

The prevalence of cardiovascular diseases risk factors associated with psoriasis in Saudi Arabia

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Type of article: Original

Abstract

Background: Extensive studies have revealed an increased risk of major adverse cardiac outcomes in patients with severe psoriasis. However, some studies show conflicting results.

Objective: This study was conducted to assess the CV risk factors in psoriasis patients, and compare it with non-psoriatic patients. In addition, we evaluated if psoriasis is an independent CV risk factor, if its severity can predict CV risk, and if systemic psoriasis treatments modify CV risk.

Methods: This was a case-control study in 200 participants -100 with psoriasis, and 100 with dermatitis who served as the control. The study was carried out from September 2015 to September 2016. Data was collected using self-administered questionnaires, one each for both groups. Questions include body surface area, current psoriasis/dermatitis therapies, presence of diabetes mellitus, hypertension, smoking history, weight, height, body mass index (BMI), elevated cholesterol, Coronary Artery Disease (CAD) history.

Results: Analyses of the associations between psoriasis and CV symptoms has demonstrated that psoriasis was associated with CAD ($p < 0.001$) and hospitalizations ($p < 0.001$) due to CAD. We found that the psoriasis group have the following association: Angina ($p = 0.005$), hypertension ($p = 0.001$), diabetes mellitus ($p = 0.016$), hypercholesterolemia ($p = 0.015$), and "CAD succeeding psoriasis ($p = 0.001$)" (it assesses how many patients with psoriasis had CAD after they are diagnosed with psoriasis). Our study showed that there was no statistically significant risk of CVD in dermatitis patients ($p = 0.16$). There was no association between severity of psoriasis and CV risk ($p = 0.07$).

Conclusions: There is a higher CV risk prevalence among Saudi psoriatic patients and this confirms that psoriasis is an independent CV risk factor in this population.

Keywords: Psoriasis, Cardiovascular disease, Dermatitis, Case-control, Saudi Arabia

1. Introduction

Psoriasis is a chronic, life-long, inflammatory, immune-mediated dermatological disease affecting the skin and the joints (1). It is characterized by erythematous plaques with white scales covering the scalp, knee and elbow (2). It can occur at any age, and is most common in the age group 50 to 69 (3). There is no clear cause of psoriasis, however, genetic predisposition is evident (4). Psoriasis can lead to physical impairment and psychosocial burden (5). According to the WHO, the prevalence of psoriasis reaches up to 11.4% worldwide and 5% in developed countries (3). Psoriasis can affect many body systems, along with many other factors that eventually will lead to increase cardiovascular (CV) risk, which will increase morbidity and mortality (6). Extensive studies from 1975 to 2008, with over a thousand total subjects revealed an increased risk of major adverse cardiac outcomes in patients with severe psoriasis (7). However, Miller et al. (8), in their Meta-analysis published in 2013, stated that population-based studies failed to show significant associations. Recent literature has shown that systemic inflammation has an implication on atherosclerosis (9). A study performed in the USA showed that patients with psoriasis were

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Received: September 01, 2017, Accepted: October 16, 2017, Published: November 2017

iThenticate screening: October 16, 2017, English editing: November 03, 2017, Quality control: November 06, 2017

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significantly more likely to suffer from atherosclerosis (95% CI: 1.59 to 3.01). They were also significantly more likely to have concomitant ischemic heart disease (95% CI: 1.51 to 2.11) (10). Literature regarding psoriasis and its management in Saudi Arabia remains limited. Isolated studies in 2004 and 2005 have reported the incidence of psoriasis to be 1.5% and 3.4%, in south-western and eastern Saudi Arabia, respectively (11, 12). A retrospective study conducted from January 1991 to December 1994 at the dermatology clinic of King Fahd Hospital in eastern Arabia showed that out of 263 adult patients, the occurrence of psoriasis was 5.3% and higher in males. Furthermore, the mean age of onset in males was 26.9 years and 22.3 years in females. Almost half of psoriatic cases developed before the age of 30, and 8.4% had a family history of psoriasis (13). Another retrospective study performed from 2001 to 2005 at the Riyadh Military Hospital to determine the patterns of skin diseases revealed that from a total of 58,450 cases, 4.61% suffered from erythematous squamous diseases with psoriasis accounting for 2.47% of those cases (14). This was the first study designed to assess the CV risk prevalence among Saudi psoriatic patients. In addition, we evaluated whether psoriasis is an independent CV risk factor, if its severity can predict CV risk, and if systemic psoriasis treatments modify CV risk.

2. Material and Methods

2.1. Research design and participants

The study included 200 participants who were out-patients at the Department of Dermatology at a tertiary care center (King Saud Medical City) from September 01, 2015 to September 01, 2016. The hospital is a reference center for dermatology diseases in the region. The study group consisted of 100 patients with psoriasis and the control group consisted of 100 patients with dermatitis.

2.2. Study design and sample size

This was a case-control study and the sample size of 200 participants was determined based on the following assumptions:

- 3.4% is the previous prevalence of psoriasis reported in Saudi Arabia,
- 5% absolute precision,
- 95% confidence interval.

2.3. Selection criteria for case and control groups

We chose all patients who attended the clinic and then we applied our inclusion and exclusion criteria. In the case group, the inclusion criteria were all adult males and females who attended the clinic for follow up or were newly diagnosed of psoriasis, and the exclusion criteria were patients being less than 18 years old. In the control group, we included all adult males and females who attended the clinic with any dermatological disease. We excluded patients less than 18 years old and those who do not suffer from dermatological disease (cosmetic reasons).

2.4. Data collection

Data was collected using a self-administered questionnaire and checklist formatted in the Arabic language, one each for case and control group. The questionnaire and checklist were created to collect the data collected in a previous study (8). The questionnaire and checklist consisted of 26 multiple choice questions, including body surface area (BSA), current psoriasis/dermatitis therapies, presence of diabetes mellitus, hypertension, smoking history, alcohol consumption, weight, height, body mass index (BMI), elevated triglycerides and cholesterol, CAD history, psoriasis/dermatitis history, family history, and renal impairment (regarding the renal impairment, we asked patients if they had history of renal impairment). The data collected in the questionnaire and checklist were applied to CV symptoms to assess its effect on severity of psoriasis, i.e. data obtained from some questions were meant to assess per New York Heart Association (NYHA) classification and classification by Canadian Cardiovascular (CCS) grading scale. For the control group, CV symptoms were obtained to assess a potential relationship.

2.5. Statistical Analysis

All the statistical analysis was carried out using IBM SPSS statistics for Windows, version 21 (IBM Corp, Armonk, NY). Frequency of the variables were determined by standard method. Comparison of all categorical variables were determined using chi square test or Fisher's exact test, whichever was applicable. A value of $p < 0.05$ was considered as significant.

2.6. Ethics of research

The research ethics committee approved the study. No participants were harmed since there were no interventions regarding patients. Moreover, the questionnaire was self-administered and in checklist form.

3. Results

3.1. Demographics and general findings

3.1.1. Case Group:

A total of 100 patients had psoriasis. The characteristics of patients with psoriasis were as follows: most patients (57%) were in the 20-60 years age group, (45% females and 55% male); 43% were overweight, 26% had psoriasis for >10 years, 43% had psoriasis for 5-10 years and 42 patients had a family history of psoriasis. A total of 26 patients had psoriasis for >10 years and 43 patients had psoriasis for 5-10 years. Forty-two patients had a positive family history of psoriasis. A total of 57 patients had joint pain and 25 were hospitalized for psoriasis. Regarding therapeutic modality, 42 patients were on topical treatment, 46 patients were on systemic treatment, 59 patients were on phototherapy, 19 patients were on anti-TNF, 30 patients were on β -blockers, 44 patients were on NSAIDS, 35 were on anti-depressants and six patients were on other medications. A total of 21 patients had renal impairment of which 13 underwent dialysis, 49 patients had T2DM, 48 patients were smokers, no patients consumed alcohol, 51 patients had elevated cholesterol and 33 patients had a family history of CAD. Regarding disease severity, 24 patients had severe, 43 patients had moderate, and 33 patients had mild psoriasis, as measured by BSA.

3.1.2. Control Group:

This group enrolled 100 patients, of which 99 had dermatitis. Their characteristics were as follows: most patients (59%) were in the 20-60 years age group, (42% females and 58% male); 58% were overweight. A total of 24 patients had dermatitis for >10 years and 48 patients had dermatitis for 5-10 years. Thirty-three patients had a positive family history of dermatitis. Twenty-four patients had joint pain and none were hospitalized for dermatitis. Regarding therapeutic modality, 12 patients were on β -blockers, 41 patients were on NSAIDS and 17 were on anti-depressants. A total of seven patients had renal impairment of which two underwent dialysis, 37 patients had T2DM, 36 patients were smokers, no patients consumed alcohol, 34 patients had elevated cholesterol and 23 patients had a family history of CAD.

3.2. CVD Risk Factors

3.2.1. Case Group:

A total of 56 patients reported a history of CAD. Most patients (58.9%) had a history of CAD for 5-10 years and 53 patients were hospitalized for CAD. The majority of patients (48) had involvement of one artery and 25 patients reported angina. A total of eight patients were classified as grade Four, nine patients were classified as grade Three, seven patients were classified as grade Two and one patient was classified as grade One as per the CCS grading scale. A total of nine patients had heart failure. Heart failure severity was defined as per NYHA Functional Classification as follows: class Three (n=4), class Two (n=2). A total of 12 patients underwent angiography and stent placement and eight patients underwent coronary artery bypass grafting (CABG). A total of six patients had a stroke, 44 patients had hypertension, and 19 patients had peripheral artery disease (PAD). Psoriasis was succeeded by CAD in 73% (41) patients, the duration between the two conditions being >10 years in 15 patients, 5-10 years in 36 patients and <5 years in Ten patients. There was no clear association between severity of psoriasis and CV risk (p=0.07).

3.2.2. Control Group:

A total of 11 patients reported a history of CAD. A total of 36.4% patients had a history of CAD for 5-10 years and 12 patients were hospitalized for CAD. Ten patients had involvement of one artery and reported angina. A total of six patients were classified as grade Three, three patients were classified as grade Two and one patient was classified as grade One as per the CCS grading. A total of five patients had heart failure. Heart failure severity was defined as per NYHA Functional Classification as follows: class Three (n=2), class Two (n=3). A total of three patients underwent angiography and two patients had a stent placed and three patients underwent coronary artery bypass grafting (CABG). A total of three patients had a stroke, and 22 patients had hypertension. Dermatitis was succeeded by CAD in only one patient, the duration between the two conditions being >10 years in four patients, and 5-10 years in seven patients.

3.3. Analysis of association between psoriasis and CVD

Analyses of the associations between psoriasis and CV symptoms has demonstrated that psoriasis was associated with CAD (p<0.001) and hospitalization (p<0.001) due to CAD; use of medications such as beta blockers (p=0.002), anti-depressants (p=0.004); angina (p=0.005), angiography (p=0.016), stent placement (p=0.006), hypertension (p=0.001), CAD succeeding psoriasis (p<0.001), peripheral vascular disease (p<0.001), renal impairment (p=0.004), dialysis (p=0.003), diabetes (p=0.016), and hypercholesterolemia (p=0.015) (Table 1).

Table 1. Comparative analysis of Psoriasis versus Control group

Characteristics		Dermatitis; n (%)	Psoriasis; n (%)	p-value	
Age (years)	<20	18	15	0.671	
	20-60	59	57		
	>60	23	28		
Gender	Male	42	45	0.669	
	Female	58	55		
Body Mass Index	Normal	12	21	0.073	
	Overweight	58	43		
	Obese	30	36		
Disease (Psoriasis/ dermatitis)	No	0	0		
	Yes	100	100		
Duration of disease (Psoriasis/dermatitis) (year)	>10	24	26	0.776	
	5-10	48	43		
	<5	28	31		
Family history of disease (Psoriasis/ dermatitis)	No	67	58	0.189	
	Yes	33	42		
Joint pain	No	76	43	<0.001	
	Yes	24	57		
Beta blockers	No	88	70	0.002	
	Yes	12	30		
NSAIDS	No	59	56	0.668	
	Yes	41	44		
Antidepressant	No	83	65	0.004	
	Yes	17	35		
Coronary Artery Diseases (CAD)	No	89	44	<0.001	
	Yes	11	56		
Duration CAD (n=67) (year)	>10	3 (27.3)	12 (21.4)	0.293	
	5-10	4 (36.4)	33 (58.9)		
	<5	4 (36.4)	11 (19.6)		
Number of involved coronary arteries (n=67)	One	10	48		
	Two	1	7	1.000	
	Three	0	1		
Angina	No	90	75	0.005	
	Yes	10	25		
Canadian Cardiovascular Society (CCS) (n=35)	Grade 4	No	10 (100)	17 (68)	0.073
		Yes	0 (0)	8 (32)	
	Grade 3	No	4 (40)	16 (64)	0.266
		Yes	6 (60)	9 (36)	
	Grade 2	No	7 (70)	18 (72)	1.000
		Yes	3 (30)	7 (28)	
Grade 1	No	9 (90)	24 (96)	0.496	
	Yes	1 (10)	1 (4)		
Angiography	No	97	88	0.016	
	Yes	3	12		
Heart failure	No	95	91	0.268	
	Yes	5	9		
New York Heart Association (NYHA) (n=14)	Class 4	No	5 (100)	9 (100)	--
		Yes	0	0	
	Class 3	No	3 (60)	5 (56.6)	1.000
		Yes	2 (40)	4 (44.4)	
	Class 2	No	2 (40)	6 (66.7)	0.580
		Yes	3 (60)	3 (33.3)	
Class 1	No	5 (100)	7 (77.8)	0.505	
	Yes	0 (0)	2 (22.2)		
Stent	No	98	88	0.006	
	Yes	2	12		
Stroke	No	97	94	0.498	
	Yes	3	6		

CABG	No	97	92	0.121
	Yes	3	8	
Hypertension	No	78	56	0.001
	Yes	22	44	
Which started first (n=67)	Disease (Dermatitis/ psoriasis)	1 (9.1)	41 (73.2)	<0.001
	CAD	10 (90.9)	15 (26.8)	
Duration between psoriasis/ Eczema and CAD (n=67) (year)	>10	4 (36.4)	15 (26.8)	0.769
	5-10	7 (63.6)	36 (64.3)	
	<5	0 (0)	5 (8.9)	
Peripheral Vascular Disease	No	100 (100)	80 (80.8)	<0.001
	Yes	0	19 (100)	
Admitted due to CAD	No	88 (88)	46 (46.5)	<0.001
	Yes	12 (12)	53 (53.5)	
Renal impairment	No	93	79	0.004
	Yes	7	21	
Dialysis	No	98	87	0.003
	Yes	2	13	
Diabetes	No	62	45	0.016
	Yes	38	55	
Type of Diabetes (n=92)	Type 1	0 (0)	6 (10.9)	0.038
	Type 2	37 (100)	49 (89.1)	
Family history of CAD	No	77	67	0.115
	Yes	23	33	
Smoking	No	64	52	0.086
	Yes	36	48	
Alcohol	No	100	100	--
	Yes	0	0	
Hypercholesterolemia	No	66	49	0.015
	Yes	34	51	

4. Discussion

Several observational studies have been conducted to analyze the association of psoriasis with cardiovascular disease. Some studies have shown association between them (15), and some studies have not (16). Thus, our study was conducted to analyze the relationship between psoriasis and CVD, and to assess a potential relationship between dermatitis and CVD. In our study, we compared patients who had psoriasis with a group of patients with dermatitis, matched for age and gender in order to assess if the inflammatory process in patients with psoriasis, as opposed to those with dermatitis, is different in a way that predisposes them to develop CV risk factors. We observed that psoriasis was associated with CVD risk factors when comparing to the dermatitis group. Our study showed that there was no statistically significant risk of CVD in dermatitis patients ($p=0.16$). This is in-line with the findings of Marshall et al. (17). The results from our study have not shown an association between psoriasis and either age, gender, BMI or family history of psoriasis. Also, the severity of psoriasis was not associated with CV risk. In our study, psoriasis was associated with the use of beta blockers ($p=0.002$) which is similar to the Danish cohort ($p<0.001$) (18). In the past, beta-blockers were known to cause drug-induced/exacerbation of psoriasis. Studies have shown that beta-blocker-provoked psoriasis improves upon discontinuation of medication, but usually does not completely resolve. Thus, it is recommended to use topical and systemic agents for psoriasis (19). Our study has shown an association between psoriasis and anti-depressants ($p=0.004$). These findings were in accordance with a UK study in which psoriasis was found to be associated with increased risks of depression, and the risk of depression was greatest among patients who were receiving therapies for severe psoriasis (HR, 1.72 [95% CI, 1.57 to 1.88]) (20). Results of our study have shown a significant association between psoriasis and CAD ($p<0.001$) and hospitalization ($p<0.001$) due to CAD, and CAD succeeding dermatitis ($p<0.001$). This is in line with the study by Mahiques-Santos et al, which showed an increased risk of ischemic CAD ($p<0.05$) in a large sample of patients in a Mediterranean area (21). Psoriasis patients in our study showed an association with cardiovascular procedures such as angiography ($p=0.016$) and stent placement ($p=0.006$).

As shown in large population-based observational studies, our study also showed an association between psoriasis and hypertension ($p=0.001$). The severity of psoriasis is directly proportional to the odds of hypertension (22). In 2013, a UK cohort study showed that severe psoriasis is a risk factor for chronic kidney disease and end-stage renal

disease, independent of age, sex, BMI, CVD, diabetes, hypertension, hyperlipidemia, and nephrotoxic medications (23). These findings are in line with our study which showed psoriasis is associated with renal impairment ($p=0.004$) and dialysis ($p=0.003$). In a systematic review of 20 of 25 studies, there were significant associations between psoriasis and dyslipidemia, with ORs ranging from 1.04 to 5.55 (24). These findings are in line with those from our study, which show that psoriasis is associated with hypercholesterolemia ($p=0.015$). Similar to previous reports, we observed that psoriasis was found to be associated with diabetes ($p=0.016$) i.e. type 1 diabetes ($p=0.038$) (15). In addition, data from literature highlight the strong relationship between Type 1 diabetes and psoriasis by means of the IL 23/IL-17 and IL-18 axis (25). Our study showed association between psoriasis and angina ($p=0.005$), peripheral vascular disease ($p<0.001$). This concurs with the findings from the Danish cohort which showed that psoriasis is associated with increased risk of adverse cardiovascular events (18). A Spanish literature review by Torres in 2013 has suggested psoriasis to be a contributing and potentially independent risk factor for the development of CV comorbidities and precocious atherosclerosis (19). Studies have shown that in patients with psoriasis, systemic anti-inflammatory therapy with methotrexate may reduce the incidence of CVD (26). Our study has shown that 25% patients had severe psoriasis as measured by BSA, and 50% patients were on systemic therapy. Despite this, there was no significant association with CV risk. Overall, the results of our study show an obvious relationship between CVD and psoriasis and a potential risk of developing CVD. The relationship between psoriasis and CVD is not a result of inflammation alone, also stress, sedentary lifestyle and low control of CV risks are predominant in Saudi Arabia. Thus, clinicians need to screen and monitor CVD and its risk factors in psoriatic patients (27). In addition to lifestyle interventions, psoriasis patients should be considered for statin therapy to delay CV risks. Regarding the study limitation, we should say that the data were self-reported.

5. Conclusions

In summary, there is a high CV risk among psoriatic patients in Saudi Arabia and psoriasis is an independent CV risk factor in this population. This potentially has significant implications regarding screening and early treatment of CAD along with strategic prevention. Future studies are needed to confirm these findings. Also, this study was conducted in Saudi Arabia so the results cannot be generalized across the world due to differences in risk factors in different regions, and multi center or multi society research could be a recommended path for future development in this research.

Acknowledgments:

Special thanks to Abdulmohsen Albagami and Saad Alhargan for their help during data collection.

Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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