Late diagnosis of psoriasis: Reasons and consequences

José Carlos Quiroz-Vergara[1,2], Martha Alejandra Morales-Sánchez[3], Gonzalo Castillo-Rojas[2], Yolanda López-Vidal[1,2], María Luisa Peralta-Pedrero[3], Fermín Jurado-Santa Cruz[3] and Samuel Ponce de León-Rosales[1]

[1]Division of Research; [2]Molecular Microbial Immunology Program; Faculty of Medicine, Universidad Nacional Autónoma de México; [3]Centro Dermatológico Dr. Ladislao de la Pascua, Secretaría de Salud de la Ciudad de México, Ciudad de México, Mexico

Abstract

Background: *Psoriasis is an autoimmune skin disease that may be associated with articular manifestations, and the most common clinical presentation is the variety "in plaques". In Mexico, in the Centro Dermatológico Pascua, it is the eighth leading cause of consultation. The aim of this study was to determine the diagnostic process of patients in a reference center for diseases of the skin.* **Methods:** *Performing an analytical cross-sectional study that included 100 patients where the diagnostic process was questioned, clinimetric scales were applied and evaluated anthropometric.* **Results:** *It was found that 70% of patients had taken over a month to get medical care (median: 3 months; IQR: 11 months), having consulted in 61% to a general physician as a doctor of first contact and 89% being diagnosed by a dermatologist. Eighty-eight percent of the patients were overweight or obese. We found as a factor of delay, a partnership with the variable of having an Institutional Medical Service (p = 0.019; U = 695.5).* **Conclusion:** *it is necessary to design a system to shorten the diagnostic process, not only in psoriasis, in addition to emphasizing dermatological education.*

KEY WORDS: *Psoriasis. Diagnosis. Delay. Obesity. Medical education.*

Introduction

Psoriasis is a dermatologic autoimmune disease with joint manifestations in about 14% of cases[1,2]. Clinically, it is characterized by well circumscribed erythemato-squamous lesions, with predominance in extensor surfaces, and its most common clinical presentation (90%) is the plaque psoriasis variety[3,4]. It has a world-wide prevalence of 2-11.8%[5,6]. In Mexico, at the Centro Dermatológico Dr. Ladislao de la Pascua (CDP), is the eight cause of doctor consultation[7].

Psoriasis is a systemic inflammatory[8,9] disease that mainly occurs between 20 and 60 years of age, in both genders alike[10]. By itself, it can affect patient quality of life, with deterioration that is associated with the seriousness of the condition[11,12]. Owing to its pathophysiology, psoriasis increases the risk for comorbidities, such as metabolic syndrome, systemic arterial hypertension and type 2 diabetes mellitus (DM2)[9,13], which turns it into a complex health problem that requires a comprehensive care approach for both early diagnosis and treatment. In a previous study carried out at the CDP, 43.5% of patients (95% confidence interval: 28-60%) were detected to have metabolic syndrome at psoriasis diagnosis[14].

The delay in the diagnosis and treatment of dermatological diseases has only been investigated in skin cancer, especially in melanoma[15,16]. In the case of psoriasis, Haroon et al.[17] calculated that a 6-month or longer delay in the psoriatic arthritis diagnosis and treatment initiation is associated with patient quality of life deterioration in comparison with shorter periods. However, there are no studies exploring the time of delay for psoriasis skin manifestations diagnosis. One of the purposes of this study was to determine the time required for psoriasis diagnosis and the

Correspondence:
Samuel Ponce de León-Rosales
E-mail: sponce@unam.mx

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diagnostic pathway of patients from a reference center for diseases of the skin.

Methods

A cross-sectional, analytic study was carried out during the period of September 7 to December 4, 2015, at the National Autonomous University of Mexico Faculty of Medicine Research Division, in collaboration with the CDP. The study was submitted to and approved by the ethics and research committees of both institutions, with registry numbers 079/15 and 103/2015, respectively. Patients diagnosed with psoriasis, with "first time" and subsequent care status, who had clinical lesions at the time of the study and who came from any department of the medical unit were recruited. The diagnostic process was inquired considering the following dates: T0, date of lesions onset; T1, time elapsed in months from the onset of lesions until medical care was sought; T2, time between the onset of lesions and the date of clinical or histological diagnosis of psoriasis; and T3, time until disease-specific treatment initiation.

Additionally, the number of consultations and doctors the patient visited until receiving the psoriasis diagnosis was investigated. All patients were applied the Dermatology Life Quality Index (DLQI)[18] and the Psoriatic Arthritis Screening and Evaluation (PASE)[19] instruments, both of which have been validated and trans-culturally adapted to our language.

The following variables were measured: blood pressure, body mass index (BMI), nail alterations with the Nail Psoriasis Severity Index (NAPSI)[20], extent of disease with the Psoriasis Area and Severity index (PASI)[21] and associated disability with the Psoriasis Disability Index (PDI)[22]. The PASI Training website freely available electronic calculator was used to calculate the PASI[23], and the digital application of the Mexican Institute of Social Security (IMSS – *Instituto Mexicano del Seguro Social*) was resorted to for BMI calculation[24]; both resources were used to standardize the calculations.

The SPSS v22.0 program was used for statistical analysis. Qualitative variables were described as proportions. For quantitative variables, the mean and standard deviation (SD) were calculated if they had a normal distribution; otherwise, the median and interquartile ranges (IQR) were calculated. A bivariate analysis was carried out to compare times in relation to demographic and medical care variables, using the Mann-Whitney U-test and Kruskal-Wallis test according to their distribution.

Results

One-hundred and four psoriasis-diagnosed patients were interviewed, out of which only 100 were included for analysis, since the information provided by 4 was contradictory between the answers given to different points of the questionnaire and data documented in the institutional patient medical records, and these patients were therefore excluded.

Of the remaining 100 patients, 55% were females and 45% were males, with a mean age of 46.5 years (SD: 15.26 years). Fifty-six percent lived in Mexico City and 31% in the State of Mexico. With regard to family history, 23% referred having first and second degree relatives diagnosed with psoriasis. Of the entire sample, 14% was interviewed at first CDP medical appointment and 72% had some kind of institutional medical coverage, defined as being affiliated to a health institution in Mexico, such as the IMSS, the Institute of Social Security and Services of State Workers (ISSSTE – *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*), the Institute of Social Security of the State of Mexico and Municipalities (ISSEMyM – *Instituto de Seguridad Social del Estado de México y Municipios*) and the People's Health Insurance (*Seguro Popular*) (Table 1).

Clinically, phototypes IV (38%) and III (33%) were the most common; the most prevalent variant was plaque psoriasis, with 89% (Fig. 1); 61% had scalp involvement; 9% had nail alterations and only two patients had a psoriatic arthritis diagnosis at the moment of the interview.

Among the comorbidities, 88% had body weight alterations, 18% had systemic arterial hypertension, 14% had another dermatosis (lichen sclerosus, contact dermatitis, seborrheic dermatitis, among others), 13% had DM2 and 5% other autoimmune condition, with arthritis being present in 2 cases (Table 2).

Of note, only 12% had a BMI within normal values, 47% had overweight and 41% corresponded to obesity. Of the obesity group, 70.7% had grade 1 obesity, 21.9% grade 2 obesity and 7.3% grade 3 obesity (Table 2).

With regard to the diagnostic pathway, 30% of patients could be observed to have taken one month or less to seek medical care since the onset of lesions; out of them, 40% attended prior to 4 weeks. Median T1 was 3 months (IQR: 11), with a maximum period of

Table 1. Demographics of the study population

	Females (n = 55)	Males (n = 45)
Mean age, years (± SD)		
Marital status		
With partner	28 (51%)	30 (66.7%)
No partner	27 (49%)	15 (33.3%)
Level of education		
No education*	2 (3.6%)	3 (6.7%)
Primary school	10 (18%)	11 (24.4%)
Secondary school	12 (21.8%)	16 (35.5%)
High school	10 (18%)	5 (11.1%)
Technical degree	10 (18%)	1 (2.2%)
College degree	11 (20%)	9 (20%)
Place of residence		
Mexico City†	29 (52.7%)	27 (60%)
State of Mexico	19 (34.5%)	12 (26.7%)
Other States	7 (12.7%)	6 (13.3%)
Status of care		
First time	7 (12.7%)	7 (15.5%)
Subsequent	48 (87.3%)	38 (84.4%)
Institutional medical coverage		
With coverage	44/55 (80%)	28/45 (62.2%)
IMSS	18/44 (40.9%)	11/28 (39.2%)
ISSSTE	5/44 (11.3%)	5/28 (17.8%)
Seguro Popular	19/44 (43.2%)	12/28 (42.8%)
ISSEMyM	2/44 (4.5%)	0/28 (0%)

*The patient knows to read and write
†Formerly Distrito Federal
SD: standard deviation; IMSS: Instituto Mexicano del Seguro Social; ISSEMyM: Instituto de Seguridad Social del Estado de México y Municipios; ISSSTE: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado.

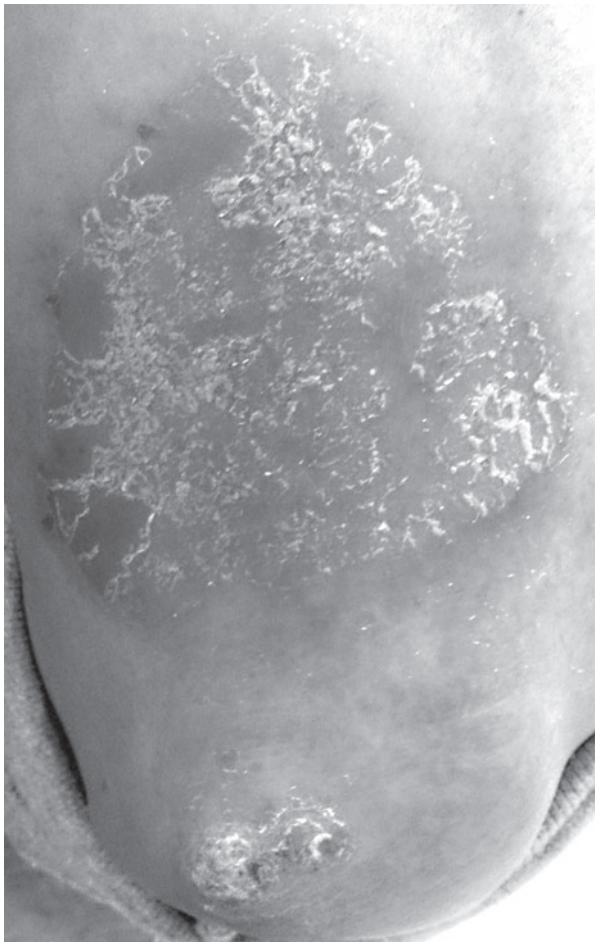

Figure 1. *Plaque psoriasis. Forearm lesion in a patient with psoriasis. Picture obtained at the CDP.*

120 months in one case (Fig. 2A). In this aspect, it should be noted that 61% consulted with a general practitioner as first-contact doctor for care, 35% attended a dermatologist and 14% had their first consultation at the CDP.

Following with the diagnostic process (T2), only 42% was diagnosed on the same year of disease onset, 20% after one year and 12% after 2 years since the onset of disease (Fig. 2 B), with 89% being diagnosed by a dermatologist, whereas only 11% was diagnosed by the general practitioner. In 59% of cases, the psoriasis diagnosis was not received until attending the CDP, and only 8 patients required histopathology studies.

In this sense, 46% of individuals referred having consulted only with one doctor for diagnosis, with the highest value being 25 clinicians in one case, and with a median of 2 consultations (IQR: 2) previous to the diagnosis being calculated, with a maximum value of 30 consultations in one patient.

Finally, only 28% of patients were observed to start psoriasis-specific "formal" treatment on the same year of disease onset (Fig. 2 C). Median time for treatment initiation was 2 months (IQR: 7).

With regard to treatment cost, one patient subgroup reported an expenditure of 291 Mexican pesos (MXN) per month for treatment during the previous year, with a minimum annual expenditure of MXN 800 and maximum of MXN 10,000. The analysis of patient expenditure broken down by severity (mild vs. moderate-severe) showed the following: for mild cases, a median of MXN 3,000 (IQR: 1,500), and for moderate-severe cases, a median of MXN 9,000 (IQR: 2,000).

With regard to the assessment by means of clinimetric scales (Table 3), 18% had a PASE score equal to or higher than 36 points, and hence they required evaluation by a rheumatologist. Ninety percent of patients had a PASI score lower than 10 points, with a median of 2.85 points (IQR: 3.2), a maximum value of 17.4 points and a minimum of 0, which corresponded to one patient who attended for examination and to another who was readmitted due to nail changes. This way, 90% of patients were classified as mild and

Table 2. Clinical characteristics of the patients with psoriasis

	Females (n = 55)	Males (n = 45)
Family history of psoriasis	14 (25.4%)	9 (20)
Prevalent phototypes		
II	8 (14.5%)	4 (8.9%)
III	22 (40%)	11 (24.4%)
IV	19 (34.5%)	19 (44.2%)
VI	6 (10.9%)	11 (24.4%)
Clinical presentation		
Plaques	48 (87.2%)	41 (91.1%)
Other	7 (12.7%)	4 (8.9%)
Scalp involvement	32 (58.2%)	29 (64.4%)
Nail changes	7 (12.7%)	2 (4.4%)
Psoriatic arthritis	1 (1.8%)	1 (2.2%)
Disease severity		
On remission	0 (0%)	2 (4.4%)
Mild	51 (92.7%)	39 (86.7%)
Moderate-severe	4 (7.3%)	4 (8.9%)
Presence of comorbidity		
Type 2 diabetes mellitus	6 (10.9%)	7 (15.5%)
Systemic arterial hypertension	11 (20%)	7 (15.5%)
Other dermatoses	11 (20%)	3 (6.7%)
Anthropometry		
Normal	7 (12.7%)	5 (11.1%)
Overweight	24 (43.6%)	23 (51.1%)
Obesity	24 (43.6%)	17 (37.8%)
Grade 1	16/24 (66.7%)	13/17 (76.5%)
Grade 2	6/24 (25%)	3/17 (17.6%)
Grade 3	2/24 (8.3%)	1/17 (5.9%)

8% as moderate-severe psoriasis. The DLQI showed that 11% had no quality of life repercussions, 23% had mild effect, 31%, moderate effect, 24% had large effect and 8%, extremely large effect, owing to psoriasis. Median DLQI was 7 points (IQR: 10) and median PDI was 5 points (IQR: 13), with a maximum value of 35 points.

Only 9 cases of nail alterations were detected, with the NAPSI showing a median of 18 points (IQR: 59), with a minimum value of 18 and a maximum of 88 points.

As for the delays in the diagnostic process steps (Table 4), inferential statistics tests were carried out in order to determine the association of T1, T2 and T3 with the following variables: age, gender, level of education, place of residence and the type of institutional health coverage the subjects had. Of these factors, a statistically significant association was only found for the institutional medical coverage variable and T1, where a median of 1.5 months (IQR: 5) was obtained in the group with no institutional medical coverage and 4 months (IQR: 10) in the group with institutional medical coverage (U = 695.5; p = 0.019). With regard to

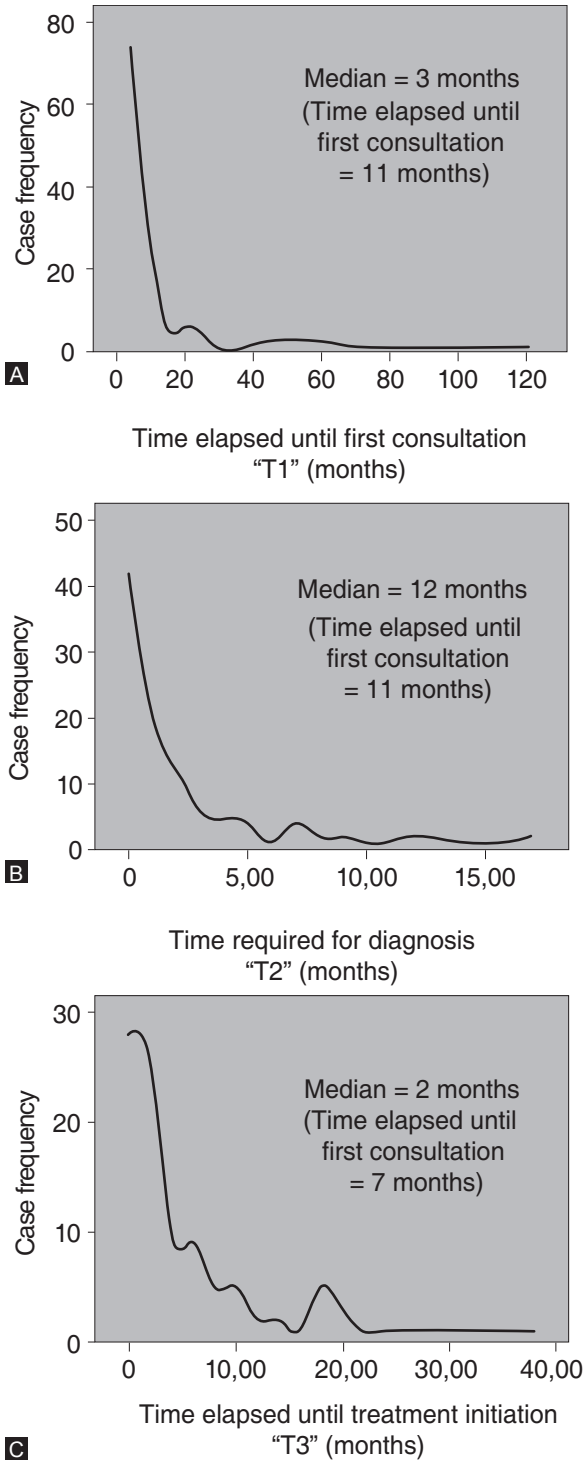

Figure 2. *Distribution of cases in different points of the diagnostic process.* **A:** *distribution of the frequency of psoriasis cases according to the time elapsed in months until first consultation because of symptoms since the date of onset.* **B:** *distribution of the frequency of psoriasis cases according to the time elapsed in months until the moment of diagnosis, obtained from the difference between the date of diagnosis and the date of disease onset. Forty-two percent of patients were diagnosed the same year of disease onset.* **C:** *distribution of the frequency of psoriasis cases according to the time elapsed in months since the moment of diagnosis until formal treatment initiation. Twenty-eight percent of patients started the treatment the same year of disease onset.*

Table 3. Clinimetric scales

	Females (n = 55)	Males (n = 45)	Total
	Median (IQR)	Median (IQR)	Median (IQR)
Psoriasis Area and Severity Index	2.7 points (3.2)	3.0 points (4.0)	2.85 points (3.2)
Nail Psoriasis Severity Index (n = 9)	40 points (60) (n = 7)	8 points (0) (n = 2)	18 points (59)
Dermatology Life Quality Index (n = 97)	8 points (8) (n = 54)	7 points (10) (n = 43)	7 points (10)
No effect	4/54 (7.4%)	7/43 (16.3%)	11/97 (11.34%)
Mild effect	12/54 (22.2%)	11/43 (25.6%)	23/97 (23.7%)
Moderate effect	19/54 (35.2%)	12/43 (27.9%)	31/97 (32%)
Very large effect	14/54(25.9%)	10/43 (23.2%)	24/97 (24.7%)
Extremely large effect	5/54 (9.2%)	3/43 (6.9%)	8/97 (8.24%)
Psoriasis Disability Index (n = 68)	2.8 points (3.2) (n = 39)	2.8 points (3.2) (n = 29)	5 points (13)
Psoriatic Arthritis Screening and Evaluation (n = 97)	31 points (16) (n = 53)	23 points (11) (n = 44)	26 points (14)
Repeat in 3 months	41/53 (77.3%)	38/44 (86.3%)	79/97 (81.44%)
Consider referral to rheumatology unit	5/53 (9.4%)	2/44 (4.5%)	7/97 (7.21%)
Refer to rheumatology unit	7/53 (13.2%)	4/44 (9%)	11/97 (11.34%)

IQR: interquartile range.

Table 4. Diagnostic process factors

	Females (n = 55)	Males (n = 45)	Total (n = 100)
	Median (IQR)	Median (IQR)	Median (IQR)
Time elapsed until first consultation (T1)	2 months (11)	4 months (6)	3 months (11)
Time required for diagnosis (T2)	22 ≤ 1 year (52.4%)	20 ≤ 1 year (47.6%)	42 ≤ 1 year (42%)
Time elapsed for treatment initiation (T3)	19 ≤ 1 year (67.9%)	9 ≤ 1 year (32.1%)	28 ≤ 1 year (42%)
First-contact doctor	35/55 (63.6%)	26/45 (57.8%)	61 (61%)
General practitioner	19/55 (54.5%)	16/45 (35.5%)	35 (35%)
Dermatologist	1/55 (1.8%)	3/45 (6.7%)	4 (4%)
Other specialty			
Diagnosing physician	5/55 (9%)	6/45 (13.3%)	11 (11%)
General practitioner	50/55 (91%)	39/45 (86.7%)	89 (89%)
Dermatologist			

IQR: interquartile range.

the moment of diagnosis (p = 0.082) and the start of formal treatment (p = 0.215), there were no significant differences. Of note, in 50% of the group with institutional medical coverage, the delay to the moment of diagnosis was 1 month (IQR: 17), in comparison with 0 months (IQR: 2) in the group without institutional medical coverage.

Discussion

Psoriasis is ranked within the 15 most common dermatoses[25] and, therefore, its diagnosis should be considered in patients where the morphology of lesions is suggestive of the disease, which is something general practitioners clearly know. At the CDP, psoriasis represented the ninth place in frequency in 2013[26], and for 2014, it was at eight place among the reasons for consultation[7]. In our study, the time half the patients took to seek medical care was 3 months; however, time to diagnosis was longer than 1 year in 58% of patients. It is important to note that, in 61% of cases, the first consulted physician was the general practitioner, but in 89% of patients, the diagnosis was established until consultation with a dermatologist.

Patient delay, defined as the time to seek medical care, which was quantified in our sample, is shorter than that reported for other skin conditions, as in the case of melanoma. In the USA, only 32% of patients with melanoma seek medical help in a time period shorter than 3 months since the tumor appearance[27]. However, it is longer than that reported for this same tumor in Australia, where mean patient delay time is 1 month[28]. The difference between both countries with regard to melanoma diagnosis delay is due to its incidence and, therefore, to the efficiency of prevention and early diagnosis programs of each country.

This time period, 3 months, may be due to the fact that, since psoriasis is a condition with clinical manifestations of erythema and scaling, is likely to be clinically mistaken with other dermatoses, which can range from a simple seborrheic dermatitis to a squamous cell carcinoma in situ (Bowen disease)[3,29], and that only when observing the persistence and progression of the lesions the patient feels the need to seek medical care.

On the other hand, doctor's delay, defined as the time to reach a diagnosis since the first consultation, is long, since more than 50% of patients were diagnosed after 12 months. This time period is in contrast with the time to melanoma diagnosis, which ranges from 1 week to 1.4 months[28]. However, it is shorter than the delay in the psoriatic arthritis diagnosis, which has a reported average of 53 months in countries such as Denmark[30]. Unfortunately, we lack data on the diagnostic delay for skin diseases in Mexico. Importantly, unlike psoriatic arthritis, where laboratory and imaging workup is required to reach a diagnosis, in psoriasis, clinical examination of the skin lesions and directed questioning are sufficient to establish the diagnosis and start treatment. In fact, our study documented that there is a 2-month delay between the diagnosis and treatment initiation in 50% of patients. This fact may be explained by the reference system in public institutions where, if first-contact doctor does not establish a diagnosis, the patient will be referred to secondary care in order to receive dermatological care, and because, in some health institutions, the medication for the treatment of psoriasis is not available at primary care units.

With regard to opportune diagnosis, Ojeda and Graells[31], in Spain, in 2011, studied the ability of family doctors to recognize lesions in keratinocytic cancer, and found their ability to be lower in comparison with dermatologists, which is to be expected owing to clinical training. This shouldn't be an impediment in psoriasis, since good undergraduate clinical training would contribute to shorten the times for diagnosis and treatment. In fact, the statistical analysis evidenced that 11% of cases were diagnosed by general practitioners, and this figure is not different when the times of disease evolution are considered, since only 4 of these cases had $\geq$ 12 months of evolution.

It is important pointing out that 28% referred not being affiliated to any kind of public healthcare institution and, in this group, patient and doctor delay were lower in comparison with those who had institutional medical coverage, with median time to seek medical care (T1) of 4 months (IQR: 10) and 1 month (RIQ: 3) to receive the diagnosis (T2) being calculated in the group with institutional medical coverage. In contrast, a median of 1.5 months (IQR: 5) for T1 and 0 months (IQR: 2) for T2 were observed in the group without institutional medical coverage. This should alert on health institutions organization form, since institutional reference and counter-reference systems could be implied in this delay. It should be noted that, in the course of the study, of all the patients who referred having institutional medical coverage, 29% belonged to the IMSS, 10% to ISSSTE, 31% to the *Seguro Popular* and 2% to ISSEMyM. This result doesn't come as a surprise, since, in a study conducted in elderly patients, 25% of IMSS affiliates and 45% of ISSSTE affiliates were observed to resort to any private medical service instead of the one corresponding to their institution of origin[32].

It is concerning that, as reported in the results, only 12% of subjects had a BMI lower than 24.9 and that, similar to other studies[33,34], we observed that 87.5% of patients with moderate-severe psoriasis (PASI $\geq$ 10) had an above-normal BMI and, out of these, 3 patients had obesity (BMI $\geq$ 30). It should be noted that the ENSANUT 2012 survey reported that 9.2% of Mexican adults has a diagnosis of DM2, out of which, the number of those who have psoriasis is not known[35]. Psoriasis immunopathogenesis is known to elevate insulin resistance (e.g., the effect of tumor necrosis factor on insulin receptors) and, hence, cardiovascular risk[10], and the remaining 92% will therefore require comprehensive management of the skin disease and its comorbidity.

The main limitation of this study is its sample size, since it is small with regard to number of patients registered in our institution; however, demographic and disease characteristics are consistent with those reported in the literature, and we can therefore claim that the sample was clinically useful. It should also be

noted that there is a memory bias, since some patients were interviewed up to one year after diagnosis, and it was therefore necessary to standardize the data collection process and use validated instruments.

The advantages of our study include the fact that it is based on a prolective data collection model for most part of them, that the methodology adhered to similar studies on diagnostic delay, and that there is no previous study exploring our research subject. However, conducting a future study with a larger sample and exploration of other variables that might relate to psoriasis, as well as to other dermatological conditions, diagnosis and treatment delay will be left pending.

Conclusions

During the conduction of the study, it was observed that the diagnosis of a common pathology can in certain cases be a challenge, to the point of delaying for years the start of a "formal" specific treatment that leads to remission of the disease.

The fact that the general practitioner only was able to diagnose the disease in 11% of cases in spite of having been the one that attended 80% of first-contact consultations, makes us reflect on how is dermatology training being carried out during undergraduate courses and on the need to continue with medical education on this area. This event may have occurred owing to skin lesions highly explicit morphology, to the time of evolution or to other concomitant factors of the pathology that would not suggest another diagnosis.

One of our proposals to tackle this problem is to generate, in the future, a diagnostic algorithm for the first-contact clinician, where all characteristics of the disease and possible differential diagnoses are exposed.

About the data on average expenditure on treatment on previous year, we only can comment that, in some cases, this expense may have increased due to the severity of the disease at the moment of arrival to our center, with this resulting from delay in diagnosis and implementation of specific treatment.

In our opinion, in addition to establishing psoriasis opportune diagnosis, the use of clinimetrics enables objective assessment of the patient at the moment of diagnosis, as it was done in our study, and also enables evolution monitoring once the treatment is implemented.

Finally, improving attention and reference/counter-reference systems of health institutions (which was observed in our study as a factor associated with delay) might shorten the diagnostic pathway times and speed up specific treatment, not only in psoriasis, but also in other diseases.

Conflict of interests

All authors refer not having any kind of conflict of interests, as well as having equally contributed to the design, execution and analysis of the study results.

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