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VARIATION IN HEART RATE AMONG HEALTHY INDIVIDUALS

[1]Dr. Mehwish Irshad, [2]Dr. Samreen Bugti, [2]Dr. Humaira Bugti
[1]MBBS, Services Hospital Lahore
[2]Bolan Medical University

Abstract:
Variability of heart rate is considered as an indicator of autonomic status. Very little work has been done on heart rate variability in normal healthy volunteers.
Objective: *Our aim was to increase the reference values of heart rate variability in our healthy population.*
Study Design: *A non- interventional descriptive study.*
Place and Duration: *In the Physiology Department of Services Hospital Lahore for one year duration from March 2016 to March 2017.*
Method: *Holter monitoring was performed between 'Reynolds Medical' and 'Holter ECG Recorder' using CF Card life for healthy volunteers from 37 to 24 hours.*
Results: *The average rhythm of heart rhythm in normal healthy volunteers in our population, RR intervals standard deviation (SDNN), NN intervals (SDANN) and NN intervals with sequential Root standard deviation square root. (RMSSD) were evaluated. A change in heart rate variability between foreign volunteers, RMSSD and domestic people was significant high in the local population ($p < 0.05$).*
Conclusion: *Heart rate variability (RMSSD) values have been found to be high in healthy volunteers compared to Pakistan's foreign data showing parasympathetic prevalence in our society.*
Key words: *Heart rate variability, autonomic nervous system, holter monitoring, time domain analysis.*

Corresponding author:
Dr. Mehwish Irshad,
MBBS, Services Hospital, Lahore

QR code

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INTRODUCTION:

Heart rate variability (HRV for short) means a complex pulse movement change in the heart rate resulting from the interaction of parasympathetic and sympathetic nerve activity in the heart sinus node. Impulse formation Variations in the sinus node are represented by the variability in heart rate obtained in RR intervals. These changes in rhythm are known as the vagal tone (RSA), inspires during breathing and breathing during heart slowing, fluctuates during the heart acceleration stages. Atrioventricular nodal conduction also increases RR variability, but appears to be insignificant in clinical conditions. This technique is widely used in the definition of the physiological response of patients with various diseases. In particular, spectral analysis methods can differentiate between HRV internal sources because these rhythms occur at various frequencies. This is a similar pattern of elderly white Americans who have had early signs of aging on autonomic nervous systems of the young African-American reaction of differences in the ethnic correlation between Various contractility rhythm and age rates in the African American and Caucasian show that have been documented. Racial differences were better documented than age matched by blacks who were less sympathetic to whites. In another study, autonomic tone race differences measured by heart rate variability indices were defined. The variability of heart rate was investigated in Japanese children only in Asian populations, but not in other races. Due to differences in their autonomy, race differences have been noted in various analysis among various people. In small children there are limited data and none have compared Asia and Caucasian adults. We are planning a study to determine the effects of changes in the heart rate in the normal volunteers of the Pakistan and to compare the variability in heart rate of our population to the outside population. We examined the parameters in the heart rate variability within the time domain.

MATERIALS AND METHODS:

This non- interventional descriptive study was held in the Physiology Department of Services Hospital Lahore for one year duration from March 2016 to March 2017. The study included 32 patients (23 males, 14 females) with healthy electrocardiography. Subjects were 35 years old with an average age of 36 ± 15 years. A detailed clinical history of each participant was taken. Patients with cardiovascular, diabetes mellitus, psychiatric or neurological disorders were not included in the study. Age, Smoking, weight and height were recorded. The study was performed after the Medical Ethics Board approval. All people received a formal confirmation in writing before working. It is a non-intrusive to study non-probabilistic sampling of individuals. Twelve standard electrocardiograms (ECG) were performed in each case. Approximately 10 heart cycles were recorded to assess heart rate. Age, ischemic heart disease, branch obstruction, arrhythmias, etc. Any problem, such as myocardial infarction, was excluded from the study of individuals. 24 hours after the operation, we use the ECG record "CF card life" Holter ECG "Reynolds Medical". ECG data were used to analyze Holter heart rate variability. HRV analysis software which is available Commercially, Reynolds Medical Digital / 700 Pathfinder, and heart rate variability were used for analysis. All data are carefully done with manual adjustments and QRS complex classifications of visual adjustments and individual RR interval. All defective complexes are arranged from the record. The signal change during normal sinus rhythm temporally is considered as (HRV) heart rate variability. Pulse formation variations are represented by HRV or derived from node to node in the RR interval of ECG. HRV was analyzed within the time frame in accordance with the (ESC) European Society of Cardiology recommendations. We take into account the parameters of the time frame; SDNN (RR intervals standard deviation), SDANN (NN ranges of the mean standard deviation) and RMSSD (average of NN squared at consecutive intervals in frames). Data were analyzed using SPSS-17 software.

RESULTS:

A total of 40 volunteer patients with Holter, electrocardiographic and normal findings were followed. However, 3 normal subjects were not selected because of excessive artifacts, insufficient monitoring hours and technical malfunctions. HRV was analyzed in the 37 remaining normal subjects.

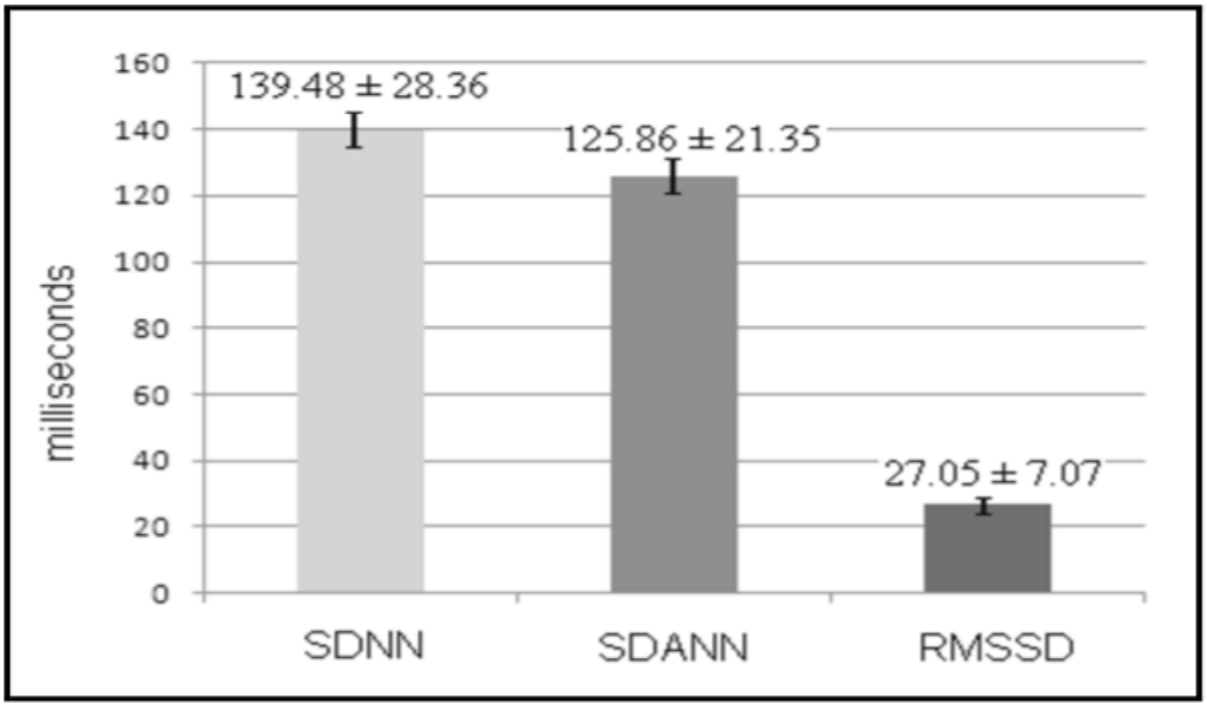

Figure-1: Time Domain Parameters in normal healthy volunteers

Figure 1 shows graphically the values of time domain indices of normal healthy volunteers. In normal healthy subjects, SDNN was 140.08 ± 27.16 milliseconds. SDANN was 125.86 ± 21.35 milliseconds in normal healthy volunteers. RMSSD was calculated as 26.95 ± 6.97 milliseconds. The values of heart rate variability in normal subjects were compared with healthy volunteers values in the foreign population.

Table-1: Comparison of time and frequency domain parameters of healthy volunteers of our population with foreign population[10]

HRV Parameters	Healthy volunteers of foreign population[10]	Healthy volunteers of Pakistani population	*p*
SDNN (ms)	141±39	133±35	>0.05
SDANN (ms)	127±35	118±34	>0.05
RMSSD (ms)	27±12	40±17	<0.05

SDNN: Standard deviation of R-R intervals, SDANN: Standard deviation of average NN intervals, RMSSD: Square root of the mean squared differences of successive NN intervals

There was a significant statistically difference in RMSSD ($p < 0.04$). Table 1 shows the time domain parameters comparison between the normal subjects of the foreign population and our population.

DISCUSSION:

Variability of heart rate is a representation of the response of the cardiovascular system to various responses. In our study, our aim was to document the reference values of population parameters of healthy volunteers. In our study, time domain parameters were affected by sympathetic and parasympathetic activity; our population and SDNN SDANN have decreased compared to the reference values presented by foreign literature. In contrast, RMSSD values (especially those affected by the parasympathetic activity of the parameter) were higher in the normal values of the foreign population in healthy individuals. (N = 24), Quintana et al. He mentioned the variability of heart rate in the normal population, but the size of the sample was too small. Similarly, Ramaekers et al. Heart rate variability was investigated in normal healthy volunteers during the day and night, so we did not document 24-hour heart rate variability. Khan and his colleagues recently conducted a local study. In this study, we found similar values for SDANN and RMSSD and our results. The difference between our study and the previous local study involves more people and examines time and frequency parameters. At the same time, we compared this local study with foreign population to see changes in autonomy. Our results showed a decrease in SDNN and SDANN and an increase in RMSSD. The increase in RMSSD showed an increase in parasympathetic activity and a lower risk of arrhythmogenesis in the population. This change can only result from healthy overseas populations being counted abroad. We include young volunteers and healthy adults in our study. Holter 24-hour demonstrations in healthy volunteers can be made larger to determine validity and reliability. In addition, even mild physical activity levels significantly affect heart rate and heart rate variability, so we were unable to fully assess participants' physical activity or exercise capacity.

CONCLUSION:

This study is an effort to develop normal reference values in frequency and time fields. In our population, we found that parasympathetic activity increased compared to the foreign population. The results emphasize the population studies importance in relation to the variability of heart rate because the change in heart rate in different habitats is considered to be an adequate objective indicator of adaptive reactions.

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