ABSTRACT: INTRODUCTION: Systemic Lupus Erythematosus is an autoimmune disorder in which organs and cells undergo damage mediated by tissue-binding auto antibodies and immune complexes\(^1\). Systemic Lupus Erythematosus is a multigenic disease.\(^1\) People of all sexes, all ages and all ethnic groups are susceptible. Lupus nephritis, infection and thromboembolism contribute for mortality. Cardiac manifestations are not uncommon in systemic lupus erythematosus. It involves all the layers of the heart, pericardium, myocardium and endocardium as well as coronary arteries. **AIM AND OBJECTIVES:** To find out the prevalence of cardiac manifestations in patients with Systemic Lupus Erythematosus. **METHODOLOGY:** The study was conducted in the Department of Medicine, Andhra Medical College, King George Hospital, Visakhapatnam, Andhra Pradesh. It is a tertiary care hospital. It was a study done on a selected population of Systemic Lupus Erythematosus based on the 1997 update of the 1982 American College of Rheumatology classification criteria for Systemic Lupus Erythematosus. **RESULTS:** In this study consisting of fifty patients, changes suggestive of cardiac disease were seen in 74% of patients. **CONCLUSION:** Systemic lupus erythematosus is a multisystem disease. Prevalence of cardiac disease is not uncommon. Pericarditis or pericardial effusion is the most common followed by valvular heart disease. **KEYWORDS:** Systemic lupus erythematosus, Pericarditis, Valvular heart disease.
hospital. The study period extended between January 2013 and January 2015. It was a study done on a selected population of Systemic Lupus Erythematosus based on the 1997 update of the 1982 American College of Rheumatology classification criteria for Systemic Lupus Erythematosus.

**Inclusion Criteria:** All admitted cases of Systemic Lupus Erythematosus, (diagnosed based on the 1997 update of the 1982 America College of Rheumatology Classification for Systemic Lupus Erythematosus).

**Exclusion criteria:**
- Tuberculosis.
- Rheumatic heart disease.
- Uremia.
- Intake of drugs or conditions other than Systemic Lupus Erythematosus, producing positive ANA.

All patients were subjected to routine physical examination including detailed cardiovascular examination, routine blood investigation like complete hemogram, blood sugar, blood urea, serum creatinine, serum electrolytes and erythrocyte sedimentation rate was done. Complete urine analysis including urine albumin, deposits and 24 hours urinary protein was done. ANA and dsDNA tests were done for all patients. Antiphospholipid antibody test was done for patients who gave history of fetal wastage. After taking ECG and X-Ray chest, all patients were subjected to Echocardiography.

**RESULTS AND ANALYSIS:** The study population included 50 patients of Systemic Lupus Erythematosus of whom 44 patients were females and 6 patients were males. Majority of patients were between the age group 20 to 40 years. The maximum prevalence of Systemic Lupus Erythematosus was seen in the age group of 31 to 50 years. Of the 50 patients of Systemic Lupus Erythematosus 46 patients were positive for antinuclear antibody and 4 patients were negative for antinuclear antibody. Clinical symptoms were varied with 39 patients presenting with chest pain of which 19 patients had non-cardiac pain and 13 patients had anginal pain. Among 50 patients 15 had dyspnea, 8 patients had palpitations and 4 patients had syncope. Cutaneous photosensitivity was the next common symptom shown by 22 patients. 23 patients had malar/discoid rash, 14 patients had positive Raynauds phenomenon. Out of 50 patients 7 female patients had previous fetal wastage, all are positive for antiphospholipid antibodies and 5 patients had history of seizures. 14 patients manifested with oral ulcers. 15 patients had alopecia or hair loss. Depending upon the signs with which the patients manifested, systemic hypertension was seen in 30 patients and all these patients had associated lupus nephropathy. The other cardiac signs included elevated JVP in 6 patients, pericardial rub in 6 patients, basal crackles in 5 patients, loud A2 in 9 patients and loud P2 were seen in 3 patients. Of the different murmurs, systolic murmurs were found in 12 patients and diastolic murmurs were present in 5 patients. In patients with basal crackles a chest x-ray was taken to rule out any underlying respiratory disease as the cause of basal crackles. According to the changes in ECG, only 35 patients had various findings while 15
patients had a normal ECG. The most common ECG change was sinus tachycardia seen in 22 patients, followed by T wave inversion in 18 patients. LVH strain was seen in 10 patients. The other changes seen in ECG were ST depression in 3 patients, PR depression in 4 patients, low voltage complexes in 4 patients, Right bundle branch block in 2 patients, left anterior hemiblock in 3 patients and first degree AV Block was seen in 1 patient. Echocardiography was done in all patients of whom 20 had normal findings. The most common finding was pericardial effusion seen in 20 patients, followed by mitral regurgitation in 14 patients, MVPS with mitral regurgitation was seen in 10 patients. The other echocardiography findings were aortic regurgitation in 10 patients, tricuspid regurgitation in 4 patients, pulmonary hypertension in 4 patients, systolic dysfunction and diastolic dysfunction in 5 patients each. Hypokinesia was seen in 10 patients of which 4 had global and 6 had regional hypokinesia.

DISCUSSION: The most common cardiac manifestation in this study was pericarditis. The prevalence of Pericarditis is 40% in this study which coincides with the study by Armas – cruz et al, Brigden et al and Kong et al. The next commonest cardiac manifestation in SLE was valvular heart disease of which mitral regurgitation accounted for 28%. This finding coincides with the studies by Leung et al and sturfelt et al. Aortic regurgitation was seen in 6% of patients and tricuspid regurgitation was seen in 8% of patients. These findings also coincide with the study by Leung et al and sturfelt et al. According to Badui et al and Griffith and Vural et al sinus tachycardia occurs in 11 to 100%. In the present study sinus tachycardia occurred in 22 patients accounting for 44%. Approximately 10% of SLE patients have conduction disturbances. In the present study 6 patients had conduction disturbances accounting for 12% of whom 3 patients had right bundle branch block, 2 patients had left anterior hemiblock and 1 patient had first degree AV block. In the present study the prevalence of hypertension is 60% manifested by 30 patients. The higher prevalence of hypertension is due to associated lupus nephropathy. These findings coincided with the findings of the studies done by Harvey et al, Kong et al, Budman and Steinberg et al, Doherty et al, Crozer et al., Shieppati and Remuzzi et al, who showed that hypertension is seen in SLE patients of about 14-60%. In this study pulmonary hypertension was found in 4 patients accounting for 8%. This finding coincided with studies by Hejtmancik et al, Perez and Kramer et al and Simonson et al. In this study left ventricular dysfunction occurred in 10 patients, of whom 5 patients had systolic dysfunction and 5 patients had diastolic dysfunction accounting for 20%. Similar findings by studies conducted by Leung et al, Doherty et al and Chia et al were seen in SLE patients. In this study global hypokinesia was seen in 4 patients accounting for 8% and regional hypokinesia was seen in 6 patients accounting for 12%. These findings coincides with the findings of the study conducted by Doherty et al and Sturfelt et al. In this study the least common cardiac manifestation was Libman-sacks endocarditis 2% which is lower than that seen in studies by sturfelt et al, Giunta et al and Galve et al. This lower prevalence was due to the use of steroids.

CONCLUSION: In the present study consisting of 50 patients of systemic lupus erythematosus cardiac manifestations were seen in 74% of the patients. The most common is pericarditis/ pericardial effusion (40%), followed by valvular heart disease of which mitral regurgitation or
mitral valve prolapse being the most common valvular disease. In this study systemic hypertension was found in 60% of the patients and pulmonary hypertension was seen in 8% of patients. Left ventricular dysfunction was seen in 20% of the patients, with systolic dysfunction being 10% and diastolic dysfunction, being 10%. The commonest arrhythmia in this study is sinus tachycardia (44%) and AV block (2%). The least common cardiac finding is Libman–sacks endocarditis, which was found in one case only (2%). The study concludes that almost all the cardiac findings are similar to those in other studies.

RESULTS:

| Age       | No. of Patients | Percentage |
|-----------|----------------|------------|
| < 15      | 1              | 2%         |
| 15 – 20   | 7              | 14%        |
| 21- 25    | 7              | 14%        |
| 26 – 30   | 8              | 16%        |
| 31 – 35   | 11             | 22%        |
| 36 – 40   | 8              | 16%        |
| 41 – 45   | 3              | 6%         |
| 46 – 50   | 3              | 6%         |
| > 50      | 1              | 2%         |

Table I: Distribution of Cases According to Age

| Gender  | No. of Patients | Percentage |
|---------|----------------|------------|
| Female  | 44             | 88%        |
| Male    | 6              | 12%        |

Table II: Distribution of Cases According to Sex

| Symptoms                  | No. of Patients | Percentage |
|----------------------------|----------------|------------|
| Chest pain                 | 39             | 78%        |
| Pericarditic               | 7              | 14%        |
| Anginal                    | 13             | 26%        |
| Non cardiac                | 19             | 38%        |
| Dyspnea                    | 15             | 30%        |
| Palpitations               | 8              | 16%        |
| Syncope                    | 4              | 8%         |
| Raynaud’s Phenomenon       | 14             | 28%        |
| Photosensitivity           | 24             | 48%        |
Seizures 5 10%
Fetal wastage 7 14%
Oral ulcers 14 28%
Alopecia/ Hair loss 15 30%

Table III: Distribution of Cases According to Clinical Symptoms

| Signs                        | No. of Patients | Percentage |
|------------------------------|-----------------|------------|
| Malar/ Discoid Rash          | 23              | 46%        |
| Arthritis                    | 5               | 10%        |
| Hypertension                 | 30              | 60%        |
| Elevated JVP                 | 6               | 12%        |
| Pericardial Rub              | 6               | 12%        |
| S3                           | 4               | 8%         |
| Basal Crackles               | 5               | 10%        |
| Loud A₂                      | 9               | 18%        |
| Loud P₂                      | 3               | 6%         |
| Murmurs                      |                 |            |
| Systolic                     | 12              | 24%        |
| Diastolic                    | 5               | 10%        |

Table IV: Distribution of Cases According to Signs

| Anti-nuclear Antibody        | No. of Patients | Percentage |
|------------------------------|-----------------|------------|
| Positive                     | 46              | 92%        |
| Negative                     | 4               | 8%         |

Table V: Distribution of Cases According to Antinuclear Antibody Positivity

| ECG Changes                  | No. of Patients | Percentage |
|------------------------------|-----------------|------------|
| Sinus Tachycardia            | 22              | 44%        |
| T inversion                  | 18              | 36%        |
| ST Depression                | 3               | 6%         |
| PR Depression                | 4               | 8%         |
| LVH Strain                   | 10              | 20%        |
| Low Voltage Complexes        | 4               | 8%         |
| Right Bundle Branch Block    | 3               | 6%         |
| Left Anterior Hemiblock      | 2               | 4%         |
| First degree AV Block        | 1               | 2%         |
| Normal                       | 15              | 30%        |

Table VI: Distribution of Cases According to changes in ECG
Table VII: Distribution of Cases According to Echocardiographic changes

| ECHO Findings                      | No. of Patients | Percentage |
|------------------------------------|-----------------|------------|
| Pericardial Effusion               | 20              | 40%        |
| MVPS                               | 13              | 26%        |
| Mitral Regurgitation               | 14              | 28%        |
| MVPS with mitral regurgitation     | 10              | 20%        |
| MVPS without mitral regurgitation  | 4               | 80%        |
| Aortic regurgitation               | 3               | 6%         |
| Tricuspid Regurgitation            | 4               | 8%         |
| Pulmonary Hypertension             | 4               | 8%         |
| Libman – Sacks endocarditis        | 1               | 2%         |
| Systolic dysfunction               | 5               | 10%        |
| Diastolic Dysfunction              | 5               | 10%        |
| Hypokinesis                        | 10              | 20%        |
| Global                             | 4               | 8%         |
| Regional                           | 6               | 12%        |
| Normal                             | 20              | 40%        |

REFERENCES:
1. Bevra Hannahns Hahn, Systemic Lupus Erythematosus in: Editors – Fauci. Braundwald. Kasper. Huusahaan. Longo. Jameson. Loscalo. Harrison’s Principle of internal medicine, volume 2, 11th ed, 2008 page 2075-2083. Mc Graw – Hill companies.
2. Siegel M, Lee SL: The epidemiology of systemic Lupus erythematosus. Semin Arthritis Rheum 3: 1, 1973.
3. Brigden W, Bywaters EGL, Less of MH, Ross IP: The heart in systemic Lupus Erythematosus, Br Heart J 22: 11960.
4. Kong TQ, Kellum RE, Haserick, JK: Clinical diagnosis of cardiac involvement in Systemic Lupus Erythematosus: A correlation of clinical and autopsy findings in thirty patients, circulation 26: 7, 1962.
5. Arnas – Cruz, Harnegker J, Ducach G, Jalil J, Gonzales F: Clinical diagnosis of Systemic Lupus Erythematosus. Am J. Med 25: 409, 1958.
6. Leung W-H, Wong K-L, Lau C-P, Wong C-K, Cheng C – H: Cardiac abnormalities in systemic Lupus erythematosus: A prospective M-mode, cross-sectional and Doppler echocardiographic study. Int J Cardiol 27: 367, 1990.
7. Sturfelt G, Eskilsson J, Nived O, Truedsson L, Valind S: Cardiovascular disease in Systemic Lupus Erythematosus: A study of 75 patients from a defined population medicine 71: 216, 1992.
8. Griffith GC, Vural K: Acute and Sub-acute disseminated Lupus Erythematosus: a correlation of clinical and postmortem finding in eighteen cases circulation 3: 492, 1951.
9. Badui E, Garcia– Rubin D, Robles E et al: Cardiovascular manifestation in Systemic Lupus Erythematosus, prospective study of 100 patients Angiology 36: 431, 1985.
10. Godeau P, Guilleven L, Fechner J, Herrenan G, Weschsler B. Manifestations cardiques du Lupus Erythematexes aigu disseminé. Nouv Presse Med. 10: 2175, 1981.
11. Gross L: The cardinal lesions in Libman – sacks disease with a consideration of its relationship to acute diffuse Lupus erythematosus. Am J pathol 16: 375, 1990.
12. Okada T, Shiokawa Y: Cardiac lesion in Collagen disease. Jpn Circ J 39: 479, 1975,
13. Doherty NE 3, Feldman G, Maurer G, Seigel RJ: Echocardiographic findings in Systemic Lupus Erythematosus, AMJ cardiol 61: 1144, 1988.
14. Harvey AM, Shulman LE, Tulmulty PA, Conley CI, Schoenrich, EH: Systemic Lupus Erythematosus: Review of Literature and Clinical analysis of 138: Medicine 33: 291, 1954.
15. Budman DR, Steinberg AD, Hypertension and renal disease in Systemic Lupus Erythematosus. Arch Intern MED 136: 1003, 1976.
16. Crozier IG, Li E, Milne MJ, Nicholls MG: Cardiovascu lar involvement in Systemic Lupus Erythematosus detected by Echo-cardiography AM J. Cardiol 65: 1145; 1990.
17. Schieppati A Remuzzi G: Hypertension in renal disease; Pathophysiological, Functional and Clinical Implications. AM J Kidney Dis 21:58, 1993.
18. Hejtmancik MR, Wright JC, Quint R: The cardiovascular manifestation of Systemic Lupus Erythematosus. Am Heart J 68: 119-1969.
19. Heibel RH; OTtoole JD, Curtiss et al. Coronary arteritis in Systemic Lupus Erythemat osus. Chest 69: 200, 1976.
20. Quismorio FP Jr, Sharma O, Koss m et al: immunopathological and clinical studies in pulmonary hypertension associated with Systemic Lupus Erythemat osus. Semin Arthritis Rheum. 13: 349, 1984.
21. Simonson JS, Schiller NB, Petri M, Hellmann Db: Pulmonary HT in Systemic Lupus Erythemat osus. Rheumatol 16: 918, 1989.
22. Chia BL, Mah EP, Feng PH: Cardiovascular normalities in Systemic Lupus Erythemat osus. Jclin. Ultrasound 9: 237, 1981.

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