Correlation Between Lipid Profile and Disease Severity in Psoriasis Patients of Dr. Sudirman Kebumen District Hospital Central Java Indonesia

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Abstract. Psoriasis is a chronic inflammatory disease characterized by skin inflammation, epidermal hyperplasia, increased risk of arthritis, cardiovascular morbidity, and psychosocial challenges. Previous studies revealed the association of psoriasis with cardiometabolic diseases, in which dyslipidemia is a common feature. The objective of the study is to identify the correlation between lipid profile and disease severity in psoriasis patients. This study employed a cross-sectional design by using primary data from patients visiting the outpatient department of Dr Soedirman Kebumen District Hospital, Central Java. Disease severity was examined using Psoriasis Area and Severity Index (PASI) score. The levels of triglyceride, HDL- and LDL- cholesterol, and total cholesterol were measured from fasting blood plasma on the same day. Data were compared by utilizing one-way ANOVA or Kruskal-Wallis test as appropriate, and correlation between lipid levels and PASI score was analyzed by utilizing the Spearman correlation test. There were 33 psoriasis patients (20 male and 13 female) enrolled in this study; mean age was 43,6 ± 16,7 years old, and mean disease duration was 8,2 ± 9,5 years. Disease severity was mild in 19 (57,5%), moderate in 5 (15,2%), and severe in 9 (27,3%) patients, and mean PASI score was 12,8 ± 10,1. There were no significant differences of triglyceride levels (p = 0,700), HDL-cholesterol levels (p = 0,743), LDL-cholesterol levels (p = 0,840), and total cholesterol (p = 0,890) among groups of disease severity. There was no significant correlation between PASI score and triglyceride (r = 0,028; p = 0,879), HDL-cholesterol (r = −0,052; p = 0,775, LDL-cholesterol (r = −0,043; p = 0,812) and total cholesterol levels (r = −0,028; p = 0,875). However, there was a significant correlation between PASI score and disease duration (r = 0,423; p = 0,014). Meanwhile, there was no significant correlation between disease severity and lipid profile in psoriasis patients.

Keywords: Psoriasis · Lipid Profile · PASI Score

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1 Introduction

Psoriasis is a chronic inflammatory disorder characterized by skin inflammation, epidermal hyperplasia characterized by erythematous scaly patches affecting the scalp, trunk, extensor surfaces of the limbs and the genital area [1]. The etiology of psoriasis is unclear, involved genetic, environmental, metabolic multifactorial mechanisms, and immune factors have been proposed [2]. Psoriasis is recently considered a systemic disease, because it affects not only the integumentary system but also psychological changes, metabolic abnormalities, arthritis, and cardiovascular comorbidities [3]. These conditions severely influence patients' quality of life: the high rates of depression and reduced lifespan as a consequence [4].

Several studies discovered that psoriasis was associated with cardiometabolic diseases such as hypertension, obesity, diabetes, and dyslipidemia. Psoriatic patients possessed elevated markers of systemic inflammation, such as interleukins, C-reactive protein and TNF-α [5]. In many metabolic diseases, these proteins function as chemoattractants of neutrophils, cytokine and chemokine production by macrophages and superoxide generation. They also play an essential role in activating and increasing proliferation of keratinocytes in psoriasis [6]. Patients with psoriasis had higher risk factors for cardiovascular disease, myocardial infarction, and other vascular diseases than the general population [7]. Psoriatic patients also possess a higher risk of dyslipidemia [8]. In the correlation of psoriasis and high frequency of cardiovascular events it seems to be associated with the severity and duration of psoriasis and the medication to treat psoriasis such as oral retinoids and cyclosporine [5].

Although psoriasis association and cardiometabolic disease were well-scrutinized, there are various association patterns between psoriasis and disorders of plasma lipids. This study was conducted to examine the correlation between lipid profile and disease severity in psoriasis patients of Dr. Sudirman Kebumen District Hospital, Central Java Indonesia.

2 Method

A cross-sectional observational study was enacted at the outpatient department of Dermatology and Venereology, Dr. Soedirman Kebumen District Hospital, Central Java from March to June 2018. This study involved all psoriasis patients with psoriasis clinical forms such as plaque, hyperkeratotic, palmoplantar, nail, scalp, and flexural psoriasis visiting the outpatient department during the study period. Patients with secondary infection of the lesion and erythrodermic were excluded from this study. All participants were signing written informed consent before the enrollment of the study. The detailed history taking was conducted on personal history (name, age, occupation, residence and particular habits), present history (onset, site, duration and treatment of psoriasis, and other treatment and diseases/conditions involved). Ethical approval for this study was obtained from Research Ethics Committee, Faculty of Medicine, Universitas Islam Indonesia (Registration number: 14/Ka.Kom.Et/70/KE/ II/2018).

The Psoriasis Area Severity Index (PASI) was administered to determine the severity of psoriatic skin lesions in patients by a dermatologist. A PASI score evaluated the area affected by psoriasis and its redness, thickness and scaling in each of four zones: the head and neck, trunk, upper and lower extremities. Anthropometric measurements were conducted at the clinic encompassing body weight, height, waist, and hip circumferences from which other parameters were obtained such as body mass index (BMI), and waist to hip ratio (WHR). Body weight and height were measured with a stadiometer and body composition scale (Omron HBF-214), in a standing position with empty pocket and light clothes. Meanwhile, waist circumference was measured based on 2005 NCEP-ATP III/AHA/NHLB criteria at umbilical level with no clothes and non-pressure contact while hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor.

Blood samples were collected after an overnight fast (12–14 h) and deposited in vacutainer tubes. Lipid concentrations were examined in fresh serum samples. Total cholesterol concentration was measured by administering a colorimetric method with cholesterol esterase and oxidase. The HDL-C concentration was calculated by employing a direct enzymatic-colorimetric method with polyethylene glycol (PEG)-modified cholesterol esterase and oxidase, while the triglyceride (TG) concentration was assessed by implementing an enzymatic-colorimetric method with phosphoglycerol oxidase. The LDL-C concentration was calculated based on the Friedewald Formula.

Data were presented as frequency and percentage or mean ± standard deviation (SD) and analyzed by performing one way ANOVA or Kruskal-Wallis test as appropriate. Correlation between lipid levels, anthropometric measurements and PASI scores were examined employing Pearson product moment or Spearman correlation test as appropriate. All analyses were administered with IBM SPSS 15.00 version 23.

3 Result and Discussion

During the study, there were 33 psoriasis patients (20 male and 13 female) with age range between 13–73 years (mean 43.6 ± 16.7 years). The demographic distribution of the subject is presented in Table 1.

Of all participants, the mean of PASI score was 12.8 ± 10.1, and psoriasis disease duration was 8.18 ± 9.5 years. The distribution of psoriasis severity in subjects is demonstrated in Table 2.

The lipid profile assessment of the participants revealed that the average of total triglyceride level was 105.1 ± 51.1 mg/dl, total cholesterol level was 171.9 ± 29.7 mg/dl, HDL-cholesterol level was 49.6 ± 14.9 mg/dl, and LDL-cholesterol level was 101.2 ± 26.7mg/dl. The distribution of triglyceride, total cholesterol, HDL-cholesterol, and LDL-cholesterol levels classification is displayed in Table 3.

Table 1. Demographic distributions

	Frequency	
	N	**%**
Gender		
Male	20	60,6
Female	13	39,4
Age (years old)		
<20	2	6,1
21–30	5	15,1
31–40	9	27,3
41–50	6	18,2
51–60	5	15,1
>60	6	18,2

Table 2. Distribution of psoriasis severity

Psoriasis severity	**PASI score**	**Frequency**	
		N	%
Mild	≤ 11	19	57,6
Moderate	12–16	5	15,1
Severe	>16	9	27,3

The anthropometric examination of the subjects discovered that the mean and standard deviation of BMI were 24.0 ± 4.1 kg/m2, waist circumference was 80.4 ± 9.3 cm, hip circumference was 91.7 ± 9.0 cm, and waist-to-hip ratio (WHR) was 0.88 ± 0.07. The distribution of anthropometric classifications is illustrated in Table 4.

The comparisons of gender proportions, age, and psoriasis disease duration across groups of psoriasis severity is presented in Table 5. There were no significant differences in gender proportions (p = 0,922) and age (0,321), but there was a significant difference in the disease duration (p = 0,029) among groups of psoriasis severity. Moderate and severe psoriasis patients significantly possessed longer disease duration compared to mild psoriasis. Spearman rank correlation test also revealed moderate significant correlation between PASI score and disease duration (r = 0,423, p = 0,014) (Table 5).

There were no significant differences in triglyceride (p = 0,700), total cholesterol (p = 0,890), HDL-cholesterol (p = 0,743), and LDL-cholesterol levels. Correlation test employing Spearman's rank correlation unveiled no significant correlation between PASI score and triglyceride (r = 0,028;;p = 0,879), HDL-cholesterol (r = -0,052; p = 0,775, LDL-cholesterol (r = -0,043; p = 0,812) and total cholesterol levels (r = -0,028; p = 0,875) (Table 6).

Table 3. Distribution of lipid levels classifications

Classification		Frequency	
		N	%
Triglyceride (mg/dl)			
Normal	<150	25	75,8
Borderline high	150–199	7	21,2
High	200–499	1	3
Total cholesterol (mg/dl)			
Normal	<200	9	27,3
Borderline high	200–239	19	57,6
High	≥240	5	15,1
HDL-cholesterol (mg/dl)			
Low	<40	10	30,3
Normal	40 -60	13	39,4
High	≥60	10	30,3
LDL-cholesterol (mg/dl)			
Optimal	<100	13	39,4
Near optimal	100–129	17	51,5
Borderline high	130–159	2	6,1
High	160–189	1	3
Very high	≥190	0	0

Table 4. Distributions of anthropometric classifications

Classification		Frequency	
		N	%
BMI (kg/m2)			
Underweight	<18,5	2	6,1
Normal	18,5–22,9	15	45,4
Pre-obese	23–24,9	3	9,1
Obesity I	25–29,9	10	30,3
Obesity II	≥30	3	9,1
Waist circumference (cm)			
Low risk	Male: < 90; Female < 80	23	69,7
High risk	Male: ≥ 90; Female ≥ 80	10	30.3

(*continued*)

Table 4. (*continued*)

Classification		Frequency	
		N	%
WHR			
Low risk	Male: ≤ 0,95; Female: ≤ 0,80	19	57.6
Moderate risk	Male: 0,96–1; Female: 0,81–0,85	5	15.1
High risk	Male: > 1; Female: > 0,85	9	27.3

Table 5. Comparisons of gender, age, and disease duration among groups of psoriasis severity

	Psoriasis Severity			P value
	Mild N = 19	Moderate N = 5	Severe N = 9	
Gender				
Male	10 (52,6%)	3 (60%)	7 (77,8%)	0,922*
Female	9 (47,4%)	2 (40%)	2 (22,2%)	
Age (mean ± SD)	41,4 ± 18,1	39,2 ± 12,4	50,8 ± 15,1	0,321**
Disease duration (mean ± SD)	4,9 ± 4,0	14,4 ± 10,5	11,6 ± 14,4	0,029***

Note: * KolmogorovSmirnov test; ** One way ANOVA test; *** Kruskal Wallis test

Table 6. Comparisons of triglyceride, cholesterol, HDL-cholesterol, and LDL cholesterol among groups of psoriasis severity

	Psoriasis Severity			P value
	Mild N = 19	Moderate N = 5	Severe N = 9	
Triglycerides (mg/dl)	102,6 ± 56,5	94,0 ± 32,4	116,8 ± 50,1	0,700*
Total cholesterol (mg/dl)	173,3 ± 27,2	174,0 ± 15,4	167,6 ± 41,4	0,890*
HDL-cholesterol (mg/dl)	51,3 ± 16,7	48,6 ± 9,0	46,7 ± 14,1	0,743*
LDL-cholesterol (mg/dl)	101,5 ± 28,2	106,6 ± 22,1	97,5 ± 27,9	0,840*

Note: * One-way ANOVA

4 Discussions

Several studies were conducted before on the association between psoriasis incidence, severity and lipid profile. Different results were reported from different settings. One study revealed that psoriatic patients exhibited high plasma levels of triglyceride (TG) and cholesterol esters, and high levels of low-density lipoprotein (LDL) cholesterol [9].

Another study by Nakhwa et al. [10] also discovered low level of HDL cholesterol associated with the increasing severity of psoriasis, while Pietrzak et al. [11] uncovered that psoriasis and psoriatic arthritis possessed lipid metabolism abnormalities and oxidative imbalance. On the contrary, a study in Korea found that although psoriasis patients with metabolic syndrome (hypertension, dyslipidemia and hyperglycemia) owned severe and large plaque-type psoriasis, the correlation between metabolic syndrome and the severity or clinical subtype of psoriasis was not significant after adjusting for age and gender [12]. A study in RSUP dr. Mohammad Hoesin Palembang Indonesia discovered that there was no correlation between plasma lipid level (total CHOL, TG, HDL cholesterol and VLDL cholesterol) and clinical severity of psoriasis [13]. In concordance with this study, our study results unveiled that there was no correlation between lipid parameters (triglyceride, total cholesterol, HDL and LDL-cholesterol) and psoriasis severity.

Several conditions were probably associated with these results. First, the group proportions of psoriasis severity were not similar. More than half psoriasis subjects in this study possessed merely mild disease, and younger age. These could be contributing factors as we discovered that the disease severity was correlated with disease duration. Second, we did not differentiate new psoriatic patients or older (regular) psoriatic patients. Older psoriatic patients might be more predisposed to metabolic syndrome, hence, the younger psoriatic patients might not be exposed to the same risk. More than half psoriasis patients in this study presented normal or borderline high triglyceride and total cholesterol. The results discovered no significant correlations between lipid profile and psoriasis severity, probably affected by the presence of other contributing factors, such as stress, infection, and medication use, that have not been examined.

5 Conclusion

In this study, there was no significant correlation between disease severity and lipid profile in psoriasis patients. Considering that disease duration was correlated with psoriasis severity, patients with longer disease durations require more careful examinations to manage the possible effect of psoriasis on lipid metabolism.

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