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Original Research Article

Evaluation of cardiovascular autonomic function in patients with rheumatoid arthritis

Rutuben Ashvinkumar Modi¹, Neha H Pandya¹, Radhe Shyam Trivedi¹,
Devka M Rupareliya^{1,*}¹Dept. of Physiology, P.D.U. Government Medical College, Rajkot, Gujarat, India

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ABSTRACT

Introduction: Rheumatoid arthritis (RA) is a type of inflammatory arthritis that affects people all over the world. RA is a chronic systemic inflammatory autoimmune disease. It primarily affects the joints and is frequently accompanied by extra-articular symptoms such as rheumatoid nodules, neuropathy, and normochromic normocytic anaemia. Objectives- The aim of this study was to evaluate cardiac autonomic function in patients with rheumatoid arthritis and compare with healthy individuals.

Materials and Methods: An observational, cross-sectional study was done between 50 having RA & 50 normal healthy subjects not on any medication, on both males & females between the age group of 30-60 years. Evaluation of autonomic nervous system was done with the help of non-invasive tests. Parasympathetic system was assessed by heart rate response to standing & heart rate response to lying down position. Sympathetic system was assessed by blood pressure response to standing, BP response to Valsalva Maneuverer & BP response to sustained hand grip.

Results: In individuals with Rheumatoid Arthritis, the diastolic blood pressure in standing position was significantly lower ($p < 0.01$) than control group. Other parameters showed non-significant changes in RA group compared to control group. Discussion- study confirmed autonomic dysfunction occurs in patient with rheumatoid arthritis. Therefore, autonomic function may be the part of routine clinical examination in RA to reduce the cardiovascular autonomic morbidity

Conclusion: Cardiovascular autonomic function tests in daily clinical examination helpful in early detection of autonomic dysfunction in rheumatoid arthritis.

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1. Introduction

Rheumatoid arthritis is a common form of inflammatory arthritis that affects people around the world.¹ Rheumatoid arthritis (RA) is a chronic systemic inflammatory autoimmune disease. It primarily affects the joints and can also be accompanied by extra-articular symptoms such as normochromic normocytic anaemia, rheumatoid nodules, and neuropathy such as weight loss, anaemia, rheumatoid nodules, rheumatoid vasculitis, and so on.^{2,3}

Rheumatoid arthritis can affect anyone at any age, but it is most frequent in people aged 35 to 55.⁴ The prevalence of RA is about 0.9% India whereas worldwide is 1% with 3-5 times more common in women than men.⁵ Autonomic neuropathy is a condition in which sympathetic and/or parasympathetic nerve fibres get affected, resulting in clammy, palpitation, cold, cyanotic extremities, syncopal episodes, peripheral vasospasm, sexual dysfunction, and orthostatic hypotension.^{6,7} Primary and secondary vasculitis, as well as systemic vasculitis diseases like SLE and RA, have been associated with sympathetic and parasympathetic involvement.⁸ As per study of Western

* Corresponding author.

E-mail address: rutumodi8519@gmail.com (D. M. Rupareliya).

populations, sympathetic nervous system activity is highly elevated in patients with RA.⁹ The peripheral nervous system is the primary target for patients with RA, and the central nervous system (CNS) is rarely affected. Although cardiac involvement in RA patients is not always symptomatic, it has been observed that there is a considerably elevated mortality ratio due to cardiovascular events.¹⁰⁻¹² The goal of this study was to assess cardiac autonomic function in RA patients and compare it to that of healthy people.

2. Objectives

The aim of this study was to evaluate cardiac autonomic function in patients with rheumatoid arthritis and compare with healthy individuals.

3. Materials and Methods

An observational, cross-sectional study was carried out in Department of Physiology, P.D.U. government medical college, Rajkot after obtaining ethical committee permission and informed consent. Study was carried out between 50 individuals having RA (Group A), Diagnosed as per American College of Rheumatology's criteria & 50 normal healthy subjects (Group B) not on any medication, on both males & females between the age group of 30-60 years. Evaluation of autonomic nervous system was done with the help of non-invasive tests. Patients were examined for signs and symptoms of possible Autonomic Nervous System (ANS) dysfunctions including orthostatic hypotension (blurred vision, sensation of weakness and unsteadiness, light headedness, fainting or syncope on standing), perspiration, palpitations and Raynaud's phenomenon. Parasympathetic system was assessed by heart rate response (HR) to standing & heart rate response to lying down position were noted in both group and compared with unpaired student t test. Sympathetic system was assessed by blood pressure (BP) response to standing were noted in both group and compared it with unpaired student-t-test, BP response to Valsalva Maneuverer & BP response to sustained hand grip were noted in both group and compared both group with unpaired student-t-test. Collected data were enrolled in Microsoft excel and analysed using Epi info 7.1 and analysed in term of mean and standard deviation. Inclusion and Exclusion criteria were as per below.

3.1. Inclusion criteria

1. Study Group: Patients are diagnosed with RA on the basis of Criteria developed by American College of Rheumatology of either sex between the age of 30-60 years.
2. Control Group: Healthy subjects not having RA or not on any Medication of either sex between the age of 30-60 years.

3.2. Exclusion criteria

1. Evidence of hypertension.
2. Known cases of diabetes mellitus.
3. Subjects receiving drugs that are known to interfere with cardiac function such as beta blockers, vasodilators and diuretics.
4. Subjects with chronic history of alcohol intake.
5. Subjects with chronic history of tobacco consumption in any form.
6. Subjects having cardiac and respiratory disorders.
7. Any disease condition affecting the autonomic nervous system.

4. Results

Demographic data were recorded in terms of age, sex and weights and comparable.

Table 1:

Demographics	Group A	Group B	P Value
Age (Mean±SD)	44.78 ±8.44	43.68±7.8	0.78
Weight (Mean±SD)	67.02 ±8.32	64.52±9.38	0.82
Sex (M/F)	28/22	29/21	0.83

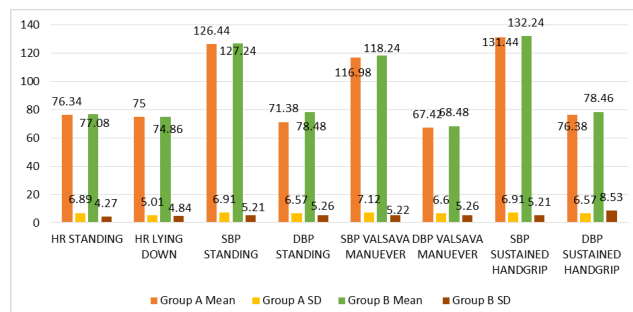


Fig. 1:

In individuals with Rheumatoid Arthritis, the diastolic blood pressure in standing position was significantly lower (<0.05) than control group whereas Systolic blood pressure in standing position was non-significant. HR in standing position and lying down position in Group A compare to Group B showed Non significant changes. Systolic blood pressure and Diastolic blood pressure in Valsalva maneuverer and sustained hand grip in both groups showed non-significant changes.

5. Discussion

A chronic systemic inflammatory autoimmune disorder is known as Rheumatoid arthritis (RA). The prevalence of RA is about 0.9% in India whereas worldwide is 1% with 3-5 times more common in women than men. Sympathetic

and/or parasympathetic nerve fibers affection causes various symptoms associated with autonomic neuropathy. In our study, we evaluated whether cardiac autonomic function get affected or not in RA comparison with healthy individuals. Evaluation of cardiac autonomic function was done by parameters which includes heart rate response to standing, heart rate response to lying down position, blood pressure response to standing, BP response to Valsalva Maneuverer & BP response to sustained hand grip. In comparison with healthy individuals, Diastolic blood pressure in standing position was significantly lower (<0.05) in RA individuals, Similar finding was observed in study of P. Deshpande et al. in 2018.¹³ This may be due to lower peripheral resistance, which leads to a drop in the percentage change in diastolic blood pressure and abnormally diminished sympathetic ANS function. Other parameters like heart rate response to standing & heart rate response to lying down position, SBP in standing position, both BP response to Valsalva Maneuverer & both BP response to sustained hand grip showed non-significant changes in RA group compared to control group. E Toussiro et al. evaluated Autonomic nervous system involvement in rheumatoid arthritis and found significant difference between the series of RA patients and the control series, only for the Valsalva maneuver ($p < 0.05$).¹⁴ Correlating with other study, Louthrenoo W, Ruttanaupawan et al showed 47% of RA patients had symptoms suggesting ANS dysfunction without any correlation with disease duration, or raised ESR in 1999.¹⁵ Study confirmed autonomic dysfunction occurs in patient with rheumatoid arthritis. Therefore, autonomic function may be the part of routine clinical examination in RA to reduce the cardiovascular autonomic morbidity.

6. Conclusion

As per our study, cardiovascular autonomic dysfunction occurs in RA compared with healthy individuals. Thus, cardiac autonomic function should be evaluated in individuals with RA and it should be part of regular clinical evaluation in RA to reduce the cardiovascular autonomic morbidity.

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8. Conflict of Interest

No conflict of interest.

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Author biography

Rutuben Ashvinkumar Modi, Resident Doctor

Neha H Pandya, Associate Professor.

Radhe Shyam Trivedi, Professor and Head

Devka M Rupareliya, Resident Doctor

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