

## IN-DEPTH REVIEWS

### Review of the Prevalence of Cardiovascular and Metabolic Comorbidities of Psoriasis

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#### ABSTRACT

**Introduction:** Psoriasis is a common disease that is linked with several other diseases. Our goals were to analyze and present literature on prevalence of various psoriatic comorbidities, and provide an estimate of what percent of psoriasis patients might have or develop Myocardial/cardiovascular/heart disease, stroke, diabetes, obesity, hypertension, or metabolic syndrome.

**Methods:** To collect the results, we searched PubMed to identify papers that studied the frequency of the most common comorbidities of psoriasis. We used about 20. The search terms used were the particular comorbidity (or synonyms) and psoriasis. Papers were selected where the prevalence data were listed by percentages of the studied population. Prevalence data from each paper were collected and charted, and then compared. We did not use data that concerned Psoriatic Arthritis. We also recorded outliers, where frequencies did not fit with the other data found.

**Results:** Results for prevalence of myocardial/cardiovascular/heart disease were mixed, varying by age and severity of disease. There are few papers on prevalence of stroke, but our review suggests risk of stroke increases with severity of psoriasis. The prevalence of diabetes was largely between 10% and 20%. Obesity's prevalence was mostly between 15% and 30%, while hypertension hovered around 30%, and metabolic syndrome prevalence was mostly between 27% and 50%.

**Conclusion:** There are many comorbidities of psoriasis. The complex interaction between cutaneous inflammation and heart disease, stroke, diabetes, hypertension and metabolic syndrome raises many questions about cause and effect or simple association.

#### INTRODUCTION

Psoriasis is a common disease of the skin characterized by erythematous scaling plaques that can be linked to several other

diseases that can have severe health consequences for the patient.<sup>1</sup> There have been a number of research studies exploring the prevalence of comorbidities-such as myocardial/heart disease, stroke, diabetes,

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obesity, hypertension, and metabolic syndrome-in various populations of psoriasis patients.<sup>1</sup> This paper reviews the literature on the prevalence of specific psoriasis comorbidities and summarizes published findings on the frequency of each of these conditions in psoriasis patients. These results are discussed below and summarized in Table 1. We aim to review the literature on the prevalence of specific psoriasis co-morbidities and summarizes published findings on the frequency of each of these conditions in psoriasis patients. These results are discussed below and summarized in Table 1. The discussion below demonstrates that psoriasis can range from mild to severe and can be associated with a wide variety of comorbidities. As we better understand these variables, it becomes clear that the most effective treatment regimens are targeted to the specific disease manifestations, comorbidities, previous treatments, and impact on patients' quality of life.<sup>2,3</sup>

## METHODS

We searched PubMed to identify papers that studied the frequency of the most common co-morbidities of psoriasis. The search terms used were the particular comorbidity (or synonyms) and psoriasis. Papers were selected where the prevalence data were listed by percentages of the studied population. Prevalence data from each paper were collected and charted, and then compared. We did not use data that concerned Psoriatic Arthritis. We also recorded outliers, where frequencies did not fit with the other data found, and they are discussed below.

## RESULTS

### *Cardiovascular Disease*

Cardiovascular disease (or myocardial disease or heart disease) is one of the most commonly reported comorbidities of psoriasis. Studies suggest mixed correlation with psoriasis. Some studies showed, a relationship between increasing psoriasis severity and decreasing prevalence of cardiovascular disease, while others showed increasing risk with increasing severity of psoriasis. Studies also showed that the increase in risk is particularly noteworthy in younger patients, partly because baseline risk of myocardial infarction is greater in older patients. It is also apparent that psoriasis with other cardiovascular risk factors increases the risk of heart disease. Studies have reported very different prevalences of cardiovascular disease in psoriasis patients, ranging from 1.8% to 17.7%.

According to a 2018 study published by Hajiebrahimi et al, myocardial infarction had a prevalence of 2.5%, 2.3%, and 1.8%, when Psoriasis was mild, moderate, and severe, respectively.<sup>4</sup> It also suggested that younger patients were at higher risk of myocardial infarction. That range of results is supported by a 2015 study, which found that 2.59% of psoriasis patients had a major cardiovascular event as compared to 2.3% of controls.<sup>5</sup> This study concluded that psoriasis was not-independent of other risk factors-associated with an increased risk of cardiovascular events.<sup>5</sup> According to Gelfand et al., the prevalence of myocardial infarction in mild and severe psoriasis was 1.8% (mild) and 2.9% (severe).<sup>6</sup> It also indicated that the risk of myocardial infarction was increased in younger psoriasis patients as opposed to older patients. Differing only slightly were the

results of a ten-year review of Malaysian psoriasis patients, which reported the prevalence of ischemic heart disease at 5.45% and the prevalence of cerebrovascular disease at 1.6%.<sup>7</sup> A 2017 study of Czech registry patients found the prevalence of coronary heart disease to be 4.9%.<sup>8</sup> In contrast, Schaarschmidt et al found that the prevalence of cardiovascular disease was 15%.<sup>9</sup> Even larger was the prevalence of cardiovascular disease reported by BMC Health Service Research, at 17.7%.<sup>10</sup> However, by far the highest prevalence was from Assessment of Possible Drug Interactions in Patients with Psoriasis and Associated Comorbid Medical Conditions: An Observational Study, which reported the prevalence of cardiovascular comorbidities at a staggering 77.3%.<sup>11</sup> Nevertheless, this paper noted that this unusually high percentage might be attributable to the fact that the study was focused in India, where cardiovascular comorbidities are more common.

### **Type 2 Diabetes Mellitus**

Type 2 diabetes mellitus (DMII) is another common comorbidity of psoriasis. DMII's prevalence in psoriasis patients mostly hovers between 10% and 20%, higher than in control groups, with the prevalence increasing with the severity of psoriasis. According to a 2018 study on patients in Swedish health registries, the prevalence of DMII is 7.6% (mild psoriasis), 8.0% (moderate-severe psoriasis), and 10.7% (severe psoriasis).<sup>4</sup> French and Czech studies found the prevalence of DMII in psoriatic patients to be 11%<sup>12</sup> and 11.4%<sup>8</sup> respectively. The Czech study also refers to other European registries showing a prevalence of DMII in psoriasis patients of 9.9-12%. Similarly, 2017 and 2018 studies found the prevalence of DMII in psoriasis patients to be 10%<sup>13</sup> and 12%,<sup>14</sup>

respectively. Another 2015 paper by Schaarschmidt et al. reported the prevalence of DMII to be 14.5%<sup>9</sup> while a review from the Malaysian Psoriasis Registry, spanning 2007-2016, and a study of over 2,700 patients in the Brigham psoriasis and psoriatic arthritis registries both found the prevalence of DMII in their cohorts to be at or near 17%.<sup>7,15</sup> All other results were close to the results mentioned, and can be found in Table 1 below, except for one unusual finding. Far and away the largest percentage found of DMII in psoriasis patients was the 49.3% found in an observational study of psoriasis patients taking two or more drugs.<sup>11</sup>

### **Stroke**

Stroke is another serious comorbidity of psoriasis, but only a few studies assess the correlation between the two conditions. One study, however, demonstrated a 2.4% prevalence of stroke in individuals with mild psoriasis, 2.2% in individuals with moderate to severe psoriasis, and 1.1% in individuals with severe psoriasis.<sup>4</sup>

### **Obesity**

Obesity is a risk factor for cardiovascular and other diseases, and is also a common comorbidity of psoriasis, with reports of prevalence ranging from 15.2% (in a study of the Czech national registry of psoriatic patients treated with biologics, and a comparison with other European registries)<sup>8</sup> to 32.6% (a study of prevalence of metabolic disease and its various components comparing 95 psoriatic patients to 95 controls).<sup>16</sup> A French study of 2,210 patients reports the prevalence to be 24%,<sup>12</sup> while a large study over 48,000, and another of over 15,000 patients, report 20.36%<sup>5</sup> and 24.3%<sup>7</sup> respectively. Trattner et al. report 27% in a study of plantar pustulosis.<sup>17</sup>

## **Hypertension**

Hypertension can potentially cause many other diseases including cardiovascular disease and stroke. Salunke et al. reports a prevalence rate of hypertension at 18.9%, but found that the rates increased with the duration of psoriasis.<sup>16</sup> The Malaysian study reports prevalence rate of 25.6%.<sup>7</sup>

Many studies show results in a consistent range. Hajiebrahimi et al. found the prevalence of hypertension in psoriasis patients at 29.9% (moderate psoriasis), 32.6% (moderate-severe psoriasis), and 36.5% (severe psoriasis).<sup>4</sup> The French study mentioned above found the prevalence to be 26%.<sup>12</sup> An *Australas Journal of Dermatology* paper reports the rate of hypertension in psoriasis patients to be 30%,<sup>14</sup> as does a Brazilian study.<sup>18</sup> The study of the Czech registries reports the prevalence at 35.2%,<sup>8</sup> and similarly, Schaarschmidt et al. listed the prevalence of hypertension at 31.5%.<sup>9</sup>

Similar to the Czech study, a study of over 48,000 psoriasis patients and over 200,000 controls, spanning the years 1994-2009 showed a baseline of 15.39% prevalence of hypertension (compared to nearly 15% in the controls). By the end of the followup period (median of just over 5 years), the hypertension prevalence rose to 24.72% (mild psoriasis) and 31.62% (severe psoriasis), and 31.6% among controls.<sup>5</sup> Other studies found outcomes in similar prevalence ranges of 30%,<sup>18</sup> 32.8%,<sup>19</sup> 32%,<sup>17</sup> 34.3%,<sup>10</sup> and 35%,<sup>13</sup> respectively. In the Brigham study the prevalence was reports at 45%.<sup>15</sup>

## **Metabolic Syndrome**

Metabolic syndrome is a conglomerate of other diseases, defined generally to include several conditions that might include obesity, hypertension, and glucose

intolerance.<sup>20</sup> Choudhary et al. surveyed 63 studies and found the occurrence of metabolic syndrome in psoriasis patients to be as high as 50% as compared to 15-25% among the general population.<sup>20</sup> Another study found the rate to be 30%.<sup>14</sup> According to Hajiebrahimi et al., metabolic syndrome has a prevalence of 50% in psoriasis patients.<sup>4</sup> Argote et al. also found a high 50% prevalence.<sup>13</sup> A similarly high finding in a study of 97 patients, reports 49.4% prevalence.<sup>21</sup>

In the study by Choudhary et al., a rigorous analysis of 63 papers, sorted by age, gender, and continent, studied 119,923 participants, of which 15,939 were psoriasis patients. Metabolic syndrome was reported among 30.29% of psoriasis patients, compared with 21.70% in the control group.<sup>20</sup> Among these patients, 50% of South American patients were reported to have metabolic syndrome, compared to 27.14 in the control group, and 27.12 of Asian patients, compared with 16.95% of the control patients.<sup>20</sup> In a case-control study from Western Maharashtra, the reported prevalence rate was 38.9%.<sup>16</sup> Similarly, Curco et al., in a 2018 paper, report a prevalence of 30%.<sup>14</sup> The second-lowest score came from a plantar pustulosis study in which a cross-sectional analysis in 102 patients claimed a prevalence of 26%.<sup>17</sup> However, the lowest prevalence rate, was a low 20.8%.<sup>22</sup>

## **CONCLUSION**

There are many comorbidities of psoriasis. While the prevalence of each comorbidity varies according to publication as does the association with severity of psoriasis, it is clear that psoriasis is more than just a skin disease. The complex interaction between

cutaneous inflammation and heart disease, stroke, type 2 diabetes mellitus, hypertension and metabolic syndrome

raises many questions about cause and effect or simple association.

**Table 1.** Summary of Prevalence of Psoriasis' Comorbidities with PMID Citations

PMID	Myocardial/Cardiovascular/Heart Disease	Stroke	Diabetes Mellitus	Obesity	Hypertension	Metabolic Syndrome
29950900 Hajiebrahimi	2.5% (mild PS), 2.3% (moderate-severe PS), 1.8% (severe PS)	2.4% (mild PS), 2.2% (moderate-severe PS), 1.1% (severe PS)	7.6% (mild PS), 8.0% (moderate-severe PS), 10.7% (severe PS)		29.9% (mild PS), 32.6% (moderate-severe PS), 36.5% (severe PS)	50.0%
26969480 Phan			11%	24%	26%	
28181669 Kojanova	4.9% coronary heart disease		11.4% (9.9-12% various registries)	15.2%	35.2% (21%-33.8% various registries)	
26633680 Schaarschmidt	15%		14.5%		31.5%	
28969252 Salunke				32.6%	18.9%	38.9%
25742120 Parisi	2.59% CV event (v. 2.3% in controls)		5.64% (initial PS) ≥ 9.02% (severe)	20.36%	15.39% (initial PS) ≥ 24.72% (mild); 31.62% (severe)	
29849578 Mohd Affandi	ischemic heart disease 5.45; cerebrovascular disease 1.6%		17.2%	24.3%	25.6%	
28814312 Schneeweiss			17%		45%	
28240341 Curcó			12%	67% (obese or overweight)	30%	30%
28099594 Duarte					30%	
26402388 Feldman			15.8%		32.8%	
26829958 Sherin	77.3%		49.3%			
31595859 Choudhary						27.12%-50%
28482887 Feldman	17.7% (17.45% moderate-severe, 17.8% mild PS)		14.2% (15.92% moderate-severe, 13.7% mild PS)	4.88% (5.18% moderate-severe, 4.79% mild PS)	34.3% (34.86% moderate-severe, 34.16% mild PS)	

PMID	Myocardial/Cardiovascular/Heart Disease	Stroke	Diabetes Mellitus	Obesity	Hypertension	Metabolic Syndrome
28662815 Argote			10%		35%	50%
30133617 Ferdinando						49.4%
26316538 Lai						20.8%
17032986 Gelfand	MI: 1.8% (mild PS) and 2.9% (severe)					
28252813 Trattner				27%	32%	26%

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