Original Research Paper

Volume -10 | Issue - 4 | April - 2020 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Physiology

A STUDY OF HEART RATE VARIABILITY ON RHEUMATOID ARTHRITIS PATIENTS

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ABSTRACT **INTRODUCTION:** Rheumatoid Arthritis is a chronic multisystem, a long-term, progressive, and disabling autoimmune disease of unknown etiology. As the immune system responds, inflammation occurs in the target tissue or organ . In the case of RA, this can be the joints, lungs, eyes, and heart. Heart rate variability is a reliable tool for assessing the activities of autonomic nervous system.

In some studies increased heart rate and decreased HRV associated with increased mortality in patients with rheumatoid arthritis. The present study was undertaken to determine the heart rate variabilty in rheumatoid arthritis patients and to compare mean values of LF, HF ,LF/HF ratio in heart rate variabilty with study group and normal group.

MATERIALS AND METHODS: The study was conducted on 50 rheumatoid arthritis patients in the age group of 30-70years and 50 healthy age and sex matched controls. HRV was done with Medicaid students Physiopac and analyzed with Kubois software Version 2.1. Data was analyzed using statistical software STATA 11.2using ANOVA. Significance of p value was taken as 0.05.

RESULT: Data was analyzed using statistical software STATA 11.2using ANOVA. Significance of p value was taken as 0.05.

CONCLUSION: In patients with Rheumatoid arthritis Heart rate variability is altered. our findings indicate higher sympathetic activity and higher basal heart rate compared to normal study. An involvement of humoral and cellular immune component has been suggested to play a role in severe autonomic neuropathy.

KEYWORDS : Heart Rate Variability, Low Frequency, High Frequency, Lf/hf Ratio, Rheumatoid Arthritis.

INTRODUCTION

Rheumatoid Arthritis is a chronic multisystem disease of unknown etiology. It has a progressive course with exacerbation and remissions being part of its natural history. Its onset could be at any age, although it usually starts in the fourth decade of life. Overall, there is a 3:1 female preponderance, but this excess is greater in young people and the age related incidence is approximately equal in elderly people. The prevalence of rheumatoid arthritis in India is about 0.75% [1, 2]. Rheumatoid arthritis (RA) causes premature death, disability, and lowers the quality of life. Adults suffer from arthritis equal to approximately 23% of the population. Multiple studies report that in the past half century, mortality among people with diagnosed RA has increased compared with the general population [3]. Several studies have shown an increased incidence of cardiovascular events in patients with RA [4,5,6,].

HRV quantification is an accepted, non-invasive tool for cardiac autonomic regulation via sympathetic and parasympathetic nervous system. HRV analysis involve time domain and frequency domain parameters. low frequency (LF) reflect sympathetic and parasympathetic nervous system, (HF) reflects parasympathetic nervous system and LF/HF ratio indicates sympathovagal balance H, Dursunoglu et al showed a decreased HRV in patients with RA [7]. Therefore, assessment of HRV has an important role in identifying the patients with RA who are at high risk of life-threatening cardiac events [8, 9]. Thus, the utility of HRV assessment can be extended to a timely diagnosis of altered autonomic function status in RA patients thereby reducing the risk of associated increased mortality due to cardiovascular events.

The aim of our study is to find frequency domain changes in rheum atoid arthritis patents to assess the autonomic nervous activity .

MATERIALAND METHODS

The Study was performed on patients attending the Medicine & Orthopedics OPD in a total of 50 Rheumatoid Arthritis patients were enrolled and compared with 50 controls in tertiary care hospital, Mumbai. After clinical evaluation and laboratory investigation, those patients satisfying the Modified American Rheumatology Classification Criteria (1987) were included in the study. Age group of the subject from 30 to 70 years both male & female and the duration of disease 5-10yrs of diseases were taken for the study. Pregnant females and Patients with history of Diabetes mellitus, Renal and liver diseases, Parkinson's disease, Cardiovascular diseases, Neurological diseases, were also excluded from the study. Written informed consent was taken after explaining to them about study in simple language in mother tongue or Hindi. Approval was taken by Ethics Committee.

METHODS:

All patients were evaluated with detailed history including age, sex, duration of Rheumatoid Arthritis, duration of morning stiffness, list of painful joints, other systemic disease, history of extra-articular manifestations and treatment. The subjects were asked to refrain from ingesting any beverages like tea or coffee and alcohol for at least 12 hours prior to the study. Details of procedures were described to each subject before starting the evaluation so that subject did not develop any anxiety at the time of the tests. The subject was allowed to relax on a bed in supine position for 10mins and then ECG recoding was done for 5 min in supine position using physiopac" by Medicad". Data collected on phyisopac was analysed by Kubois software, version 2.1. Data was recorded and analyzed by unpaired 'T' test. P value <0.05 was considered to be statistically significant.

8 CHANEL PHYSIOPAC

HRV ANALYSIS BY KUBIOS SOFTWARE

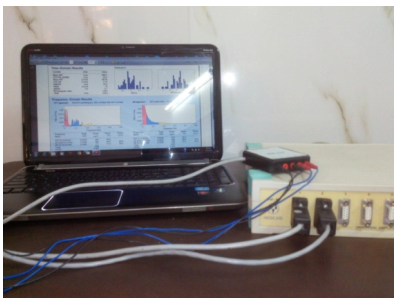

Table No.1: Mean values of HRV Parameters with relation to Frequency Domain in study population

Mean autuonomic parameters	Cases		controls		pvalue
	Mean	SD	Mean	SD	
HR	83.98	11.63	80.3	11.7	0.12(NS)
LF(ms)^2	133.42	77.57	98.46	55.87	0.01*
HF(ms)^2	117.35	70.14	159.72	106.08	0.02*
LF (n.u)	72.89	72.89	65.30	10.98	0.001*
HF(n.u)	27.78	8.19	32.08	9.39	0.02*
LF/HF RATIO	2.85	0.98	2.21	0.75	0.001*

Footnote –* significant; P value <0.05 is considered significant; NS – not significant;unpaired' test applied

DISCUSSION

In the study of Nishu Mittal et al [10] Mean resting heart rate of subjects was 79.32 ± 11.38 and that of control was 74.08 ± 10.67 with a p-value of 0.059, which is found to be non-significant, but resting heart rate is higher in patient group than that of control group In our study the mean baseline heart rate 83.98±11.63 and controls 80.3±11.7 but was statistically not significant (p>0.05) which was similar to study of Nishu Mittal et al[10].

The present study correlated with Nishu Mittal et al.The higher resting Heartrate was probably due to physical deconditioning [11]

The findings of our study are in accordance with Asuman Kaftan etal[9].In his study 42 RA patients and 44 controls were taken and RA patients showed lower HF. In contrast, studies of Bekkelund et al [12] and Piha et al [11] found no CVS-ANS abnormality. Increased LF in power in normalized unit is observed in study group as compared to control group. LF indicates more sympathetic influence than parasympathetic.

High Frequency (HF), which mainly indicates parasympathetic activity, is diminished significantly in study group compared to control group. HF is direct representation of vagal tone and an important determinant of cardiovascular health. Thus our study indicates early cardiovascular vagal tone changes in study group.

Increased LF/HF ratio in study group compared to control group points towards sympathovagal imbalance. Our data regarding autonomic dysfunction in RA patients is also consistent with Asuman Kaftan et al [12]. Edmonds showed parasympathetic dysfunction in 30 % patients with RA which is similar to our findings [8]. However, Bekkelundet al. did not find autonomic dysfunction in 43 patients with RA [12].

CONCLUSION

Thus the present study shows that there is autonomic dysfunction with decreased vagal tone leading to sympathetic predominance. Autonomic dysfunction is an important determinant of cardiovascular health.

Autonomic function test indicates involvement of the sympathetic and parasympathetic pathways in patients of RA. The pathogenesis of the ANS dysfunction in patients with RA is not clearly understood. An involvement of humoral and cellular immune component has been suggested to play a role in severe autonomic neuropathy. The direct immunological damage to components of neural pathways can be postulated which is supported by the demonstration of circulating complement fixing auto-antibodies directed against sympathetic and parasympathetic nervous structures, represented by superior cervical ganglia and vagus nerve, respectively, in patients with RA [13].

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