



Prevalence of metabolic syndrome among mild psoriatic patients above forty years old, cross-sectional study

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Abstract

Psoriasis is a chronic inflammatory disease characterized by epidermal cells hyperproliferation associated with some comorbidities, including cardiovascular diseases, obesity, and dyslipidemia. These comorbidities make up the metabolic syndrome. To detect the prevalence of metabolic syndrome in psoriatic patients above forty years old who suffered from mild psoriasis. Our randomized prospective cross-sectional study included 380 patients with mild psoriasis total Psoriasis Area and Severity Index (PASI) <10. Their ages ranged from 41 to 71 with a mean of 55.7 ± 8.78 , patients were subjected to: Complete history taking, general examination and measurement of height, weight, blood pressure, and waist circumference, then local examination for assessment of PASI score of psoriasis. Finally, laboratory investigations were done for each patient including Fasting Blood Sugar (FBS), Triglycerides level (TG) and High-Density Lipoproteins (HDL). The Metabolic syndrome is diagnosed by updated National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III). In our study we found the prevalence of metabolic syndrome was 37.6% among the studied population, and there is a relation between smoking, body mass index (BMI), hypertension, high TG, abnormal HDL, and diabetes with psoriasis. There was also strong significant correlation between waist circumference and BMI ($r=0.64$ at $p<0.01$), also between weight and both waist and BMI. We found newly accidentally discovered hypertension, high TG, abnormal HDL and diabetic patients with psoriasis (46%, 20%, 10% and 35 % respectively) during the study. The prevalence of metabolic syndrome and some cardiovascular risks were higher in psoriasis patients.

Keywords: Metabolic syndrome, psoriasis, cardiovascular risk.

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1. Introduction

Psoriasis is one of the most common inflammatory skin disorders, affecting 2~3% of the total world population. Psoriasis has a variety of clinical cutaneous symptoms. Chronic, erythematous, and scaling plaques are the most typical symptoms. The major histological characteristics of psoriasis include epidermal hyperproliferation and parakeratosis. Notably, people with psoriasis experience long-term damage to many tissues and organs due to increase release of pro-inflammatory cytokines and the continuous activation of innate and adaptive immune systems [1]. Other systemic diseases such as obesity, hypertension, hyperlipidemia, inflammatory cardiovascular disease, and chronic renal disease frequently coexist with psoriasis [2]. Metabolic syndrome (MetS) is a group of risk elements, including central obesity, atherogenic dyslipidemia, hypertension, and glucose intolerance. The significance of MetS lies in the possibility of raising cardiovascular risk

beyond that of its constituent parts. After accounting for traditional cardiovascular risk factors, men with metabolic syndrome are nearly three times more likely to die of coronary artery disease [3]. Psoriasis and MetS may co-occur due to a similar immunological aetiology that involves persistent low-level inflammation mediated by pro-inflammatory cytokines such as IFN-gamma, IL-17, IL-23, and TNF-alpha. Additionally, several studies have linked the development of diabetes and hyperlipidemia, as well as the keratinocyte proliferation found in psoriasis, to insulin-like growth factor 1 (IGF-1) [4]. In addition to the role of chronic inflammation. Lifestyle factors such as poor nutrition, inactivity, smoking, alcohol consumption and stress also play a significant role in the development of metabolic syndrome in people with psoriasis [5]. The aim of this study was to detect the prevalence of metabolic syndrome in patients above forty years of age who suffered from mild psoriasis.

2. Materials and methods

This cross-sectional prospective observational study included 380 patients with mild psoriasis PASI<10. Their ages ranged from 41 to 71 with a mean of 55.7 ± 8.78 , who seek treatment at psoriasis Unit of Cairo Hospital of dermatology and venerology (Al-Haud Al-Marsoud). The study was approved by Ethical Committee of Central Directorate of Research and Health Development (IORG0005704/IRB0000687), Patients were recruited in the period from November 2022 to April 2023. The included cases were notified about the aim of the study, and informed written consents were taken from the patients before enrollment in the study. Males and females, older than 40 years patients with mild psoriasis PASI<10 were included in the study while pregnant, lactating women and patients with history of any malignancy were excluded from the study. Patients were subjected to: Complete history taking including age, sex, onset, duration of the disease, associated disorders, history of medications followed by general examination to detect signs of systemic diseases, measurement of weight, height, waist circumference and blood pressure, then local examination for assessment of PASI score of psoriasis. Finally, laboratory investigations were done for each patient including Fasting Blood Sugar (FBS), Triglycerides level (TG) and High-Density Lipoproteins (HDL).

According to the updated National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III), metabolic syndrome is diagnosed when a person has at least 3 out of these 5 conditions:⁶ (Figure 1)

- (1) Fasting glucose ≥ 100 mg/dL (or receiving drug therapy for hyperglycemia),
- (2) Blood pressure $\geq 130/85$ mm Hg (or receiving drug therapy for hypertension),
- (3) Triglycerides ≥ 150 mg/dL (or receiving drug therapy for hypertriglyceridemia),
- (4) High-density lipoprotein-cholesterol complex (HDL-C) less than 40 mg/dL in men or less than 50 mg/dL in women (or receiving drug therapy for reduced HDL-C),
- (5) Waist circumference ≥ 102 cm (40 inches) in men or ≥ 88 cm (35 inches) in women.

Patients were examined and investigated for metabolic syndrome then the total number of cases were summed and the incidence of metabolic syndrome was calculated in Percentage.

2.1. Statistical Analysis

Statistics done by using Statistical Package for the Social Science (IBM SPSS) version 28.

3. Results

The study included 380 patients, 260 males (68.4%) and 120 females (31.6%) with mild Psoriasis. Ages ranged from 41 to 71 with a mean of 55.7 ± 8.78 . Psoriasis duration ranged between 5 and 360 months with a mean of 85.24 months ± 95.29 . The height of the patients ranged between 155-186 cm with a mean of 168.28 ± 7.38 , the weight range was 44-115 kg with a mean of 83.30 ± 13.12 and the waist circumference was 60-133 cm with a mean of 109.28 ± 13.22 . There was significant relation between smoking and Psoriasis as the number of the smokers represented 209 patients with percentage of 55%, while nonsmokers in the studied group was 171 patient 45%. There was significant relation between

hypertension and Psoriasis as Hypertension among the studied patients was found in 250 patients with percentage of 65.7%. There was significant relation between high TG and Psoriasis as high TG among the studied patients was found in 221 patients with percentage of 58.2% while the normal TG values observed within 41.8% of the patients. There was significant relation between abnormal HDL and Psoriasis as abnormal HDL level among the studied patients was found in 219 with percentage of 57.6%, while patients with normal HDL were 152 patients with percentage of 42.4%. There was significant relation between Diabetes and Psoriasis as high fasting blood sugar among the studied patients was found in 228 patients with percentage of 60%, while patients with normal fasting blood sugar were 152 patients with percentage of 40% (Table 1). There was a relation between obesity and Psoriasis as the percentage of obesity ($BMI \geq 30$ kg/m²) was about 51.31% also the percentage of overweight and obesity ($BMI \geq 25$ kg/m²) was about 79.99% among the studied population (Table 2). A strong significant correlation has been noticed between weight and both waist and BMI ($r=0.66$ and 0.05 at $P<0.01$ respectively) and Strong significance correlation has been noticed between waist and BMI ($r=0.64$ at $p<0.01$) (Table 3). We found newly accidentally discovered HTN, high TG, abnormal HDL and diabetic patients with psoriasis (46%, 20%, 10% and 35 % respectively) during the study, who did not know about their medical disease before (Table 4). According to the updated (NCEP ATP III), the prevalence of metabolic syndrome was 37.6% (95 percent CI, 0.34-0.40) among the studied population. The distribution of MetS among the studied population, we revealed that patients with metabolic syndrome of 3 criteria (18.9%) represented the highest percentage followed by those of 4 criteria (15%), patients were having 5 criteria of metabolic syndrome with percentage of (3.7%) (Table 5).

4. Discussion

Although the relation between MetS and psoriasis is not clear. Researchers have hypothesized that the MetS may be due to a same inflammatory mechanism, connected to severe inflammatory diseases like psoriasis, systemic lupus erythematosus and rheumatoid arthritis. Increased Th1 cell activity is a hallmark of both metabolic syndrome and psoriasis recommending that these two conditions may be related through the dysregulated inflammatory pathways that underlie their pathogenesis. Additionally, some contend that certain lifestyle habits, such as increased psychological stress, cigarette smoking, alcohol consumption, and less physical activity are more common in psoriasis patients predisposing them to developing components of the MetS (such as obesity, hypertension and insulin resistance) [5]. Based on this evidence, our objective was to detect the prevalence of metabolic syndrome in patients above forty years, who suffered mild psoriasis. Our randomized prospective cross-sectional study included 380 psoriasis patients, 260 males (68.4%) and 120 females (31.6%). Ages ranged from 41 to 71 with a mean of 55.7 ± 8.78 . Psoriasis duration ranged between 5 and 360 months with a mean of 85.24 months ± 95.29 . We concluded a relation between sex and psoriasis where male patients are more susceptible to psoriasis than females. In several studies, the incidence was higher in females [7,8] and some in males [9,10]. A population-based study from the

United States, investigating the incidence of adult-onset psoriasis between 1970 and 2000, the incidence in men was higher than in women (85.5 per 100,000 person-years in men vs 73.2 in women). With the highest incidence for men was found in their seventh decade of life (115.3/100,000), for women in their sixth (90.7/100,000), with a higher incidence than men [9]. The number of smokers in the studied group was 209 patients (55%), while the nonsmokers represented 171 patients with percentage of 45%, Zhou et al [11], agreed with us as they looked for research on the connection between smoking and psoriasis in the Cochrane Library and PubMed databases. They then performed a meta-analysis with a fixed-effects model to get odds ratios (ORs) and (95 percent confidence intervals), and they concluded that smoking increases the chance of developing psoriasis and reduces the advantages of biologic medicines [11]. While relation between drinking habits and smoking with severity of the disease was also studied by Sobhan et al., [12] and the results showed no significant relation (P-values of smoking was 0.76) [12]. In our study the relation between heart diseases and psoriasis there were 57 patients (15%) suffering from heart diseases, while the rest 85% were not having any heart problems, despite this, patients should be thoroughly assessed for any heart diseases as they may have other risk factors for coronary heart diseases and atherosclerosis like high triglyceride level and low HDL levels. Gao N et al., [13] provided suggestion for a potential link between psoriasis and cardiovascular diseases¹³. These findings partly suggest that early monitoring of cardiovascular risk in patients with psoriasis is intentional. Puig et al., [14] also concluded that there is substantial evidence linking psoriasis, chronic inflammation, and cardiovascular disease; however, more studies of the general population are needed to fully grasp the pathological mechanisms underlying this association and to advance primary prevention, which is currently troubled by patients' underdiagnosis of cardiovascular risk factors.¹⁴ In this study, the percentage of obesity (BMI \geq 30 kg/m²) were about 51.3%, which may indicate that there is a relationship between obesity and psoriasis. A systematic evaluation of the literature by Felming et al., [15] found that seven out of nine papers showed a significant correlation between greater BMI and increased psoriasis severity¹⁵. In a meta-analysis of 16 observational studies, Armstrong et al., [16] found that patients with psoriasis had a 1.66 odds ratio for obesity (95 percent confidence interval [CI]: 1.46-1.89) compared to patients without the condition. Conversely, those with more severe psoriasis have a larger risk of being obese than those with mild psoriasis [16].

Adversely, Sobhan et al., [12] found that mean was 25.86 \pm 5.93, 30.85 \pm 3.77 and 26.96 \pm 5.68 kg/m², in mild, moderate, and severe psoriasis patients respectively (P=0.096), and no significant difference was found regarding mean BMI. Moreover, there was no significant difference among the three groups based on severity of the disease and BMI [12]. A study from Norway found variable suggestion for a relation between BMI and risk of psoriasis; a conventional classification of BMI gave weak and imprecise associations, whereas the results recommended that there might be a threshold around 28 kg/m² at which the risk of psoriasis increases¹⁷. In a nested case-control study from the United Kingdom General Practice Research Database Huerta et al. [18] found a 30% increased risk of developing

psoriasis in obese individuals. However, it could be speculated that a sample obtained from a general practitioner database differs from the general population when it comes to health status and morbidity, and that such selection could have influenced the estimated association between obesity and psoriasis [18]. In this research, hypertension among the studied group existed in 250 patients with percentage of 67.7%, while patients without hypertension were 130 with percentage of 34.2%, indicating a close relation between hypertension and psoriasis. Results were similar to other studies which also showed an increased occurrence of hypertension. Rosa et al., discovered that 59.2 % of psoriasis patients had increased blood pressure [19]. According to Sommer et al., [20] psoriasis patients had a 3 times greater frequency of elevated blood pressure than the control group [20]. According to Ghiasi et al., [21] psoriasis patients had a 2.2 times greater risk of developing high blood pressure compared to the control group [21]. We found 58.2% of the studied patients were having high TG level, while normal TG values were observed within 41.8% of the patients, also patients with abnormal HDL were about 57.6%, while those with normal level were 42.8%. Akkara et al., [22] agreed with us as they found TG levels were significantly higher (p<0.001), and HDL levels significantly lower (p=0.013) in psoriasis patients compared to non-psoriasis subjects [22]. Miao et al., [23] also agreed with us in their study 222 psoriatic patients and 445 non-psoriatic control patients. Compared with controls, levels of BMI and the prevalence of obesity were significantly higher in psoriatic patients. The results discovered that when compared to controls, significant elevation of serum TG (P<.001) and levels of HDL (P<.001) and apoA1 (P<.001) were significantly lower in psoriatic patients [23]. On assessing the link between psoriasis and diabetes we found that diabetic patients represented 60% and patients with normal FBS represented 40%. From these results we notice that psoriatic patients are more likely to get type 2 diabetes. That's a condition that makes it hard for the body to make and use the insulin hormone, the worse the skin problem, the greater chances of getting diabetes. Ikumi et al., [24] agreed with our results, they investigated whether psoriasis itself is correlated with hyperglycemia in humans and mice. In patients, the severity of psoriasis was correlated with high blood glucose levels, and treatment of psoriasis by phototherapy improved insulin secretion [24]. The BMI is a widely used indication of body composition, however research indicated that measurements of abdominal adiposity, such as waist circumference and waist-hip ratio, are more accurate predictors of metabolic syndrome and cardiovascular disease risk [25]. A strong significance correlation has been noticed in our study between weight and both waist and BMI (r = 0.66 and 0.05 at P<0.01 respectively), also strong significant correlation between waist and BMI (r=0.64 at p<0.01). Bardazzi et al., [26] reviewed the severity of psoriasis and its relationship with BMI in Italy. They found a significant relation between the increase in BMI and waist size on one side and the increase in the severity of the disease [26]. According also to Kumar et al., [27] there was a graded positive association between BMI (both baseline and updated) and the risk of psoriasis (both P values for trend <0.0001).

Table 1: Percentage of risk factors of metabolic syndrome among the studied group.

	No.	%
Smokers	209	55%
Patients with Heart Diseases	57	15%
Hypertension	250	65.7%.
High TG	221	58.2%.
Abnormal HDL	219	57.6%
Elevated FBS	228	60%



Figure 1: Clinical evaluation

A 56-year-old man presented with a 6-year history of pruritic erythematous papule and plaques Scattered on his body. He is smoker (10 cigarette per day) and past medical history of hypertension and cardiovascular disease with open heart surgery. On examination, there are well-demarcated erythematous papule and plaques with overlying scale distributed over abdomen (A) and lower limbs (B), with (PASI) less than 10%. By physical examination: His waist circumference is 108cm, Height:156cm, Weight:75kg, and BMI is 30.8. This classifies him as obese. his blood pressure is 134/85mm Hg. Laboratory data as follows: Triglycerides: 170mg/dL (normal range: Less than 150), HDL: 35 mg/dL (Normal range more than 60 mg/dl), Fasting Blood Sugar: 90 mg/dL (normal rang :70-100 mg/dl). Based on his waist circumference, hypertension, decreased HDL, and increased triglycerides, the patient meet the criteria of metabolic syndrome According to the updated (NCEP ATP III).

Table 2: According to WHO, BMI classification and Distribution among the studied group.

BMI	Weight Status	No.	%
<18.5	Under Weight Normal rang	9	2.37%
18.5-24.9		67	17.64%
25-29.9	Overweight (Pre-obese)	109	28.68%
30-34.9	Obese class 1	124	32.63%
35-39.9	Obese class 2	52	13.68%
≥ 40	Obese class 3	19	5%

Table 3: Correlation between Height, Weight, Waist and BMI.

		HIGHT	WEIGHT	WAIST	BMI
HIGHT	Pearson Correlation(r)	1	0.096	-0.071	-.427**
	Sig. (2-tailed) P		0.556	0.663	0.006
WEIGHT	Pearson Correlation(r)	0.096	1	.662**	.854**
	Sig. (2-tailed) P	0.556		<.001	<.001
WAIST	Pearson Correlation(r)	-0.071	.662**	1	.635**
	Sig. (2-tailed) P	0.663	<.001		<.001
BMI	Pearson Correlation(r)	-.427**	.854**	.635**	1
	Sig. (2-tailed) P	0.006	<.001	<.001	

** . Correlation is significant at the 0.01 level (2-tailed). P level ≤ 0.01

Table 4: Newly accidentally discovered clinical parameters during the study.

Clinical Parameter	No.	%
HTN	175	46
High TG	76	20
Abnormal HDL	38	10
Elevated FBS	133	35

Table 5: Distribution of MS Criteria among the studied patients.

Parameters	Patients with MetS (n=143)
3 criteria n (%)	72 (18.9%)
4 criteria n (%)	57 (15%)
5 criteria n (%)	14 (3.7%)
Total	143 (37.6%)

Higher waist circumference, hip circumference, and waist-hip ratio were associated with a higher risk of incident psoriasis but became non-significant after additionally adjusting for BMI [27]. In our study the prevalence of metabolic syndrome was 37.6 % among the studied population. Our study is slightly higher than the global prevalence of MetS in psoriasis which revealed that the prevalence in adults was 32% (95% CI, 0.29-0.36), while that in children and adolescents was 9% (95% CI, 0.00-0.18). Men and women both had a similar prevalence of MetS among psoriasis patients, of 35% (95% CI, 0.26-0.43). Latin America had the highest prevalence overall, of 47% (95 percent CI, 0.43–0.51; random-effects model), followed by Africa (37% (95 percent CI, 0.34-0.40)), and Europe (34% (95 percent CI, 0.31-0.37; random-effects model)). North America came in second with a frequency of 26% (95 percent CI, 0.16-0.37; random-effects model), followed by Asia in fourth place with a prevalence of 29 percent (95 percent CI, 0.24-0.34). The three countries with the greatest rates of comorbid psoriasis in Europe, Asia, and Africa were Israel (55 percent), Singapore (45 percent), and Algeria (37 percent) [28]. Although no studies were published in Egypt about the prevalence of MetS with psoriasis or normal population, Egypt National STEPWISE surveillance for chronic diseases done by World Health Organization (WHO) in 2017 revealed that the prevalence of diabetes was 15.16%, hypertension (SBP140 and or DBP 90) was 29.50% and hyperlipidemia (total cholesterol \geq 5.0 mmol/L) was 19.20%. According to “100 million health” survey, which was conducted in Egypt in 2019 and screened 49.7 million adult Egyptians (\geq 18 years old), The prevalence of obesity (BMI \geq 30 kg/m²) has increased in Egypt to reach about 40% compared to the 36% estimate of 2017 STEPWISE survey [29]. These findings suggested that MS and its risk elements should be well-known and managed in psoriasis patients as our study revealed the percentage of diabetes, hypertension and obesity (BMI \geq 30 kg/m²) with psoriasis (60%,65.7%,51.3% respectively) were higher than its percentage of Egyptian population. *Love et al.*, [30] found that metabolic syndrome was more prevalent in psoriasis patients than controls (40 percent vs. 23 percent, odds ratio 2.16 in the general USA population) in a cross-sectional health survey of 6,549 participants [30]. *Cohen et al.*, [31] showed that the prevalence of metabolic syndrome was higher in psoriasis patients [31], which was consistent with what *Gisoni et al.*, [32] reported [32]. Finally, regarding the newly discovered clinical parameters, during the study we found newly accidentally discovered HTN, high TG, abnormal HDL and diabetic patients with mild psoriasis (46%, 20%, 10% and 35 % respectively), so assessing these parameters on dealing with psoriasis patient is advised as they can affect the plan of management and the course of disease progression but further studies is needed on large scale of patients to be sure of the exact clinical link. In our study, we highlighted the link between the metabolic syndrome and psoriasis. We recommend strong follow-up the psoriatic patients to detect metabolic syndrome side effects as early as possible. Also, although percentage of heart diseases were low in our result, but it shouldn't be neglected as there are many other risk factors as obesity that can affect heart, The current research reveals the importance of treating psoriasis by addressing more than just the skin lesions.

BMI is calculated by dividing weight by the square of height as follows: $BMI = \text{Weight (kg)}/\text{Height (m)}^2$.

The strength of correlation is described as follow: (< 0.20= Very weak, 0.20-0.39= Weak, 0.40-0.59= Moderate, 0.60-0.79=Strong, > 0.80= very Strong). A 56-year-old man presented with a 6-year history of pruritic erythematous papule and plaques Scattered on his body. He is smoker (10 cigarette per day) and past medical history of hypertension and cardiovascular disease with open heart surgery. On examination, there are well-demarcated erythematous papule and plaques with overlying scale distributed over abdomen (A) and lower limbs (B), with (PASI) less than 10%.

By physical examination: His waist circumference is 108cm, Height:156cm, Weight:75kg, and BMI is 30.8. This classifies him as obese. his blood pressure is 134/85mm Hg. Laboratory data as follows: Triglycerides: 170mg/dL (normal range: Less than 150), HDL: 35 mg/dL (Normal range more than 60 mg/dl), Fasting Blood Sugar: 90 mg/dL (normal rang :70-100 mg/dl). Based on his waist circumference, hypertension, decreased HDL, and increased triglycerides, the patient meet the criteria of metabolic syndrome according to the updated (NCEP ATP III).

Recommendations

Further studies on larger scale of population are advised with longer follow up period to get more stronger results.

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