



Epidemiology of Psoriasis: Comorbidities Frequency and Healthcare Services: A Descriptive Study of 122 189 Patients in Mexico

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Abstract

Objective: The purpose of this pilot study was to describe the clinical and epidemiological behavior related to psoriasis in adult patients, older than 18 years in a period of 5 years in Mexico is used the database System of Analysis of Noncommunicable Diseases (SANENT) in the IMSS.

Methods: Observational, retrospective and descriptive study (2013-2017), with the ICD-10 codes, which was obtained from the information systems of the Mexican Social Security Institute (IMSS). A total of 122,189 records of people diagnosed with psoriasis.

Results: The study included from 2013 to 2017, psoriasis patients had an average age of 48.2 years. It was identified that 0.8% (n=1,007) recorded hospital discharges during the mentioned period. In 12% of hospitalized patients, the presence of some comorbidity added to psoriasis was documented, the most frequent being the presence of systemic heart disease (41%) and psoriatic arthritis (34%). The factors that increased the length of hospital stay were in-hospital complications (p=0.001), surgical procedures (p=0.001) and age (p<0.001). The factors that were associated with an increased risk of presenting in-hospital complications were age (OR 1.02), while in male sex (OR 0.57) was a protective factor. The factor associated with the risk of death was age (OR 1.02). The prevalence in health services found in adults with psoriasis was 0.38%. In hospitalized patients they had a mortality of 5.79%.

Conclusions: In this study demonstrated that in psoriasis patients the age was a constant risk factor for longer hospital stay, hospital complications and mortality; also, surgical procedures and hospital complications increased the length of hospital stay.

Keywords

Psoriasis, Epidemiology, Prevalence, Comorbidities, Complications, Hospitalizations, Mortality

Introduction

Psoriasis is a chronic, immunologically mediated multisystem disease that predominantly affects the skin and joints, Psoriasis is a chronic inflammatory skin condition that acts systemically and can cause hair loss at any affected site, including the scalp. Psoriatic alopecia of the scalp is usually non-scarring. It can present in regions of active disease or as a generalized telogen effluvium and can be due to systemic medications or even caused by the friction from applying local therapy [1,2]. It affects 2-3% of people in the United States and Europe [3,4]. In Mexico, epidemiological studies on this disease are scarce, but a prevalence of 2% is estimated, which would be equivalent to approximately 2 million Mexicans with psoriasis [5]. However, in clinical practice it is considered one of the most frequent dermatological diseases [6].

The exact pathogenic mechanism that leads to inflammation associated with the disease is not yet fully known [7]. The complex interactions between keratinocytes, dendritic cells, T lymphocytes, neutrophils and mast cells are responsible for the histopathological changes observed in psoriasis, named elongated ridges, hyperkeratosis with parakeratosis, microabscesses of Munros and dilated vessels in the dermal papilla [8]. Although it is considered an inflammatory pathology mediated by T cells, cells belonging to both adaptive and innate immunity and non-immune cells are highly involved [9]. Thus, psoriasis is a genetically programmed pathologic interaction among skin cells, immunocytes, and numerous biologic signalling molecules that is triggered by environmental stimuli. It was found that dendritic cells, natural killers and macrophages were involved in the pathogenesis of psoriasis [10].

Comorbidities of psoriasis include psoriatic arthritis, which is a progressive inflammatory arthritis present in up to 30% of psoriasis patients, with an increased risk in more extensive psoriasis, metabolic syndrome, inflammatory bowel disease, opportunistic infections, neoplasms, depression, anxiety and even suicide [11-14].

It is considered that one of the main problems in the treatment of psoriasis is the substantial lack of knowledge of the disease, among patients and medical professionals. Mexico is a developing country where the practice of folk medicine is still strong. A large percentage of patients have no idea of their disease. Often, they are desperate and rely on a lot of strange treatments that undergo healers and fraudulent practices. This results not only in personal economic losses, but in late diagnoses and medical care, as well as possible medical complications created by these practices. In this context, there is a substantial percentage of patients with severe forms of psoriasis who are not receiving adequate treatment. The majority continue to be treated with topical prescriptions and there is some resistance on the part of some doctors, to use systemic treatment in patients with moderate or severe psoriasis.

There is no updated epidemiological data of this disease in Mexico, nor the change in the morbidity and mortality rate that occurs in our population, so the objective of our study was to describe the clinical and epidemiological behaviour related in patients with psoriasis over 18 years of age of the Mexican Social Security Institute (IMSS) in a period of 5 years (January 2013 to December 2017).

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Methodology Applied

Study design

A observational, retrospective and descriptive study was conducted in patients with psoriasis 18 years of age or older treated between 2013 and 2017 in the IMSS.

Data Sources: The data for this study were records compiled through the Comprehensive Healthcare Information System, the hospital records of the Medical Statistics System (DataMart) and the database System of Analysis of Noncommunicable Diseases (SANENT®) of the IMSS, and the Family Medical Units (UMF) database. The IMSS database contains records for each patient, including those who attended medical check-ups at the first-, second- and third-level care clinics. Diseases are reported using International Classification of Diseases (ICD10) codes. Likewise, the procedures performed during the hospital stay were recorded by means of the international classification of procedure codes (ICD-9-MC).

Baseline variables and follow-up and clinical outcomes

The variables of sex, age and location were described. The town was divided according to its geographical distribution in the North regions (Baja California, Baja California Sur, Chihuahua, Coahuila, Nuevo León, Sinaloa, Sonora, Tamaulipas), Centro (State of Mexico, Federal District, Hidalgo, Morelos, Puebla, Querétaro, Tlaxcala), Central-West (Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí, Zacatecas) and South-Southeast (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz, Yucatan).

In hospital discharges, in addition to including sex, age and location, the days of stay, complications and reasons for discharge were described. For comorbidities, they were specifically described: psoriatic arthritis, cardiovascular diseases related to atherosclerosis, Crohn's disease, ulcerative colitis, depression and anxiety, as well as mortality.

For the intentional search for psoriasis the following ICD-10 codes were used: L40 which includes psoriasis, (L40.0) vulgar psoriasis, (L40.1) generalized pustular psoriasis, (L40.2) continuous acrodermatitis, (L40.3) plantar palm pustulosis, (L40.4) guttata psoriasis, (L40.8) other psoriasis and (L40.9) unspecified psoriasis.

For comorbidities, those patients were identified with the diagnoses that included the codes of systemic heart disease (I.20 to I.25), cerebral infarction (I.63), stroke not specified as haemorrhage or infarction (I.64), occlusion and stenosis of pre-cerebral arteries, not resulting in cerebral infarction (I.65), disorders of the metabolism of lipoproteins and other dyslipidaemias (E.78), non-infectious enteritis and colitis (K50 to K52), Crohn's disease (K50), ulcerative colitis (K51), other gastroenteritis and non-infectious colitis (K52), depression (F.32 to F.34) and anxiety (F.40 to F.48).

The primary outcomes that were included were for hospitalized patients, hospitalization, duration of hospital stay, complications, surgical procedures and deaths were considered.

Ethics approval

The study was approved by the institutional review boards of the National Research and Health Ethics Committee of IMSS, with the registry number R-2014-785-024. It was conducted in accordance with the Declaration of Helsinki and the guidance for good clinical

practice (November 30, 2006) and regulations of the Specialty Hospital of National Centre Medical, of the Mexican Social Security Institute (CMN SXXI-IMSS), in accordance with the Official Mexican Standard (NOM-012-SSA3-2012)

Statistical analysis

For the quantitative variables (age and days of hospital stay), the non-parametric Kolmogorov-Smirnov normality test was performed. Quantitative variables were described by means and standard errors. For qualitative variables proportions and frequencies were calculated. Patients were divided into two groups, in those with and without comorbidities (CM). To compare the age and days of hospital stay between the groups was through the Mann Whitney U test. For in-hospital complications, surgical procedures and mortality, the chi-square test was calculated. A multiple linear regression model was used to identify the factors related to the days of hospital stay; To explain the hospital complications and mortality, a multiple logistic regression model was performed. The value of $P < 0.05$ was defined as statistical significance. All analyses were done with STATA version 12.

Results

Study participation

During the analysis period, of the total registry of beneficiaries with attention in the IMSS over 18 years of age were of $n=31,600,422$. But 419,756 consultations of patients diagnosed with psoriasis were registered, of which 29.1% ($n=122,189$) were first-time consultations, and 70.9 subsequent% ($n=297,555$); This reflects the use of psoriasis services in adults treated in the IMSS. In the general characteristics of the population of first-time, a marginal predominance of the male sex was observed (53.1%), with a general average age of 48.2 years (Table 1).

According to the geographical region of the country, the highest prevalence of use of health services due to psoriasis was in the Northern region, followed by the Central region. A total of 122,189 patients who received first-time consultation were identified, while 297,555 patients received subsequent consultations; also, the average was 1.3 ± 0.01 consultations. Of the total of subjects attended in the external IMSS consultation, only 3.4% ($n=4,211$) were treated for the first time in third level medical units. With respect to the medical specialty that attended to patients, 56% were dermatology, 45% family medicine, 5% rheumatology and 5% internal medicine (Table 1).

Of the patients registered with psoriasis ($n=122,189$), it was identified that only 0.8% ($n=1,007$) registered at least one hospital discharge during the analysis period. Of this group of patients there was a predominance in the male sex (67%) with an average age of 53.8 years. In the majority of cases (70%), the reason for hospitalization was urgent, with an average hospital stay of 5.4 ± 0.19 days in said discharges (Table 2).

With respect to the diseases that conditioned hospitalization, the finding that it is the psoriasis itself that is first in 38% ($n=385$), followed by cardiovascular disease in 12.22% ($n=123$) and infections of the skin and subcutaneous tissue with 5% ($n=52$). With respect to the geographical region, the northern zone had the highest percentage of hospitalized patients in 38.1% ($n=384$), followed by the central zone in 25.6% ($n=258$) and central-western in 21.5% ($n=220$) (Table 2).

Table 1: General characteristics of 419,756 consultations of patients diagnosed with psoriasis from 2013 to 2017.

n		First time	Subsequent 297,555
		122,189 (29.1%)	-70.90%
		Frequency (%)	Frequency (%)
Age (years)*		48.2 (0.05)	51.7 (0.03)
Male sex		64,931 (53.14)	158,329 (53.21)
Consultation according to the type of Specialty	Family Medicine	32,013 (26.20)	155,656 (52.31)
	Dermatology	68,551 (56.10)	114,366 (38.44)
	Rheumatology	5,836 (4.78)	15,156 (5.09)
	Internal Medicine	6,692 (5.48)	7,277 (2.45)
	Emergency medicine	6,224 (5.09)	835 (0.28)
	General Surgery	688 (0.56)	674 (0.23)
Others		2,185 (1.79)	3,591 (1.21)
Consultation year	2013	25,161 (20.59)	60,432 (20.31)
	2014	25,155 (20.59)	60,062 (20.19)
	2015	24,598 (20.13)	59,596 (20.03)
	2016	24,174 (19.78)	59,163 (19.88)
	2017	23,101 (18.91)	58,302 (19.59)
Geographic region	North	40,333 (33.01)	105,112 (35.33)
	Center	38,370 (31.40)	82,291 (27.66)
	Central West	20,568 (16.83)	54,162 (18.20)
	South-Southeast	22,918 (18.76)	55,990 (18.82)
Level of attention medical	First	30,904 (25.29)	130,042 (43.70)
	Second	87,061 (71.25)	143,927 (48.37)
	Third	4,211 (3.45)	23,453 (7.88)

*Medium (Standard Error) Others, in these consultations were reported specialties with fewer consultations such as: ophthalmology, gynecology, endocrinology, audiology.

The IMSS database contains records for each patient, including those who attended medical check-ups at the first-, second- and third-level care clinics. Diseases are reported using International Classification of Diseases (ICD10) codes

Table 2: General characteristics of 1,007 patients diagnosed with psoriasis and hospitalized from 2013 to 2017.

		Frequency (%)
Age (years)*		53.85 (0.49)
Male sex		677 (67.23)
Type of Hospitalization	programmed	300 (29.79)
	Urgent	707 (70.21)
Reason for hospitalization	Psoriasis	385 (38.23)
	Cardiovascular disease	123 (12.22)
	Infection of the skin and subcutaneous tissue	52 (5.16)
Arthropathies and complications due to prosthetic devices		45 (4.47)
Respiratory diseases		36 (3.57)
Bone fracture		23 (2.28)
Liver failure		19 (1.89)
Bleeding from the digestive tract		19 (1.89)
Urinary tract infection		18 (1.79)
Others		287 (28.50)
Days of hospital stay *		5.48 (0.19)
Comorbidities		120 (11.92)
* Medium (Standard Error)		
For Comorbidities, added to psoriasis were the most frequent being the presence of cardiovascular diseases (46.8% n=56), arthropathic psoriasis (35.8% n=43), enteritis and non-infectious colitis (8.3% n=10), depression (5.8% n=7) and cerebral infarction (3.3% n=4).		

Of the total hospitalized patients, 8.5% (n=86) presented complications, the most frequent being the presence of diabetes mellitus (n=28), respiratory infections (n=20), urinary infections (n=19), arterial hypertension systemic (n=15) and peptic ulcer (n=14). With respect to surgical procedures performed during hospitalizations, this occurred in 14.4% (n=145), and in more than

half of the cases (57.2% n=83) it was due to a cholecystectomy or appendectomy procedure, followed by repair of some type of hernia (15.8% n=23) and tracheostomy (11% n=16).

In 12.92% (n=120) of hospitalized patients, the presence of some comorbidity added to psoriasis was documented, the most frequent being the presence of cardiovascular diseases (46.8% n=56), arthropathic psoriasis (35.8% n=43), enteritis and non-infectious colitis (8.3% n=10), depression (5.8% n=7) and cerebral infarction (3.3% n=4) (Table 2). It was reported that 5.79% (n=76) of hospitalized subjects died, cardiovascular disease being the most frequent cause in 38.1% (n=29) and infectious diseases in 38.1% (n=29), followed by oncological diseases in 23.8% (n=18).

When classifying hospitalized patients according to the presence or absence of comorbidities, it was identified that those records with comorbidities had a lower frequency of surgical interventions, without difference by sex, days of hospital stay, hospital complications and deaths. The percentage of mortality between patients who had a comorbidity (8.33%) and those who did not (7.44%) was compared. 8.33% of hospitalized psoriasis patients who presented a complication suffered from compared to 7.44% of those without complications the difference is not significant with p=0.728 (Table 3).

To analyze the risk factors that explained the days of hospital stay, a multivariate model was performed and it was identified that in-hospital complications (coefficient 1.47 p=0.033), surgical procedures (coefficient 1.77 p=0.001) and age (coefficient 0.04 p=0.001) increased time. Other multivariate models were performed to identify the factors that increased the risk of presenting in-hospital complications and mortality. For in-hospital complications, age was (OR =1.02), while male sex (OR =0.57) was a protective factor (Table 4A). On the

Table 3: Comparison of the characteristics of patients with and without comorbidities of 1,007 adults diagnosed with hospitalized psoriasis from 2013 to 2017.

	Frequency (%)		p
	without n=887	with n=120	
Age (years)*	53.94 ± 0.53	53.17 ± 1.33	0.443
Male sex	590 (66.52)	87 (72.50)	0.19
Days of hospital stay*	5.51 ± 0.16	5.45 ± 0.48	0.885
Hospital complication	74 (8.34)	12 (10.00)	0.542
Surgical intervention	136 (15.33)	9 (7.50)	0.022
Mortality	66 (7.44)	10 (8.33)	0.728

* Medium (Standard Error)
In hospital discharges, in addition to including sex, age and location, the days of stay, complications and reasons for discharge were described. For comorbidities, they were specifically described: psoriatic arthritis, cardiovascular diseases related to atherosclerosis, Crohn's disease, ulcerative colitis, depression and anxiety, as well as mortality

Table 4: Logistic regression analysis to identify the factors that impact on hospital complications (A) and mortality (B) in adults diagnosed with rheumatoid arthritis from 2013 to 2017 (n= 1,007).

	OR	95% IC	p
A. IN-HOSPITAL COMPLICATIONS			
Presence of comorbidities	1.32	0.69 a 2.55	0.4
Male sex	0.57	0.36 a 0.91	0.02
Age (years)	1.02	1.01 a 1.04	<0.001
Surgical procedure	1.11	0.60 a 2.06	0.72
B. MORTALITY			
Presence of comorbidities	1.11	0.54 a 2.24	0.77
Male sex	1.09	0.65 a 1.83	0.74
Age (years)	1.02	1.01 a 1.04	<0.001
Surgical procedure	0.64	0.30 a 1.39	0.27
In-hospital complications	1.67	0.83 a 3.35	0.15

A multiple linear regression model was used to identify the factors related to the days of hospital stay; also, to explain the hospital complications and mortality. For comorbidities, they were specifically described: psoriatic arthritis, cardiovascular diseases related to atherosclerosis, Crohn's disease, ulcerative colitis, depression and anxiety, as well as mortality. The value of P<0.05 was defined as statistical significance.

other hand, the factor that was identified as risk for mortality during hospitalization was age (OR =1.02), without impacting hospital complications, the presence of comorbidities or surgical procedures (Table 4B).

Discussion

Psoriasis is a disease with an estimated prevalence of 2% worldwide, however, there is great variability between countries, between their geographical regions and even among their ethnic groups. Christopher's reports in his 2001 study, that in the Henan province of China there is a percentage of 0.4%, and in the East African region 0.7%, while in North American countries like Canada the number rises to 4.7% and in the United States of America 4.6%. In our study a prevalence of 0.38% was identified, which is similar to those reported in China or Africa, but lower than North America, this may be secondary to the fact that the ranges vary between different ethnic groups, ages, gender, specifically the white race is the most common in suffering from psoriasis, in addition to inadequate diagnosis of mild psoriasis [1].

Regarding gender predominance, our study identified a marginal male predominance (53%) similar to that reported by Christopher,

and Rachakonda; This difference is most evident when studying the subgroups of hospitalized patients and those with comorbidities reaching values of up to 87% with a statistically significant gender difference between patients with comorbidities. However, some more recent studies such as Feldman's 2018 show no differences between genders [1-4].

Regarding the type of medical care that patients with psoriasis receive, according to our study, the highest percentage of first-time consultation was performed in the second level of care with 71%, this trend persists in subsequent consultations where the second level of care It concentrates the highest percentage of patients with 48%. However, only half of the patients are evaluated by a dermatology specialist (56%), and although they are seen by the specialist, psoriasis being an erythematous squamous dermatosis is confused by countless dermatological problems that may go unnoticed by the "untrained eye". For dermatologists in general it is a relatively frequent pathology in health institutions, and they arrive here when they have already been multitracked and present comorbidities that sometimes make it difficult to find the right treatment [1,15].

Referring to the comorbidities identified in our study, the most frequent were cardiovascular diseases (42%) and arthropathic psoriasis (36%). In international studies psoriatic arthritis has been reported as the most frequent comorbidity, with frequency ranges between 6 to 42% according to Feldman, while Christopher's reported between 5 to 8%. The association between cardiovascular disease, obesity, metabolic syndrome, diabetes mellitus, autoimmune diseases, as well as depression and anxiety, are considered significant and a common inflammatory base is assumed. [1,4,16].

Analysing the most frequent causes of hospital mortality identified in this study, were cardiovascular diseases followed by infectious and oncological ones [17,18]. There are not many reports regarding the mortality of psoriasis patients, it has only been shown that there is a high risk of death in psoriasis patients compared to the general population; being higher in patients with severe psoriasis and even moderate as indicated by the study by Salahdeen E. et al and Abu bara K. et al, where the most frequent causes were cardiovascular diseases, followed by oncological, pulmonary and infectious [19,20]. Although they are the same causes of mortality, the order is different, where in a country like ours, which is in the process of development, infectious causes are still important, which in first world countries have diminished [17-19].

From the significant data found in this study, it was observed that of the hospitalized subjects, about 23% underwent a surgical procedure, identifying a statistically significant difference with respect to the subjects that did not merit this type of intervention, which could mean a protective factor in relation to the patients who were not subjected to surgical procedures, probably this associated to the fact that they are programmed procedures, which for their authorization and performance require certain conditions in the patients. Being the most important condition in this context, is that patients have adequate control of comorbidities, and in this way the risk of presenting intrahospital complications or death decreases.

Likewise, regarding the factors associated with hospital stay, it was identified that age, surgical procedures and hospital complications increase the length of hospital stay. It has been reported that older patients are adding chronic diseases, so hospital stay and complications increase [20]. On the other hand, in-hospital complications and surgical interventions can tell us about a subject

with multiple comorbidities that merits longer hospital stay. When studying the factors associated with hospital mortality, the only statistically significant factor is age, suggesting that the older, the greater the presence of comorbidities, as well as complications of the disease itself [21].

Mexico is a developing country where the practice of folk medicine is still strong. A large percentage of patients have no idea of their disease. Often, they are desperate and rely on a lot of strange treatments that undergo healers and fraudulent practices. This results not only in personal economic losses, but in late diagnoses and medical care, as well as possible medical complications created by these practices [22]. Describing the epidemiology of this disease is very useful for future studies where the diagnosis of psoriasis can be performed early.

Conclusion

The present study highlights the prevalence of psoriasis was 0.38% in the IMSS, in these patients with psoriasis who required hospitalization, the mortality was just under 6%. The risk factors that were identified, age was a constant risk factor for longer hospital stay, hospital complications and mortality; Surgical procedures and hospital complications were associated with an increase in the average length of hospital stay.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflict of interest

The authors declare that they have no competing interests.

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