# ASSESSMENT OF LEFT VENTRICULAR VOLUME AND FILLING PRESSURE IN CHILDREN WITH SYSTEMIC LUPUS ERYTHEMATOSUS

*Thesis*

*Submitted for Partial Fulfillment of Masters Degree in Pediatrics*

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# تقييم حجم الامتلاء و الضغط الانبساطي للبطين الايسر لعضلة القلب في الاطفال المصابين بداء الذئبة الحمراء

رسالة

توطئة للحصول على درجة الماجستير
في طب الاطفال

مقدمة من الطبيب


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# SUMMARY

Systemic lupus erythematosus (SLE) is an inflammatory autoimmune disease with multiorgan involvement, a wide variety of manifestations and an unpredictable course. Cardiac involvement in SLE is prevalent in more than50% of that disease. The symptoms of myocardial involvement are usually clinically silent compared with other cardiac involvements.

Myocardial involvement (myocarditis) can provoke bilateral ventricular contractility and relaxation abnormalities inducing systolic and diastolic dysfunctions in SLE. Furthermore, it was reported that LV relaxation abnormality usually precedes systolic dysfunction in SLE.

This cross sectional study was carried out at the Pediatric Allergy and Immunology unit, Children's Hospital, Ain Shams University. It included 60 children classified into 2 groups. Group I, included 30 children who were diagnosed to have SLE. Group II, included 30 healthy, age and sex matched children as a control group. An informed consent was obtained from caregivers of each studied subject before enrollment in the study.

The studied children with SLE were subjected to clinical evaluation; they were classified into 2 groups. Group A, fifteen cases with hypertension, Group B, fifteen cases without hypertension. The disease activity index

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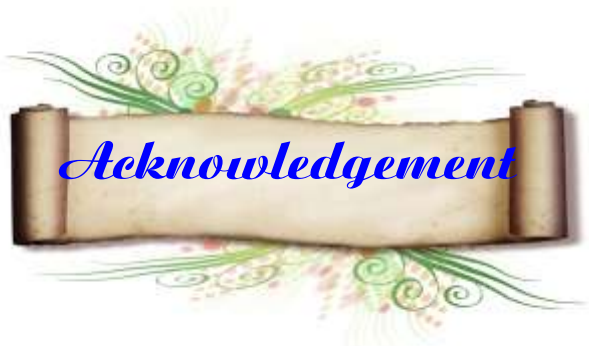
# List of Abbreviations

| | |
|---|---|
| ACE..... | Angiotensin – converting enzyme |
| ACEIs..... | Angiotensin converting enzyme inhibitors |
| ACR..... | American college of rheumatology |
| AOD..... | Aortic root diameter |
| AV block..... | Atrio-ventricular block |
| AV..... | Aortic valve |
| C3 ..... | Complement 3 |
| CAD..... | Coronary arterial disease |
| CBC..... | Complete blood count |
| CHF..... | Congestive heart failure |
| CMRI..... | Cardiac magnetic resonance imaging |
| DE time..... | Deceleration time |
| DHF..... | Diastolic heart failure |
| e/a ratio ..... | ratio between early diastolic transmitral flow and flow of atrial contraction. |
| E/e' ratio..... | ratio between early diastolic transmitral flow and early diastolic mitral annular velocity. |
| ECG..... | Electrocardiogram |
| EDV..... | End diastolic volume |
| EF ..... | Ejection fraction |
| FS ..... | Fractional – Shortening |
| Hb..... | Hemoglobin |
| HF..... | Heart failure |
| IVC ..... | Inferior vena cava |
| IVSd ..... | Inter ventricular septal diameter in diastole |
| LA..... | Left atrial |
| LAEDD ..... | Left atrial end-diastolic diameter |
| LA-LV ..... | Left atrial – Left ventricular |
| LAP ..... | Left atrial pressure |
| LV..... | Left ventricle |
| LVEDD ..... | Left ventricular end diastolic diameter |

## List of Abbreviations (Cont…)

| | |
|---|---|
| LVEDd..... | Left ventricular enternal diameter in diastole |
| LVEDP..... | Left ventricular end diastolic pressure |
| LVEF..... | Left ventricular ejection fraction |
| LVH..... | Left ventricular hypertrophy |
| LVPWd ..... | Left ventricular posterior wall diameter in diastole |
| MRI ..... | Magnetic resonance imaging |
| MTPC..... | Myocardial tissue phase contrast |
| MV..... | Mitral valve |
| NBTE..... | Non-bacterial thrombotic endocarditis |
| PAWP..... | Pulmonary artery wedge |
| PLT..... | Platelet |
| PTE ..... | Pulmonary thromboembolism |
| PVF ..... | Pulmonary venous flow |
| RV..... | Right ventricle |
| RVEDD..... | Right ventricular end diastolic diameter |
| SD..... | Standard deviation |
| SLE..... | Systemic lupus erythematosus |
| SLEDAI ..... | Systemic lupus erythematosus disease activity index |
| SPV..... | Superior vena cava |
| SSFP ..... | Steady – state free precession |
| TDI ..... | Tissue Doppler imaging |
| Tei index..... | Tei chuwa published in 1995 an index of myocardial performance (Tei index) that evaluates the ventricular systolic and diastolic function in combination |
| TLC ..... | Total leukocyteic count |
| TMF..... | Transmitral flow |
| TPC ..... | Tissue phase contrast |
| VHD ..... | Valvular heart disease |
| VSD..... | Ventricular septal defect |




*First and foremost, thanks are to* ***Allah****, the creator of the heavens and the earth and what's between them, to Him, whose knowledge is beyond all knowledge, for blessing this work until it has reached its end, as a part of His generous help throughout my life…*

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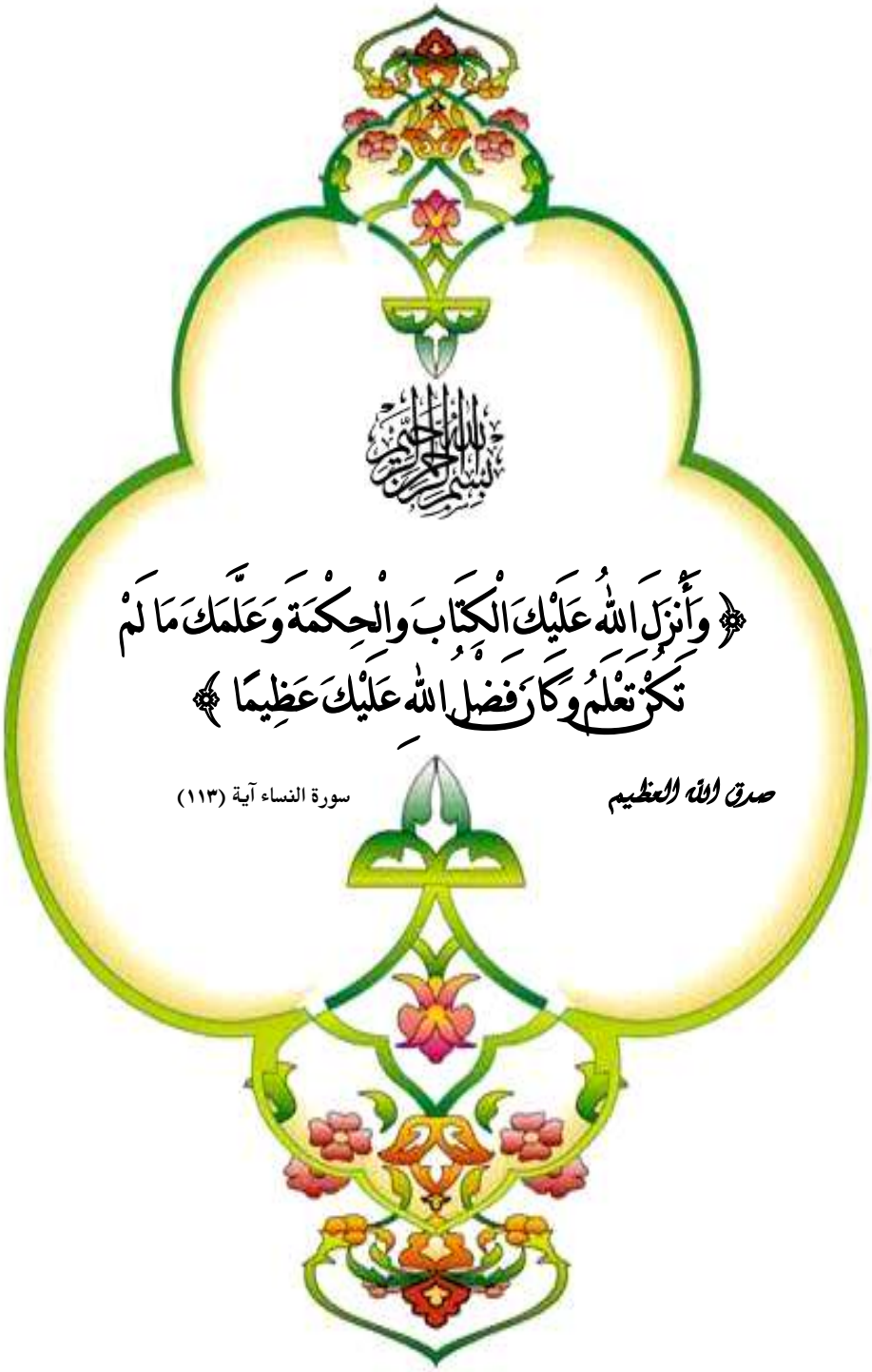
بسم الله الرحمن الرحيم
﴿ وَأَنزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا ﴾
صدق الله العظيم
سورة النساء آية (١١٣)

# Dedication

**To**

**My Family, My Beloved Husband**
**And My Daughter**

*Who Gave Me Too Much*

*And Received Too Little*

# INTRODUCTION

Systemic lupus erythematosus (SLE) is the prototypic inflammatory autoimmune disease with multiorgan involvement, a wide variety of manifestations and an unpredictable course. Cardiac involvement in SLE is prevalent in more than 50% of cases and includes myocarditis, valvular heart disease, coronary arterial disease, and conduction abnormalities ***(Doria et al., 2005).***

Because the symptoms of myocardial involvement are usually clinically silent compared with other cardiac involvements, its prevalence in 7% to 10% of cases might have been underestimated ***(Van de Veire and Sutter, 2006).***

Cardiac Magnetic resonance imaging (MRI) is a noninvasive test that helps to diagnose cardiac affection especially systolic dysfunction. Also, cardiac MRI showed a higher prevalence of myocarditis up to 40% - 70% ***(Kim et al., 2005).***

Myocardial involvement (myocarditis) can provoke bilateral ventricular contractility and relaxation abnormalities inducing systolic and diastolic dysfunctions in SLE. Furthermore, it was reported that left ventricle (LV) relaxation abnormality usually precedes systolic dysfunction in SLE ***(Olson et al., 2006).***

Considering the confounding effects of SLE involvements, such as pulmonary hypertension in the diastolic function of the right ventricle (RV), LV diastolic function can reflect myocardial inflammation due to SLE independently and relatively better than RV diastolic function. Thus, it is reasonable to assess the LV diastolic dysfunction to detect myocarditis in patients with early phase SLE ***(Galie et al., 2005).***

There have been few reports on the morbidity and the mortality rates due to LV diastolic dysfunction in patients with SLE. However, in the general population, isolated LV diastolic dysfunction (elevated LV end-diastolic pressure with preserved LV systolic function) was reported to show that 45% of patients developed symptoms of congestive heart failure over a follow-up period of 5 years, and 25% of patients required hospitalization for these symptoms ***(Paran et al., 2007).***

Furthermore, the mortality rate in patients with diastolic heart failure ranges from 5% to 8% annually, as compared with 10% to 15% in patients with systolic heart failure. Therefore, if we detect and correct LV diastolic dysfunction early, we can improve the prognosis in patients with SLE ***(Lee et al., 2008).***