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Research Article

Comparison of ECG Changes between Healthy Females of Different Age Groups

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Abstract: With advancing age, degenerative changes occur in heart muscle and its conduction system. This study was undertaken to see the ECG changes in different age groups of healthy females. A cross sectional study was conducted in a group consisting 75 healthy female in the age group 21 to 80 years. All the subjects were divided into different subgroups according to their sex and age. Lead II ECG was recorded on all subjects in supine position in an ambient temperature for 3 minutes by using Power lab and the analysis of the ECG was done by the software in the same instrument. RR interval, Heart rate, QTc Interval and ST height were used for analysis. In results there was prolongation of R-R interval and decrease in heart rate and ST height with increasing age in both males and females. In this study we saw changes in different ECG parameters in females of different age groups. But all these changes were within physiological limits.
Keywords: Electrocardiogram, Aging, females.

INTRODUCTION

The process of normal aging in the absence of disease is accompanied by a myriad of changes in body systems. Health and lifestyle factors together with the genetic make-up of an individual determine the response to these changes. With advancing age, degenerative changes occur in heart muscle and its conduction system. Some of the pathways of pacemaker system may develop fibrous tissue and fat deposits. Functionally, there is a prolongation of myocardial contraction and relaxation time and decrease in ventricular compliance. The number of pacemaker cells in the SA node is reduced which is possibly related to reduce heart rate to both sympathetic and parasympathetic stimuli [1]. It is necessary at intervals to revise our standards of the normal in all sciences. This is particularly desirable in electrocardiography, where important advances are made yearly in its application to the diagnosis of cardiac disease. A critical analysis of the literature in the field of electrophysiological pattern in normal population reveals that though during last century a sizable amount of literature has been generated in this field, still there is a wide gap in differentiation between a 'normal" and 'abnormal' electrocardiogram for a particular population. The differentiation between various abnormal ECG pattern and their correlation with specific pathology requires further and definite knowledge about the normal ECG pattern in a wide range of population. In females, oestrogen protects heart till menopause. After menopause risk of hypertension and heart diseases increases due to decreasing level of oestrogen. Again increasing age itself is responsible for degenerative changes in body. The purpose of this study was to see the ECG changes in different age groups of healthy females.

MATERIALS & METHODS

A cross sectional study was conducted in a group consisting 75 healthy female in the age group 21 to 80 years. All female subjects were divided into 3 subgroups according to their age. Group I (21-40 years), Group II (41-60 years) and Group III (61-80 years) respectively. The study protocol was approved by the Institute's Ethical Committee and each subject signed an informed consent statement prior to participation and could withdraw without prejudice at any time. Subjects with a history of systemic diseases like hypertension, heart diseases, diabetes mellitus, smoking, alcohol consumption and medication were excluded from the study. After explaining the procedure the subjects were asked to take rest for 10 minutes. Then Lead II ECG was recorded on all subjects in supine position in an ambient temperature for 3 minutes by using Power lab 8/30 series with dual bio amplifier (Manufactured by AD instruments, Australia with model no ML870). And

the analysis of the ECG was done by the software in the same instrument. Blood pressure, Body Mass Index (BMI) and Waist/Hip ratio were also measured in all the subjects. RR interval, Heart rate, QTc Interval and ST height were used for analysis. Descriptive statistics such as mean standard deviation & proportion was used to present the data. One way ANOVA test followed by post-hoc Tukey-Kramer Multiple Comparisons Test and students't' test for parametric and Mann-Whitney Test for non-parametric data were used for comparison between groups. Pearson's correlation coefficient 'r' was used to examine relationship between ECG changes with difference age groups. A two tailed p-value less than 0.05 will be considered as significant. R-R interval was within normal range in all the age groups. There was prolongation of R-R interval with increase in age. This prolongation was statistically significant when compared between I and III group. Heart rate was within normal range in all the age groups. There was decrease in heart rate with increase in age. This decrease was statistically significant when compared between I and III group. QTc interval was within normal range in all the age groups. There was prolongation of QTc interval with increase in age. This prolongation was statistically significant when compared between I and III group. There was decrease in ST height in group II and group III compared to Group I. This decrease was statistically significant when compared between I and II group. But there was statistically insignificant increase in ST height in group III compared to Group II.

Table-1: Comparison of ECG Parameters between females of different age groups

Parameters	**Group I**	**Group II**	**Group III**	**Post hoc multiple Comparison**
RR Interval (s)	0.68 ± 0.18	0.69 ± 0.06	0.76 ± 0.07	Gr I vs II, p>0.05 Gr I vs III, p<0.05* Gr II vs III, p>0.05
HR (bpm)	85.52 ± 11.3	83.26 ± 12.3	77.33 ± 10.1	Gr I vs II, p>0.05 Gr I vs III, p<0.05* Gr II vs III, p>0.05
QTc Interval (s)	0.22 ± 0.05	0.26 ± 0.07	0.26 ± 0.05	Gr I vs II, p>0.05 Gr I vs III, p<0.05* Gr II vs III, p>0.05
ST height (mv)	0.052 ± 0.06	0.011 ± 0.01	0.03 ± 0.018	Gr I vs II, p<0.01* Gr I vs III, p>0.05 Gr II vs III, p>0.05

***** Statistically significant

DISCUSSION

The diagnostic accuracy of ECG to differentiate between 'Normal' and 'Abnormal' rests entirely on analysis of distribution in 'Normal', i.e. clinically healthy, population [2]. Age is biologically most important variable and there is significant age differences found in various ECG items measured. In our study it was observed that the R-R interval and the heart rate were within normal range in all the age groups of. There was highly significant prolongation of R-R interval and decrease in heart rate with increase in age. These finding are similar to the previous studies [3,4]. The probable explanation for these findings can be as age increases, vagal tone increases and heart rate decreases. The SA node loses some of its cells. These changes may result in a slightly slower heart rate. Our study revealed that QTc intervals increased with advancing age in both males and females. Our findings match with previous studies [5]. Several studies have shown that women have longer QTc interval than men [6]. QTc interval may increase with age due to aging processes occurring in the myocardium, such as fibrosis and amylodosis of the myocardium. Another explanation for the increased QTc interval with age is an imbalance between sympathetic and parasympathetic tone. In the elderly, an exaggerated shift toward sympathetic activity has been reported [7]. High sympathetic activity can lead to myocardial membrane properties that give rise to early after depolarizations and dispersion of repolarization [8, 9, 10, 11]. Furthermore, noradrenaline levels have been reported to increase with age [12]. Some of the increased sympathetic activity can be explained by loss of arteriolar compliance with age as well as by deteriorating function of the sinus node compensated by excess sympathetic activity [13]. The values of ST height in our study decreased in females as the age advanced. Recent studies revealed that ST segment depression is a more important criterion in evolving inferior wall acute myocardial infarction [14]. ST segment abnormalities indicate subclinical myocardial damage from coronary atherosclerosis that later may be clinically manifested as sudden death. These abnormalities in the electrocardiogram can reflect inequalities in ventricular recovery, and disparity in recovery of excitability in cardiac muscle is related to increased vulnerability to arrhythmias [15]. Thus, the

electrocardiographic signal permits detection of cardiac status at high risk of ventricular arrhythmias.

CONCLUSION

`In conclusion, we saw changes in different ECG parameters in females of different age groups. But all these changes were within physiological limits. Due to degenerative changes with increasing age, arteries become stiff leading to myocardial insufficiency. Also after menopause females are more prone for hypertension and cardiovascular diseases. Therefore although clinically normal, the females should be advised regular follow up to detect early cardiovascular insufficiency or any other cause.

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