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RESEARCH ARTICLE

A cross-sectional study on cardiac autonomic functions in psoriasis patients

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ABSTRACT

Background: Psoriasis is a chronic, genetically determined and immune-mediated inflammatory disease of unknown etiology with a prevalence of 0.44–2.8% in India. The literature reports an increased risk of cardiovascular diseases in psoriatic patients. The present study was designed to explore the autonomic nervous system functions in psoriatic patients. **Aim and Objective:** The objective of the present study was to assess cardiac autonomic functions in psoriasis patients aged 30–40 years as compared to age- and sex-matched healthy controls. **Materials and Methods:** The present study was conducted in the Department of Physiology, SMS Medical College, Jaipur. Forty psoriatic patients of both genders were recruited from the Dermatology Department and forty, age- and gender-matched healthy subjects were taken as controls subjects from among employees of SMS Medical College, Jaipur. Prior approval and consent were obtained by the institutional ethics committee and institutional research review board. Parasympathetic function tests include E:I ratio, 30:15 ratio (lying to standing ratio), and Valsalva ratio; sympathetic function tests included blood pressure (BP) response to standing and sustained hand grip. **Results:** Change in diastolic BP during isometric hand grip exercise was significantly lower in psoriasis patients ($P < 0.05$). Change in systolic BP on immediate standing was higher in psoriasis group ($P < 0.05$). E:I ratio, Valsalva ratio, and 30:15 ratio were also significantly decreased ($P < 0.05$) in psoriasis patients as compared to the healthy controls. **Conclusion:** The deranged autonomic function tests in psoriasis patients suggested definite cardiac autonomic dysfunction. Autonomic dysfunction might put the psoriasis patients at greater cardiovascular disease risk. Therefore, autonomic function assessment of psoriasis patients is necessary for a better prognosis.

Key words: Psoriasis; Sympathetic; Parasympathetic; Cardiovascular

INTRODUCTION

Psoriasis is a chronic systemic inflammatory disorder of unknown etiology and appears to result from a complex interplay between genetics, environment, skin barrier disruption, and immune dysfunction.[1,2] Psoriasis has a prevalence of 0.44–2.8%[3] in India. Psoriasis is a disorder that not only affects skin but also associated with scalp, nails, and occasionally the joints.[4] Pro-inflammatory markers such as tumor necrosis factor-5 (TNF-5) and interleukins (IL 12, IL 23, and IL 17) have been suggested to play major roles in the development of the immune response in Psoriasis.[5]

Chronic inflammation makes the body susceptible to various other system disorders. The inflammatory markers have been found to be associated with the pathogenesis of various cardiovascular diseases such as atherosclerosis, coronary artery disease, and

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stroke.[6-8] Several studies have documented the direct association between psoriasis and cardiovascular disorder-related morbidity and mortality.[9-11] The impairment of autonomic regulation of cardiovascular system with a sympathetic dominance strongly correlates with an increased cardiovascular risk in the general population.[12] Dysautonomia has been implicated as one of the most important yet ignored cause of cardiovascular morbidity in psoriasis patients.[13] The pathophysiology however remains unclear as the studies show contradictory results. Some studies have reported autonomic imbalance with a sympathetic dominance,[14] and others, suggested an involvement of only the parasympathetic system only. However, studies have also reported that no such involvement of either of the systems occurs in psoriasis.[15] There remains still a paucity of knowledge regarding the status of the autonomic function in the psoriasis patients. Hence, in the present study, an attempt was made to assess the cardiac autonomic nervous system (ANS) status in patients with psoriasis.

MATERIALS AND METHODS

The present study was a hospital-based cross-sectional type of observational study conducted on forty psoriasis patients in the age group of 30–40 years and forty age- and gender-matched healthy controls. Psoriasis patients were recruited from psoriasis clinic of the Dermatology Department after a careful examination of the skin lesions by dermatologist. The age- and gender-matched healthy controls were selected from amongst the employees of SMS Medical College, Jaipur. Prior approval and consent were obtained by the institutional ethics committee and institutional research review board. A written informed consent was obtained from all the subjects before commencing any procedure. Patients having diabetes mellitus, thyroid disorders, Vitamin B_{12} deficiency, any form of anemia, cardiac failure, cardiac arrhythmia, psychosomatic, and neurological (Parkinsonism, ataxia, etc.) disorders and patients on neuroprotective and antihypertensive drugs were excluded from the study.

ANS Function Assessment

All the subjects were instructed to avoid caffeine for at least 4 h and food for preceding 2 h before the test. All the subjects were laid down in quiet room, with a room temperature of 25°C. ANS function tests were carried out in the ANS function laboratory. Cardiovascular autonomic function assessment was done according to Ewing's battery[16] of tests using RMS CANWIN (cardiac autonomic neuropathy analyzer) machine between 9 and 11 AM after a rest of 15 min.

The autonomic function tests used were parasympathetic and sympathetic reactivity tests.

a. Parasympathetic reactivity tests
    1. Heart rate response to deep breathing (E/I ratio)
    2. 30:15 ratio
    3. Valsalva maneuver.
b. Sympathetic reactivity tests
    1. Blood pressure (BP) response to standing
    2. BP response to isometric hand grip (IHG) exercise.

Statistical Analysis

Quantitative data were expressed as mean±SD. Statistical analysis was performed by unpaired *t*-test to compare the difference of means using MS EXCEL 2010. Statistical significance was assigned at $P = 0.05$.

RESULTS

Table 1 shows the baseline characteristics of psoriasis and control groups. Age, height, weight, and body mass index did not show any statistically significant difference between the two groups. Change in DBP during IHG exercise [Table 2] that is a measure of sympathetic reactivity (9.60 ± 5.07 mmHg), was significantly lower in psoriasis patients as compared to the controls (13.47 ± 2.28 mmHg). Fall in SBP on immediate standing was higher in psoriasis group (10.25 ± 5.30 mmHg) as compared to controls (6.70 ± 2.47 mmHg), and the difference was statistically significant ($P < 0.05$). E:I ratio, Valsalva ratio, and 30:15 ratio that are indicators of parasympathetic reactivity showed significant ($P < 0.05$) decrease in psoriasis patients as compared to the healthy controls.

DISCUSSION

The present study was an effort to explore the extent of autonomic dysfunction in patients of psoriasis. The important findings of this study were decreased parasympathetic

Table 1: Baseline clinical characteristics of the psoriasis and control groups

Variables	Control (40)	Cases (40)	*P*-value
Age (years)	33.48±3.40	32.43±2.37	NS
Weight (kg)	55.45±4.95	55.45±4.95	NS
Height (m)	1.61±0.08	1.61±0.08	NS
BMI (kg/m^2)	21.70±3.35	22.07±3.89	NS
Resting heart rate (beats per min)	74.45±6.74	73.37±4.92	NS

Table 2: Autonomic function test in psoriasis (cases) and control groups

AFT variables	Controls (40)	Cases (40)	*P*-value
30:15 ratio	1.17±0.12	1.02±0.10	S
E:I ratio	1.35±0.11	1.16±0.13	S
Valsalva Ratio	1.48±0.14	1.15±0.36	S
BP response to standing (fall in systolic BP) mm of Hg	6.70±2.47	10.25±5.30	S
BP response to IHG (rise in diastolic BP) mm of Hg	13.47±2.28	9.60±5.07	S

IHG: Isometric hand grip

reactivity, as evident by the decreased E:I ratio, Valsalva ratio, and 30:15 ratio [Table 2] whereas the compromised status of sympathetic reactivity was evident by decrease in rise of diastolic BP response to IHG test and an increased fall on active standing [Table 2].

The etiology of psoriasis is complex and has been attributed to the inflammatory mediators such as TNF-5, IL 1, IL 12, IL 17, and IL 23. The pro-inflammatory cytokines have been reported to inhibit the sympathetic nervous system at the site of inflammation in patients of psoriasis.[17] These inflammatory mediators may act independently of conventional cardio vascular risk factor that promotes atherosclerosis.[18] The resulting autonomic dysfunction leads to greater cardiovascular disease risk in the psoriasis patients.[19,20]

Several studies have reported increased incidences of cardiovascular disease in patients of Psoriasis, as well as an increased cardiovascular risk factors such as, diabetes, hypertension, and dyslipidemia.[21-23] Psoriasis, that was previously considered a primary disorder of skin, is now widely accepted as a systemic inflammatory condition.[1,2] Several studies have evaluated the status of the autonomic functions in psoriasis previously but results show varied findings. Halıgür *et al*. reported sympathetic dysfunction in psoriasis using sympathetic skin response and R-R interval variation.[13] Yuksel *et al*. used heart rate recovery index as an indicator of ANS function and reported parasympathetic dysfunction in psoriasis patients.[24] However, Biçer *et al*. found no autonomic dysfunction in psoriasis patients in 24 h Holter recording for heart rate variability and turbulence analysis.[15] There exists heterogeneity in the severity of psoriasis and that might be attributable to the varying results regarding autonomic functions in psoriasis.

Strengths – The study of this kind would addresses some of these issues and contributes to providing some better understanding on how autonomic functions are affecting psoriatic patients and could fill some research gaps. Limitations of my study are that study group is small containing only 40 individuals. The sample size is too small to substantiate the results. The patients in both groups are not inter classified according to severity, sex, and treatment wise. The role of duration of the disease in ANS is not defined.

The present study concluded a statistical comparison of ANS function parameters in psoriasis and healthy control group shows definite dysfunction of ANS. The cardiovascular autonomic reactivity methods used in this study indicate a compromised status of both sympathetic and parasympathetic systems. These findings could be attributed to the level of inflammatory markers and their association with the disease. An early assessment of the ANS function and management strategy can prevent cardiac morbidity in future.

CONCLUSION

The findings of the present study indicate definite impairment of parasympathetic as well as sympathetic nervous system in psoriasis patients. The impaired status of ANS function puts psoriasis patients at greater cardiovascular risk that warrants an early assessment of ANS functions in these patients. This could prevent the overall morbidity and mortality in psoriasis patients.

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