Early detection of Subtle Myocardial deformation abnormality in patients with psoriasis by speckle tracking echocardiography in Babylon governorate

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Abstract

Background: Psoriasis is a chronic immune-inflammatory-mediated disease in which its pathogenesis involves an interaction between genetic, environmental, and immunological factors and is characterized by topical skin lesions as well as an increased risk for cardiovascular disease. There is increasing evidence that patients with psoriasis are more associated with cardiovascular disease as compared with the general population. The aim was to assess the cardiac performance in patients with psoriasis and compare with control participants and compare between conventional two dimensional echocardiography and global longitudinal strain changes.

Methods: A case control study of 57 psoriasis patients and 57 control participants who attend the Dermatology unit in Marjan medical city between the first of March and the first of June of 2019, were recruited in study. The patients who met the inclusion criteria, invited to do echocardiogram. In echocardiography unit, the participant’s age, duration of disease and sex was recorded and echocardiography done using conventional and 2 dimension STE. Student T tests and ANOVA test were used to found the mean difference in echocardiograph measurement between patients and control participants.

Results: There were a no significant difference in conventional parameter between the psoriasis patients and the controls. There was a statistically significant difference in Global longitudinal strain between the psoriasis patients and the controls. Global longitudinal strain is decreased by prolong or increase disease duration.

Conclusions: The speckle tracking echocardiography techniques was useful noninvasive, reliable and non-expensive tool for detection of subtle myocardial deformation in patients with psoriasis.

Key words: Psoriasis, immune, inflammatory-mediated disease, genetic, environmental, topical skin, lesions

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INTRODUCTION

Psoriasis is a common T helper type-1 and T helper type -17 lymphocyte, mediated chronic inflammatory disease, it is noncontagious, multisystem disorder, it has a 2–3% prevalence of the general population (1, 2). There are many factors causes difference in the prevalence of psoriasis include age, gender, geography, and ethnicity, probably due to genetic and environmental factors(3). Psoriasis involves the skin and nails, with localized or generalized lesion, mostly symmetrical, sharply demarcated, red papules and plaques, and usually covered with white or silver scales. The most frequent and observed symptoms connected to psoriasis include scaling of the skin in 92%, pruritus in 72%, erythema in 69% fatigue in 27%, swelling in 23% and in 20% burning or bleeding (4). The exact causes of psoriasis are not fully understood (5) but a number of risk factors are recognized(6). Traditionally psoriasis considered as a disease limited to the skin and joints, but there is risen evidence suggests that psoriasis has multi-systemic effects(7-9). In spite of the growing literature on psoriasis co-morbidities, there is a critical knowledge gap on the association of psoriasis severity and the prevalence of co-morbidities. Previous researches have depend on indirect measures of psoriasis severity, such as treatment
Subject and methods:

A case control study that conducted between the first of March and the first of July of 2019. The data collection was carried out in echocardiography unit in medical department of Marjan medical city in Babylon city, Iraq and among patients attended dermatology unit in same hospital. Sample size was calculated using the formula:

\[ N = \left( \frac{z^2 \cdot \text{p} \cdot \text{q}}{d^2} \right) \]

\[ N = (1.96)^2 \times 0.03 \times 0.97 / (0.05)^2 \]

\[ N = 45 \]

Sample sizes of 57 patients were included in this study. Other 57 healthy volunteers homogenous in terms of age and gender who attended the Marjan medical city were selected as the control group. Included all participants who were Age more than 18 years and Confirmed history of psoriasis by dermatology and Excluded every participant with Poor echo window, Smoking history, IHD (as defined by history, abnormal ECG), echo RWMA (regional wall motion abnormality), Alcohol consumption, Obesity (BMI > 30 kg/m²), Medical history of hypertension, diabetes mellitus, renal failure, Dyslipidemia and arrhythmias and History of cardiac surgery. In echocardiography unit, participants age, duration of disease and sex were recorded then echocardiography was performed on all subjects according to the same protocol by using a commercially available speckle tracking system in an Echopac (ver. 13 GE Vingmed Horten, Norway Medical System Vivid nine ultrasound machine equipped with 1.5-5 MHz sector transducer probe). The participants put in left lateral decubitus positioned and monitored using an electrocardiographic lead, the following echocardiographic cuts were performed long parasternal, apical two, four and five chambers to evaluate cavities systolic and diastolic functions of ventricles. All measurements were performed in accordance with the guidelines/recommendations of American Society of Echocardiography/European Association of Echocardiography.

The following echocardiographic variables were assessed: EF, calculated by use of biplane modified Simpson's method, considering the normal value of EF as 54-74% (2-S-D) range for the female, and 52-72% (2-S-D) range for male according to the current recommendations diastolic function, evaluated by use of mitral flow (pulsed wave Doppler registration with gate placed at the tip of open mitral valve leaflets sample volume 1-3 mm), with anterograde values of E wave and A wave. E/A ratio: reflects LA-LV gradient in early and late diastole, help define stages of diastolic function. Annular velocity e': correlates with early diastolic relaxation. E/e' ratio: predict LV filling pressure. Tissue Doppler of lateral mitral annulus, measures of S' wave (systolic velocity of the lateral mitral annulus) were normal value is >10.5 cm/second and E' wave of lateral mitral annulus (early diastolic velocity)
were normal value is > 10 cm / second; and the ratio of (E/A) and E/E’ was derived. The GLS was acquired by use of Automated Functional Imaging (AFI) of three clips with images of the left ventricle on three apical views, so that all myocardial segments could be well visualized: 4-chamber, 2-chamber and 3-chamber views. The events of aortic valve opening and closure were marked. The images were acquired at a frame rate between 60 fps and 90 fps, and heart rate of > 70 beat / minute).

Data was analyzed using statistical package for the social sciences (SPSS version 23). Analytic statistics as Student –t test and ANOVA test used to find association variables.

**Results**

The male to female ratio in psoriasis was 1.1:1 and in control participants was 1.4:1, figure 1.

![Figure 1: Bar chart for gender distribution in patients with psoriasis and control group.](chart1)

The mean in psoriasis patients’ age was 41±14.2 years and in control participants the mean age was 40.3±12.8, figure 2.

![Figure 2: Bar charts for age distribution in patients with psoriasis and control group.](chart2)
In psoriasis patients, the mean duration of disease was 18.1±13.6 years, figure 3.

Figure 3: Pie chart for distribution of psoriasis patient on duration of disease.

The mean ejection fraction in control participants was 61.3%±3.6 where it was lower in participants with psoriasis 60.9%±6.2 and there were no significant statistical difference between two group (p= 0.432). The GLS was showed significantly difference in psoriasis patients than control (-19.6±3.5 VS -21.2±1.5, P= 0.003). Other echo parameter that showed no significant difference between two group were S', e', E/E, E/A, LA, LVED and LVES, table 1.

Table 1: comparison of mean difference of some echocardiographic parameters between control and patient with psoriasis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control participants</th>
<th>Participants with psoriasis</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF%</td>
<td>61.3%±3.6</td>
<td>60.9%±6.2</td>
<td>0.432</td>
</tr>
<tr>
<td>S' in cm/sec</td>
<td>13.3±1.4</td>
<td>11.7±2</td>
<td>0.78</td>
</tr>
<tr>
<td>e' in cm/sec</td>
<td>12.1±1</td>
<td>11.6±2.2</td>
<td>0.53</td>
</tr>
<tr>
<td>E/E</td>
<td>4.6±2.1</td>
<td>9.5±3.5</td>
<td>0.943</td>
</tr>
<tr>
<td>E/A</td>
<td>1.4±0.4</td>
<td>1.2±0.2</td>
<td>0.102</td>
</tr>
<tr>
<td>GLS%</td>
<td>-21.2%±1.5</td>
<td>-19.6%±3.5</td>
<td>0.003*</td>
</tr>
<tr>
<td>LA in ml</td>
<td>35.5±7.9</td>
<td>36±9.1</td>
<td>0.09</td>
</tr>
<tr>
<td>LVED in ml</td>
<td>86.6±9.8</td>
<td>97.8±38.7</td>
<td>0.27</td>
</tr>
<tr>
<td>LVES in ml</td>
<td>37.4±10.3</td>
<td>42.9±19</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Student T test * significant p value ≤0.05.

The GLS was matched with duration of disease and result showed in table -2-.
Table 3.2: Comparison of the mean of GLS according to duration of disease.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Duration of disease</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;5 years</td>
<td>5-10 years</td>
</tr>
<tr>
<td>GLS % (Mean ±SD)</td>
<td>-23%±1.2</td>
<td>-22.2%±2.1</td>
</tr>
</tbody>
</table>

Anova test * significant p value ≤0.05.

Discussion

This study was conducted to compare the echocardiographic features between psoriatic patients and healthy individuals. After exclude every patient with clinical evidence of cardiovascular diseases that may act as confounder for result. The result of conventional echocardiograph parameters (EF) showed that there were no significant difference between psoriasis patients and control and this result was agreed with other study like Guven et al that reported comparable LV dimensions, wall thickness, and EF between patients with psoriasis and healthy controls (33). Ardic et al also showed no differences in LV diameters or EF (34) and the results of Dittlo G et al that showed that all conventional echocardiographic parameters are comparable between patients with mild psoriasis and controls (35).

The speckle tracking echocardiography techniques demonstrate that there was higher prevalence of subclinical myocardial dysfunction in psoriasis patients than previously considered, this technique can detect minimal abnormalities in systolic and regional LV function (36, 37). In this study, the GLS values were significantly lower compared to controls, suggesting subclinical reductions in longitudinal function and this similar to other study that found the patients with psoriasis even with normal ejection fraction had evidence of subclinical myocardial deformation. Furthermore, a recent study demonstrated (using 2D strain imaging) that patients with psoriasis have lower LV function (35, 38).

In this study, the GLS was correlated with the duration of the disease. A possible explanation is that patients with longer disease duration could have developed more inflammatory damage than those ones with a shorter duration. These data agree with those of Sunbul et al study (39).

In this study, there were no significant differences in some parameters of diastolic function between psoriasis and control group and this compatible with other study like Yalimazer B et al study (40) and reverse to other studies like Hoork P et al study, that showed different in prevalence of left ventricular dysfunction (left ventricular diastolic dysfunction was observed in 14 psoriasis patients (60.8) and 3 control subjects (13.4) (P<0.001), all of whom were presented with grade I diastolic dysfunction) and there were a significant association in diastolic parameters between psoriasis and control group (41) and Dattilo G study that found the Left ventricular diastolic dysfunction was found in 36.5% patients in the psoriasis group versus 0% in control group, and significant reduction of the E/A ratio was found also for the right ventricle (35) the cause behind this may be due to in this study and Yalimazer B et al study the mean age (41 years) was lower than other study that showed significant difference.

Conclusions

Global longitudinal strain was significantly lower in patients with psoriasis than in controls. The myocardial impairment was associated with disease duration. This study suggests that psoriasis patients, in the absence of other cardiovascular risk factors, are associated with subclinical alterations in cardiac function.
References

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