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Dermatology Research

Dyslipidemia in Patients with Psoriasis and Psoriatic Arthritis

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ABSTRACT

Background: *Different comorbidities, including metabolic syndrome, altered lipid profile, and an increased cardiovascular risk commonly associated with Psoriasis and psoriatic arthritis (PsA). This study aimed to declare the correlation between dyslipidemia and Psoriasis.*

Patents and methods: *Ninety-tow patients (29 patients with PSA and 63 patients with psoriasis vulgaris) and 88 healthy, age and sex-matched controls were recruited for the study. Serum levels of total cholesterol (TC), triglycerides (TG), high-density lipoproteins (HDL), and low-density lipoproteins (LDL) were measured. The severity of Psoriasis and PsA activity was assessed using the Psoriasis Area and Severity Index (PASI) and the Disease Activity Score using 28 joints (DAS28) for patients with Psoriasis and PSA, respectively.*

Results: *HDL level was significantly lower in the patients than in controls. TC, TG, and LDL levels were significantly higher in the patient group than those in the control group. There are no significant differences in serum TC, TG, LDL, and HDL levels in Psoriasis and psoriatic arthritis. The serum TC, TG, LDL, and HDL levels were not related to disease duration but were associated with high disease activity.*

Conclusion: *Dyslipidemia was found in a high percentage of psoriatic and PsA patients than in healthy controls. Dyslipidemia was associated with high disease activity in psoriatic and PsA patients. As Psoriasis and PsA are associated with an increased risk of cardiovascular diseases, thorough lipid levels estimation is required.*

Keywords

Dyslipidemia, Psoriasis, Psoriatic arthritis.

Introduction

Psoriasis is an immune-mediated chronic, inflammatory disorder of the skin, still of an obscure etiology, with a prevalence of 1-3% [1]. The cutaneous manifestations presented as infiltrative erythemato-squamous papules and plaques and were commonly associated with systemic involvement [2]. Psoriasis presents most commonly as plaque psoriasis, but some patients have psoriatic arthritis (PsA). Psoriasis cutaneous lesions are comprised of raised, red, scaly patches that appear on the skin surfaces. It typically affects extensors though it can appear on other sites. Some people report that Psoriasis is itchy and stings. The exact causes of Psoriasis are still not known. The immune system and genetics play major roles in its development. The skin cells in people with Psoriasis grow at an abnormally fast rate, which causes the buildup of psoriatic lesions [3-5]. Psoriatic arthritis comprises inflammatory changes in the joints (arthritis) and ligament and tendon attachments (enthesitis), which usually follow the onset of the cutaneous lesion but can precede or accompany psoriatic lesions or occur as the only symptom of the disease [6]. Psoriasis is characterized by increased keratinocyte proliferation and alteration in dermal and epidermal T-cells, monocytes-macrophages, and neutrophils. It is also characterized by the abundance of type 1 (TH1) cytokines like interferon, interleukin, and tumor necrosis factor (TNF-α), which

lead to inflammatory changes in the epidermis yielding thick, scaly plaques [7,8]. There is evidence suggesting the role of IL-17A and neutrophils in the pathogenesis of atherosclerotic plaques and Psoriasis [9]. But, there is still debate concerning the role of IL-17A in psoriasis-associated atherosclerosis. Usui et al. reported that IL-17A deficiency protected against atherosclerosis in apoE−/− mice due to reduced macrophage infiltration and inflammatory cytokine secretion in the lesions [9]. The most important comorbidity of Psoriasis is a metabolic syndrome consisting of abdominal obesity, arterial hypertension, abnormal oral glucose tolerance, and abnormal blood lipids [10]. Literature suggests a definitive association between Psoriasis and dyslipidemia. In contrast, some data fail to provide a definite conclusion [10,11,14]. Very little work has been conducted on this aspect in our locality; hence, we conducted this study in order to establish the occurrence of dyslipidemia in Psoriasis in our region.

Patients and Methods

A case-control study was carried out at the Dermatology Outpatient Unit, Department of Rheumatology and Rheumatology Outpatient Unit in Basrah Teaching Hospital from August 2020 until September 2021. A sample of 92 (49 males and 43 females) patients with Psoriasis was recruited for the study. A dermatologist confirmed the diagnosis of Psoriasis. Twenty-nine patients (15 male and 14 female) fulfilled the classification criteria of psoriatic arthritis [15]. 88 (53 males and 35 females), age- and sex-matched controls recruited from the general population were enrolled for this study. Data collection was done through an interview with the patients using a special questionnaire developed by the researchers. A detailed history was obtained from patients and controls concerning family history, prior treatment history, physical activity, and other lifestyle factors, including cigarette smoking and alcohol exposure. Data also included weight, height, body mass index (BMI), blood pressure, duration, type, and severity of Psoriasis. BMI was calculated as weight (kg)/ [height(mt)]2.

All patients were examined and investigated for complete blood cell count and erythrocyte sedimentation rate (ESR). Measurement of skin disease severity was performed using Psoriasis Area Severity Index (PASI). A PASI score below three, between 3 and 10, and above 10 was defined as mild, moderate, and severe disease, respectively (according to British Association of Dermatologists Guidelines) [16]. Disease activity score using 28 joints (DAS28) and ESR [17] was measured for all patients with PsA exclusion criteria were pustular Psoriasis, erythrodermic Psoriasis, diabetes, family history of hyperlipidemia, renal and liver failure, and patients on retinoids or lipid-lowering agents.

Statistical analyses

SPSS software version 25.0 was used for data analysis. Percentages and mean were used to present the data in tables. In addition, a comparison of study groups was carried out using the Chi-square test for categorical data and Student's t-test for continuous data. P <0.05 was considered statistically significant.

Results

From the total sample of 92 patients (63 with Psoriasis and 29 with PsA), 49(53.3%) patients were males, and 43(46.7%) were females, with mean age and disease duration were 50.5 ± 7.3 and 11.12 ± 3.4, respectively. There were 88 (53 males and 35 females) individuals in the control group with a mean age of 49.7± 7.8. There were 57(63.3%) overweight/obese individuals in the patient group while 34(38.6%) overweight/obese individuals in the control group; the difference was statistically significant (P= 0.006). For the patient group, serum levels of cholesterol, triglycerides, HDL, and LDL were 234.3 ± 65.4 mg/dl, 218.4c76.6 mg/dl, 33.8 ± 14.7 mg/dl, and 155.8 ± 37.5 mg/dl respectively, while they were 153.1 ± 44.4 mg/dl, 127.6 ± 43.4 mg/dl, 69.8 ± 9.9 mg/dl, and118.9 ± 35.2 mg/dl for the control group respectively; the difference was statistically significant (P= 0.004, 0.004, 0.003, and 0.005 respectively) as shown in Table 1. There were no statistically significant differences in serum levels of cholesterol, triglycerides, HDL, and LDL between psoriasis and PsA patients (P>0.05 for all), as shown in Table 2. Table 3 shows no statistically significant difference in serum levels of cholesterol, triglycerides, HDL, and LDL in correlation to disease duration (P>0.05 for all). There were statistically significant differences in serum levels of cholesterol, triglycerides, HDL, and LDL in Psoriasis and PsA in correlation to disease activity (P= 0.001for all), as shown in Table 4.

Table 1: Demographic, clinical, and lipid level profile in psoriatic patients compared to controls

Characteristic	Psoriatic patients	Controls	P value
Total No.	92	88	0.34
Male	49 (53.3%)	53 (60.2%)	
Female	43 (46.7%)	35 (39.8%)	
psoriasis	63 (68.5%)		
Psoriatic arthritis	29 (31.5%)		
Age (mean ± SD)	50.5 ± 7.3	49.7± 7.8	0.24
Disease duration (mean ± SD)	11.12 ± 3.4		
Overweight/Obesity	57 (63.3%)	34 (38.6%)	0.006
Cholesterol (mg/dl) Mean ± SD	234.3 ± 65.4	153.1 ± 44.4	0.004
Triglycerides (mg/dl) Mean ± SD	218.4 ± 76.6	127.6 ± 43.4	0.004
HDL (mg/dl) Mean ± SD	33.8 ± 14.7	69.8 ± 9.9	0.003
LDL (mg/dl) Mean ± SD	155.8 ± 37.5	118.9 ± 35.2	0.005

Table 2: Differences in lipid levels in psoriatic compared to PsA patients

Subgroup	Cholesterol (mg/dl) Mean ± SD	Triglycerides (mg/dl) Mean ± SD	HDL (mg/dl) Mean ± SD	LDL (mg/dl) Mean ± SD
Psoriasis	232.9 ± 64.9	220.4 ± 76.6	54.1 ± 14.1	155.4 ± 35.5
Psoriatic arthritis	237.3 ± 67.6	214.1 ± 77.8	56.3 ± 16.4	156.6 ± 42.1
P value	>0.05	>0.05	>0.05	>0.05

Table 3: Differences in lipid levels in psoriatic patients in correlation to disease duration

Disease duration	Cholesterol (mg/dl) Mean ± SD	Triglycerides (mg/dl) Mean ± SD	HDL (mg/dl) Mean ± SD	LDL (mg/dl) Mean ± SD
Less than 10 years	239.4 ± 61.5	220.3 ± 73.1	52.8 ± 14.8	156.6 ± 35.2
10 years and more	226.9 ± 68.1	212.2 ± 79.5	56.4 ± 14.8	147.2 ± 39.2
P value	>0.05	>0.05	>0.05	>0.05

Table 4: Differences in lipid levels in psoriatic and psoriatic arthritis patients in correlation to disease activity

Disease activity parameter	Cholesterol (mg/dl) Mean ± SD	Triglycerides (mg/dl) Mean ± SD	HDL (mg/dl) Mean ± SD	LDL (mg/dl) Mean ± SD
High PASI	265.4 ± 37.04	258.1 ± 46.4	47.1 ± 7.2	173.9 ± 17.4
Low PASI	137.5 ± 13.5	109.8 ± 13.6	74.8 ± 7.2	100.9 ± 7.5
P value	0.001	0.001	0.001	0.001
Moderate-high DAS28	275.7 ± 34.3	261.2 ± 37.1	46.1 ± 5.6	182.9 ± 14.2
Remission -low DAS28	182.8 ± 66.2	147.4 ± 71.6	70.7 ± 15.8	119.2 ± 40.3
P value	0.001	0.001	0.001	0.001

Discussion

Psoriasis and PsA are systemic diseases associated with different comorbidities such as metabolic syndrome and cardiovascular diseases [5,18]. In the 1920s, Ishimaru and Lortat-Jacob showed how lipid abnormalities among patients with Psoriasis impact the disease course. In the 1930s, Grutz and Burger suggested that intestinal lipid absorption correlated to skin function, and they called Psoriasis "lipoidosis". In 1963, Melczer reported the correlation between the progression of psoriasis and lipid metabolism [19]. Researchers confirmed that patients with Psoriasis or PsA have alterations in lipid profile and are associated with high serum concentrations of TC, LDL-C, and TG [20]. This study compared the prevalence of dyslipidemia between psoriatic subjects and control individuals. We found significantly higher serum total cholesterol, TGs, and LDL levels, whereas a lower HDL level was observed in the psoriatic patient. Our result is consistent with the findings of various studies that reported increased total serum cholesterol in psoriatic patients [4,14]. In contrast to our study, Uyanik et al. [21] found normal serum total cholesterol. Serum triglyceride levels have significantly elevated in psoriatic patients in most studies [4,22]. Inconsistent with our result, other studies [14,22,23] have reported normal levels of serum HDL, whereas Rocha-Pereira et al. [3] reported low levels. In agreement with our finding, most studies report significant elevation of the most atherogenic LDL [4,14,22,23] in psoriatic patients. The actual cause of dyslipidemia in patients with Psoriasis are numerous; the cellular oxidative stress associated with alterations in IL-6 and tumor necrosis factor, C-reactive protein, may be responsible for altered lipid metabolism [24]. The disease is characterized by increased keratinocyte proliferation and alteration in dermal and epidermal T-cells, monocytes-macrophages, and neutrophils [25]. Increased antigen presentation by dendritic cells and their presentation to T-lymphocytes lead to the following changes: T-cell activation and secretion of type 1 (TH1) cytokines like interferon, interleukin-2, and tumor necrosis factor (TNF-a). These cytokines induce inflammatory changes, yielding thick, scaly plaques [7].

Recently, the role of T lymphocytes in the pathogenesis of Psoriasis and atherosclerosis has been documented. Psoriasis has been associated with an abnormal plasma lipid metabolism and diabetes, probability related to alterations in insulin secretion and sensitivity [26]. Furthermore, oxidative stress is correlated to the high frequency of cardiovascular disease [24]. The high rate of cardiovascular disorders is linked to the disease severity, which occurs more frequently in patients with large body surface areas affected by psoriasis lesions [27]. In psoriatic patients with high serum cholesterol, scaling was remarkably higher, whereas scaling in psoriasis patients with free fatty acid was lower [27]. In addition, scaling in psoriatic patients that occurs at the active phase leads to the depletion of much cholesterol and consequently stimulates the synthesis of more cholesterol. In this study, we found no difference in lipid levels between patients with Psoriasis and PsA. No similar finding was reported in the literature for comparison. In our study, we found no correlation between disease duration and dyslipidemia, finding contrary to the results of a study done by Nakhwa et al. [28], who found that; disease duration impacts lipid levels. To date, all accumulated knowledge is derived from studying psoriasis patients without considering disease duration. Mallbris et al. [12] showed the lipid changes at the onset of the disease. What happens to these lipid levels as the disease progresses yet to be evaluated. According to our study, no increase in lipids was observed with the disease duration. Whether the change in lipid metabolism indicates the increased cardiovascular risk with the progression of Psoriasis needs long-term follow-up of these

cases with a larger case population. In this study, we used the PASI score and DAS28 to grade the severity of Psoriasis and PsA. In agreement with our study, Fortinskaia et al. [29] and M. Taheri Sarvtin et al. [30] found that psoriatic patients with high disease activity have high levels of serum TC, LDL, TG, and low levels of HDL. This finding is contradictory to the finding of a study conducted by Farshchian M [31,32]. In this study, dyslipidemia was associated with higher disease activity in patients with PsA. No similar finding was reported in the literature for comparison.

Conclusion

Dyslipidemia was found in a high percentage of psoriatic and PsA patients than in healthy controls. Dyslipidemia was associated with high disease activity in psoriatic and PsA patients. As Psoriasis and PSA are associated with an increased risk of cardiovascular diseases, thorough lipid levels estimation is required.

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