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Research Article

Echocardiographic Abnormalities in Systemic Lupus Erythematosus and its Association with Anticardiolipin Antibodies and Serum Lipids

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Abstract

Background: Systemic Lupus Erythematous (SLE) is an autoimmune disease damaging to organs, tissues and cells mediated by antibodies and immune complexes. The higher occurrence of SLE in females may be because of hormonal changes and effects. Due to lack of awareness, many women undergo screening during the fifth decade of their life and may be diagnosed to have SLE. One of the many possible reasons could be late diagnosis, referral bias, optimal health care facilities, tuberculosis and predisposing genetic factors. Leading causes of early mortality and poor prognosis are because of disease activity and autoimmune infections. Whereas, later mortality is due to cardiovascular disease. Echocardiography to assess cardiac function has been a great tool of use. With use of Echocardiography, patients with SLE can be monitored for cardiac anomalies. Many studies in the past have suggested that increasing prevalence of dyslipidaemia in patients having SLE and their association with atherosclerotic cardiovascular disease, which leads to mortality. Dyslipidaemia is seen to be modifiable risk for cardiovascular diseases, but has been a great scope of research in patients having SLE.

Aim: To study the echocardiographic abnormalities in patients having SLE. Furthermore, association of these findings with anticardiolipin antibodies. In the end, learning the association of the results with serum lipids.

Methods: An observational, Randomised, cross sectional study was conducted with 40 patients diagnosed with SLE according to modified ACR criteria. In the chosen population, 2D Echo findings, anticardiolipin antibodies and lipid profile was studied in the under criteria of inclusion and exclusion on the certain criteria.

Results: The demography of patients included in study were in the ratio of 1:7, meaning 5 males and 35 females. The mean age of the male patients was 30 ± 14.13 years, where as that of females were 29.11 ± 9.57 years. The mean duration of the disease was found to be 2.19 ± 1.99 years, thus concludes that majority of the patients had less than 2 years of disease duration.

Out of the 40 patients, 30 patients had abnormal echocardiographic study, which was categorised into pericardial, myocardial and valvular. On categorisation, it was found that 6 patients had pericardial involvement likely pericardial effusion, 13 patients had myocardial involvement like left ventricular diastolic dysfunction (LVDD) and left ventricular hypertrophy (LVH). 23 patients were reported having valvular regurgitation or thickenings. On comparing the echo findings of males and females, there was no statistically significant difference between males and females. In addition, there was no significant difference in echo with regard to duration of disease. Anticardiolipin antibody was found positive only in 6 patients with the distribution of IgG of 12.5% and IgM of 2.5%. Thus, these findings of anticardiolipin did not implicate the positive complications of SLE. It was also reported that 24 out of 40 patients had abnormal serum lipid values. Serum triglycerides were high in 21 of 40 patients, which showed no significant correlation between TG's and echocardiographic abnormalities. High cholesterol levels were noted in 4 out of 40 patients and showed no significant correlation between TC's and echocardiographic abnormalities. 1 patient had very high LDL-C levels, whereas 39 patients had normal ranged values. Out of the lipid profiles mean values, TGs showed abnormally high of 172.45 ± 61.41 mg/dl. Thus, there was no statistically significant and correlation between pericardial, Valvular and Myocardial abnormalities in the studied patients.

Discussion: In the study conducted we could find that valvular incompetence as most common form of valvular involvement. Furthermore, we could find that, myocardial abnormality to be second biggest factor for cardiac involvement of SLE. There was no statistical significance between echo findings and the anticardiolipin antibodies in the give IgG and IgM. Thus, it could not positively implicate the echocardiological manifestations. The most common abnormality was found to be was high serum triglycerides. Furthermore, we also found that there was no significantly correlation between high serum lipids and echocardiographic findings of the pericardial, myocardial and valvular in the 40 cases of SLE.

Conclusion: Most of the SLE patients associated with cardiac disease had no symptoms of cardiac disease. Thus, a high degree of suspension can be there to rule out the cases of SLE with cardiac abnormalities. Routine checks up or screening for cardiac diseases during the SLE to diagnose the cardiac abnormalities. Thus, diagnostic tool for such cases can be Transthoracic 2D echo can help to rule out the causes of cardiac cases. In the screened cases, high possibility of valvular associated abnormalities was indicated. To conclude, prevalence of SLE can be significantly reduced by routine cardiac examination and modify the lifestyle or proper medical management to prevent aggravated response of SLE.

Keywords: Systemic Lupus Erythematous (SLE); Serum Lipids; Dyslipidaemia

Introduction

Systemic Lupus Erythematous (SLE) is an autoimmune disease damaging to organs, tissues and cells mediated by antibodies and immune complexes [1]. SLE is known to have prevalence among young reproductive age group female. The higher occurrence of SLE in females may be because of hormonal changes and effects. Due to lack of awareness, many women undergo screening during the fifth decade of their life and may be diagnosed to have SLE [2,3]. SLE is very rare in India, according a study conducted by Malviya et al, the study had the female population of 8:1 [4]. Looking towards the epidemiology, a Prevalence study conducted in rural population of Delhi reported that 3 per lakh point prevalence [5]. Whereas, 12.5 per lakh was reported in England population [6], 39 per lakh for Finland population [7] and 124 per lakh for USA [8]. The prevalence was much higher when compared with west prevalence studies. Rising number of cases have been reported by large hospitals in India. Though, SLE is rare in India, but when diagnosed with a patient, creates a considerable impact on socioeconomic status and available health services. It has been studied that prognosis of SLE is quite poor, as it leads to irreversible damage to organs. Due to higher prevalence in west, many new treatments are available for treatment of SLE, which are quite considerable and show improvement up to 80% in the first 10 years of treatment. In India, recovery figures are around 50-60% in the first 10 years of treatment. One of the many possible reasons could be late diagnosis, referral bias, optimal health care facilities, tuberculosis and predisposing genetic factors [9]. Leading causes of early mortality and poor prognosis are because of disease activity and autoimmune infections [9]. Whereas, later mortality is due to cardiovascular disease [9].

Clinical feature of SLE have been seen different in in many geographical areas of the world, and also racial differences have been seen in various races among the world. A study having 100 Indian patients having SLE, showed that prolonged fever was the most common clinical feature [10]. Other features were arthralgia, haemolytic anaemia, malar rash, anasarca, splenomegaly, lymphadenopathy and hepatomegaly. A study done in UK, showed that 85% patients had a first definite clinical feature of musculoskeletal and cutaneous [11]. Another study done in Zimbabwe, showed that renal diseases were more common, second most common feature was photosensitivity and serositis was lesser common in USA [12]. An Indian study based in Kerala, showed lowed incidence of Raynaud's phenomenon in attribution to warm climate [12]. These studies signify the fact that there are natural changes in the clinical features of SLE among different races, ethnicity and geographical regions. In terms of severity, the range ranges from mild diseases like rash and arthritis to severe diseases like renal failure and central nervous system involvement.

It has been seen that SLE has been affecting widespread of organs because of the clinical manifestations of involving cutaneous and musculoskeletal structure, which further involves, neurologic, renal, skin and many other manifestations. Though, many manifestations have been studied in detailed, cardiac anomalies haven't received much detailed attention. Use of Echocardiography to assess cardiac function has been a great tool of use. With use of Echocardiography, patients with SLE can be monitored for cardiac anomalies. SLE is known to affect cardiovascular systems with pathological features of pericarditis, myocarditis, conduction systems of heart and myocardial infarction secondary to coronary arteritis. In some renal studies, it has been seen that patients often have left ventricular hypertrophy with left atrial dilation that occurs in response of renal hypertension. Severe complications like thromboembolism, infective carditis and serious complications that requires cardiac surgeries. In another study, it was reported to have valvular lesions in SLE.

With new advances in the therauptic options, valves impairment may remain asymptomatic orundetectable producing no murmurs of regurgitation or stenosis thus no changes on haemodynamic properties. In the Echocardiographic study, Doppler with colour mode flow imaging is the only key to detect these lesions and explore the pathology. It has also been seen that serum of patients having SLE antibodies reactive to altered autologous antigens. Many patients have a group of antiphospholipid in their serum concentrations having diagnosed with SLE. This group of antiphospholipid have IgG, IgM, anticardiolipin antibodies and false positive VRDL for syphilis. Lupus anticoagulant and anticardiolipin (aCL) have been associated with embolisms, thromboembolisms, recurrent abortions and thrombocytopenia in patients having SLE. The relation of these antiphospholipid with cardiac diseases seems very unclear.

Many studies have shown that SLE have evidence association with anticardiolipin antibodies having diseases like cardiomyopathy, likely in Limban-Sacks endocarditis, valvular dysfunction and valvular thickenings. It has been seen that specific association of pulmonary hypertension and thickening, and ischemic cardiomyopathy in lupus patients have been documented. These findings suggest that aCL has a major role for basic immunological eventsrelated to development of cardiomyopathy in SLE.

Many studies in the past have suggested that increasing prevalence of dyslipidaemia in patients having SLE and their association with atherosclerotic cardiovascular disease, which leads to mortality. Dyslipidaemia is seen to be modifiable risk for cardiovascular diseases, but has been a great scope of research in patients having SLE. The purpose of the study is to evaluate the cardiovascular systems and efficiency in SLE patients and association with anticardiolipin antibodies and serum lipids. Along with studying the echocardiographic abnormalities in patients having SLE. Furthermore, association of these findings with anticardiolipin antibodies. In the end, learning the association of the results with serum lipids.

Methods

A total of 40 patients were diagnosed to have SLE with modified 1982 revised criteria according to the department of American College of Rheumatology (ACR) [13]. The study is Randomised cross sectional Observational, with 40 patients according to American College of Rheumatology (ACR). The flow of study is depicted in image 1.

- **Inclusion criteria:** 1. All patients fulfilling the revised Toronto criteria for SLE. 2. All patients giving informed written consent.

- **Exclusion criteria:** 1. Patients with history of cancer. 2. Patients with history of drug abuse. 3.Patients with history of coagulation disturbances. 4. Patients with history of previous rheumaticfever. 5. Patients currently receiving anticoagulant drugs. 6. Patients with terminal illness.
- **Investigations:** 1. Routine laboratory investigations-CBC, ESR, LFT, RFT, RBS. 2. ECG 3. Chest X ray PA view. 4. Rheumatologic-CRP/RF, ANA, Anti-dsDNA. 5. Lipid profile. 6. 2DEcho and Doppler echocardiography. 7. Anticardiolipin antibody IgG and IgM by ELISA.

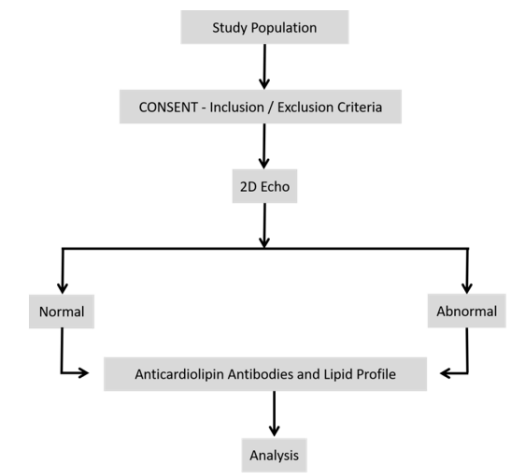

Image 1: Flow of the study.

Antiphospholipid antibodies

These are circulating antibodies to phospholipids associated with venous and arterial thrombosis, thrombocytopenia, and recurrent pregnancy loss. There are several auto antibodieswhich comprise this group: Anticardiolipin, Antiphosphatidylinositol, Antiphosphatidylglycerol, and Antiphosphatidylserine.

Antibodies directed towards phospholipids which are ubiquitous, occurring as part of the envelope of many types of blood cells (mainly the platelets) as well as other proteins which are responsible for maintaining our blood in a fluid non-clotted state are formed in patients with certain "autoimmune" diseases such as Systemic Lupus Erythematosus (SLE), accompanying other auto antibodies seen in this disease. They are also formed in patients who have a condition known as the "Primary" Antiphospholipid Syndrome who does not have SLE, as well as in other rheumatic diseases, infections, after certain drug ingestion and more uncommonly in patients with cancer and certain types of vasculitis. Anticardiolipins are the most commonly detected antiphospholipid antibodies. In general, to diagnose the syndrome, a positive blood test to either the lupus anticoagulant or the anticardiolipin antibody on two separate occasionsat least 8 weeks apart is needed.

Laboratory tests

Lupus Anticoagulant Test: This is done on plasma and the patient therefore has to present herself at the laboratory personally as the blood has to be spun to extract the plasma. Usually,a modified Russel Viper Venom Test and the Kaolin Cephalin Thromboplastin Tests are usedby most laboratories today.

Anticariolipin antibody tests

These are measured by a procedure known as ELISA. Thereare three main classes of anticardiolipin antibody, the IgG, IgM and IgA. It is the IgG which is considered the most important as a screen for clotting. The IgM antibody is less threatening but cases have been reported with this class who have also presented with clotting. The level of these antibodies as well as the clot is important, those patients with the highest levels beingmore at risk than those with lower levels generally,

Other tests

B2 Glycoprotein antibodies, VDRL or "false positive test for syphilis. This was one of the earliest tests used to identify patients at risk for clotting and may still be used if othertests are negative. Tests for other antiphospholipids e.g. antiphosphatidylserine, ethanolaminemay also be performed by specialized laboratories if other tests prove negative.

Echocardiography

Transthoracic Doppler echocardiographic examinations would be carried out by a single examiner, within a period of up to 10 days following the interview and blood collection for anticardiolipin antibody tests. The presence of pericardial effusion, global or segmentalcontractile deficit of the left ventricle (LV), diastolic dysfunction of the LV, left ventricular hypertrophy (LVI). pulmonary arterial hypertension, valvular thickening, and valvular regurgitation would be registered. Machine used in Echocardiography would be PHILIPS IE 33.

Lipid profile

Total cholesterol, Triglycerides, High density Lipoproteins were estimated using Beckman Cx4 auto analyzer. LDL cholesterol was calculated using Friedwalds formula. All measurements would be done after 14 hrs fasting. > Normal Serum lipid values [14]:

TG- <165 mg/dl *TC- <200 mg/dl

HDL- <40 mg/dl low, >60 mg/dl high *

LDL- <130 mg/dl

Results

Sample, when distributed according to the age and sex. It was seen that out of the total 40 patients, 35 were found to be females and 5 were males. The ration of male and female was 1:7. The mean age of the male patients was 30.00 ± 14.13 years and that of female was 29.11 ± 9.57 years. Age range in our study was about 11-46 years and maximum numbers of patientswere in age 21-30 years. The youngest patient was 11 years old male and the maximum age patient was 46-year-old male (Interpreted in Table 1 and Figure 1).

Age Groups (In years)	Sex		Total
	Male	Female	
<30	2 (5.00)	19 (47.50)	21 (22.50)
>30	3 (7.50)	16 (40.00)	19 (47.50)
Total	5 (12.50)	35 (87.50)	40 (100.00)
Mean ± Sd (Male) = 30.00 ± 14.13 Mean ± Sd (Female) = 29.11 ± 9.57			

Table 1: Distribution according to age and sex.

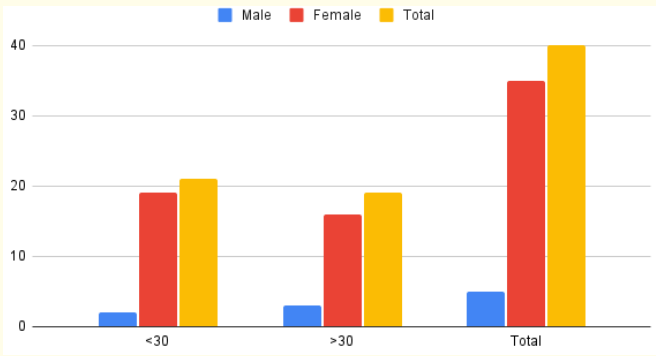

Figure 1: Distribution according to age and sex.

Sample, when distributed according to the duration of disease, mean duration of disease in 40 SLE patients was 2.19 ± 1.99. The Majority of the patients (21 of 40 i.e. 52.5%) had less than2 years of the disease and only 20% had duration more than 4 years (Interpreted in Table 2 and Figure2).

Duration (In years)	Number	Percentage
< 2	21	52.50
2-4	11	27.50
4 +	8	20.00
Total	40	100.00
Mean ± Sd = 2.19 ± 1.99		

Table 2: Distribution according to duration of disease.

Figure 2: Distribution according to duration of disease.

Sample, when distributed according to the Echo of the patients, 30 out of 40 i.e. 75% of the patients had abnormal echocardiographic study which included pericardial, myocardial and valvular abnormalities whereas 10 patients i.e. 25% had normal study (Interpreted in Table 3 and Figure 3).

Echo	Number	Percentage
Normal	10	25.00
Abnormal	30	75.00
Total	40	100.00

Table 3: Distribution according to Echo of the patients.

Figure 3: Distribution according to Echo of the patients.

Sample, when distributed according to the age and Echo findings showed that 6 out 40 patients i.e. 15% of the patients had pericardial involvement 6 of 40 i.e. 15% of the patients had pericardial involvement in the form of pericardial effusion. 13 of 40 i.e. 32.5% of the patients had myocardial involvement either in the form of Left ventricular diastolic dysfunction (LVDD) or Left ventricular hypertrophy (LVH). 23 of 40 i.e. 57.5% of cases had valvular endocardial involvement in the form of valvular regurgitation/valvular thickening. We found no significant difference in echocardiographic findings between different age groups studied (Interpreted in Table 4 and Figure 4).

Figure 4: Distribution according to age and Echo findings.

Age Groups (years)	Pericardial			Myocardial			Valvular		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
< 30	3	18	21	6	15	21	12	9	21
	(7.50)	(45.00)	(52.50)	(15.00)	(37.50)	(52.50)	(30.00)	(22.50)	(52.50)
> 30	3	16	19	7	12	19	11	8	19
	(7.50)	(40.00)	(47.50)	(17.50)	(30.00)	(47.50)	(27.50)	(20.00)	(47.50)
Total	6	34	40	13	27	40	23	17	40
	(15.00)	(85.00)	(100.0)	(32.50)	(67.50)	(100.0)	(57.50)	(42.50)	(100.0)
Pericardial $\chi 2 = 0.963$ d.f. = 1 p > .05 NS Mycardial $\chi 2 = 0.307$ d.f. = 1 p > .05 NS Valvular $\chi 2 = 0.002$ d.f. = 1 p > .05 NS									

Table 4: Distribution according to age and Echo findings.

Sample when distributed according to the sex and Echo findings, there was no statistically significant distribution between males and females (Interpreted in Table 5 and Figure 5).

Age Groups (years)	Pericardial			Myocardial			Valvular		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Male	1	4	5	0	5	5	3	2	5
	(20.00)	(80.00)	(100.0)	(0.00)	(100.0)	(100.0)	(60.00)	(40.00)	(100.0)

Female	5	30	35	13	22	35	20	15	35
	(14.29)	(85.71)	(100.0)	(37.14)	(62.86)	(100.0)	(57.14)	(42.86)	(100.0)
Total	6	34	40	13	27	40	23	17	40
	(15.00)	(85.00)	(100.0)	(32.50)	(67.50)	(100.0)	(57.50)	(42.50)	(100.0)
Pericardial $\chi 2 = 0.112$ d.f. = 1 p > .05 NS Valvular $\chi 2 = 0.716$ d.f. = 1 p > .05 NS									

Table 5: Distribution according to sex and Echo findings.

Figure 5: Distribution according to sex and Echo findings.

Sample when distributed according to the duration of disease and Echo findings, there was nostatistically significant distribution between Echo Findings and duration of disease (Interpretedin Table 6 and Figure 6).

Figure 6: Distribution according to duration of disease and Echo findings.

Duration	Pericardial (n = 40)		Myocardial (n = 40)		Valvular (n = 40)	
	Number	Percentage	Number	Percentage	Number	Percentage
< 2	3	7.50	5	12.50	10	25
2-4	2	5.00	5	12.50	7	17.50
4 +	1	2.50	3	7.50	6	15.00
Total	6	15.00	13	32.50	23	57.50

Table 6: Distribution according to duration of disease and Echo findings.

Sample when distributed according to the anticardiolipin antibody, anticardiolipin antibody was positive in 6 out of 40 patients i.e. 15% of the cases, IgG in 12.5% and IgM in 2.5% (Interpreted in Table 7 and Figure 7).

Anticardio-lipin	IgG		IgM	
	Number	Percentage	Number	Percentage
Present	5	12.50	1	2.50
Absent	35	87.50	39	97.50
Total	40	100.00	40	100.00
$\chi 2 = 1.621$; d.f. = 1; p > .05 NS				

Table 7: Distribution according to anticardiolipin antibody.

Figure 7: Distribution according to anticardiolipin antibody.

Sample when distributed according to Echo and anticardiolipin antibody of the patients, there was no statistically significant correlation between Echo manifestation and anticardiolipin antibody i.e. anticardiolipin antibody either IgG or IgM was positively implicated in cardiological manifestation of SLE (Interpreted in Table 8 and Figure 8).

Echo	Anticardio-lipin		Total
	Positive	Negative	
Normal	2 (20.00)	8 (80.00)	10 (100.00)
Abnormal	4 (3.33)	26 (96.67)	30 (100.00)
Total	6 (15.00)	34 (85.00)	40 (100.00)
$\chi 2 = 0.000$; d.f. = 1; $p > .05$ NS			

Table 8: Distribution according to Echo and Anticardiolipin antibody of patients.

Figure 8: Distribution according to Echo and Anticardiolipin antibody of patients.

Sample when disturbed according to the Lipid profile of the patients, 24 of the 40 i.e. 60% patients had abnormally high TG's Cholestrol/low HDL serum lipid values, whereas 16 out of 40 i.e. 40% had serum lipids within normal lipids (Interpreted in Table 9 and Figure 9).

Lipid	Number	Percentage
Normal	16	40.00
Abnormal	24	60.00
Total	40	100.00

Table 9: Distribution according to lipid profile of the patients.

Figure 9: Distribution according to lipid profile of the patients.

Sample when distributed on the basis of Echo Findings and TG, the serum triglycerides were high in 21 of 40 i.e. 40 52.5% of cases studied. There was no significant correlation between high serum TG's and echocardiographic abnormalities may it be pericardial, myocardial or valvular (Interpretation in Table 10 and Figure 10).

Figure 10: Distribution according to Echo findings and TG.

TG	Pericardial			Myocardial			Valvular		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
High	4	17	21	4	17	21	10	11	21
	(66.67)	(50.00)	(52.50)	(30.77)	(62.96)	(52.50)	(43.48)	(64.71)	(52.50)
Normal	2	17	19	9	10	19	13	6	19
	(33.33)	(50.00)	(47.50)	(69.23)	(37.04)	(47.50)	(56.52)	(35.29)	(47.50)
Total	6	34	40	13	27	40	23	17	40
	(15.00)	(85.00)	(100.0)	(32.50)	(67.50)	(100.0)	(57.50)	(42.50)	(100.0)
Pericardial $\chi 2 = 0.096$ d.f. = 1 p > .05 NS Myocardial $\chi 2 = 2.470$ d.f. = 1 p > .05 NS Valvular $\chi 2 = 1775$ d.f. = 1 p > .05 NS									

Table 10: Distribution according to Echo findings and TG.

Sample when distributed on the basis of Echo findings and TC, only 4 out of 40 i.e. 10% of thepatients had total cholesterol values. As with serum TG's we found no positive correlation between abnormal echo findings and high serum cholesterol (Interpretation in Table 11 and Figure 11).

TC	Pericardial			Myocardial			Valvular		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
High	0 (0.00)	4 (11.76)	4 (10.00)	2 (15.38)	2 (7.41)	4 (10.00)	3 (13.04)	1 (1.23)	4 (10.00)
Normal	6 (100.0)	30 (88.24)	36 (90.00)	11 (84.62)	25 (92.59)	36 (90.00)	20 (86.96)	16 (98.76)	36 (90.00)
Total	6 (15.00)	34 (85.00)	40 (100.0)	13 (32.50)	27 (67.50)	40 (100.0)	23 (57.50)	17 (42.50)	40 (100.0)
Pericardial $\chi 2 = 0.050$ d.f. = 1 p > .05 NS Valvular $\chi 2 = 0.045$ d.f. = 1 p > .05 NS									

Table 11: Distribution according to Echo findings and TC.

Figure 11: Distribution according to Echo findings and TC.

Sample when distributed on the basis of the ECHO findings and LDL-C, 39 out of 40 i.e. 97.5% of the cases had normal serum LDL-C values and only one patient had LDL-C more than 130 mg/dl (Interpretation in Table 12 and Figure 12).

Figure 12: Distribution according to Echo findings and LDL-C.

LDL-C	Pericardial			Myocardial			Valvular		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
High	0 (0.00)	1 (2.94)	1 (2.50)	1 (7.69)	0 (0.00)	1 (2.50)	1 (4.54)	0 (0.00)	1 (2.50)
Normal	6 (100.0)	33 (97.06)	39 (97.50)	12 (92.31)	27 (100.0)	39 (97.50)	22 (95.45)	17 (100.0)	39 (97.50)
Total	6 (15.00)	34 (85.00)	40 (100.0)	13 (32.50)	27 (67.50)	40 (100.0)	23 (57.50)	17 (42.50)	40 (100.0)
Pericardial $\chi 2 = 0.050$ d.f. = 1 p > .05 NS Valvular $\chi 2 = 0.045$ d.f. = 1 p > .05 NS									

Table 12: Distribution according to Echo findings and LDL-C.

Means values of serum lipids in 40 patients of SLE were within normal range except for serumTG's which was 172.45 ± 61.41 mg/dl (Interpretation in Table 13 and Figure 13).

Lipid Profile	Mean ± Sd (mg/dl)
TG	172.45 ± 61.41
TC	160.35 ± 33.11
HDL	43.90 ± 6.25
LDL	83.62 ± 28.53
VLDL	33.12 ± 12.28

Table 13: Mean ± Sd of lipid profile.

Figure 13: Mean ± Sd of lipid profile.

Mean ± Sd Values of Lipid profile according to Pericardial, we found no significant differencein mean serum lipid values between patients who showed pericardial involvement and patientswho had normal pericardium on echocardiography. (Interpretation in Table 14 and Figure 14).

Lipid Profile	Pericardial		P-value	Significance
	Present (n = 6)	Absent (n = 34)		
TG	185.17 ± 28.67	170.20 ± 65.26	> .05	NS
TC	157.67 ± 22.34	160.82 ± 34.64	> .05	NS
HDL	40.83 ± 6.76	44.44 ± 5.99	> .05	NS
LDL	80.50 ± 18.11	84.21 ± 29.96	> .05	NS
VLDL	36.00 ± 9.29	32.62 ± 12.67	> .05	NS

Table 14: Mean ± Sd of lipid profile according to pericardial.

Figure 14: Mean ± Sd of lipid profile according to pericardial.

Mean ± Sd Values of Lipid profile according to Myocardial, we found no significant differencein mean serum lipid values between patients who showed Myocardial involvement and patientswho had normal myocardium on echocardiography. (Interpretation in Table 15 and Figure 15).

Figure 15: Mean ± Sd of lipid profile according to Myocardial/ Lipid profile.

Lipid Profile	Myocardial		P-value	Significance
	Present (n = 13)	Absent (n = 27)		
TG	143.23 ± 43.19	186.52 ± 63.88	> .05	NS
TC	161.31 ± 34.42	159.89 ± 32.44	> .05	NS
HDL	43.53 ± 6.48	40.07 ± 6.12	> .05	NS
LDL	89.23 ± 34.20	80.96 ± 24.91	> .05	NS
VLDL	29.38 ± 8.25	34.92 ± 13.44	> .05	NS

Table 15: Mean ± Sd of lipid profile according to Myocardial.

Mean ± Sd Values of Lipid profile according to Valvular, we found no significant difference in mean serum lipid values between patients who showed Valvular involvement and patients who had normal Valves on echocardiography. (Interpretation in Table 16 and Figure 16).

Lipid Profile	Valvular		P-value	Significance
	Present (n = 23)	Absent (n = 17)		
TG	163.39 ± 57.06	184.70 ± 64.86	> .05	NS
TC	158.39 ± 34.53	163.00 ± 30.89	> .05	NS
HDL	42.52 ± 6.34	45.76 ± 5.61	> .05	NS
LDL	83.43 ± 30.55	83.94 ± 25.53	> .05	NS
VLDL	32.52 ± 10.97	33.94 ± 13.81	> .05	NS

Table 16: Mean ± Sd of lipid profile according to Valvular

Figure 16: Mean ± Sd of lipid profile according to Valvular/Lipid profile.

Discussion

SLE is an auto immunogenic disease of unknown origin, Characterised by Widespread inflammation and cardiovascular involvement. The involvement of cardiovascular pathology is up to 50-60% of the patients. Thus, having infections in renal leading to renal failure and leading to cause mortality [15]. SLE is a disease that can manifest among every organ of the body, including cardiovascular system (CVS). The changes among the CVS are pericarditis, which is a very most common disease association with SLE. The pericardium linings are attacked by antibodies and leading to inflammation. Many patients present with the asymptomatic condition of pericarditis and ruled out during Echocardiographic screening tests.Thus, lupus causes inflammation of the heart, may further also damage to the valves. The pathology among the heart valves may be damaged, which may become thick or develop the ward like growths called as Libman-Sacks Lesions. Myocarditis involvement is very uncommon in SLE. Patients are at the increased risk of development of increased coronary vessel vasculitis. Thus, degeneration of the coronary arterimay lead to the exposure ofcirculating immune complexes [16].

SLE is an autoimmune disease in which organs, tissues and cells undergo damage mediated by tissue binding autoantibodies and immune complexes [1]. Systemic Lupus Erythematosus (SLE) can potentially affect organ systems. Perhaps because of the prominence of cutaneous, musculoskeletal, renal and neurologic manifestations, cardiac involvement has not received detailed attention. The widespread use of modern echocardiography together with the longer life spans of patients with severe SLE has contributed to an increased recognition of cardiovascular involvement of these patients. A number of relevant studies in patients with Systemic Lupus Erythematosus (SLE) have evidenced an association of anticardiolipin antibodies with cardiovascular system involvement, particularly in the case of Libman-Sacks endocarditis, valvular dysfunction, and valvular thickening. These findings suggest that aCL are responsible for basic immunological events related to the development of cardiomyopathyin SLE. Recently there have been studies which have reported increasing prevalence of dyslipidaemia in patients of Systemic Lupus Erythematosus and its association with atherosclerotic cardiovascular disease which is one of the major causes of mortality in these patients. Dyslipidaemia being one of the modifiable risk factors for cardiovascular disease has been the recent area of research in patients of SLE.

This study started with complete history of the illness, family history, past and personal history was taken. Presenting complaints of each patient were noted. Complete physical examination including systemic examination was done. All routine investigations including serum lipid profile, Echocardiography and Anticardiolipin antibody were done and analysed.

Age and sex wise distribution of cases

In our study of 40 patients of SLE, 35 were females and 5 were males. Female to Male ratio inour study was 7:1. Mean age of male patients was 30.00 ± 14.13 yrs., and that of female patients was 29.11 ± 9.57 yrs. (Table 1). Age range in our study was 11- 46 yrs. Maximum numbersof patients were in the age group of 21- 30 yrs. youngest patient was 11 yrs. old male while theeldest was 46 yrs. old male. Binoy J et also reported an average female to male ratio of 11:1. Another Indian series by Malviya et al* had a female to male ratio of 8:1. The increased frequency SLE among females is thought to be due to hormonal effects.

Duration of disease

Mean duration of disease in 40 SLE patients in years was 2.19 Majority of the patients (21 of 40 i.e. 52.5%) had less than 2 years 1.99 disease and only 20% had duration more than 4 yrs (Table 2). In the study of Malviya et al*, median duration of illness prior to diagnosis was 17 months [17].

Echocardiographic findings

In our study 30 of 40 i.e. 75% of the patients had abnormal echocardiographic study which included pericardial, myocardial

and valvular abnormalities, whereas only 10 patients i.e. 25% had normal study. This is consistent with other studies but a bit on the higher side. 6 of 40 i.e. 15% of the patients had pericardial involvement in the form of pericardial effusion (Table 4). 13 of 40 i.e. 32.5% of the patients had myocardial involvement either in the form of Left ventricular diastolic dysfunction (LVDD) or Left ventricular hypertrophy (LVH) which was noted in only one patient who had associated lupus nephritis (Table 4). 23 of 40 i.e. 57.5% of cases had valvular/endocardial involvement in the om of valvular regurgitation/valvular thickening (Table 4). So, the most common ECHO abnormality in our study was valvular which is consistent and has been reported in all other studies [18,19]. The most common form of the regurgitation common form of only involving the mitral valve (14 patients) followed by aortic most commonly in patients) and tricuspid valve (6 patients). 6 patients had two valves involved mostly mitral and tricuspid together and only one patient had all calves involved. This patient had concentric LVH and enlarged LA ECHO most probably due to lupus nephritis which led to systemic hypertension. Stenotic lesions were not seen in our study except for one patient (Mod mitral stenosis) who had associated Rheumatic Heart Disease (RHD). All these lesions were mild and haemodynamically insignificant except for two patients, one who had associated RHD and the other with associated lupus nephritis. Other forms of valvular involvement were found in very few patients. Valvular thickening was present in only 5 patients of which 4 had anterior mitral leaflet (AML) tip thickened and one had aortic valve thickening. Only one patient had evidence of vegetation on AML tip. These findings are in sharp contrast to findings in other studies where valvular thickening/ vegetations were pretty common, in fact in some studies these were reported to be the most common finding.

Shaheed H et al'' in his study in Pakistan reported cardiac involvement in 58.33% of cases of SLE [19]. Most common finding reported was pericardial effusion followed by valvular and myocardial damage. was pericardial of common valvular finding was in the form of thickening of valve Most common valvular Carlos A et al' reported cardiac involvement in high percentage of cusps [20]. Carlos A of SLE (65%) most commonly in the form of valvular thickening/ cases vegetations followed by valvular incompetence (61%). Pericardial and myocardial involvement was much less common. Falcao et al found ECHO abnormalities in 54.3% of cases of SLE [21]. Most common valvular abnormality reported was Mitral Incompetence. Anna W et al' also in their study have reported cardiac involvement in high (50%) of cases most commonly in the form of valvular regurgitation. They found valvular thickening vegetations less frequently as compared to other studies [22]. Similar findings have been reported in other studies but all differ with regard to the form of valvular involvement, some have reported valvular incompetence and some vegetations/thickening as the most common form of valvular involvement in SLE patients [23]. In our study we have found valvular incompetence as the most common form of valvular involvement. Table 17 Summarises the findings of all studies.

We found myocardial abnormality as the 2nd most common form of cardiac involvement in SLE patients. Majority of patients had LVDD which was haemodynamically insignificant. Other studies have found myocardial involvement less as compared to the current study either in the form of left ventricular systolic dysfunction/left ventricular diastolic 9:43 AM | 0.0KB/s dysfunction. Falcao et all have also reported LVH and pulmonary hypertension (PH) in quite a few numbers of cases [24]. We found pericardial involvement in only 6 of the 40 cases studied. All patient's trad mild involvement in on dial effusion Cardiac tamponade was not seen in any. None of pericardial effusion had clinical evidence of pericarditis, we found no correlation of the cardiac abnormalities with the age le no 4) and sex (Table 5) of the patient, duration of the disease le no 6), and with other clinical features of SLE. These findings are consistent with other studies. There was no follow up study, and the ability of cardiac abnormalities undergoing change along with the fluctuating course of disease activity could not be excluded.

Association with anticardiolipin antibodies (aCL)

In the current study we found anticardiolipin antibody positive in only 6 of 40 i.e., 15% of cases, IgG in 12.5% and IgM in 2.5% (Table 7). We found no statistically significant correlation between ECHO manifestations and anticardiolipin antibody i.e., anticardiolipin antibody either IgG or IgM was not positively implicated in the cardiological manifestations of SLE (Table 8). These results are in contrast to the recent studies which have in general reported a positive association between the cardiological manifestations of SLE especially, the valvular involvement and anticardiolipin antibodies [25-27]. These studies have also reported a higher prevalence of anticardiolipin antibodies in SLE cases approximately in the range of 30-50% [28]. In a study by Falcao et al [29] had a

prevalence of 44.3% and aPL had a prevalence of 50%. Patients having echocardiographic abnormalities had a prevalence of 54.3% and showed a trend towards an association with aCL IgG (P = 0.06). aCL IgG was significantly associated wth PH and showed some trend towards an association with Echocardiographic findings and abnormalities taken together. These findings suggest a role of aCL IgG in the development of Lupus cardiovascular disease. A study showed that there was a significant higher frequency of Valvular and coronary lesions in SLE patients with aPL than those without antibodies [30]. Another study postulated that there is a strong association between myocardial and valvular involvement in SLE and raised aCL titres.

There have been many studies that have suggested no association. A study conducted showed that valvular heart diseases were present in 36% of the patients with aPL antibodies and 34% of the patients without antiphospholipid antibodies, pericardial involvement was evident in 24% and in 28% of the patients with or without them respectively [31]. Therefore, there was no correlation of between the evidence of endocardial or pericardial involvement and such autoantibodies [32]. In other antibodies there were high levels of the anticardiolipin antibodies in 73% of the patients with valvular lesions and 67% of the patients without valvular lesions (P > 0.05) and concluded that valvular involvement is frequent in patients with SLE but is apparently unrelated to aPL autoimmunisation [33].

Serum Lipids and association with Echocardiographic findings

In the current study 24 of the 40 i.e. 60% of patients had abnormal (high TG's or high Cholesterol or low HDL) serum lipid values whereas 16 of 40 i.e. 40% had serum lipids within normal limits (Table 9). The most common lipid abnormality we found in our set of patients of SLE was high Serum Triglycerides. Serum triglycerides were high in 21 of 40 i.e. 52.5% of cases studied (Table 10). The mean value of serum TG was 172.45mg/dl (Table 13) whereas the mean value of other parameters of lipid profile were within normal limits. Only 4 of 40 i.e. 10% of patients had high total cholesterol values (Table 11) and only one patient had high serum LDL-C (Table 12). Maximum patients were on steroids, that too in high doses (prednisone > 30 mg/day). This might be an additional contributing factor for the dyslipidaemia seen.

Vijaya LK et al reported dyslipidaemia in 75.3% in their study on SLE patients [35]. The distribution of lipid profile in sample population were 43% with total cholesterol > or = 200 mg/dL, 26% with HDL cholesterol level mg/dL, 26.4% with LDL cholesterol level > or = 130 mg/dl and 7% with triglycerides serum level > or = 150 mg/dL. A study studied the prevalence of dyslipoproteinemia in Thai patients with custemic lupus erythematosus [36]. A significant elevation of TG's levels was observed in the SLE patients compared to controls (mean+/-SD 113.3+. 59 5 versus 77.7+-45.7 mg/dL, P < 0.001). The HDL-c level was also significantly lower in SLE patients than controls (mean+/-SD 49.7+/-12.7 versus 65.0+/-14.8 mg/dL, P < 0.001). The LDL-c and TC levels were comparable in both groups. We found statistically no significant correlation between high serum lipids and echocardiographic abnormalities may it be pericardial, myocardial or valvular in the current study of 40 SLE cases (Table 14, 15, and 16). Very few studies in the past have evaluated this association.

Conclusion

Cardiovascular system involvement in common in SLE patients and is one of leading causes of morbidity and mortality, we found echocardiographic changes in 75% of our cases, most common being valvular (57.390) involvement followed by myocardial (32.5%) and pericardial (15%) involvement The most common form of valvular involvement was in the form of regurgitation most commonly involving the mitral valve (14. patients) followed by aortic (8 patients) and tricuspid valve (6 patients). But majority of these findings were clinically silent and haemodynamically insignificant There was statistically no significant correlation between the ECHO findings and anticardiolipin antibodies in contrast to the findings in most other studies. Serum lipid values were abnormal in 60% (24 of 40) of our SLE cases whereas 16 of 40 i.e. 40% had serum lipids within normal limits. The most common lipid abnormality we found in our set of patients of SLE was high serum triglycerides. Serum triglycerides were high in 27 of 40 i.e. 52.5% of cases studied. The mean value of serum TG was 172.45 mg/dl.

However statistically there was no significant correlation between high serum lipids and echocardiographic abnormalities, hence we conclude that "Most patients with lupus and cardiac have no cardiac symptoms. So, a high index of suspicion is for detection of presence of cardiac disease, as asymptomatic with cardiac involvement are widely reported. A careful cardiac examination should be the primary screening method, but Transthoracic

Echocardiography can be helpful as a non-invasive, easily available diagnostic tool for detection of such cases. However, there will always be possibility of having other vascular problems in lupus patients despite normal echocardiographic studies". Also "The increased prevalence of dyslipoproteinemia in SLE patients in this report confirmed the results of previous studies and emphasizes the importance of controlling this modifiable cardiovascular risk factor by the combination of lifestyle modification and medical treatments".

Conflict of Interest

The authors certify that there is no conflict of interest with any financial organizationregarding the material discussed in the manuscript.

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Authors' Contributions

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