseled regarding future risk of cardiovascular problems. Inclusion Criteria: Patients who have been diagnosed with hypertension disorders during the pregnancy were studied during the antenatal period by advising ECG.Exclusion criteria: Diagnosed heart disease and systemic illness. And those requiring ICU admission due for any reason were excluded from the study.

Stastical analysis: Results of this study are described under the following headings. The distribution of parameters was Presented in tables in simple percentages. Fischer's exact test was applied and the p-value was calculated.

Table :1 Distribution of age group of the subjects in the study population

age group	Frequency	Percent
<= 20 years	16	6.4
21 - 25 years	85	34.0
26 - 30 years	102	40.8
31 - 35 years	39	15.6
> 35 years	8	3.2
Total	250	100.0

Table :1 shows Among the study population, around 75% of the subjects were within the 21 – 30 years age group of which 40.8% belonged to 26 – 30 years and 34% belonged to the 21 – 25 years age group. Only around 6% were below 20 years and 3% above 35 years.

Table-2: ECG abnormalities with gestational age of the subjects

Gestational age	ECG Abnormalities		T0tal no	p-value
	Abnormal	Normal		
Preterm	64 (77.1%)	19 (22.89%)	83 (100%)	

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Term	90 (53.89%)	77 (46.1%)	167(100%)	0.001
Total	154 (61.6%)	96 (38.4%)	250(100%)	

Table:2 Among the study population, 77.1% of subjects with preterm deliveries had ECG abnormalities while it was 53.89% of subjects with term deliveries had ECG abnormalities. The difference in the distribution of ECG abnormalities with a gestational age of the subjects in the study population was statisticallySignificant(p<,0.05)

Table-3: ECG abnormalities among parity of the subjects

Para	**ECG Abnormalities**		**Total no**	**Fisher's exact p-value**
	Abnormal	**Normal**		
nullipara	123(59.42%)	84(40.57%)	207(100%)	0.014
P1	18(64.28%)	10(35.71%)	28 (100%)	
P2	13(86.66%)	2 (13.33%)	15 (100%)	
Total	154(61.6%)	96 (38.4%)	250(100%)	

Among the study population, 86.6% of subjects with 2 deliveries had ECG abnormalities, 64.28% in subjects with 1 delivery, and 59.42% in subjects with nulliparous. The difference in the distribution of ECG abnormalities among parity of the subjects in the study population was statistically significant ($p < 0.05$).

Table-4: ECG abnormalities among treatment duration of the subjects:

Treatment Duration	**ECG Abnormalities**		**Total no**	**Fisher exact value**
	Abnormal	**Normal**		
1 week	32(48.48%)	34(51.51%)	66 (100%)	0.001
2 week	26(63.41%)	15(36.58%)	41 (100%)	
3 weeks	18(47.36%)	20(52.63%)	38 (100%)	
4 weeks	74(73.26%)	27(26.73%)	101(100%)	
> 1 month	4 (100%)	0 (0%)	4 (100%)	

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Total	154(61.6%)	96 (38.4%)	250(100%)	

Table:4 Among the study population, 100% of subjects with treatment taken for more than 4 weeks had ECG abnormalities while it was 47.3%in 4 weeks, 47.3% in 3 weeks, 63.4% in 2 weeks, and 48.4% in 1-week treatment taken.

Table-5: ECG abnormalities among hypertensive disorders:

Hypertensive Disorders	**ECG Abnormalities**		**Total no**	**Fisher's exact p-value**
	Abnormal	**Normal**		
Chronic Hypertension	37 (74%)	13 (26%)	50 (100%)	
Gestational hypertension	59(41.54%)	83(58.45%)	142(100%)	
Preeclampsia	43 (100%)	0 (0%)	43 (100%)	
Eclampsia	15 (100%)	0 (0%)	15 (100%)	
Total	154(61.6%)	96 (38.4%)	250(100%)	0.001

Table:5 Among the study population, 100% of subjects with eclampsia and pre-eclampsia had ECG abnormalities while it was 41.5% in subjects with Gestational hypertension and 74% in subjects with chronic hypertension. The difference in the distribution of ECG abnormalities among hypertensive disorders of the subjects in the study population was statistically significant ($p < 0.05$).

Table-6: Comparison of profile ECG abnormalities of the subjects in the study population

ECG Profile	**Frequency**	**Percent**
Normal	96	38.4
Sinus Tachycardia	55	22.0
LV hypertrophy	52	20.8
T wave inversion	17	6.8
T segment inversion	5	2.0
Myocardial Infarction	13	5.2
Left axis deviation	6	2.4
LV failure	3	1.2
VentricularArrhythmias	3	1.2

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Table:6 Among the study population 154 had ECG abnormal, among them55 (22%) subjects had sinus tachycardia as ECG abnormality followed by 52 (20%) subjects with Left ventricular hypertrophy and 17 (7%) subjects with T wave inversion.

Discussion

The primary objective of this is to study the physiological changes in preeclampsia patients will be documented and the pattern of ECG will be studied. Some of these changes are reversible and can be prevented with early diagnosis and prompt interventions. (5) The echocardiography changes in cardiac structure and function can be identified beforehand if the condition is clinically apparent**.** Among the study population, around 75% of the subjects were within the 21 – 30 years age group of which 40.8% belonged to 26 – 30 years and 34% belonged to the 21 – 25 years age group. Only around 6% were 65 below 20 years and 3% above 35 years. All the subjects were given labetalol as a treatment as it is the first choice, out of which 44% receive Nifidipine since it is a second choice and the second drug added to control hypertension. ECG alterations detected during normal pregnancy comprise sinus tachycardia, ectopic beats, left axis deviation, inverted or flattened t waves, a Q wave in lead D111and increased voltage unipolar left foot lead(6). Among the study population of 250, 154 (62%) subjects had ECG abnormalities and 96 (38%) didn't have any ECG abnormality.55 (22%) subjects had sinus tachycardia as ECG abnormality followed by 52 (20%) subjects with Left ventricular hypertrophy and 17(7%)subjects with Twaveinversion.ST-segment inversion was present in 5(2%),left axis deviation in6(2%),LV failure in3(1%)and ventricular arrhythmias in 3(1%).Since sinus tachycardia in the abnormal ECG, prevalence has gone up to 62%. Leaving sinus tachycardia the prevalence of ECG abnormalities will come up to 40%. In comparison with the other studies done by Bramham K et al, normal healthy pregnant women found a 5% rate of sinus tachycardia. (7)In a study by Desai et al, the hypertensive women also found a 5% rate of sinus tachycardia. (8). The difference noted in our study may be due to other factors of sinus tachycardia like tension and environmental changes(9). (10)left axis deviation most commonly missed ECG abnormality and is present even during postpartum(11).In this study, Left axis deviation was found to be present in 6 (2%) of the study population. Desai et al reported it as 4% in their study. (12)Left axis deviation is one of the most commonly missed ECG abnormalities and it is present during the post-partum period even after the delivery. About 50 (2 %) subjects had suffered from Chronic Hypertension, 142 (56.8%) subjects had suffered from PIH, 43 (17.2%) subjects had suffered from pre-eclampsia, and 15 (6%) subjects had suffered from eclampsia. Among the study population, 100% of subjects with eclampsia and pre-eclampsia had ECG abnormalities while it was 4 1.5% in subjects with PIH and 74% in subjects with chronic hypertension. The hypertensive disorder has a direct relationship with the ECG changes. This is directly proportional to the severity of the disease. The difference in the distribution of ECG abnormalities among Parity, treatment duration, and hypertensive disorders of the Subjects in the study population was a statistically significant p-value. ($p < 0.05$). In this study,52(20%) subjects had left ventricular hypertrophy. In a study by Melchiorre et al, symptomati**c** left ventricular impairment with acute preeclampsia was studied. A 40% enlarged risk of hypertension and 56% risk of left ventricular dysfunction were found with preeclampsia with ECG changes during the postpartum period, at 1 year and 2 years postpartum(13) Duley L et al studies conclude preeclampsia showed longer QRS, prolonged QT and QTc compared to normal group(14). A Meta-analysis by Magee and LA et al concluded a three-fold increase in future chronic hypertension and nearly a doubling of the risk of thromboembolism, stroke, and ischemic heart disease among those with preeclampsia(15).

Conclusion

62% had ECG abnormalities .ECHO was done by cardiologist and same confirmed and started aspirin in few subjects. Future risk has been explained and asked for follow-up in the future. With not just immediate pregnancy outcome in mind but future cardiovascular health of the lady in mind, ECG in pregnancy with preeclampsia is the first step and may improve the holistic approach in obstetrics. The difference in the distribution of ECG among parity, treatment duration, and hypertensive disorders in the study population was a statistically significant p-value($p<0.05$).

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