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Assessment of Lipid Profile in Females Suffering from Endometriosis

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ABSTRACT

Introduction: Endometriosis is a prevalent, multifactorial benign gynaecological disorder, characterized by the formation of endometrial and stromal tissue outside the lining of the uterus. 10-15% women suffer from endometriosis at the age between 20-35 years. Exact etiology of endometriosis is not clear but serum lipid level may play important role to cause endometriosis.

Aims & Objectives: The current study aims to determine the prevalence of dyslipidemias in young women suffering from endometriosis. Hyperlipidemias implicate inflammation and oxidative stress which may play an important role in the aetiology of endometriosis.

Place and duration of study: A cross sectional analytical research of six months duration was conducted in Chaudhry Muhammad Akram Teaching and Research Hospital, Lahore.

Material & Methods: Lipid profile such asTotal cholesterol, Triglycerides, Low density lipoprotein (LDL) and high-density lipoprotein were biochemically analyzed from venous blood of 30 females with endometriosis and 30 healthy controls by kit method.

Results: Result of present study demonstrated significant (p=0.025, <0.001 and 0.036) elevated levels oftotal cholesterol (TC), triglycerides (TG) and low-density lipoprotein (LDL) respectively in patients than that of control ones. Whereas the level of High-density lipoprotein (HDL) was reduced (23.53±4.76 mg/dl) in females with endometriosis as compared to healthy individuals (65.20±8.78 mg/dl).

Conclusion: In present study, raised lipid profile in females with endometriosis demonstrated substantial etiological role of lipids in the pathogenicity of endometriosis.

Key words: HDL, LDL, TC, TG

INTRODUCTION

Endometriosis is a gynaecological disorder that effects almost 10% of the women in reproductive age.[1] It usually presents with chronic pelvic pain and infertility, but dysmenorrhea and dyspareunia are also common presentations.[2] Endometriosis is characterized by the presence of endometrial stroma cells and glands in ectopic places. The exact cause of endometriosis is still not known. Many theories have been proposed to explain the aetiology but the leading proposal is the retrograde menstrual flow in the peritoneal cavity.[3] However, all young women have varying degrees of retrograde menstrual flow but only some women develop endometriosis. Recent studies have suggested that oxidative stress and inflammation together might be responsible for the development and propagation of endometriosis.[4,7] Oxidative stress and inflammation are also the main culprits in atherosclerosis which has significant relation with dyslipidaemias. High levels of low-density lipoproteins (LDL) and low levels of high-density lipoproteins (HDL) are characteristics of atherogenic lipid profile. Similar profile is studied in the plasma of the patients suffering from atherosclerosis.[8]

Tissue macrophages exposed to lipoproteins along with scavenger receptors have been found in both endometriosis and atherosclerosis.[9,11] It has been studied that both the diseases have remarkably raised macrophages, T cells, cytokines and oxidized LDL.[8,9] In endometriosis however, a systemic inflammation has also been observed. Raised levels of B lymphocytes, T lymphocytes and interleukins like, IL-1 and IL-6 have also been studied,

supporting the presence of chronic inflammatory state.[12,14] Endometriosis has been associated with other autoimmune disorders like thyroiditis and rheumatoid arthritis.[15] Several studies have shown atherosclerosis and dyslipidemias as the reason behind mortality and morbidity in patients of autoimmune disorders like rheumatoid arthritis.[16,17] The aim of current study is to assess presence of dyslipidaemias in order to establish a link between inflammation, oxidative stress and sub clinical atherosclerosis in women suffering from endometriosis.

MATERIAL AND METHODS

The prospective study was conducted at Chaudhry Muhammad Akram Teaching and Research Hospital, Lahore, Pakistan. Ethical approval was taken from the "Research and Ethics Committee" The Superior University, Lahore, Pakistan on 8th September, 2020 (Letter No: IRB/ANMC/2020/006).Samples of 30 healthy females were taken as control. Another 30 samples of females, having endometriosis with clinical diagnosis after laparoscopic examination and history were collected. The data assayed in the current study was collected and screened at, Chaudhry Muhammad Akram Teaching and Research Hospital, Pakistan. Predesigned performa was used to collect relevant history of patients. After taking an informed consent all relevant laboratory investigations and focused examination of endometriotic patients and control individuals were done carefully. All the females suffering from clinically diagnosed stage IV endometriosis according to revised American Society for Reproductive Medicine (rASRM) classification were included.[18] The score was calculated by taking into account the location, depth of endometriosis, type of adhesions, and involvement of fallopian tubes. Those patients who were on antipsychotic medication or receiving treatment for Parkinson's disease or had the history of alcohol consumption, cigarette smoking, metabolic dysfunction (Hypertension, Cancer, and diabetes), depression and malnutrition were not added in this study. The women who were on contraceptives or were using any type of contraception 6 months prior to study were excluded from the study. Women who had been on any medicines which can hamper the lipid profile status were also excluded from the study. From endometriotic and control participants of this study 5ml of venous blood, after a 12 hour fast, was drawn. Within two hours sample was centrifuged at 4000 rpm. Serum was separated after the centrifugation and stored at -70ºC for the analysis. For further processing the sample was transmitted in the laboratory. Total cholesterol and Triglyceride levels of participants were estimated by Elisa Kit (Cayman chemicals). Microplate reader was used to calculate the wavelength. Low density lipoprotein (LDL) and high-density lipoprotein of study population were determined by commercial human diagnostic kit of Cell Biolabs, INC. Promptly the reading was taken on 530-570 nm wavelength by using microplate reader.

Statistical analysis:

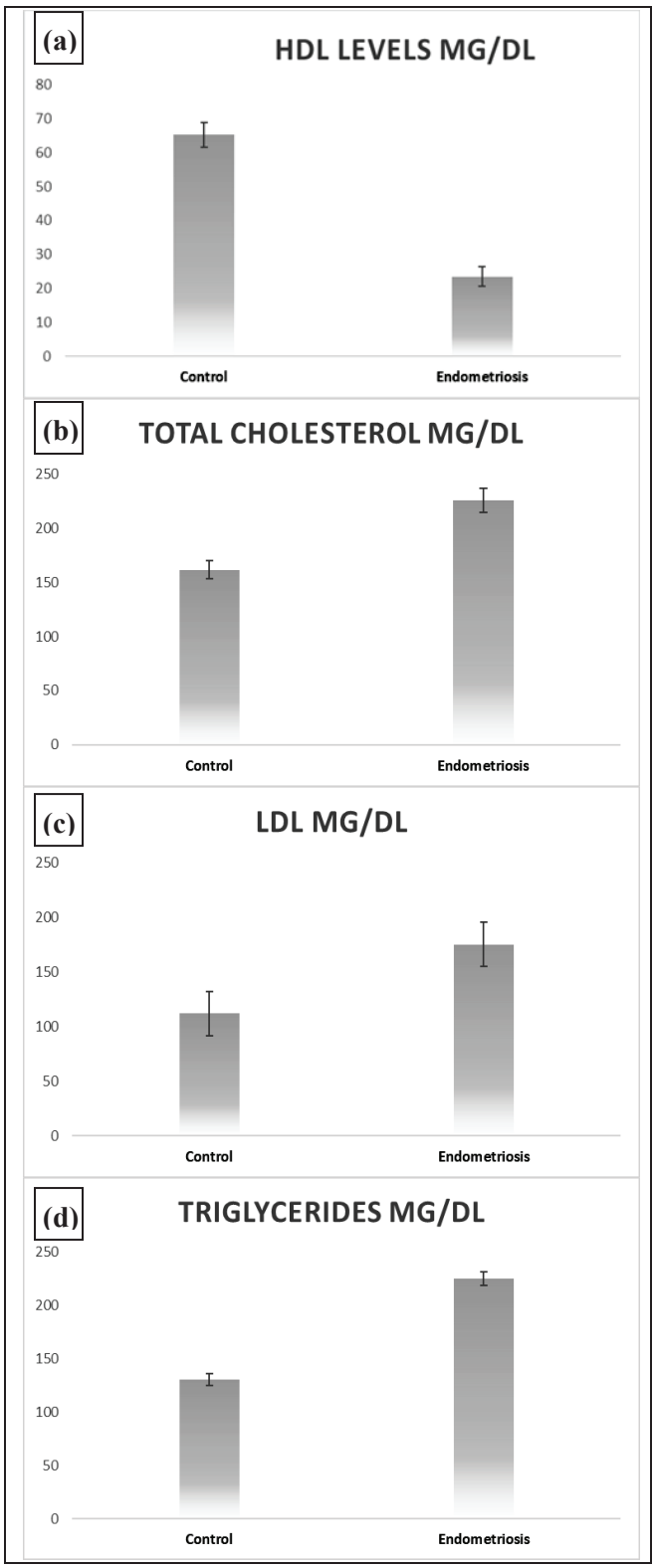
Statistical analysis was done by using SPSS 17.0. Data was presented as mean ± SD and analyzed by the application of independent sample t-test. Significance was defined statistically as $p<0.05$.

RESULTS

Variables	Groups	N	Mean	Standard Deviation	P Value
HDL	Controls	30	65.20	8.78	0.017
	Endometriosis	30	23.53	4.76	
TC	Controls	30	161.60	21.90	0.025
	Endometriosis	30	225.90	33.74	
LDL	Controls	30	111.93	13.07	0.036
	Endometriosis	30	175.47	21.18	
TG	Controls	30	130.60	15.07	<.001
	Endometriosis	30	225.53	34.27	

Table-1: Group Statistics for Lipid Profile of Controls vs Patients with Endometriosis

Table-1 described the lipid profile of females suffering from endometriosis and its major role to progress endometriosis in the female of reproductive age. Increased level of total cholesterol (225.90 ±33.74 Vs 161.60 ± 21.90 mg/dl), triglycerides (TG) (225.53±34.27 Vs. 130.60 ±15.07 mg/dl) and low-density lipoprotein (LDL) (175.47 ± 21.18 Vs. 111.93 ± 13.07 mg/dl) were observed in females with endometriosis as compared to healthy individuals. On the other hand, significantly (P= 0.017) reduced level of High-density lipoprotein (HDL) was observed in patients of endometriosis (23.53 ±4.76 mg/dl) as compared to control ones (65.20± 8.78 mg/dl).



Significant at (P<0.05)

Fig-1(A-D): Lipid profile of young females suffering from endometriosis

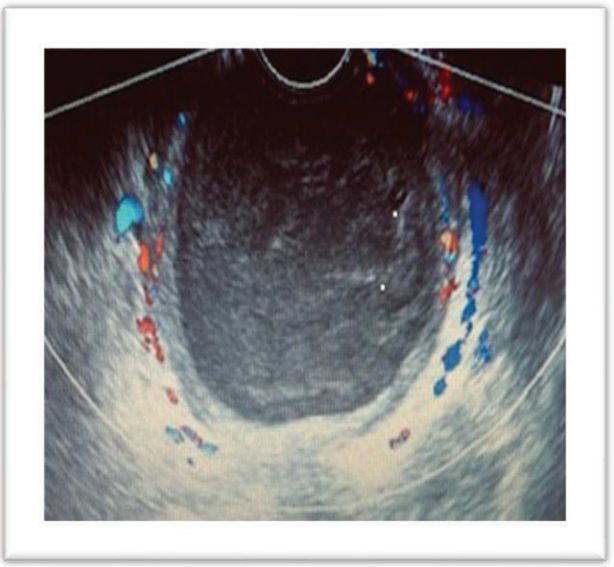


Fig-2a: Doppler ultrasound of 24 years old patient of endometriosis with continuous bleeding and deranged lipid profile.

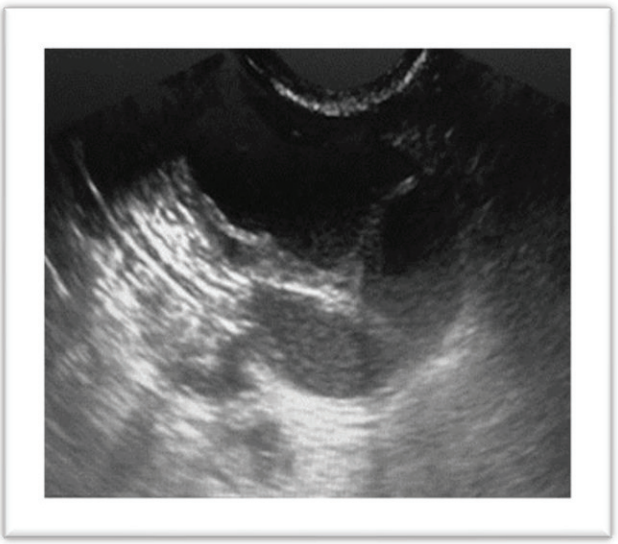


Fig-2b: Transvaginal ultrasound of 29 years old patient showing dilatation of the fallopian tube due to invasion of the endometriosis.

DISCUSSION

Endometriosis and atherosclerosis are two different disease conditions sharing some similarities in the pathophysiology. The present study demonstrates presence of dyslipidemia in the patients suffering from endometriosis, who are not receiving therapy, compared to the healthy control group. We found LDL, Total Cholesterol and triglycerides were significantly high in patients with endometriosis, which is in accordance to the study done by Verit et al., Their results also showed that patients suffering from endometriosis had significantly lower levels of HDL and higher levels of TG, TC and LDL than

controls ($p< 0.0001$).[19] Melo et al. demonstrated higher levels of LDL, TG and TC but HDL levels were raised which is in contrary to the current study.[20] In a study by Almassinokiani et al. only total cholesterol levels had significant difference between the two groups (P = 0.004) and it was higher in patients with endometriosis.[21] Although the lipid profile of the women suffering from endometriosis show elevation of all lipoproteins but the most remarkable are the low-density lipoproteins (LDL) and High-density lipoproteins (HDL) levels. The LDL is of high clinical importance because in the presence of inflammation and high oxidative stress it gets oxidized. This oxidized LDL then damages the endothelium which results in accumulation of inflammatory cells. These inflammatory cells along with many growth factors, platelet aggregation and oxidized LDL lead to systemic inflammation and formation of atheroma in the walls of arteries. The raised LDL levels in the endometriosis women pose them to higher risk of atheromatous plaque formation and atherosclerosis.[22] Different end products of lipid oxidation were found in the peritoneal fluid and serum of the patients suffering from endometriosis by Polak et al., they found that oxidized LDL levels were very high in endometriotic patients specially patients with stage IV endometriosis. Their results showed that disruption in the oxidative stress levels in the peritoneal fluid results in advancement of disease.[23] Similar results were observed by Murphy et al, only they have investigated etiology of endometriosis and its association with oxidized LDL.[24] Various pro inflammatory cytokines are induced by this oxidized LDL, among these cytokines are interleukin-6, macrophage colony stimulating factor and tumor necrosis factor in the peritoneal fluid.[25] In another study by Rong et al., it was demonstrated that oxidized LDL secretes monocyte chemotactic factor 1. All these cytokines create a pro inflammatory condition in the peritoneal fluid and cavity leading to adhesions causing invasion angiogenesis and proliferation of the extrauterine ectopic endometrium leading to endometriosis.[26]

Another study by Crook et al. showed significant rise in TG only.[27] Pretta et al., did not find any significant difference in the lipid profiles of the controls as well as endometriosis patients.[28] Their study failed to identify any sub clinical atherosclerosis in women with endometriosis when matched against BMI and age. The reason being the patients were receiving hormonal therapy for the endometriosis. The hormonal therapy alters the lipoprotein levels. Several studies have shown the effects of oral contraceptives, danazol and GnRh analogue that can alter the lipid profile.[29,30] The current study however has some limitations like it did not take into account the level of physical activity which can change the profile of the lipids. Another limitation of the current study is that although controls were healthy, but laparoscopic examination was not performed to rule out asymptomatic endometriosis.[31] The current study demonstrates unfavorable lipid profile as LDL, TG, TC are remarkably raised which poses young women with endometriosis to greater risk of cardiovascular diseases and increased risk of mortality and morbidity, as seen in other autoimmune diseases.

CONCLUSION

In present study, raised lipid profile in female with endometriosis demonstrated their substantial etiological role for the pathogenicity of endometriosis.

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