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Evaluate The Ultrasound Enthesis Score in Patients Suffering From Psoriasis to Detect Subclinical Enthesopathy

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Abstract:*Psoriasis (PsO) is a common, chronic inflammatory disease of the skin characterized by well demarcated, infiltrated, erythematous, scaly plaques. Psoriatic arthritis (PsA) is an inflammatory arthritis associated with PsO. PsA is a heterogeneous disease. The proportion of PsO patients suffering from PsA vary from 5-20% in different studies.PsA is of great socioeconomic importance because it produces significant morbidity, disability and economic burden. One of the major features of PsA is enthesitis, yet clinically asymptomatic cases of entheseal abnormalities are likely to go undiagnosed. This concept was utilized in studies to evaluate entheseal changes in clinically asymptomatic psoriasis patients as a predictor of psoriatic arthritis. Ultrasonography is a cost effective screening modality to detect significant entheseal abnormalities in patients with psoriasis, despite the absence of clinical symptoms of arthropathy.*

Keywords:*Psoriasis, psoriatic arthritis, entheseal changes, ultrasonography*

I. Introduction

Psoriasis (PsO) is a common, chronic inflammatory disease of the skin characterized by well demarcated, infiltrated, erythematous, scaly plaques that may be limited or widespread in extent having profound effect on quality of life of patients. Worldwide incidence varies greatly due to racial, geographical and environmental factors. Psoriasis has a peak prevalence approaching 3% of the general population in Scandinavia and Northern Europe[1], and accounts for 2.3% of total dermatology out patients in North India. [2]

Psoriatic arthritis (PsA) is an inflammatory arthritis associated with PsO. PsA is a heterogeneous disease. Clinical manifestations vary from a mild, slightly troublesome oligoarthritis to a severe, mutilating polyarticular form. The proportion of PsO patients suffering from PsA vary from 5-20% in different studies.[3,4,5]PsA is of great socioeconomic importance because it produces significant morbidity, disability and economic burden. In approximately 70% of cases, PsO precedes the onset of arthritis but interval between is extremely variable; in 15% of cases arthritis precedes the onset of PsO and in another 15% cases the PsO and inflammatory arthritis are diagnosed together.[6] .

One of the major features of PsA is enthesitis, yet clinically asymptomatic cases of entheseal abnormalities are likely to go undiagnosed. This concept was utilized in studies to evaluate entheseal changes in clinically asymptomatic psoriasis patients as a predictor of psoriatic arthritis.The importance of enthesitis as the key pathological lesion underpinning the pathogenesis of psoriatic arthritis (PsA) has been increasingly recognized [7] .Ultrasonography is a cost effective screening modality to detect significant entheseal abnormalities in patients with psoriasis, despite the absence of clinical symptoms of arthropathy. A number of small epidemiological studies have revealed preliminary evidence that subclinical enthesopathy may predict psoriatic arthritis in patients with psoriasis.Early screening of psoriasis patientwithout clinically apparent joint disease may help to decrease the occurence of psoriatic arthritis in such patients. In India there have been very few studies on Subclinical Enthesopathy associated with psoriasis. So we aimed to Conduct the study, evaluating the prevalence of subclinical enthesopathy using ultrasound in psoriasis patients in our region.

II. Materials and Method

It was a non interventional and case control study and conducted on all patients referred to the department of Radio-diagnosis from Dermatology department of Govt. Medical College, Kota in a period of 1 year.**. Total** 80 subjects undergone ultrasonography out of which 40 cases of chronicplaque psoriasis and 40 control.Patient were not having clinically apparent joint disorder .

Inclusion criterias :

1. Disease duration of at least 3 years.
2. Patients not receiving any systemic treatment for psoriasis for at least two month before enrolment.

3. Patients not having symptoms of any joint disease.

Exclusion criterias:
1. Patients receiving any systemic treatment for psoriasis for 2 month before enrollment.
2. Patients with psoriatic arthritis and other joint related symptoms.

The sonographic examinations were performed after a 20-minute rest in the evaluation room Abnormalities were quantified according to the MASEI score ,which systematically explores 6 enthesis locations bilaterally (proximal plantar fascia, distal Achilles tendon, distal and proximal patellar ligaments, distal quadriceps, and brachial triceps tendons) in each subject . The sonographic examination evaluated the following characteristics of the enthesis at each site: thickness, structure, calcifications, bursae, erosions, and power Doppler signal in the bursa or enthesis full tendon (cortical bone profile, intratendon and paratendon on the enthesis insertion). The structure was defined as pathologic if loss of a fibrillar pattern, a hypoechoic aspect, or fusiform thickening of the enthesisoccurred . Bone erosion was defined as a cortical interruption with a step-down contour defect, and an enthesophytewas defined as a step-up bony prominence at the end of the normal bone profile . Calcifications were evaluated at the area of the enthesis insertion and classified according to size . Blood flow was examined in each enthesis by power Doppler imaging, the settings of which were standardized, with a pulse repetition frequency of 400 Hz, a gain of 20 dB and a low wallfilter.[8]

III. Result

The study included 40 cases of psoriasis vulgaris and 40 age and gender matched controls. Detailed history followed by thorough clinical examination and ultrasound ofenthesis were performed after taking consent.Age of psoriasis cases ranged from 19 to 77 years [Mean 41.80].The control were in the age range of 19 to 72 [Mean 40.40] and were age matched. [Table 2,] .Out of 40 cases, 23 [57.5%] were males and 17 [42.5%] were female In control out of 40 , 21 [52.5%] were males and 19 [47.5%] were female[Table 1] . In other variables , our cases and controls have no history of any joint disorders.In our study, subclinical evidence of enthesopathy is detected by means of ultrasonography.Various elemental lesions such as calcification, erosion, bursitis, structural and thickness abnormality along with power Doppler flow abnormalities composite to form MASEI score for each enthesis examined.Firstly, the cutoff point of MASEI score was found to differentiate between patients and controls. The ROC (Receiver operating characteristic curve) analysis was performed using the overall MASEI score. The area under the ROC curve was 0.88 (95% confidence interval) [Figure 1]. . The sensitivities, specificities, PPVs (Positive predictive value), and NPVs (Negative predictive value) of the cutoff points are shown (Table 3).The best cut off considered was >11 to differentiate between cases and control.The cutoff point of 11 was exceeded by 30 [75%] of the patients and 5 [12.5%] of the controls. 75% of psoriasis patient had subclinical enthesopathy as compared to only 12.5% of controls.(Table 6)
The mean MASEI scores between patients and controls were statistically different. The mean of psoriasis group [15.13±6.32] is higher as compared to control group [5.30±4.91] with statistically significant difference [P value 0.00]. [Figure23] When analyzed by sex in terms of MASEI scores, females with psoriasis had slightly higher MASEI scores than males.[Table 4].

Entheopathy was detected most frequent in achillis tendon in cases with Mean MASEI score [3.0±1.66]. Mean MASEI score at all six enthesis sites were higher in cases as compared to control with statistically significant level [Table 5].Most common elementary lesion detected were structural inhomogeneity of enthesis (loss of fibrillar pattern)which account for 80% in cases and 12.5% in controls .Least common elementary lesion detected was Calcification, which was detected in 5% of cases but none in controls.There were no PD flow abnormality in either group [Figure 24].There was a significant association between the presence of enthesopathy and some of its elemental lesions in patient with psoriasis when compared to controls [Table 6].

IV. Discussion

Psoriasis is a paradigm of chronic and relapsing inflammatory skin disease which so far was supposed to restricted to skin. In recent past , much of the focus has shifted to association of psoriasis with comorbidities such as arthritis and enthesitis[9]. Enthesopathic changes have been suggested as being the unifying feature of the clinical subtypes of psoriatic arthritis, So we aimed in this work to evaluate the role of enthesealutrasonography in the subclinical diagnosis of psoriatic enthesopathy.Ultrasound (US) enthesopathy was quantified based on MASEI score.Out of 40 cases 23 were male and 17 were females.Male female ratio was 1.35:1.In our study, entheseal abnormalities could be documented by US in 75 % patients with psoriasis as compared to 12.5 % of control.The mean MASEI scores of psoriasis group [15.13±6.32] was higher as compared to control group [5.30±4.91] [p- value 0.00].When analyzed by sex in terms of MASEI scores,

females with psoriasis had slightly higher MASEI scores than males.This study found that entheseal abnormalities can be documented by ultrasonography in clinically asymptomatic patients with psoriasis.

In our study, Enthesopathy was detected most frequent in achillis tendon in psoriasis patients as well as control with mean MASEI score [3.0±1.66] & [1.0±1.14] respectively for cases and control [P value-0.00]. Mean MASEI score at all six enthesis sites were found higher in cases as compared to control with statistically significant level.In our study, Most common elementary lesion detected were structural inhomogeneity of entheses which account for 80% in cases and 12.5% in controls .Least common elementary lesion detected was calcification ,which was detected in 5% of cases but none in controls.There were no PD flow abnormality in either group.70% cases had thickness abnormalities of different enthesis as compared to 30% in control cohort. Erosion & bursitis were found in 10% & 25% among cases respectively as compared to 2.5% and 10 % among control respectively. We observed a higher prevalence of subclinical enthesopathy in psoriatic patients was confirmed in all age classes as compared to controls.

V. Tables and Figures

Table-1: Gender Wise Distribution of Cases and Controls

Gender	Cases		Control	
	No.	%	No.	%
Male	23	57.5	21	52.5
Female	17	42.5	19	47.5
Total	40	100	40	100

Table-2 : Age Wise Distribution of Cases and Controls

Age in years	Cases		Controls	
	No.	**%**	**No.**	**%**
<20	2	5	1	2.5
20-35	13	32.5	15	37.5
36-50	15	37.5	16	40
51-65	9	22.5	6	15
66+	1	2.5	2	5
Total	40	100	40	100
Mean	41.80		40.40	

Table-3 : Sensitivity, Specificity, PPV, and NPV at each Cutoffpoint

score	Sensitivity	Specificity	PPV	NPV	LR+	LR-	TP	TN	FP	FN	ivity+Spec	Accuracy
8.000	0.825	0.725	0.750	0.806	3.000	0.241	33	29	11	7	1.550	0.775
9.000	0.775	0.825	0.816	0.786	4.429	0.273	31	33	7	9	1.600	0.800
10.000	0.750	0.825	0.811	0.767	4.286	0.303	30	33	7	10	1.575	0.788
11.000	**0.750**	**0.875**	**0.857**	**0.778**	**6.000**	**0.286**	**30**	**35**	**5**	**10**	**1.625**	**0.813**
12.000	**0.700**	**0.925**	**0.903**	**0.755**	**9.333**	**0.324**	**28**	**37**	**3**	**12**	**1.625**	**0.813**
13.000	0.650	0.950	0.929	0.731	13.000	0.368	26	38	2	14	1.600	0.800
14.000	0.550	0.950	0.917	0.679	11.000	0.474	22	38	2	18	1.500	0.750
Test is positive if score > threshold value												

Table-4 : Result of MASEI Score Overall and Sex Analysed

Characteristic	Cases	Control	P value
Male/Female ratio	23/17	21/19	
Males (MASEI)	13.48±7.27	5.47±4.90	0.00
Females (MASEI)	17.35±8.07	5.10±4.74	0.00
Overall (MASEI)	15.13±6.32	5.30±4.91	0.00

Table-5 :MASEI Score by Enthesis Affected

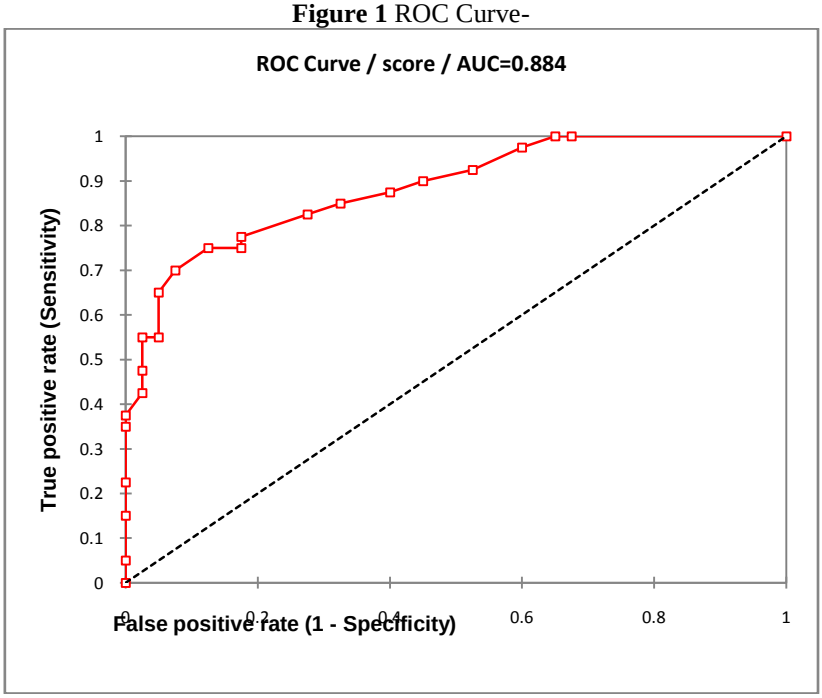
Enthesis Affected	Cases	Control	P value
Plantar fascia	1.75±1.46	0.97±0.97	0.00

Achilles tendon	3.0±1.66	1.0±1.14	0.00
Distal patellar tendon	2.60±1.79	1.08±1.18	0.00
Proximal patellar tendon	2.65±1.70	0.73±1.13	0.00
Quadriceps tendon	2.55±1.66	0.80±1.09	0.00
Triceps tendon	2.42±1.65	0.45±0.74	0.00

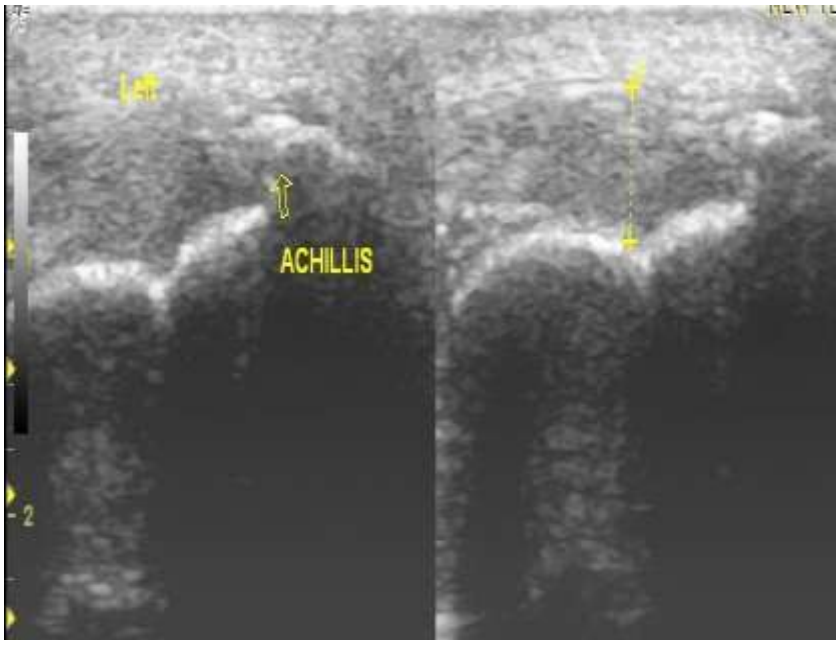
Table-6: Distribution of Enthesopathy& its Elementary Lesionin Cases and Controls

Enthesopathy and elementary lesions	**Cases (n=40)**	**Control (n=40)**	**OR (odds ratio)**
Enthesopathy[n%]	30 (75%)	5 (12.5%)	21
Structure inhomogeneity	32 (80%)	5 (12.5%)	28
Thickness >cut off	28 (70%)	12(30%)	5.44
Calcification	2 (5%)	0 (0%)	NA
Erosion	4 (10%)	1 (2.5%)	4.33
Bursitis	10 (25%)	4(10%)	3.0
PD flow abnormality	0 (0%)	0 (0%)	NA

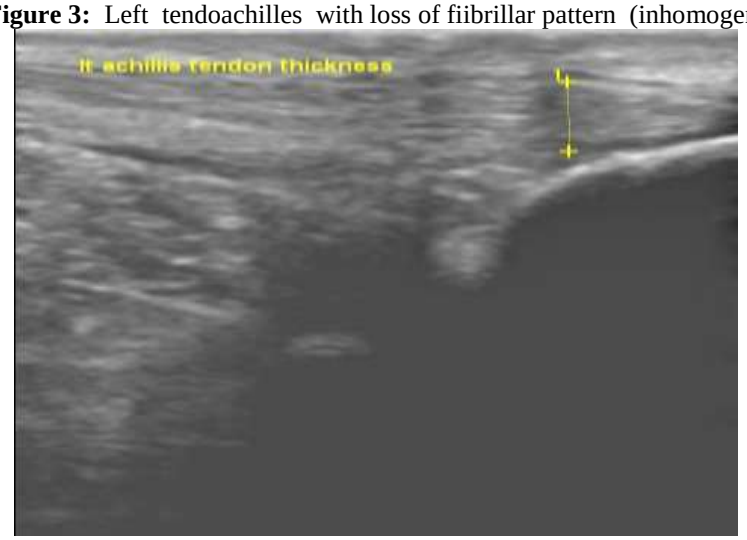
Figure 1 ROC Curve-



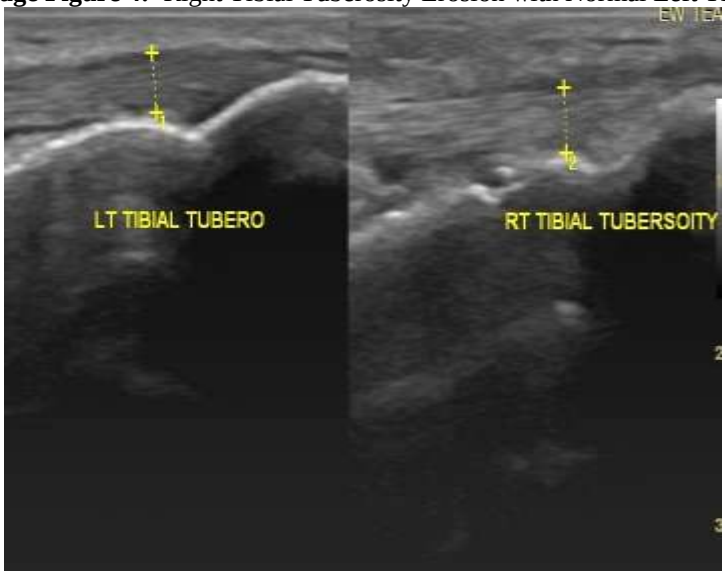
Ultrasound image Figure 2: Calcification in Left Tendoachillis



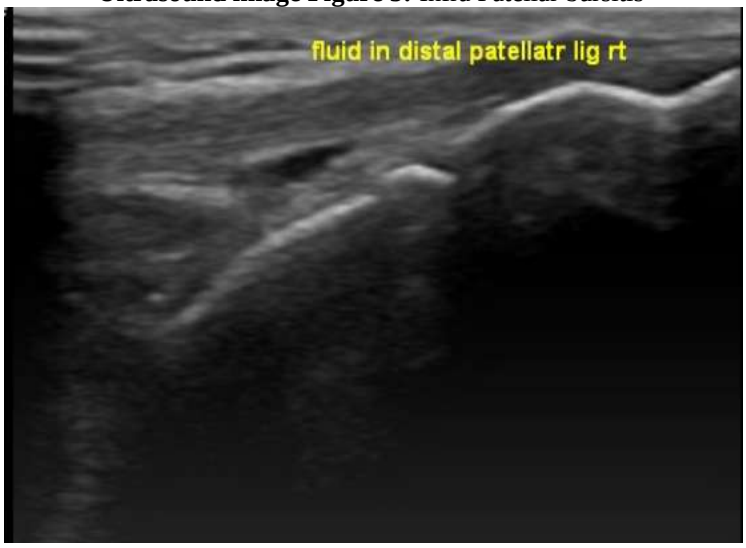
Ultrasound image Figure 3: Left tendoachilles with loss of fiibrillar pattern (inhomogenous) and thickened



Ultrasound image Figure 4: Right Tibial Tuberosity Erosion with Normal Left Tibial Tuberosity



Ultrasound image Figure 5: Infra Patellar bursitis



VI. Conclusion

Psoriasis is one of the most common dermatological ailments seen in daily practice. In the past decade, many studies have been conducted on comorbid conditions in psoriasis especially, psoriatic arthritis and subclinical enthesitis is focus of attention.In our study we observed that subclinical enthesopathy was significantly more common in psoriasis patients than in controls. Psoriasis patients also had a significantly higher prevalence of few of the elemental lesions associated with enthesopathy such as structural inhomogeneity (loss of fibrillarpattern) and thickness abnormalities of enthesis examined.There was no statistically significant difference in the prevalence of bursitis, erosion and abnormal PD flow when compared between cases and controls.

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