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ORIGINAL RESEARCH

Evaluation of electrocardiographic changes in preeclamptic women

[1]Dr. Divyashree.S, [2]Dr. Hithashree Chandrakant Shriyan, [3]Dr. Harshitha B R, [4]Dr. Mallika M M, [5]T. Sheikh Mohammed Faisal, [6]Juwayriya Sadiq, [7]Arpitha Jewel Furtado, [8]Aiona Flavia Correa, [9]Vinayak Sahai Mathur, [10]Shathank Girish, [11]Dalli Harsha Nandan, [12]Arna De, [13]Maheshwari B.V, [14]Chandan Gowda H.M, [15]Syed Masroor Mustafa, [16]Setu Saket Sukesh, [17]Reem Fathima, [18]Rida Tanvir

[1]Assistant Professor, Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India
[2]Assistant Professor, Department of General Medicine, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India
[3]Consultant Obstretician and Gynecologist, Kangaroo care Ramanagar, Karnataka, India
[4]Specialist, Department of Obstetrics and Gynaecology, Karwar Institute of Medical Sciences, Karwar, India
[5-18]Former Undergraduates, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India

Corresponding author
Dr. Divyashree.S
Assistant Professor, Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India

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ABSTRACT

Background: Cardiovascular disease remains the primary cause of death among women, encompassing ischemic heart disease, stroke, and related problems. Preeclampsia during pregnancy is a common phenomenon. The present study was conducted to evaluate electrocardiographic changes in preeclamptic women. **Materials & Methods:** 30 pregnant women (gestational age >20 weeks) with pre-eclampsia of 18 to 45 years of agewere put in group I and controls (age matched normotensive) in group II. An ECG was recorded using a portable electrocardiograph. **Results:** T h e mean HR (bpm) was 76.2±7.2 and 81.4±9.6, P (sec) was 0.081±0.1 and 0.083±0.2, QRS (sec) was 0.12±0.4 and 0.10±0.1, PR (sec) was 0.13±0.7 and 0.14±0.5, QT (sec) was 0.39±0.1 and 0.35±0.6, QTc (msec) was 452.4±56.9 and 412.8±43.2, Sokolow (mm) was 20.3±4.2 and 18.1±6.8 in group I and group II respectively. **Conclusion:** Women with pre-eclampsia are at heightened risk for cardiovascular issues. Pregnancies complicated by pre-eclampsia have a considerable impact on ventricular repolarization, and thus may cause changes to it (AVR). AVR could account for the heightened cardiovascular risk among women with pre-eclampsia.

Keywords: Electrocardiograph, Preeclampsia, Pregnancy

INTRODUCTION

Cardiovascular disease remains the primary cause of death among women, encompassing ischemic heart disease, stroke, and related problems. Preeclampsia during pregnancy is a common phenomenon.[1] Recent evidence indicates that preeclampsia can serve as a screening test for future cardiovascular issues, and abnormalities during pregnancy may assist in advising patients about their future risk of such problems.It is well recognized that pre-eclampsia is a primary contributor to maternal and neonatal mortality on a global scale.[2]

Preeclampsia, a multi-organ syndrome unique to pregnancy, affects 2% to 8% of pregnancies. It is marked by the emergence of hypertension reaching 140/90 mm Hg or higher, accompanied by proteinuria, in a patient who was normotensive and nonproteinuric before the 20th week of gestation.[3] The clinical features typically emerge in the latter part of the third trimester, i.e., close to term (around the 38th to 40th weeks of gestation), and continue to progress until delivery. This condition is exclusive to human pregnancy, involving the interplay of various genetic, immunological, and environmental factors.[4]

High maternal mortality and fetal complications are linked to pre-eclampsia. It represents not just a short-term risk but also elevates the maternal cardiovascular risk in the future.[5] The hypothesis proposed that irregular uterine artery perfusion and associated feedback mechanisms within the fetoplacental unit contribute to heightened stress on the maternal heart, which subsequently influences maternal ventricular

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repolarization.[6]The present study was conducted to evaluate electrocardiographic changes in preeclamptic women.

MATERIALS & METHODS

The study was carried out on 30 pregnant women (gestational age >20 weeks) with pre-eclampsia of 18 to 45 years of age. All gave their written consent to participate in the study.

Data such as name, age, etc. was recorded. Cases were put in group I and controls (age matched normotensive) in group II. An ECG was recorded using a portable electrocardiograph. The study utilized ECG parameters that encompassed six variables: HR, P-wave, QRS-wave, PR-wave, QT-wave, QTc-wave, and the Sokolow-Lyon index. The Sokolow-Lyon index is a measure used to identify left ventricular hypertrophy through electrocardiography. It is determined by adding the S wave amplitude in V1 to the R wave amplitude in V5 or V6 (whichever is greater), with a result of ≥35 mm (≥7 large squares) indicating hypertrophy.Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

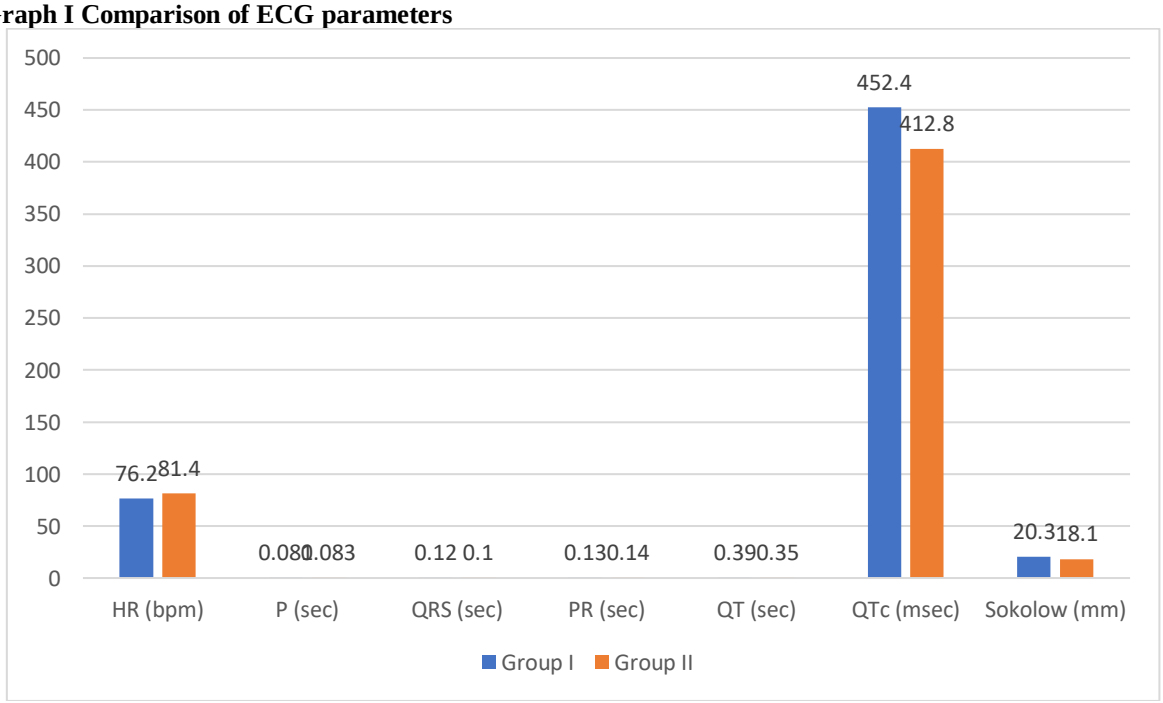
RESULTS

Table I Comparison of ECG parameters

Parameters	Group I	Group II	P value
HR(bpm)	76.2±7.2	81.4±9.6	0.57
P (sec)	0.081±0.1	0.083±0.2	0.86
QRS(sec)	0.12±0.4	0.10±0.1	0.03
PR(sec)	0.13±0.7	0.14±0.5	0.92
QT(sec)	0.39±0.1	0.35±0.6	0.05
QTc (msec)	452.4±56.9	412.8±43.2	0.02
Sokolow (mm)	20.3±4.2	18.1±6.8	0.46

Table I, graph I shows that mean HR (bpm) was 76.2±7.2 and 81.4±9.6, P (sec) was 0.081±0.1 and 0.083±0.2, QRS (sec) was 0.12±0.4 and 0.10±0.1, PR (sec) was 0.13±0.7 and 0.14±0.5, QT (sec) was 0.39±0.1 and 0.35±0.6, QTc (msec) was 452.4±56.9 and 412.8±43.2, Sokolow (mm) was 20.3±4.2 and 18.1±6.8in group I and group II respectively.

Graph I Comparison of ECG parameters



DISCUSSION

According to the National eclampsia registry, it is estimated that nearly 72,000 women die from issues related to preeclampsia and eclampsia. While in India the incidence is about 10%, the global estimates are comparable.[7]Cardiovascular disease is known to be responsible for about 40% of all global deaths. Recent findings suggest that these two conditions may exist on a continuum.ECG is a straightforward, inexpensive, and widely accessible examination. The Indian obstetrician knows that most patients' first encounter with a healthcare professional occurs during pregnancy, and they may not have another until another specific medical issue arises.[8]While a lot of emphasis is being given on the early identification, optimum management, reduction of morbidity and

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prevention of mortality related to preeclampsia /eclampsia, very little emphasis is being given to the long-term sequel of this condition.[9]The present study was conducted to evaluate electrocardiographic changes in preeclamptic women.

We found that mean HR (bpm) was 76.2±7.2 and 81.4±9.6, P (sec) was 0.081±0.1 and 0.083±0.2, QRS (sec) was 0.12±0.4 and 0.10±0.1, PR (sec) was 0.13±0.7 and 0.14±0.5, QT (sec) was 0.39±0.1 and 0.35±0.6, QTc (msec) was 452.4±56.9 and 412.8±43.2, Sokolow (mm) was 20.3±4.2 and 18.1±6.8 in group I and group II respectively.Loukrakpam B et al[10]found out electrocardiographic changes in preeclamptic women, and compared with age matched normotensive pregnant women. In this study, 25 pregnant women (gestational age >20 weeks) with pre-eclampsia in the range of 18 to 45 years of age were recruited. ECG parameters of pre-eclamptic women were compared with those of normotensive pregnant women. Pre-eclamptic women showed significantly longer QRS (0.10±0.02 sec vs 0.09±0.05 sec), prolonged QT (0.401±0.03 sec vs 0.365±0.003sec) and QTc (457.73±37 msec vs 416.47± 25.4 msec) than control group.

Desai et al[11]studied140 patients who have been diagnosed as gestational hypertension and pre-eclampsia during the pregnancy who were in the antenatal period. The average age distribution of the patients was 28.26 years. Majority of the patients in the study were primigravidae. 35% of the patients were more than 37 weeks of gestation. 20 patients showed electrocardiographic abnormalities. The most common abnormality was sinus tachycardia and left axis deviation. ECG abnormalities are seen in 14.2% of preeclamptic women. ECG abnormalities in preeclamptic women studied had no relation to the maternal age, gestational age; parity and use of antihypertensives.

Murphy et al[12] conducted a study to determine the effect of preeclampsia on ECG parameters. They concluded that while examining the relation between preeclampsia andcardiovascular disease, identification of ECG changes provides an easy, unique and early opportunity for identification and screening for cardiovascular issues, much before other factors become obvious. Isezuo et al[13] noted that the mean heart rate and QTc (470.4 vs. 436.3, $p < 0.05$) were significantly higher in intrapartum eclamptic patients compared to those with uncomplicated pregnancies. The QT interval appears to be unaffected by a normal pregnancy. On the other hand, pregnancies that give rise to hypertensive disorders appear to involve alterations in ventricular repolarization that could occur before clinical symptoms manifest.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that women with pre-eclampsia are at heightened risk for cardiovascular issues. Pregnancies complicated by pre-eclampsia have a considerable impact on ventricular repolarization, and thus may cause changes to it (AVR). AVR could account for the heightened cardiovascular risk among women with pre-eclampsia.

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