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Original Research Article

Study of P-wave dispersion in patients of psoriasis: An observational study

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ABSTRACT

Background: Psoriasis being a multisystemic disorder has multiple systemic comorbidities apart from cutaneous manifestations including metabolic syndrome and cardiovascular diseases.
Aim: To study P-wave dispersion in patients of psoriasis.
Materials and Methods: A total of 71 patients who presented in the dermatology OPD with chronic plaque psoriasis were assessed for disease severity and their ECG was evaluated.
Results: In this study of 71 patients aged 15-60 years, a strong positive correlation was found between PASI score and P-wave dispersion (r=0.703, p=0.000) indicating a strong association between disease severity of psoriasis and development of cardiovascular diseases.
Conclusion: The P-wave dispersion was significantly higher in patients with high PASI scores. This indicates that the patients of psoriasis are at a higher risk of developing cardiovascular diseases like atrial fibrillation.

1. Introduction

Psoriasis is a chronic multisystemic T-cell-mediated inflammatory disorder characterized by well-demarcated erythematous plaques covered by silvery-white scales affecting scalp, extensor skin surfaces, nails, and joints. It affects 2-4% of the human population worldwide[1] and around 0.44% to 2.8% in India.[2] There seem to be 2 peaks in the onset of psoriasis: the first one between the ages of 20 and 30 years and the second between the ages of 50 and 60 years.[3] It is a multifactorial disease and can be triggered by a variety of factors like trauma (mechanical, physical, chemical, allergic), smoking, alcohol, infections, stress, seasonal variations, pregnancy, and a large variety of drugs. Psoriasis being a multisystemic disorder has multiple comorbidities including metabolic syndrome, cardiovascular diseases, diabetes mellitus, depression, and cancer. Cardiovascular diseases like arterial hypertension, arterial atherosclerosis, and heart valve diseases are frequently observed during severe psoriasis. Psoriasis has only recently emerged as an independent risk factor for cardiac arrhythmias. Measures of electromechanical heterogeneity across the atria during depolarisation (P-wave dispersion) are indicators of an increased risk for AF.[4] P-wave dispersion is defined as the difference between the maximum and the minimum P-wave duration recorded from 12-lead ECG. It is used as an electrocardiographic marker for intra-arterial and inter-arterial conduction time, heterogenous and sinus. Prolonged P-wave dispersion is an independent risk factor for the development of abnormal conduction of sinus impulses, indicative of atrial fibrillation that increases the risk of cardiovascular morbidity, and mortality thereby affecting

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the general quality of life.[5,6] Systemic inflammation in psoriasis may contribute to the development of psoriasis. Considering the disease burden and disability related to a stroke that is predisposed to atrial fibrillation, it is important to validate the direct effect of psoriasis on atrial fibrillation.

2. Materials and Methods

This study was a hospital-based observational cross-sectional study carried out in patients with clinically evident chronic plaque psoriasis who attended the outpatient Department of Dermatology, Venereology and Leprology in a tertiary health care center in western Madhya Pradesh.

2.1. Patients

2.1.1. Inclusion criteria

1. All new patients of plaque psoriasis presenting to RDGMC institution.
2. All male/female patients of age group 15-60 yrs.
3. Patients who gave consent for the study.
4. Exclusion criteria
5. Unwilling or uncooperative patients
6. Immunocompromised patients.
7. Patients with other types of psoriasis (like guttate, pustular psoriasis, and erythrodermic).
8. Patients with concurrent diseases like hypertension, diabetes mellitus, coronary artery disease, valvular heart diseases, chronic obstructive pulmonary diseases, thyroid abnormalities, electrocardiac abnormalities, rhythms other than sinus, and systemic inflammatory diseases other than psoriasis.
9. Patients taking antiarrhythmics, antihistamines, and antipsychotic drugs.
10. Obese patients (BMI >/= 30kg/m^*2).

2.2. Evaluation of patient's disease activity

The diagnosis of psoriasis vulgaris was based on the history and description of characteristic lesions on clinical examination. Clinical severity of the patients was evaluated using PASI score. The PASI assesses four body regions: the head, trunk, upper extremities, and lower extremities. For each region, the surface area involved is graded from 0 to 6 and multiplied by their respective multiplier, and each of the three variables (erythema, thickness, and scaling of the plaques) is graded from 0 to 4. The scores from all the regions were added to determine a PASI score ranging from 0 to 72. PASI score was calculated in a patient with chronic plaque psoriasis. Patients with PASI score <3 were characterized as mild, 3-10 as moderate, and >10 as severe.

2.3. Twelve-lead electrocardiogram and P-wave dispersion analysis

12-lead ECG will be recorded after a 10-minute rest, with 20 mm/mV amplitude, 50 mm/s rate, and voltage set at 1mV/cm with standard lead positions between 13:00 and 16:00 o'clock using a commercially available machine. ECGs were measured manually using a magnifying glass. The normal value for P-wave dispersion will be 29+/- 9 milliseconds, and P-wave dispersion >/= 40 milliseconds indicate the presence of heterogenous electrical activity in different regions of the atrium.

3. Results

In our study, among the 71 patients 29(40.8%) belonged the age group of over 50 years, 16(22.5%) in the age group of 41-50 years, 16(22.5%) in the age group of 31-40 years and 10(14.1%) in the age group of 30 and below (Table 1). Out of 71 cases, 23(32.4%) cases had severe psoriasis, 23(32.4) cases had moderate psoriasis and 25(35.2%) cases had mild psoriasis (Graph 1). Patients with PASI score < 3 were categorized as mild, PASI score 3-10 as moderate, and PASI score >10 were categorized as severe psoriasis (Graph 2). Significant association was observed between gender and severity of disease with p<0.05. In male cases, severe psoriasis was seen in 21(38.9%) cases and in female cases it was seen in 2(11.8%) cases only (Graph 2).

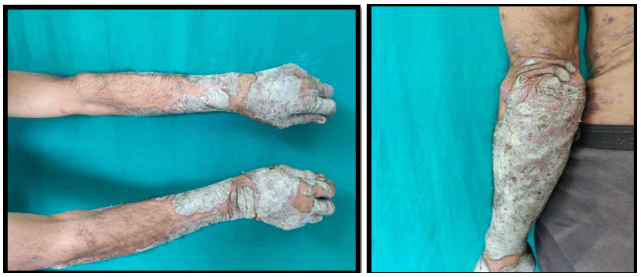


Fig. 1: Typical psoriatic lesions with distribution over extensors of extremities

Table 1: Age distribution of the cases

Age groups	Frequency	Percent
<= 30 Years	10	14.1
31-40 Years	16	22.5
41-50 Years	16	22.5
>50 Years	29	40.8
Total	71	100.0

In the present study mean P-wave dispersion was found significantly varying according to the severity of the disease with p<0.05. In severe psoriasis, cases mean P-wave dispersion was significantly higher with mean

Table 2: Gender distribution of the cases

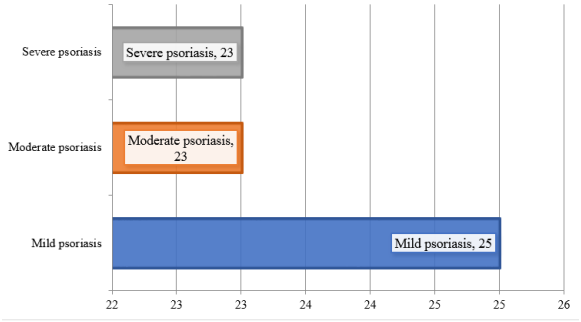
Gender	Frequency	Percent
Male	54	76.1
Female	17	23.9
Total	71	100.0

Table 3: Mean P-wave dispersion comparison with the severity of diseases

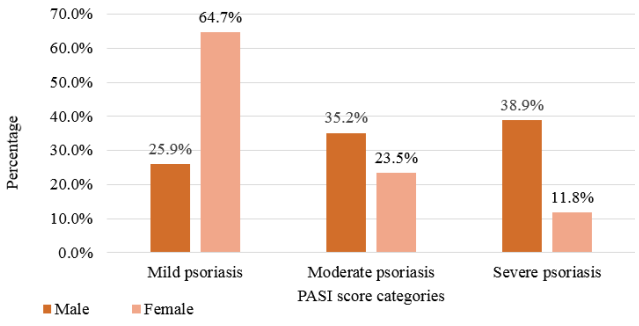
PASI score categories	N	Mean P-wave dispersion	SD	95% Confidence Interval for Mean		Minimum	Maximum	F	p
				Lower Bound	Upper Bound				
Mild psoriasis	25	30.60	2.87	29.41	31.79	24	35	17.240	0.000
Moderate psoriasis	23	37.57	7.63	34.27	40.86	29	60		
Severe psoriasis	23	49.65	18.14	41.81	57.50	34	110		
Total	71	39.03	13.70	35.79	42.27	24	110		

Table 4: Comparison with results of different studies

Parameter	Bacaksizi A. et al[5]	Simsek H. et al[6]	Namazi N. et al[7]
Country	Turkey	Turkey	Iran
Type of study	Cross- sectional, case-control	Cross- sectional, case-control	Cross- sectional, case-control
P-wave Dispersion	Cases (69.1 ± 22.6) Controls (45.6 ± 19.4)	Cases (41.9 ± 7.6) Controls (30.3 ± 7.2)	Cases (40±8.6) Controls (30±6.2)
P- Value	p<0.001	p<0.001	p<0.0001



Graph 1: Severity of disease among cases according to PASI score



Graph 2: Association between gender and PASI score categories

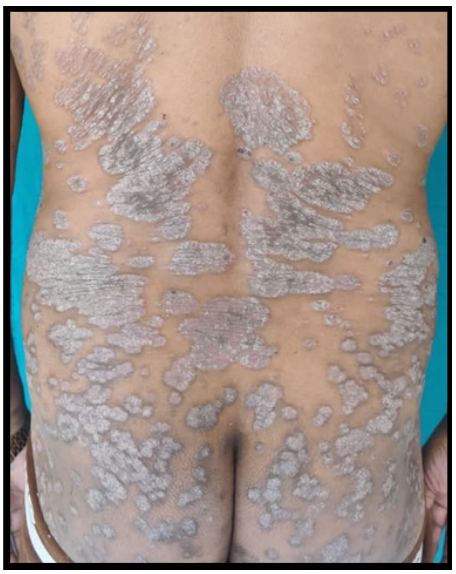


Fig. 2: Classical chronic plaque psoriasis over the lumbo-sacral area

49.65±18.14 as compared to moderate psoriasis cases with mean 37.57±7.63 and mild psoriasis cases with mean 30.60±2.87. A strong positive correlation was observed between (r=0.703, p = 0.000) PASI score and P-wave dispersion (Table 3)(Graph 3) (Graph 4).

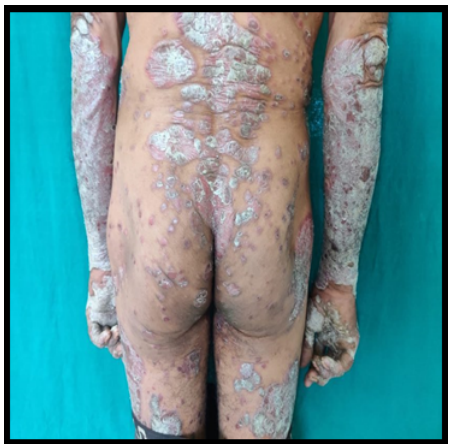


Fig. 3: Silvery white scales covering erythematous plaques of psoriasis

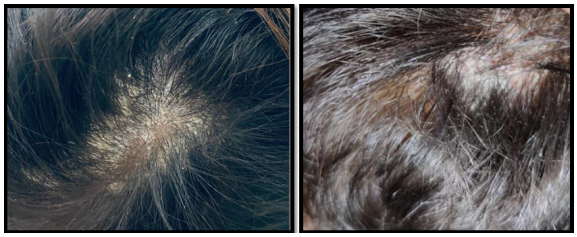


Fig. 4: Scalp psoriasis

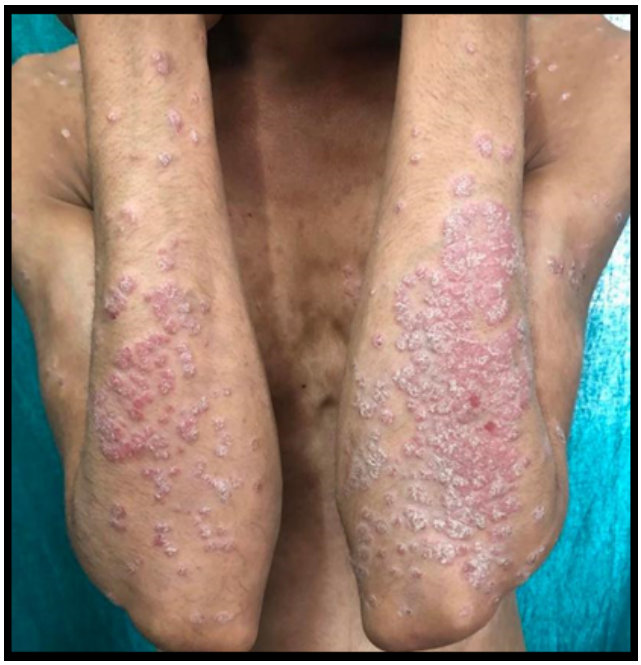


Fig. 5: Eczematized psoriasis

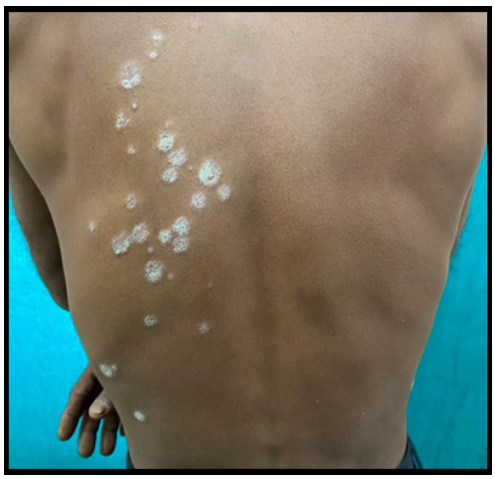


Fig. 6: Psoriasis vulgaris with unilateral distribution

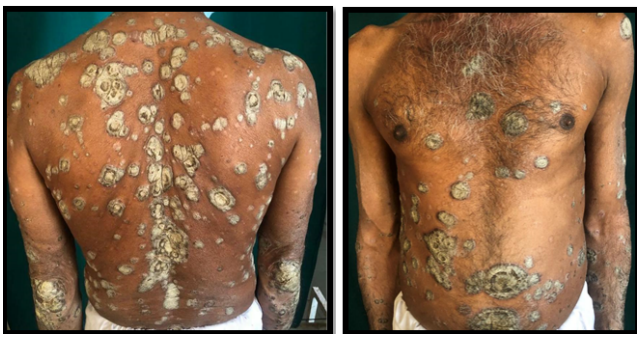


Fig. 7: Limpet-shell like scales of rupoid psoriasis

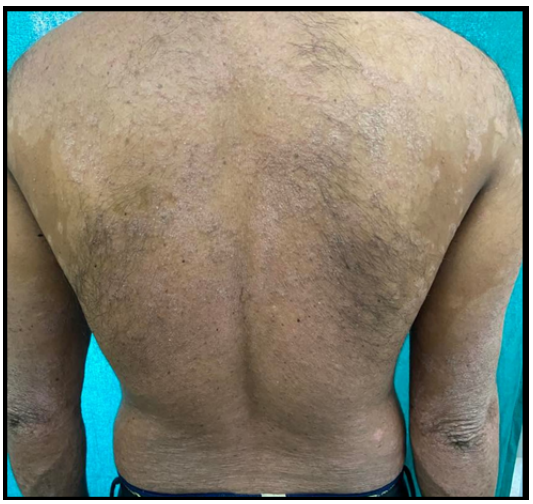


Fig. 8: Steroid modified psoriasis resembling lesions of tinea corporis

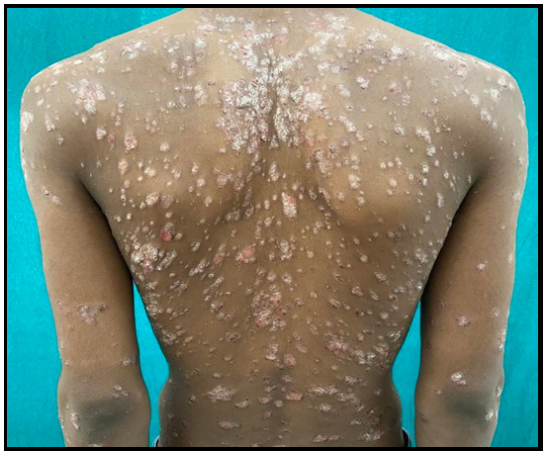
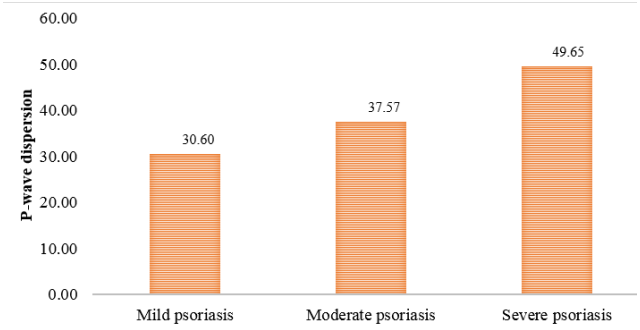
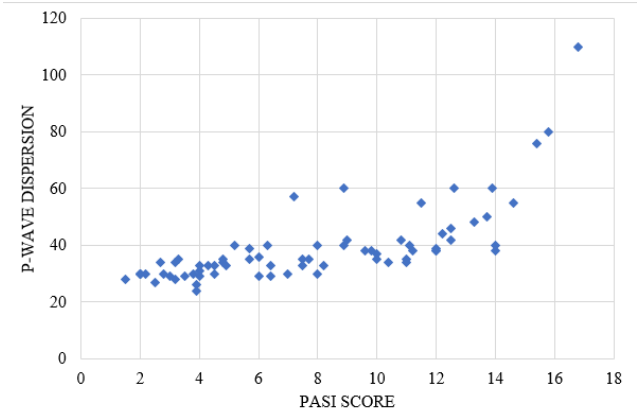


Fig. 9: Young adult male having PASI score >10



Graph 3: Mean P-wave dispersion according to severity of disease



Graph 4: Scatter diagram between P-wave dispersion and PASI score

4. Discussion

Pathogenesis of psoriasis involves an interplay between the innate and acquired immune systems; involving the Th1- Th17-Th22 immune pathway causing an increased cell turnover rate with abnormal keratinocyte hyperproliferation and multiple systemic effects. Markers of systemic inflammation such as C-reactive protein levels, T-helper cell type-1 cytokines, and the inflammatory processes and oxidative stress are delineated.[7] Metabolic syndrome and type 2 diabetes which are known comorbidities of psoriasis are accompanied by an expansion and biological transformation of epicardial adipose tissue.[8] Moreover, TNF-α and PDGF-α are also responsible for electronic remodelling.[9] All these changes play a role in microvascular dysfunction and fibrosis leading to electroanatomical remodeling causing various cardiovascular morbidities such as atrial fibrillation, arterial hypertension, atherosclerosis and heart valve diseases.[10] Individuals with psoriasis have an increased risk of developing atrial fibrillation with a severity-adjusted risk of 1.50–2.98 in patients aged <50 years and 1.16–1.29 in those aged ≥50 years.[11] A total of 35.2% of psoriasis patients belonged to the mild PASI score (<3), 32.4% in moderate (3-10), and 32.4% in severe PASI score (>10) category. A normal electromechanical activity corresponds to P-wave dispersion of 29 ±10 milliseconds. In this study, we observed an increasing trend in P-wave dispersion with an increase in the severity of psoriasis with a mean value of 30.60±2.87 milliseconds in patients with mild psoriasis, 37.57±7.63 milliseconds in patients with moderate psoriasis and 49.65±18.14 milliseconds in patients with severe psoriasis. This result was found to be consistent when compared with the other studies done in other parts of the world. An all-over raised P-wave dispersion (69.1 ± 22.6) was observed in 61 cases of psoriasis as compared to healthy matched controls (45.6 ± 19.4) without disease in the cross-sectional case-control study conducted in Turkey by Bacaksizi A. et al.[12] In another cross-sectional case-control study by Simsek H. et al[13] in Turkey, a higher P-wave dispersion was observed among 94 cases (41.9 ± 7.6) of psoriasis than 51 healthy controls (30.3 ± 7.2). In a case-control study with 65 cases of moderate to severe psoriasis and 65 matched healthy controls by Namazi N. et al in Iran[14] increased P-wave dispersion was observed among cases with a median range of 48 milliseconds as compared to 36 milliseconds in controls (Table IV). In the cross-sectional study conducted by Calapkorur B. et al[15] in Turkey, PASI score was well correlated with atrial electromagnetic delay, hence indicating that the mild-moderate group had a lower risk of atrial fibrillation than the severe group.

5. Conclusion

In this study a significant association of psoriasis with P-wave dispersion was observed. The P-wave dispersion was significantly higher in patients with high PASI scores and lower in patients with low PASI scores. This indicates that patients with psoriasis are at a higher risk for developing atrial fibrillation. Elevated systemic pro-inflammatory mediators may be responsible for various cardiovascular morbidities like atrial fibrillation in psoriasis. Considering the disease burden and disability related to stroke which is predisposed by atrial fibrillation, it is important to validate the direct effect of psoriasis on atrial fibrillation.

6. Conflict of Interest

There are no conflicts of interest in this article.

7. Source of Funding

None.

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