



## The disease activity score ultrasound mode b (DAS28US) and power doppler (DAS28 DP) in the assessment of the activity of arthritis rheumatoid.

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### ABSTRACT

The objectives were to determine the DAS28 Us and DAS28 DP, to compare it with DAS28 standard and establish its influence in the assessment of the activity of the rheumatoid arthritis. The DAS28 US and DAS28DP were calculated from the four parameters (articular index, mode B or Doppler power synovial index detected in relation to the 28 joints intended for the DAS28 standard, Patient Global Visual Analogue Scale, ESR). The examination evaluated the ultrasound synovitis and the Power Doppler activity according to the criteria OMERACT. 37 patients of the average age of 50 years  $\pm 11$  were enrolled. The duration of the evolution was  $7,40 \pm 0,72$ . There was an average correlation between DAS28 standard and the number of the synovitis mode B ( $r=0,43$ ;  $p=0,01$ ) (table 3). Our study revealed the subclinical synovitis in 41% of the cases. This study showed a strong correlation between the standard DAS28 and the US and DP ultrasounds DAS28. 35% of patients who were reported in clinical remission were reconsidered ill after ultrasound tests. Thus, this study suggests that the ultrasound scores as DAS28US and DAS28DP could be used in clinical practice to evaluate the rheumatoid arthritis activity.

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### Introduction

The rheumatoid arthritis face has changed and its prognosis has improved, due to windows and available therapeutic advances in the arsenal of its handling [], whose main objective is to obtain remission by tight and continuous controls. The DAS28 standard clinical evaluation reveals deficiencies, related for example to the presence of residual clinical synovitis although the examination is carried out properly. The musculoskeletal ultrasound is currently booming; several studies have demonstrated its impact in detecting subclinical synovitis [6,7]. It would therefore be desirable to develop other subclinical synovitis including the number of ultrasound B-mode and Doppler power [8] and define their place in monitoring patients with rheumatoid arthritis. The aims were to determine the DAS28 Us and DAS28 DP, to compare it with DAS28 standard and establish its influence in the assessment of the activity of the rheumatoid arthritis. .

### Materials and Methods

It was about a transversal study having included patients suffering from rheumatoid arthritis according to the diagnostic criteria of the American College of Rheumatology /European League Against Rheumatism [9]. The verbal consent was obtained. The clinical assessment was done by an experienced examiner who researched the pain evaluated by Visual Analogue Scale, the swollen, limitations. The ultrasound explorations of interphalangeal proximal joints, metacarpophalangeal joints, wrists, elbows, shoulders and knees were realized in a bilateral way on the same day, not having enough clinical data, by a senior operator by the help

of a linear probe in the mode B (14MHZ) and in the Power Doppler mode. The device used is brand Toshiba. The examination evaluated the ultrasound synovitis and the Power Doppler activity according to the criteria OMERACT (synovitis mode B scale: hypoechoic synovial hypertrophy grade 0, absent; grade 1 slight; grade 2 moderate; grade 3, severe. Power Doppler scale: grade 1, low hyperemia with three single spots or two confluent spots or one confluent spot associated with 1 single spot; grade 2, moderate hyperemia related to less than 50% of synovial hypertrophy; grade 3, marked hyperemia related to more than 50% of synovial hypertrophy) [10]. The DAS28 US and DAS28DP were calculated from the four parameters (articular index, mode B or Doppler power synovial index detected in relation to the 28 joints intended for the DAS28 standard, Patient Global Visual Analogue Scale, ESR) [11,12]. The statistical test used on the software SPSS21 with  $\alpha$  fixed at 5%. Quantitative variables were presented as mean  $\pm$  standard deviation or median. Qualitative variables were presented in workforce (percent). For comparison, we used the simple linear correlation of Pearson ( $r$ ), Spearman and crosstabs with Fisher exact test.

### Results

37 patients of the average age of 50 years  $\pm 11$  were enrolled. The mean of DAS28 standard and DAS28 US were respectively  $5,06 \pm 1,49$  and  $5,38 \pm 1,3$ . A very strong and significant correlation existed between DAS28US and the DAS28 standard ( $r = 0,95$ ;  $p < 0,001$ ). There was an average correlation between DAS28 standard and the number of the synovitis mode B ( $r=0,43$ ;  $p=0,01$ ) (table 3).

We found 162/397(41%) subclinical synovitis ( $p < 0,001$ ) and 4 (23.5%) patients who had a standard DAS28 less than 2,6; had subsequently a DAS28DP greater than 2,6.

**Table 1 . Demographic and clinical parametres.**

Paramaters	Frequency	Mean
Number of patients	37	
Total joints	1036	
Age (years)		50,30±11(30 ;78)
Sex femele	32 (86%)	
Desease duration(month)		7,4±0,72(6;9)
ERS		39[22;67,50]
CRP		10[4,25 ;29,62]
BMI		25,50±5,33(14;36)
Rheumatoid Factor Positive	37(100%)	
ACPAPositive	37(100%)	
DAS28standard		5,06±1,49(2,38;7,56)
HAQ		5,40±3,85 (0;15)
VASpain (patients)		43±15
VAS global		51±21
Pain joints	353(34%)	
Swollen joints	221(21,33%)	
Limited joints	30(3%)	
DMARS	27(74%)	
Biologic treatement	8(22%)	
Corticosteroids	34(93%)	
NSDAIs	7(19%)	

**Table 2 . Ultrasound parameters .**

Paramaters	Frequency	Mean
Synovitis mode B	397(38%)	
Synovitis power doppler	201(19%)	
Effusion joint	109(11%)	
Bone erosions	41(4%)	
DAS28US		5,38±1,37(1,90 ;7,70)
DAS28DP		5,06±1,40(1,85 ;7,62)

**Table3 . Correlation between DAS28US, DAS28DP with clinical, biologic and ultrasound parameters.**

	DAS28US r p	DAS28DP
Age	0,10 0,54	0,11 0,51
Disease duration	- 0 ,15 0,38	- 0 ,13 0,41
BMI	-0,15 0,35	-0,19 0,26
VAS pain patients	0,41 * 0,01	0,43** 0,007
VAS global	0,43** 0,008	0,43** 0,008
Pain joints	0,43** 0,003	0,53** 0,001
Swollen joints	0,27 0,10	0,27 0,10
Limited joints	-0,01 0,98	-0,01 0,92
Rheumatoid Factor	0,19 0,27	0,18 0,29
ACPA	-006 0,69	-007 0,69
ERS	0,68** <0,001	0,65** <0,001
CRP	0,49** 0,004	0,46** 0,007
DAS28standard	0,95** <0,001	0,96** <0,001
HAQ	0,23	0,24

	0,16	0,19
Synovitis mode B	0,34*	0,36*
	0,03	0,02
Synovitis power doppler	0,43**	0,45**
	0,008	0,004
Effusion joints	0,01	-0,01
	0,9	0,93
Bone erosions	-0,22	-0,21
	0,12	0,20

## Discussion

The rheumatoid arthritis is a chronic illness. its clinical expression is polymorphous and may associate joints and extra-articular signs . The joints manifestations are mainly polysynovitis damages which may lead to osteo-articular destruction. It is a severe and a invalidating illness in 20-25% of the cases .The earliness of the diagnosis within three to six months after the appearance of the first sign, is a key element while supporting the patients [13] by providing effective therapeutic opportunities windows [14, 15]; but it is difficult to diagnose rheumatoid arthritis in its beginning, referring to an evocative arguments beam [16]. Several authors were able to prove that in some cases, a structural progression occurred while patients were reported in clinical remission. According to Molenaar and al. Up to 52% of patients in clinical remission evolve towards osteo-articular destruction after 24 months of evolution [25SMRbis] Which is the place of musculoskeletal ultrasound in the assessment of the disease especially in its active form in the power Doppler. Thus, the ultrasound composite scores such as DAS28 US and DAS28DP could be useful .In regard to sonographic parameters for the calculation of these DAS, we found in our study ,397 synovitis B-mode, 201 synovitis power Doppler. Florent Garrigues and Al, on 1600 joints they found by ultrasound, 477synovitis B-mode (30%) and 279 synovitis power Doppler (17%) [17]. The results of our study revealed 162/397 (41%) subclinical synovitis. According to the studies of Skudlarek and al, which included 40 rheumatoid arthritis patients and 20 healthy control persons, the median age of the rheumatoid arthritis patients was 58 (range 23–79) years; the female/male ratio was 4:1 both in the rheumatoid arthritis group and in the control group; they examined 480 joints including the inter proximal phalangeals and the metacarpophalangeals, ultrasound has detected 194 synovitis while the clinical examination has found 121 [18]. In detecting the subclinical synovitis and The erosions, the osteo-articular ultrasound has significantly contributed to the early diagnosis of rheumatoid arthritis, and therefore the support of the patients .The study conducted by Naredo and al. , Which included 94 rheumatoid arthritis cases, revealed that the ultrasound damages (number of effusion joints , number of synovitis with / without Doppler signal) are correlated with ESR and CRP [19]; which is similar to the results of our study . According to our work, we have found a correlation between the number of synovitis power Doppler and the number of bone erosions. This explains the reason why the synovitis Doppler is a predictive factor of bone erosion and structural progression, impeding the functional prognosis of patients. This was demonstrated by Ramos who conducted a study that included 72 cases of rheumatoid arthritis. It showed that during the follow-up phase the Doppler signal was very high in the PR destructive group versus non destructive RA group ( $p = 0.006$ ) [20].Our work revealed that there was a very strong significant correlation between the standard DAS28 and the DAS28 US, DAS28 DP; these

results are similar to those obtained in 2008 by Naredo; F .Gandjbakhchand Al [21]. Thus, the assessment of disease activity with composite scores including ultrasound parameters like DAS28 US and DAS28DP could be useful in clinical practice . The DAS28US and DP presents difficulties related, to time consumed in ultrasound explorations. Other ultrasound scores such as: Naredo 12 joints (2 wrists, 2 metacarpophalangeal joints second and third, 2elbows 2knees, 2 tibiotarsal joints) [22] and Backhaus score 7 joints (wrist, metacarpophalangeal and interphalangealproximal joints second and third, metatarsophalangeal joint second and fifth dominant side) [23] have also been proposed. Elyse Contant and Al reported that these scores appear to be the most interesting for clinical practice in the rheumatoid arthritis monitoring domain [24] .By comparing the standard DAS28 to the DAS 28 DP, according to our study, we found that 4 (23.5%) patients who had a standard DAS28 less than 2.6; had subsequently a DAS28DP greater than 2.6; that is to say, the patients were reported in clinical remission, were no longer in it after having introduced into the calculation of the DAS 28, the number of active synovitis with ultrasound. The purpose of the care of these patients is to obtain remission; this implies an absence of structural growth in the future [25]. In 2007, Cohen G.and al have described that in clinical remission, an active synovitis through the ultrasound, is a predictive factor of relapse, its absence is associated with a stable remission in 90% of cases [26]. Thus, ultrasound synovitis consideration with / without power Doppler is needed to define remission, in order to improve the care of patients suffering from rheumatoid arthritis.

### Conclusion

Our study revealed the subclinical synovitis in 41% of the cases. This study showed a strong correlation between the standard DAS28 and the US and DP ultrasounds DAS28. 35% of patients who were reported in clinical remission were reconsidered ill after ultrasound tests. Thus, this study suggests that the ultrasound scores as DAS28US and DAS28DP could be used in clinical practice to evaluate the rheumatoid arthritis activity.

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