ORIGINAL RESEARCH

Physiological Changes in Electrocardiogram in Normal Pregnancy- A comparative study.

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ABSTRACT
Cardiovascular disorders are the main cause of maternal mortality. electrocardiograms play important role in understanding these changes in pregnant women in first trimester. **Aim and Objectives:** To study the effect of normal pregnancy on the electrocardiogram. **Materials & Method**: This study was conducted on 40 young healthy subject having good physical condition. 40 healthy non pregnant women of the same age group were selected randomly from general population. We explained and demonstrate to all subjects about study and consent was taken from each subject. Subjects were allowed to take rest for ten minutes. Recording of resting pulse rate done by palpating the radial artery and blood pressure was recorded with a mercury sphygmomanometer. A 12 lead ECG was recorded by using ECG machine with special emphasis on changes in heart rate, PR interval, QT interval, all the parameters were analyzed. **Results:** The ECG changes observed in our study include, significant increase in heart rate and increase in QT interval, decrease in PR interval when compared to normal non pregnant women. **Conclusion**: This study proved that increment in heart rate is significant compared to control group. Decrease PR interval and increase QT interval is not significant. Now we can conclude that there is need to further evaluation cardiac changes during antenatal period.
Keywords: Pregnancy, Heart Rate, PR interval, Electrocardiogram

INTRODUCTION

Cardiovascular changes during pregnancy occurs and continue throughout the pregnancy such as heart rate, cardiac output and intravascular volume[2]. These changes facilitate the adaptation of heart to fulfill the metabolic needs of mother[1].

ECG changes during pregnancy can precipitate cardiac disease. The Electrocardiogram (ECG) is a graphical record of the electrical potential caused by the excitation of the cardiac muscle. hormonal change can precipitate increase in heart rate and increased atrioventricular conductivity.

Each small box horizontally was calculated to be 0.04second and each small box vertically was 0.1mV in electrocardiogram.

The heart rate was calculated by dividing 1500 with number of small boxes between RR interval. Data was analyzed by ANOVA one wat test.P value was considered significant if less than 0.05 and not significant if more than 0.05 and highly significant if less than 0.001

MATERIALS AND METHOD

This study was conducted on 40 young healthy pregnant women having good physical condition.40 healthy non pregnant women of the same age group were selected randomly from general population. We explained and demonstrate to all subjects about study and consent was taken from each subject when they presented to the obstetric outpatient department rama medical college hospital and research center. A pretested structured proforma was used to record the relevant information from each individual case selected. Data acquisition was performed in the morning. A physical examination was done including height in centimeter and weight in kilograms. Only singleton pregnancies were eligible.

Subjects were allowed to take rest for ten minutes. Recording of resting pulse rate done by palpating the

radial artery and blood pressure was recorded with a mercury sphygmomanometer.

women with any organic cardiac disease, Renal disease, Severe Anemia, Thyroid disease, Diabetes, Hypertension, with chronic medication and with history of surgery was excluded from this study. This project was approved by institutions ethics committee.Subjects were allowed to take rest for ten minutes. Recording of resting pulse rate done by palpating the radial artery and blood pressure was recorded with a mercury sphygmomanometer. A 12 lead ECG was recorded by using ECG machine with special emphasis on changes in heart rate, PR interval, QT interval, and all the parameters were analyzed.

ELECTROCARDIOGRAPHIC RECORDING

ECG was recorded after 30min rest in a normal pregnant woman. It was 12 lead electro cardiograph machines;all the waves were carefully observed. In our electrocardiogram these findings are considered as normal.

1. Heart rate range from 70 to 90 beats per minute. [3]
2. The normal P-Q interval is about 0.16 second (.12-.20).[3]
3. the Q-T interval is about 0.35 second [3]

One-way ANOVA was used for multiple group comparisons.

DISCUSSION

In our study heart rate increases throughout the pregnancy and it is significant in third trimester. Decrease in PR interval and increase in QT interval is not significant in our study.

The maternal physiological changes in normal pregnancy undergoes to adjust the growing embryo. These changes are considered as completely normal. Another study showed that altered ECG is due to change in spatial arrangement of chest organs and change in sympathetic hormonal modulation.4 Another study showed shorter PR interval at third trimester compared to first and second trimester.[5]

Study by Carrutn JE and his colleagues found that the mean PR interval was shorter at third trimester compared to first and second trimester[6]. Decreased PR interval may be due to the low conduction velocity during normal pregnancy[7].

In our study change in QT interval is not significant. In another study all mentioned changes were observer like prolonged QT interval. change in AV conduction, ventricular depolarization and repolarization[8].

there was significant change in heart rate during first trimester. Hunter S found in their study that, the heart rate increase was seen by 5th week of gestation and continued till 32 Weeks.[9]

these alterations may be due to the autonomic nervous system changes that produces autonomic cardiac alteration[10]. Increase heart rate may be a endocrinal correlation, it may be linked with chorionic gonadotropin.[11]

RESULTS

Our study demonstrated that few ECG valuesshowed changes by the physiological state of pregnancy in the absence of any heart disease.

Table 1 shows comparison of heart rate expressed in bpm among the all four groups i.e. pregnant women in first trimester, pregnant women in 2nd trimester, pregnant women in 3rd trimester and the normal non pregnant women.

Heart rate showed increase in the pregnant groups when compared to controls but the results of first and second trimester groupswere not significant P>.05. There was significant increase in heart rate inpregnant women in third trimester when compared to control groupP is 05.

Table 2 represents comparison of PR interval (seconds) among four groups.

PR interval showednon-significant decrease in both pregnant women group when compared to controls ($p > 0.01$).

Table 3 shows comparison of QT interval (sec) among the four groups.In this study though there was slight increase in QT interval in pregnant women in third trimester. There was no statistical significance when values of controls, pregnant women in first trimester, 2nd trimester and pregnant women in 3rd trimester were compared ($p > 0.05$).

Table 4 showed the statistical data of all four groups having SD of control group is 1.884 and other pregnant groups are SD=4.950, 2.681, 2.444In spite of these data, there was no difference in the overall impression related to the normality of the ECG of all groups.

Statistical data of PR interval in Table 5 showed increase in heart rate in all groups including control groups having SD=.01071, .00480, .00501, .00679. Table 6 showed insignificant changes in QT interval with SD=, .00404, .0335, .00304, .00480

OBSERVATIONS

Table-1 comparison of heart rate between control group and other variables.

Serial number	Variables	Sum of squares	Df	F	significance
1	Control (A)				
2	First trimester(B)	955.775	39	(A-B)1.080	.38
3	Second trimester(C)	280.400	39	(A-C)1.149	.35
4	Third trimester(D)	232.975	39	(A-D)2.451	.05

Table-2 comparison of PR interval between control group and other variables.

Serial number	Variables	Sum of squares	Df	F	significance
1	Control (A)				
2	First trimester(B)	.001	39	(A-B).175	.970
3	Second trimester(C)	.001	39	(A-C).586	.711
4	Third trimester(D)	.002	39	(A-D).764	.582

Table-3 comparison of QT interval between control group and other variables.

Serial number	Variables	Sum of squares	Df	F	significance
1	Control group				
2	First TM	.000	39	(A-B).298	.74
3	Second TM	.000	39	(A-C).993	.38
4	Third TM	.001	39	(A-D)1.694	.19

Table-4 statistical description of heart rate

Variables	HR (range)	Minimum	Maximum	Mean	SD
Control group	9	68	77	70.88	1.884
First TM	18	82	100	91.58	4.950
Second TM	12	97	109	99.80	2.681
Third TM	9	99	108	102.23	2.444

Table-5 statistical description of PR interval

Variables	PR interval (Range)	Minimum	Maximum	Mean	SD
Control group	.04	.11	.16	.13883	.01071
First TM	.03	.11	.14	.1197	.00480
Second TM	.02	.11	.13	.118	.00501
Third TM	.03	.11	.14	.1127	.00679

Table-6 statistical description of QT interval

Variables	QT interval (Range)	Minimum	Maximum	Mean	SD
Control group	.02	.32	.34	.3212	.00404
First TM	.01	.33	.34	.3312	.0335
Second TM	.01	.33	.34	.3390	.00304
Third TM	.02	.33	.35	.3477	.00480

CONCLUSION

This study proved that increment in heart rate is significant compared to control group. Decrease PR interval and increase QT interval is not significant. Now we can conclude that there is need to further evaluation cardiac changes during antenatal period.

In conclusion we report, ECG changes occur during antenatal period are increase in heart rate, decrease in PR interval, increase in QT in pregnant women compared to non-pregnant women in which the increase in heart rate is significant.

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