# *Summary and Conclusion*

In patients with RA, the assessment of disease activity and therapeutic response is primarily dependent on clinical assessment and serum markers of inflammation. Power Doppler (PD), has been shown to reliably assess synovial blood flow. There is increasing in evidence of the potential applications of PD in the evaluation of arthritic joints. In RA, involvement of the small joints of the hands is common and occurs early in the course of the disease consequently, reliable assessment of these joints with PD is of major importance *(Kamishima et al., 2009).*

Power Doppler technology has allowed the visualization of hyperemia of soft tissues in inflammatory articular diseases *(Suzuki et al., 2009).*

The aim of this study is to assess synovitis of hand joints using Power Doppler Ultrasonography (PDUS) as a supplement to the clinical, laboratory and other radiological parameters in rheumatoid arthritis.

 This study comprised 40 patients with RA diagnosed according to the ACR revised criteria *(Arnett et al., 1988),* who were attending the out-patient clinic and in-patients of the Rheumatology and Rehabilitation Department of Benha University Hospitals.

Our patients were divided into 2 groups. Group I, categorized as having  moderate or high disease activity (DAS28 ≥ 3.2) while group II represented patients with remission or low disease activity (DAS28< 3.2). Both groups of patients were matched for age and sex.

All the patients undergone a full history taking, thorough clinical examination and laboratory investigations. RA disease activity was

assessed using DAS28 while RA disease severity was assessed using Larsen's score and functional capacity of patients was assessed using MHAQ.

PDUS examination of bilateral MCP joints (from the first to the fifth) were scanned longitudinally from the dorsal view and wrist radiocarpal and ulnar-carpal joints were scanned in the longitudinal plane from the medial and lateral aspects of joints.

**The results of our study showed the following:**

- The mean age of group I patients was (48.20 ± 8.42 years) with a range from 34 to 58 years, while that of group II was (46.60 ± 5.45 years) with a range from 40 to 55 years. Patients were matched regarding their age (t = 0.7 and P > 0.05).

- Twelve patients were females (60%) and 8 patients were males (40%) in group I patients, while 8 patients were females (40%) and 12 were males (60%) in group II patients. Patients were mated regarding their sex ($X^2$ = 0.9 and P > 0.05).

- The mean duration of RA was (14.20 ±2.7 years) with a range from 10 to 18 years in group I patients, while it was (2.6± 1.8 years) with a range from 2 months to 5 years in group II patients with a Highly statistically significant difference (P<0.001) between patients of both groups.

- The mean overall assessment of disease activity (VASOA) was (70.8±8.2mm) in group I patients while it was (42.4±10.5mm) in group II patient with statistically significant difference between patients of both groups.

- The mean of MHAQ was (2.27± 0.27) in group I patients, while it was (1.05± 0.33) in group II patients with a Highly statistically significant difference (P<0.001) between patients of both groups.

- The mean counts of tender joint (TJC) was (16.4 ±3.6 joints) in group I patients, while it was (2.20± 0.77 joints) in group II patients with a highly statistically significant difference (P<0.001) between patients of both groups.

- The mean counts of swollen joint (SJC) was (22.4 ± 2.1 joints) in group I patients, while it was (3± 0.9 joints) in group II patients with a Highly statistically significant difference (P<0.001) between patients of both groups.

- The mean DAS28 was (4.8±0.2) in group I patients, while it was (2.3±0.1) in group II patients with a highly statistically significant difference (P <0.001) between patients of both group.

- ESR ranged from 30 to 74 min (54.60  ±14.59 mm/h) in group I patients, while it ranged from 20 to 54 min (33.80 ±12.386 mm/h) in group II patients with a statistically significant difference (P <0.05) between patients of both groups.

- The C-Reactive Protein (CRP) was (17 ± 5 mg/dl) in group I patients, while it (8 ± 4 mg/dl) in group II patients with a highly statistically significant difference (P<0.001) between patients of both groups.

- Twelve patients were sero+ve (60%) and 8 patients were sero-ve (40%) in group I patients, while 8 patients were sero+ve (40%) and 12 were sero-ve (60%) in group II patients. with a statistically non significant difference (P> 0.05) between patients of both groups.

- All group I patients were represented in grade III (40%) and grade IV (60%), on the other hand, group II patients were represented in grade I (60%) and grade II (40%) regarding disease severity assessed using Larsen's method.

- Regarding PDUS grading patients in group I had 4 (20.0%) patients with grade II ,16 (80.0%) patients with grade III and Patients in group II had 8 (40.0%) patients with grade I ,12 (60.0%) patients with grade II .

- The mean CFS of patients of group I patients was (1.3±0.38) while it was (0.25±0.10) of group II patients with highly statistically significant difference (P<0.001) between both groups. The mean of RI was (0.48±0.17) of group I patients and (0.08±0.03) to group II patients with statistically significant difference (P<0.05) between both groups.

- The mean CFS of patients with moderate disease activity was significantly lower than that of patients with high disease activity (p<0.05). On the other hand, there was statistically insignificant difference between these patients as regards the mean RI (p>0.05).

- There are statistically significant difference between both subgroups (remission and low disease activity) as regard the mean CFS and the mean RI (p<0.05).

- There is a highly statistically significant difference between PDUS grades regards functional capacity in group I patients,. While on comparing same variables in group II patients, there is statistically insignificant difference (P<0.001).

- There is statistically insignificant difference between PDUS grades (grade II and grade III) in group I patients as regard ESR($P>0.05$). While on comparing same variables in group II patients, there is statistically significant difference between them ($P<0.05$).

- As regard CRP in group I, on comparing different PDUS grades , there is statistically insignificant difference between them (grade II and  grade III) ($P>0.05$). While on comparing same variables in group II patients there is statistically insignificant difference between them (grade II and grade III) ($P>0.05$).

- More seropositive patients (75%) were represented in PDUS grade III in group I patient with statistically significant difference between patients of both grades (II,III). On the other hand, statistically insignificant difference between PDUS grades (I,II) in group II patients regarding  seropositivity.

- There is highly statistically significant difference between grade III and grade IV of radiological severity regarding the mean CFS ($p<0.001$) with the higher mean represented in grade IV.

- There is statistically significant difference between grade III and grade IV of radiological severity regarding the mean RI ($p<0.05$) with the higher mean represented in grade IV.

- On the other hand, statistically insignificant difference detected between grade I and  grade II of radiological severity  as regard the mean CFS ($p>0.05$) and the mean RI ( $p>0.05$) in group II patients.

- As regards radiological severity there is highly statistically significant difference between grade III and grade IV regarding the mean CFS with the higher mean represented in grade IV.

- There is highly statistically significant positive correlation of CFS with MHAQ (p=0.00), DAS28 (p=0.00), RF (p=0.006) and  Larsen's score (p=0.000).

- There is significant positive correlation of CFS with ESR (p=0.016)

- There is non statistically significant correlation with CRP (p=0.382).

- There is highly statistically significant positive correlation of RI with MHAQ (p=0.000 ), DAS28 (p=0.00), RF (p=0.003) and Larsen's score (p=0.000) .

- There is none statistically significant correlation of RI with  ESR (p=0.150) and CRP (p= 0.330).

**Conclusion:**

- PDUS is a useful method in assessing synovial inflammation in hand joints of RA patients correlating closely with disease activity, severity and functional capacity.

- RA patients on remission or having low disease activity (DAS28) may have ongoing synovitis which can be assessed using PDUS.

- PDUS of hand joints can serve as broadly applicable complementary tool to the clinical assessment in RA patients.

**Recommendation:**

A modification of current RA remission criteria by combining clinical and imaging examinations is strongly advised as in some situations the DAS28 score, acute phase markers or the global assessment of disease activity are discordant, so that PDUS assessment of rheumatoid hand joints synovitis provides an early and useful information regarding synovial disease and vascularity being a reliable, feasible and cheap imaging method.