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Original Research Article

A Study of Lipid Profile in Rheumatoid Arthritis with Subclinical Atherosclerosis

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Abstract:

Background: Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disease associated with an increased risk of cardiovascular disease (CVD), partly due to accelerated atherosclerosis. Dyslipidemia and systemic inflammation in RA patients may contribute to this risk. This study aims to evaluate the lipid profile in RA patients and its correlation with disease activity and subclinical atherosclerosis, assessed by carotid intima-media thickness (CIMT).

Methods: Fifty-four RA patients aged over 18 years, fulfilling the American College of Rheumatology/European League against Rheumatism criteria, were enrolled. Patients with conditions affecting lipid metabolism or cardiovascular status were excluded. Clinical assessments included the Disease Activity Score using 28 joints (DAS28). Fasting lipid profiles were measured, including total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), very low-density lipoprotein cholesterol (VLDL-C), and triglycerides (TG). CIMT was measured using high-resolution B-mode ultrasonography. Correlations between lipid parameters, DAS28 scores, and CIMT were analyzed.

Results: The study population had a mean age of [mean ± SD years], with a female predominance. Elevated DAS28 scores indicated moderate to high disease activity. Lipid profile analysis showed that RA patients had decreased HDL-C levels and altered TC/HDL-C and LDL-C/HDL-C ratios. Significant inverse correlations were found between HDL-C levels and DAS28 scores ($p < 0.05$). CIMT measurements revealed that a substantial proportion of patients had increased CIMT (>0.8 mm), indicative of subclinical atherosclerosis. CIMT positively correlated with DAS28 scores and negatively with HDL-C levels ($p < 0.05$).

Conclusion: RA patients exhibit dyslipidemia characterized by reduced HDL-C levels, which correlates with increased disease activity and subclinical atherosclerosis. The findings underscore the importance of regular lipid monitoring and cardiovascular risk assessment in RA patients. Early intervention targeting lipid abnormalities and inflammation may help reduce the risk of CVD in this population.

Keywords: Rheumatoid arthritis, Lipid profile, Dyslipidemia, Subclinical atherosclerosis, Carotid intima-media thickness, Disease activity score.

Introduction

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease characterized by persistent synovial inflammation and progressive joint destruction, leading to significant morbidity and reduced quality of life [1]. Beyond articular manifestations, RA is associated with a range of extra-articular complications, notably an increased risk of cardiovascular disease (CVD), which contributes substantially to the elevated mortality rates observed in these patients [2].

The heightened cardiovascular risk in RA cannot be fully explained by traditional risk factors alone [3]. Chronic systemic inflammation plays a pivotal role in accelerating atherosclerosis, often referred to as "inflammatory atherogenesis" [4]. Pro-inflammatory cytokines like tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6) can alter lipid metabolism, leading to dyslipidemia—a known risk factor for atherosclerosis [5].

Interestingly, RA patients often exhibit a "lipid paradox," where lower levels of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) are paradoxically associated with increased cardiovascular risk [6]. This paradox may be attributed to inflammation-induced alterations in lipoprotein function and composition, enhancing

their atherogenic potential despite lower circulating levels [7]. Carotid intima-media thickness (CIMT) is a non-invasive marker of subclinical atherosclerosis and has been validated as a predictor of future cardiovascular events [8]. Studies have shown increased CIMT in RA patients compared to healthy controls, correlating with disease activity and duration [9]. Assessing CIMT alongside lipid profiles may provide valuable insights into cardiovascular risk stratification in RA patients. This study aims to explore the lipid profile patterns in RA patients with subclinical atherosclerosis and examine the correlation between lipid levels, disease activity (assessed by the Disease Activity Score-28 or DAS28), and CIMT measurements. Understanding these relationships is crucial for developing targeted strategies to mitigate cardiovascular risk in RA patients.

Materials and Methods

Study Design and Population: A cross-sectional observational study was conducted at the General Medicine outpatient departments. Patients with comorbid conditions affecting lipid metabolism or cardiovascular status were excluded. Demographic data, medical history, and clinical examination findings were recorded. Disease activity was assessed using the DAS28, incorporating tender joint count, swollen joint count, and erythrocyte sedimentation rate (ESR), and patient global assessment [11]. Fasting blood samples were collected to measure lipid profiles, including TC, LDL-C, high-density lipoprotein cholesterol (HDL-C), very low-density lipoprotein cholesterol (VLDL-C), and triglycerides (TG). Inflammatory markers ESR and C-reactive protein (CRP) were also measured. CIMT was measured using high-resolution B-mode ultrasonography with a 7.5–10 MHz linear transducer [8]. Measurements were taken from both common carotid arteries, and the mean CIMT was calculated. A CIMT >0.8 mm was considered indicative of subclinical atherosclerosis.

Statistical Analysis: Data were analysed using SPSS version 23. Continuous variables were expressed as mean ± standard deviation. Pearson's correlation coefficient assessed the relationship between lipid profiles, DAS28 scores, and CIMT. A p-value of <0.05 was considered statistically significant.

Results

Table 1: Demographic and Clinical Characteristics of RA Patients

Characteristic	Value
Age (years)	48.5 ± 10.2
Gender (F/M)	42/12
Disease Duration (years)	6.3 ± 3.1
DAS28 Score	5.2 ± 1.1
CRP (mg/L)	18.7 ± 7.5

Table 2: Lipid Profile of RA Patients

Parameter	Mean ± SD (mg/dL)
Total Cholesterol (TC)	165.4 ± 35.2
LDL Cholesterol (LDL-C)	100.6 ± 28.4
HDL Cholesterol (HDL-C)	38.7 ± 9.1
VLDL Cholesterol (VLDL-C)	26.1 ± 11.3
Triglycerides (TG)	130.5 ± 56.5

Table 3: Correlation between Lipid Profile and DAS28 Scores

Parameter	Correlation Coefficient (r)	p-value
TC	–0.12	0.36
LDL-C	–0.15	0.28
HDL-C	–0.42	**0.002**
TG	0.18	0.20

Table 4: CIMT Measurements

Measurement	Value
Mean CIMT (mm)	0.85 ± 0.12
Patients with CIMT >0.8 mm	35 (64.8%)

Table 5: Correlation between CIMT and Study Variables

Parameter	Correlation Coefficient (r)	p-value
DAS28 Score	0.47	**0.001**
HDL-C	–0.38	**0.005**
LDL-C	0.22	0.11

Discussion

This study examined lipid profiles and their association with disease activity and subclinical atherosclerosis in RA patients. The findings reveal that HDL-C levels were significantly inversely correlated with disease activity, aligning with previous research indicating that active RA is associated with reduced HDL-C [12].

The inverse relationship between HDL-C and DAS28 suggests that systemic inflammation adversely affects lipid metabolism. Inflammatory cytokines can inhibit the synthesis of apolipoprotein A-I, a key component of HDL-C, and enhance HDL-C catabolism [13]. Consequently, reduced HDL-C impairs reverse cholesterol transport, promoting atherogenesis [14].

Despite mean LDL-C levels within normal ranges, a positive but non-significant correlation with CIMT was observed. This may reflect qualitative changes in LDL particles due to oxidation, making them more atherogenic even at lower concentrations [15]. The "lipid paradox" highlights that traditional lipid measurements may underestimate cardiovascular risk in RA patients [6].

The majority of patients exhibited increased CIMT, indicating prevalent subclinical atherosclerosis. The positive correlation between CIMT and DAS28 underscores the role of chronic inflammation in vascular changes [9]. Pro-inflammatory cytokines contribute to endothelial dysfunction, facilitating atherosclerotic plaque formation [16].

These findings support the use of CIMT as a valuable tool for early detection of cardiovascular risk in RA patients [8]. Regular monitoring of lipid profiles and CIMT can aid in risk stratification and prompt initiation of preventive measures.

Management strategies should address both disease activity and cardiovascular risk factors. Anti-inflammatory treatments, particularly biologic agents targeting TNF-α and IL-6, have been shown to improve lipid profiles and endothelial function [17]. Lifestyle interventions and pharmacotherapy for dyslipidemia should be integrated into patient care [18].

Limitations of this study include its cross-sectional design and relatively small sample size, which may affect the generalizability of results. Longitudinal studies are warranted to establish causal relationships and evaluate the impact of interventions on cardiovascular outcomes in RA patients.

Conclusion

RA patients demonstrate significant alterations in lipid profiles, particularly reduced HDL-C levels correlated with disease activity. Elevated CIMT suggests a high prevalence of subclinical atherosclerosis. These findings highlight the importance of comprehensive cardiovascular risk assessment, including lipid profiling and CIMT measurement, in RA patients. Integrating cardiovascular prevention into RA management may reduce the burden of cardiovascular morbidity and mortality.

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