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The Relationship of Psoriasis and the Cardiovascular Risk Factors - United Arab Emirates Experience

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Abstract

Background: Psoriasis is a common chronic immune mediated skin disease. Recent research indicates that the chronic inflammatory nature may lead to adverse health outcomes and patients carries an increased risk of developing co-morbidities including cardiovascular disease.

Objective: The aim was to examine the relationship between psoriasis and cardiovascular risk, as well as its demographic relationships.

Methods: A retrospective cross-sectional study, based on the records of 158 psoriatic patients between 1st of January and 31st December 2014, in dermatology clinic of SKMC Abu Dhabi, UAE

Results: Our study indicated that 14% of patients with chronic plaque psoriasis had hypertension, 43% had high low-density lipoproteins (LDL), 27% had cholesterol higher than the reference range, 21% had triglycerides higher than the reference range and 80% were overweight or obese. A significant relationship was observed between some of the demographic variables and cardiovascular risk factors. Older age was significantly associated with increased risk of hypertension, diabetes, increased risk of high LDL, high cholesterol and with increased risk of high triglycerides.

Conclusion: There is a relationship between psoriasis and increased risk of cardiovascular disease. Further research is required to study the exact association of cardiovascular risks in those affected with chronic plaque psoriasis.

Keywords: Psoriasis; Cardiovascular risk factors; UAE

Background

Psoriasis, a common chronic immune mediated disease that affects life quality and overall wellbeing and may lead to adverse health outcomes [1,2]. Several studies showed that psoriatic patients have increased risk of co-morbidities including hypertension, obesity, lipid abnormalities and insulin resistance. Research indicated a 50% increased risk of mortality that may result in approximately 5 years of life lost in patients with more severe disease [3]. Relationship between psoriasis and myocardial infarction, vascular inflammation and atherosclerosis has been found as well [4,5].

Objective

The aim was to examine the relationship between psoriasis and cardiovascular risk factors – diabetes mellitus (DM), hypertension (HTN), obesity, hyperlipidemia, and also some demographic characteristics among psoriatic patients with cardiovascular risk factors.

Materials and Methods

The study was conducted in the Dermatology Department of Sheikh Khalifa Medical City (SKMC), Abu Dhabi, United Arab Emirates (UAE). It was a retrospective study using records of 158 patients with chronic plaque psoriasis only or psoriasis associated with psoriatic arthritis (ICD9 code 696.1, 696.0) between January 2014 to December 2014. Data were obtained from the electronic medical records (Malaffi ®/Cerner® system). Of the total registered cohort of 261 subjects, 103 individuals were excluded. Exclusion criteria were: patient age below 16 or above 65years old, as well as patients with incorrect coding. 158 patients with psoriasis met the inclusion criteria. Of the 158 subjects, 82 were females (52%) Average age was 39.7 years (SD = 12.1). The diagnosis of hypertension, diabetes, obesity, hyperlipidemia or the abnormal levels of low-density lipoprotein (LDL), cholesterol and triglycerides were precisely documented into an excel spreadsheet. Additional data included age, sex, body mass index BMI and eventual systemic therapy. The SKMC IRB granted exempt approval for this study: Ethics Approval Reference No: REC-20.09.2015[RS-385]

Statistical Analysis

Descriptive statistical analyses were performed for the study sample in terms of demographic variables and cardiovascular risk factors: diabetes, hypertension, high LDL, high cholesterol, high triglycerides, and body mass index (BMI). Continuous variables were expressed as mean ± SD, median (interquartile range, IQR). Number and percentage were used for categorical variables. Pairwise associations between cardiovascular risk factors measured using odds ratio (OR), with 95% confidence intervals were calculated (Figures 1,2).

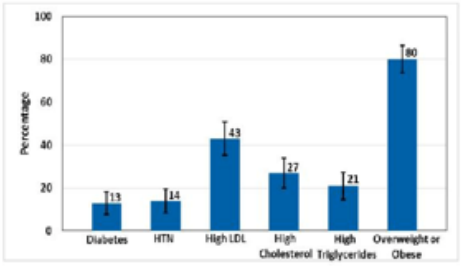

Figure 1: *Descriptive Statistics: Percentage of Patients with Cardiovascular Risk Factors and 95% Confidence Interval.*

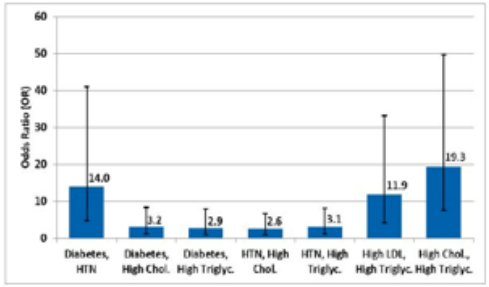

Figure 2: *Odds Ratio (OR) Measuring Pairwise Association between Cardiovascular Risks Factors, with 95% Confidence Interval.*

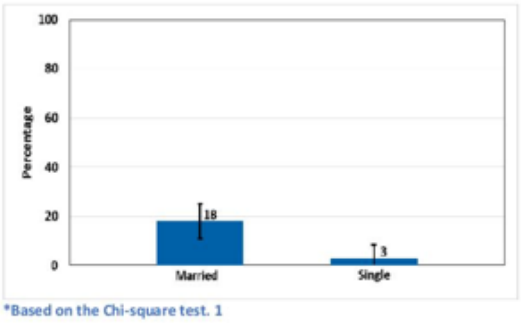

Figure 3: *Percentage of Patients with Hypertension by Marital Status, with 95% Confidence Interval.*

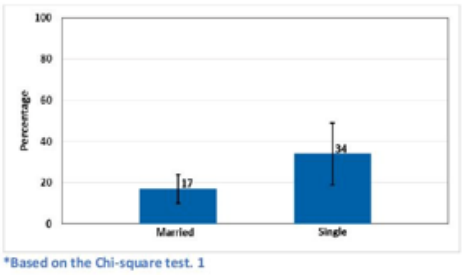

Figure 4: *Percentage of Patients with High Triglycerides by Marital Status, with 95% Confidence Interval.*

The relationship between demographic variables: age, gender and marital status and cardiovascular risk factors was examined. The Chi-square test was used for categorical data (gender and marital status) and the Mann-Whitney U test or Kruskal-Wallis was used for continuous data (age) (Figures 3,4). Separate multivariate logistic regression models were utilized to predict the effect of age, gender and marital status on the risk of cardiovascular risk factors. Statistical significance was considered at $p<0.05$.

All statistical analyses were performed using SPSS 21.0 [Release 21.0.0.0, IBM, USA].

Results and Discussion

A total of 158 psoriasis patients were included. Our study population was typical for a psoriasis population with 48% of subjects being male (mean age 37 (32-48) years) and 52% female (mean age 39.7 ± 12.1) (Table 1). 76% were ethnically Emirati and 24% of other ethnicities and 74% were married. Regarding cardiovascular risk factors 13% had diabetes, 14% were hypertensive, 43% had a high low density lipoprotein level (LDL), 33% had a raisedcholesterol level, 29% had a raised triglyceride level, 35% were overweight and 45% were obese - BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2) (Table 1). No significant differences were

found in cardiovascular risk factors between the genders (Table 2,3) whilst hypertension was significantly more likely in the married population and a raised triglyceride level more likely in the single population (Table 4,5). Our study analyzed the relationship between certain cardiovascular factors (obesity, diabetes, hypertension, dyslipidemia) with psoriasis and the relationship of selected demographic data with the cardiovascular risk factors among psoriatic patients in UAE. Previous studies demonstrated that psoriatic patients have higher risk of cardiovascular diseases and this risk increases with disease severity [6]. This association was confirmed by studies that demonstrated overlapping proinflammatory cytokines in both psoriasis and cardiovascular disease [7].

Table 1: *Descriptive Statistics for the Study Sample. N = 158.*

DEMOGRAPHICS	
Gender n (%)	
Female	82 (52%)
Male	76 (48%)
Age (years) mean ± SD	39.7 ± 12.1
median (IQR)	37 (32-48)
Nationality* n (%)	
Emirati	101 (76%)
Non-Emirati	32 (24%)
Marital Status* n (%)	
Single	38 (25%)
Married	115 (74%)
Other	2 (1%)
CARDIOVASCULAR RISK FACTORS* n (%)	
Diabetes	
Absent	137 (87%)
Present	20 (13%)
Hypertension	
Absent	135 (86%)
Present	22 (14%)
LDL	
Normal	88 (57%)
High	67 (43%)
Total Cholesterol	
Normal	113 (73%)
High	42 (27%)
Triglycerides	
Normal	122 (79%)
High	33 (21%)
BMI (kg/m^2)* mean ± SD	30.2 ± 6.3
median (IQR)	29 (25.4-34.5)
BMI Category	
Normal	31 (20%)
Overweight	54 (35%)
Obese	70 (45%)
*Data had missing values; % missing: Nationality (16%), marital status (2%), diabetes (0.6%), hypertension (0.6%), LDL (2%), total cholesterol (2%), triglycerides (2%) and BMI (2%). BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2).	

Table 2: *Descriptive Statistics and Comparison of Age by Cardiovascular Risk Factors. Total Number of Subjects = 158.*

Cardiovascular Risk Factors	Mean ± SD	Median (IQR)	p-value*
DIABETES			0.001
Absent	38.5 ± 11.1	36 (31-45.5)	
Present	47.8 ± 15.5	53 (37.8-59)	
HYPERTENSION			<0.001
Absent	38.2 ± 11.8	36 (31-45)	
Present	48.8 ± 10.1	52.5 (40.8-56.3)	
LDL			0.046
Normal	37.9 ± 11.3	36 (29-46)	
High	42.0 ± 13.0	39 (34-54)	
TOTAL CHOLESTEROL			0.006
Normal	38.0 ± 11.0	36 (30.5-46)	
High	44.2 ± 14.1	42 (34-56.3)	
TRIGLYCERIDES			0.15
Normal	39.0 ± 11.6	37 (30.8-46.3)	
High	42.3 ± 13.9	40 (33.5-55.5)	
BMI CATEGORY			0.40
Normal	39.6 ± 11.3	41.5 (29-47.3)	
Overweight	38.8 ± 12.7	36 (31-49)	
Obese	40.4 ± 11.8	37.5 (33.8-49)	
*Based on the Mann-Whitney U test or Kruskal-Wallis test. BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2).			

Table 3: *Descriptive Statistics and Comparison of Gender by Cardiovascular Risk Factors. Total Number of Subjects = 158.*

Cardiovascular Risk Factors n (%)	Female	Male	p-value*
Diabetes - present	8 (10%)	12 (16%)	0.24
Hypertension - present	9 (11%)	13 (17%)	0.25
LDL - high	31 (38%)	36 (49%)	0.19
Total Cholesterol - high	18 (22%)	24 (32%)	0.15
Triglycerides - high	14 (17%)	19 (26%)	0.20
BMI Category			0.30
Normal	16 (20%)	15 (20%)	
Overweight	24 (30%)	30 (41%)	
Obese	41 (50%)	29 (39%)	
*Based on the chi-square test. BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2).			

Table 4: *Descriptive Statistics and Comparison of Marital Status by Cardiovascular Risk Factors. Total Number of Subjects = 158.*

Cardiovascular Risk Factors n (%)	Married	Single	p-value*
Diabetes - present	16 (14%)	4 (11%)	0.58
Hypertension - present	21 (18%)	1 (3%)	0.017
LDL - high	49 (44%)	16 (42%)	0.86
Total Cholesterol - high	32 (29%)	9 (24%)	0.56
Triglycerides - high	19 (17%)	13 (34%)	0.025

BMI Category			0.73
Normal	21 (19%)	9 (24%)	
Overweight	42 (37%)	12 (31%)	
Obese	49 (44%)	17 (45%)	
*Based on the Chi-square test. BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2).			

Table 5: *Multivariate Logistic Regression Models for Cardiovascular Risk Factors. Total Number of Patients = 158.*

MODEL FOR HYPERTENSION	**Odds Ratio (OR)**	**95% CI**	**p-value**
Age (per 10 years)	1.93	(1.21,3.10)	0.006
Gender (male vs. female)	1.70	(0.64, 4.48)	0.29
Marital status (single vs. married)	0.33	(0.04, 3.02)	0.33
MODEL FOR DIABETES			
Age (per 10 years)	2.41	(1.41,4.13)	0.001
Gender (male vs. female)	1.58	(0.57, 4.32)	0.38
Marital status (single vs. married)	3.21	(0.66, 15.59)	0.15
MODEL FOR HIGH LDL			
Age (per 10 years)	1.46	(1.05,2.02)	0.025
Gender (male vs. female)	1.47	(0.76, 2.83)	0.25
Marital status (single vs. married)	1.66	(0.66, 4.16)	0.28
	Odds Ratio (OR)	**95% CI**	**p-value**
MODEL FOR HIGH TOTAL CHOLESTEROL			
Age (per 10 years)	1.71	(1.18,2.49)	0.005
Gender (male vs. female)	1.60	(0.76, 3.37)	0.22
Marital status (single vs. married)	1.80	(0.61, 5.27)	0.29
MODEL FOR HIGH TRIGLYCERIDES			
Age (per 10 years)	2.03	(1.30,3.16)	0.002
Gender (male vs. female)	1.48	(0.65, 3.38)	0.35
Marital status (single vs. married)	8.82	(2.59, 30.00)	<0.001
MODEL FOR BMI: OVERWEIGHT OR OBESE			
Age (per 10 years)	0.96	(0.66,1.40)	0.83
Gender (male vs. female)	0.92	(0.43, 1.80)	0.83
Marital status (single vs. married)	0.80	(0.28, 2.31)	0.68
BMI: Normal (18.5-24.99 kg/m^2), Overweight (25-29.99 kg/m^2) and Obese (>30 kg/m^2).			

Hypertension was found in 14% of study population compared to 13% in UAE population8. Increased blood pressure is associated to the increased level of angiotensin-converting enzyme (ACE), endothelin-1 (ET-1), and rennin [8-12]. Adipose tissues release angiotensinogen which is converted to angiotensin II that stimulates T-cell proliferation [13]. Weight reduction may lower blood pressure as it will reduce the angiotensin II [14]. Hypertension occurs more frequently in patients with psoriasis [15-18]. However, recent literature does not fully support this association 15. In our study, older age was significantly associated with increased hypertension risk [p = 0.006] (Tables 2 and 5). This is consistent with previous studies which concluded that psoriasis patients had an increased risk of hypertension after the age of 40 [19]. In our study, a significant relationship between marital status and hypertension was found. The prevalence of hypertension was higher among married patients [p = 0.017]. Our study showed that 43% of the patients had high LDL, 27% high cholesterol, 21% high triglycerides compared respectively to 38.6%, 42% and 29% among adult Emiratis [20]. Significantly higher prevalence of abnormal triglycerides levels in single patients [34% vs. 17%; p = 0.025] and over 8-fold higher risk of abnormal triglycerides levels than married ones (p <0.001). Older

age was significantly associated with increased risk of higher LDL [p = 0.025], higher cholesterol [p = 0.005] and risk of higher triglycerides [p = 0.002].The relationship of dyslipidemia to psoriasis is explained by the chronic elevation of proinflammatory cytokines which affect the lipid metabolism. Other dyslipidemia causes in psoriasis patients include patient's lifestyle and treatment side effect [21].

Our results are consistent with previous studies that psoriasis patients have higher concentrations of lipid levels [15-23]. Obesity or overweight was found in majority of our patients (80%). The UAE population is the one with world highest obesity level and obesity might be considered as an epidemic. No significant relation was found with age. Adipose tissue, an active endocrine tissue that releases pro-inflammatory cytokines [25,26]. The increased risk of obesity may be secondary to the release of inflammatory cytokines [27]. Obesity with high levels of C-reactive protein and raised erythrocyte sedimentation rate in the absence of inflammatory conditions may exacerbate skin lesions in patients with psoriasis [28]. Psoriasis patients were found to have higher levels of leptin and lower level of adiponectin [29]. Cohort studies suggest that obesity is a risk factor for psoriasis development [30,31]. Large databases of psoriatic patients found that BMI increased in patients after psoriasis diagnosis which might indicate that obesity is secondary to psoriasis.32Some cross-sectional studies found that increased BMI correlates with more severe psoriasis [32,33]. Moreover other studies mentioned that weight loss may improve psoriasis and treatment response [34-36]. Diabetes was found in 13% of our patients compared to 8% in UAE general population 8.The chronic inflammatory nature of psoriasis with the inflammatory mediators will result in epidermal hyperplasia, antagonized insulin signalling and mediate insulin resistance [29-37]. Previous study confirm the coexistence of diabetes in patients with severe psoriasis in 7.1% and with mild psoriasis in 4.4% compared to the control group (3.3%) [33]. Polish study showed slightly higher levels of insulin in psoriasis patients compared to the control group, but at the limit of statistical significance [38].

In our study, age was significantly different in diabetic patients vs. non-diabetics [median, IQR: 53 (37.8-59) years for diabetics vs. 36 (31-45.5) for non-diabetics; p = 0.001]. Older age was significantly associated with increased risk of diabetes [p = 0.001] and this was concurrent with previous studies which found significantly increased odds ratio for developing diabetes among psoriatic patients between 35 and 55 years of age [15-39]. Our results showed significant pairwise associations between a variety of cardiovascular risk factors including diabetes andhypertension [p<0.001], high cholesterol [p = 0.017], high triglycerides [p = 0.034]; hypertension and high cholesterol [p = 0.041], high triglycerides [p = 0.019]; high LDL and high triglycerides [p<0.001] and high cholesterol and high triglycerides [p<0.001]. The study highlights the importance of psoriasis and cardiovascular risk factors relationship. Early routine screening is vital. A previous study found, half of the dermatologists who were aware of the high cardiovascular risk didn't educate their patients [40]. Some studies showed that biologics targeting TNF-alpha may reduce cardiovascular risk factors but no recommended therapies based on that [41,42]. Routine United States-based recommendations for all patients (not only psoriasis) include: 1) a blood pressure check in patients 21 or older, (2) fasting glucose every 3 years in patients above 45 or younger in patients with diabetes risk factors (3) cholesterol screening every 5 years starting at age 20 1. In Abu Dhabi, weqayaprogram was established in 2008 for cardiovascular risk factors screening among UAE individuals [43].

Conclusion

As patients with psoriasis have an increased risk of cardiovascular disease, physicians may put more strict levels for blood pressure and cholesterol [44]. Detecting any abnormalities earlier may reduce the cardiovascular risk. Future studies are needed to know the impact of treatment on the comorbidities. To the best of our knowledge this is the first study examining the cardiovascular risk factors among psoriatic patients in UAE.

Limitations

Our study was a retrospective cross sectional study which doesn't allow the directionality of the association to be established.

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