

EPIMAG: International Cross-Sectional Epidemiological Psoriasis Study in the Maghreb

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Key Words

Psoriasis · Epidemiology · Characterization · Screening · Prevalence · Frequency

Abstract

Background: Psoriasis is a common skin disorder that is characterized by red plaques covered with silvery scales and is associated with considerable psychosocial impact. It has been described in several studies worldwide, but specific data from the Maghreb (Algeria, Morocco and Tunisia) are unavailable. **Objectives:** To characterize the frequency of new psoriasis cases and to describe the epidemiological and clinical profile of psoriasis in the Maghreb. **Methods:** A psoriasis working group for the Maghreb initiated the EPIMAG international multicentre cross-sectional observational epidemiological study coupled with a 2-week psoriasis screening study via medical consultation. Data were collected via questionnaires. **Results:** The total analysis population included 373 pre-existing and 326 new psoriasis cases, described by 261 participating investigators. The frequency of new psoriasis cases was 10.26/1,000 in Algeria, 15.04/1,000

in Morocco and 13.26/1,000 in Tunisia, and thus 12.08/1,000 in the Maghreb. In all 699 psoriasis subjects, the mean age was 46 years, the mean BMI was 26.6, and 55.7% of subjects were men. Two thirds of the subjects had never smoked, and 85.0% had never consumed alcohol. Half had brown skin, and 28.6% had a family history of psoriasis. Three quarters had localized psoriasis, 85.8% had plaque psoriasis, coupled with pruritus in over 70.0% of cases. Flares or outbreaks were most often triggered by stress (79.4%) and change of season (43.1%). The majority of subjects used topical therapy, and the investigators considered overall treatment efficacy to be partial in over half of the cases. Among patients with pre-existing psoriasis, secondary analyses showed that 73.2% had severe psoriasis, and that quality of life was severely affected in 40.1% of cases. The mean number of missing school or work days over 6 months was 3.2 (± 12.1) days. **Conclusions:** Our study provides novel information relative to psoriasis epidemiology and characterization in the Maghreb and highlights the need to improve psoriasis screening and management in the region. The data will help optimize psoriasis management, to ensure appropriate national health care policies.

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Introduction

Psoriasis is a chronic inflammatory non-infectious and non-contagious skin disorder. Classic psoriasis manifests as well-demarcated red plaques covered with silvery scales, usually localized to the shoulders, knees and scalp. Various pustular forms have also been identified, and symptoms may also include articular inflammation in the case of psoriatic arthritis [1, 2]. Psoriasis development is influenced by environmental and genetic factors, and family history [3–5].

Although severe physiological consequences are rare, the psychosocial impact on health-related quality of life (QoL) is considerable, and not limited to severe psoriasis [6]. The American National Psoriasis Foundation (NPF) reported that 71% of patients claimed their psoriasis had a moderate-to-severe effect on QoL, affecting everyday life. Psoriasis causes emotional stress, impaired self-esteem and depression [7, 8], increasing the disease's psychological burden. A recent Algerian study showed that over three quarters of patients with psoriasis considered their QoL affected, and that the disease was a major handicap in 6.8% of cases [9].

Psoriasis is common and has been the focus of multiple studies worldwide. However, specific data from the Maghreb (Algeria, Morocco and Tunisia) are unavailable. Epidemiological studies conducted so far in the region have mainly been retrospective single-centre hospital studies [9–13]. Psoriasis prevalence has been estimated at 2.3% in Morocco [12] and 3.0% in Tunisia [3], consistent with estimates reported in other countries [14].

A psoriasis working group for the Maghreb, composed of 14 dermatologists, was created in 2010. The group initiated discussion and action in order to optimize psoriasis management and improve psoriasis characterization in the Maghreb. The PSOMAG cross-sectional study on the frequency of psoriasis seen by general practitioners (GPs) and dermatologists was the first to be initiated by this working group [15]. The EPIMAG ('Epidemiological and clinical profile of psoriasis patients followed by GPs and dermatologists in the Maghreb and systematic screening over a 2-week period') international multicentre cross-sectional observational epidemiological study followed. The EPIMAG is the first such study in the Maghreb characterizing the frequency of new psoriasis cases and describing epidemiological and clinical profiles of these cases. It provides clinical and epidemiological characterization of patients with psoriasis in the Maghreb coupled with psoriasis screening via medical consultation.

Methods

Study Design

International cross-sectional epidemiological observational study characterizing psoriasis coupled with a 2-week psoriasis screening study via medical consultation, conducted in Algeria, Morocco and Tunisia.

Setting

Approvals were obtained from each participating country, from the CCTIRS on December 15, 2011, and from the CNIL on March 20, 2012. Questionnaires were completed between March 13, 2012, and August 12, 2012. Data quality control was carried out by BIOSTATEM during the data management phase, which had a cut-off date of August 31, 2012. Investigators who agreed to participate in the study received a contract by mail with questionnaires for psoriasis characterization and diagnosis, along with envelopes for the completed questionnaires and signed contracts to be returned. The GPs and dermatologists contacted to participate in this study belong to a representative sample of health care professionals previously recruited in the PSOMAG study [15]. The number of recruiting GPs was calculated as a function of the medical demographics of each country. GPs were chosen randomly in each country, stratified by regions, and 20 dermatologists per country were also recruited.

Data Collection

Data were collected via two similar questionnaires that contained additional questions adapted to the characteristics of the patient groups with existing or newly diagnosed disease. Investigators recorded psoriasis management data and clinical characterization of existing psoriasis cases (EPIMAG1). Patients were included in chronological order of consultations over a period of 2 months. Investigators completed a medical history questionnaire for each patient, including demographic data, date of diagnosis, clinical data (e.g. medical history, psoriasis evaluation), QoL data, and missing school or work days. As part of the systematic screening of new psoriasis cases (EPIMAG2), investigator data, date of diagnosis and clinical data were collected. At the study end, the total number of patients seen in consultation and the number of patients diagnosed during the 2-week screening period were collected for each centre.

Systematic psoriasis screening was implemented following a common training programme developed by the working group and taught by panel members during conferences for the benefit of the participating GPs. Completion of this training was a condition for GP participation in EPIMAG2. Screening was conducted by GPs and dermatologists on subjects' elbows, knees and scalps without affecting the usual medical practice. A questionnaire was completed for each newly diagnosed case, and the patient was treated as per usual practice.

Participants

In the EPIMAG1, adult patients with previously diagnosed psoriasis and followed for psoriasis were included. In the EPIMAG2, eligibility criteria included all adult patients seen in consultation over a 2-week period willing to participate in the study after being informed.

Variables

Variables generated from questionnaires included age, date of diagnosis, body mass index (BMI), severity of known cases, psoriasis

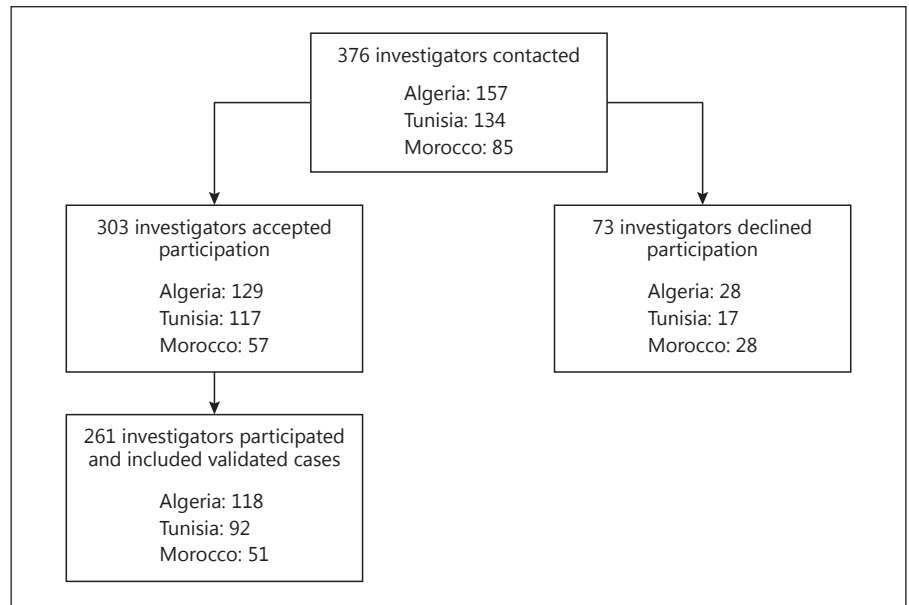


Fig. 1. Investigator and subject participation.

riasis type (generalized, localized and/or erythrodermic), and other manifestations (rheumatism, peripheral, axial or mixed involvement). In the QoL evaluation by investigators, if at least 1 QoL item was assessed as ‘incapacitating’, psoriasis was considered severe. Psoriasis is considered severe if it requires systemic treatment, is generalized or affects >20% of the total body surface, if it is local with pustular and/or erythrodermic lesions, or if it is associated with other manifestations (rheumatism, peripheral involvement, axial and/or mixed) [16]. The frequency of new psoriasis cases was calculated by dividing the number of psoriasis cases diagnosed with the total number of patients who consulted during the 2 weeks of screening. In the secondary analysis, the percentage of patients with severe psoriasis was described. Missing psoriasis severity data was completed by taking into account large alterations of QoL, and the number of missing work or school days over 6 months for each known psoriasis case.

Study Size

The number of participating centres was calculated in the previous PSOMAG study for a frequency estimate with a 1/1,000 precision [15]. Medical and population demographic data per country were used in the calculation. Differences in the number of recruited GPs between countries reflect the different numbers of practising health care professionals. In order to describe the different variables across the Maghreb, between 100 and 200 pre-existing psoriasis cases per country were sufficient. Recruitment was divided between GPs and dermatologists. Based on the PSOMAG, 2 pre-existing psoriasis cases could be described per GP in a 2-month period. Four patients were described by each dermatologist. A total of 410 pre-existing psoriasis cases needed recruiting by GPs and 240 cases by dermatologists.

Bias

To minimize potential selection bias, training programmes were done for GPs, and biased psoriasis data were reviewed by the scientific committee.

The severe psoriasis types are: palmoplantar keratosis, non-responder psoriasis, generalized psoriasis excluding erythroderma, psoriasis with a psychological and social impact.

The psoriasis severity was not measured by the PASI scale because it was not adequate for GPs who represented the most important investigators participating in this trial, so therefore it was removed from the questionnaire of psoriasis severity assessment.

Statistical Methods

Data are presented for the region as a whole; no statistical comparisons between countries were performed. Epidemiological and clinical characterization of patients with psoriasis was done through descriptive analyses of the collected variables. The distribution of quantitative variables was described by frequency, means, standard deviations, medians and ranges. Qualitative variables were described by frequency and by the percentage of patients in each category. Missing data were not included in calculating percentages. The upper 95% confidence intervals were estimated in the primary analysis. Statistical analyses were performed with SAS[®] software (version 9.3). Duplicate interactive data capture was performed using Clinsight[®] software (version 6.2). The accepted error rate was 1% for all data.

Results

Participants

Overall, 376 investigators were contacted: 157 in Algeria, 134 in Tunisia and 85 in Morocco. Among these, 73 declined participation (fig. 1) for the following reasons: too many other professional obligations; absent during the screening period; unable or unwilling to contact patients; did not frequently see psoriatic patients;

Table 1. Demographic data of psoriasis subjects

	Algeria (n = 261)	Morocco (n = 171)	Tunisia (n = 267)	Maghreb (n = 699)
Age, years				
Mean \pm SD	45.5 \pm 15.7	44.6 \pm 14.2	46.8 \pm 15.2	45.8 \pm 15.2
Median (range)	44.4 (19.0–92.0)	45.1 (18.4–80.0)	47.2 (18.0–87.2)	46.0 (18.0–92.0)
Gender (male/female), %	49.0/51.0	57.3/42.7	61.0/39.0	55.7/44.3
Health insurance				
Missing	0	1	0	1
No/yes, %	23.0/77.0	55.9/44.1	29.2/70.8	33.4/66.6
Height, cm				
Number	261	168	260	689
Missing data	0	3	7	10
Mean \pm SD	167.0 \pm 8.7	168.8 \pm 8.7	169.4 \pm 9.1	168.3 \pm 8.9
Median (range)	168.0 (130.0–190.0)	168.0 (150.0–200.0)	169.0 (149.0–195.0)	168.0 (130.0–200.0)
Weight, kg				
Number	261	164	260	685
Missing data	0	7	7	14
Mean \pm SD	73.5 \pm 13.8	74.8 \pm 12.9	78.1 \pm 14.4	75.6 \pm 13.9
Median (range)	74.0 (35.0–120.0)	74.5 (46.0–122.0)	76.0 (44.0–134.0)	75.0 (35.0–134.0)
BMI				
Number	261	164	259	684
Missing data	0	7	8	15
Mean \pm SD	26.3 \pm 4.5	26.3 \pm 4.2	27.1 \pm 4.2	26.6 \pm 4.3
Median (range)	26.2 (15.0–48.9)	26.0 (17.3–44.8)	26.6 (17.3–42.8)	26.3 (15.0–48.9)
Waist circumference, cm				
Number	254	137	241	632
Missing data	7	34	26	67
Mean \pm SD	90.0 \pm 15.3	92.4 \pm 12.2	93.7 \pm 18.2	91.9 \pm 15.9
Median (range)	90.0 (46.0–160.0)	90.0 (64.0–121.0)	92.0 (52.0–198.0)	91.0 (46.0–198.0)
Tobacco use				
Missing	0	4	0	4
Never	192 (73.6)	114 (68.3)	138 (51.7)	444 (63.9)
Occasional	19 (7.3)	13 (7.8)	40 (15.0)	72 (10.4)
Current	25 (9.6)	23 (13.8)	60 (22.5)	108 (15.5)
Stopped for \geq 6 months	25 (9.6)	17 (10.2)	29 (10.9)	71 (10.2)
Alcohol use				
Missing	0	6	1	7
Never	238 (91.2)	141 (85.5)	209 (78.6)	588 (85.0)
Occasional	10 (3.8)	11 (6.7)	31 (11.7)	52 (7.5)
Current	2 (0.8)	4 (2.4)	5 (1.9)	11 (1.6)
Stopped for \geq 6 months	11 (4.2)	9 (5.5)	21 (7.9)	41 (5.9)
Skin type				
White	138 (52.9)	74 (43.3)	125 (46.8)	337 (48.2)
Brown	121 (46.4)	97 (56.7)	139 (52.1)	357 (51.1)
Black	2 (0.8)	0 (0.0)	3 (1.1)	5 (0.7)
Family history of psoriasis				
Missing	0	1	2	3
No	176 (67.4)	137 (80.6)	184 (69.4)	497 (71.4)
Yes	85 (32.6)	33 (19.4)	81 (30.6)	199 (28.6)
Individual history ¹				
Atopy	49 (18.8)	32 (18.7)	57 (21.3)	138 (19.7)
Diabetes	45 (17.2)	24 (14.0)	55 (20.6)	124 (17.7)
IBD	2 (0.8)	1 (0.6)	4 (1.5)	7 (1.0)
Other	80 (30.7)	35 (20.5)	69 (25.8)	184 (26.3)

Values are presented as numbers with percentages in parentheses unless otherwise indicated. IBD = Inflammatory bowel disease.

¹ Subjects could declare more than one.

difficulties in recruiting patients (e.g. for geographic reasons, or because informed consent was refused). In total, 303 investigators (80.6%) accepted participation in the study (fig. 1). Among these, 261 investigators (69.4%) participated in the EPIMAG (recruited validated cases), including 118 in Algeria, 92 in Tunisia and 51 in Morocco.

Among participating investigators, 172 (65.9%) completed at least 1 questionnaire describing pre-existing cases (EPIMAG1), and 194 (74.3%) participated in the screening study (EPIMAG2). Within the latter group, 131 (67.5%) diagnosed at least 1 new psoriasis case. The majority of investigators worked in private practices (91.9 and 76.8% for EPIMAG1 and EPIMAG2, respectively) and were GPs in 78.5 and 82.0% of cases for the EPIMAG1 and EPIMAG2, respectively.

In total, investigators included 753 psoriasis cases (396 pre-existing and 357 new cases). Among these, 54 were minors and were excluded. The analysis population thus included 699 subjects (92.8%), 261 of whom consulted in Algeria, 171 in Morocco and 267 in Tunisia. Of the 699 subjects, 373 were pre-existing cases (EPIMAG1) and 326 were new cases (EPIMAG2).

Demographic Data and Analysis of Primary Objectives

Overall, subjects had a mean age of 46 years (range, 18–92 years), and 55.7% were men; the proportion of male patients was especially elevated in Morocco (57.3%) and Tunisia (61.0%). The average height was 1.68 m for an average 75.6 kg weight, and a mean BMI of 26.6. The mean waist circumference was 91.9 cm. In all, 15.5% of subjects were current and regular smokers, 63.9% had never smoked, 1.6% were regular alcohol users, and 85.0% had never consumed alcohol. Half of the subjects (51.1%) had brown skin, and 28.6% had a family history of psoriasis (table 1). Finally, 19.7 and 17.7% had current or ongoing atopy and diabetes, respectively.

Clinical data showed that 75.2% had localized psoriasis, 85.8% had plaque psoriasis, coupled with pruritus in over 70.0% of cases. Other symptoms were recorded in 19.7% of cases, including rheumatic manifestations (81.9%) or peripheral involvement (27.5%). Psoriasis evolution was progressive in 25.2% of subjects. Flare-ups or outbreaks were triggered by stress in almost 80% of subjects, followed by change of season in 43.1% of subjects and weight increase in 12.4% of cases (table 2).

Psoriasis medical history was described in all known cases. Psoriasis was diagnosed on average approximately 10 years previously. 97.3% of subjects used topical ther-

apy, and 33% used systemic treatment. In about half of the cases (52.4%), overall efficacy of treatment was considered partial by the clinician (table 3). In subjects with pre-existing psoriasis, the most affected zones were the legs (76.7% on either side from the front) and arms (65.1% on the right and 66.5% on the left, from the back, table 4). To increase patient acceptability of the systematic psoriasis screening part of the study (EPIMAG2), psoriasis location was simply recorded on the subject's elbows, knees and scalp, without affecting the usual medical practice. Among these newly diagnosed cases, almost half had psoriasis on the elbows or knees (49.1 and 46.6%, respectively), and 36.2% of the subjects had psoriasis on the scalp.

The frequency of new psoriasis cases measured during the 2-week screening period (table 5) was 10.26/1,000 in Algeria, 15.04/1,000 in Morocco and 13.26/1,000 in Tunisia. In the Maghreb region overall, psoriasis frequency of newly diagnosed cases was estimated at 12.08/1,000.

Secondary Analyses

Among the 373 patients with pre-existing psoriasis, investigators assessed that 73.2% had severe psoriasis, and that QoL was severely affected in 40.1% of cases, either on a professional or social level. Everyday life was moderately-to-severely affected by psoriasis in 32.1% of cases, professional activities in 25.4% of cases and social relationships in 28.6% of cases. Treatment side effects moderately-to-severely affected 10.4% of patients, and 13.2% answered that psoriasis interfered with their education. When including mildly affected patients, psoriasis affected everyday life, professional activities and social relationships in 57.7, 43.5 and 51.2% of cases, respectively. The mean number of missing school or work days over 6 months was 3.2 (± 12.1) days.

Discussion

EPIMAG provides an epidemiological and clinical profile of psoriasis and determines the frequency of newly diagnosed psoriasis cases in the Maghreb. It is the first multicentre study of its kind in the region and is important because psoriasis clinical characteristics are known to vary between populations and regions [17].

Study participation rates were elevated. Of the investigators participating in EPIMAG, 172 (65.9%) completed at least one questionnaire describing pre-existing cases (EPIMAG1), and 194 (74.3%) participated in

Table 2. Psoriasis data in participating subjects

	Algeria (n = 261)	Morocco (n = 171)	Tunisia (n = 267)	Maghreb (n = 699)
Clinical presentation				
Missing	0	1	0	1
Localized	197 (75.5)	127 (74.7)	201 (75.3)	525 (75.2)
Generalized	64 (24.5)	43 (25.3)	66 (24.7)	173 (24.8)
Plaque psoriasis	227 (87.0)	149 (87.1)	224 (83.9)	600 (85.8)
Pustular psoriasis	13 (5.0)	9 (5.3)	18 (6.7)	40 (5.7)
Erythrodermic psoriasis	33 (12.6)	24 (14.0)	38 (14.2)	95 (13.6)
Pruritus				
Missing	6	3	2	11
No	59 (23.1)	31 (18.5)	64 (24.2)	154 (22.4)
Localized to plaques	179 (70.2)	121 (72.0)	184 (69.4)	484 (70.3)
On unaffected skin	17 (6.7)	16 (9.5)	17 (6.4)	50 (7.3)
Other manifestations				
No	214 (82.0)	138 (80.7)	209 (78.3)	561 (80.3)
Yes	47 (18.0)	33 (19.3)	58 (21.7)	138 (19.7)
Rheumatism	38 (80.9)	23 (69.7)	52 (89.7)	113 (81.9)
Peripheral involvement	14 (29.8)	7 (21.2)	17 (29.3)	38 (27.5)
Axial	9 (19.1)	4 (12.1)	11 (19.0)	24 (17.4)
Mixed	4 (8.5)	2 (6.1)	9 (15.5)	15 (10.9)
Evolution				
Progressive	64 (24.5)	45 (26.3)	67 (25.1)	176 (25.2)
Flares and complete recovery	87 (33.3)	53 (31.0)	71 (26.6)	211 (30.2)
Flares and incomplete recovery	108 (41.4)	73 (42.7)	129 (48.3)	310 (44.3)
Factors favouring and/or triggering flare-ups¹				
Stress	214 (82.0)	130 (76.0)	211 (79.0)	555 (79.4)
Weight increase	36 (13.8)	20 (11.7)	31 (11.6)	87 (12.4)
Change of season	94 (36.0)	69 (40.4)	138 (51.7)	301 (43.1)
Infection	24 (9.2)	18 (10.5)	29 (10.9)	71 (10.2)
Pregnancy	8 (3.1)	7 (4.1)	4 (1.5)	19 (2.7)
Receiving medication	11 (4.2)	17 (9.9)	15 (5.6)	43 (6.2)
Other	16 (6.1)	18 (10.5)	16 (6.0)	50 (7.2)

Values are presented as numbers with percentages in parentheses.

¹ Subjects could declare more than one.

the screening study (EPIMAG2). The majority were GPs working in private practices. The analysis population comprised 699 subjects, including 373 with pre-existing psoriasis (EPIMAG1) and 326 new cases (EPIMAG2).

The patients with psoriasis who agreed to participate were relatively young (average age of 46 years), tended to be men (56%) and had a mean BMI of 26.6 (overweight according to WHO reference values). Psoriasis is known to affect both genders in equal measure [18]. The overrepresentation of male patients in Morocco and Tunisia may be explained by the social context, whereby women have more limited access to health care [19, 20], and fewer women are medical professionals [21].

The majority of subjects were non-smokers (63.9%) and had never consumed alcohol (85.0%). Lifestyle choices such as smoking or alcohol consumption are known psoriasis risk factors [22]; given the social and religious context in the Maghreb region, responses to questions about tobacco and alcohol consumption should be interpreted with caution. Obesity and smoking may increase the risk of developing psoriasis [23, 24]. Patients with psoriasis are more likely to be obese compared with the general population [25]. Diabetes was recorded in 17.7% of subjects and was associated with psoriasis duration and severity, and not necessarily driven by elevated BMI alone [26, 27].

Although it has been suggested that Caucasians are more frequently affected by psoriasis than other populations [14, 28], there were no significant differences be-

Table 3. Psoriasis medical history in pre-existing cases

	Algeria (n = 127)	Morocco (n = 104)	Tunisia (n = 142)	Maghreb (n = 373)
Years since diagnosis				
Number	126	99	137	362
Missing data	1	5	5	11
Mean ± SD	10.3±10.5	8.7±10.8	10.9±9.9	10.1±10.4
Median (range)	7.2 (0.0–52.0)	4.9 (0.0–58.4)	8.0 (0.0–51.4)	7.0 (0.0–58.4)
Treatments ¹				
Topical	127 (100.0)	98 (94.2)	138 (97.2)	363 (97.3)
Systemic	45 (35.4)	32 (30.8)	46 (32.4)	123 (33.0)
Physical	7 (5.5)	14 (13.5)	11 (7.7)	32 (8.6)
Thermal spa treatment	19 (15.0)	10 (9.6)	8 (5.6)	37 (9.9)
Alternative medicine	41 (32.3)	20 (19.2)	31 (21.8)	92 (24.7)
Self-medication	30 (23.6)	35 (33.7)	43 (30.3)	108 (29.0)
Overall efficacy				
Missing	0	6	14	20
Low	19 (15.0)	18 (18.4)	31 (24.2)	68 (19.3)
Partial	65 (51.2)	51 (52.0)	69 (53.9)	185 (52.4)
Satisfactory	43 (33.9)	29 (29.6)	28 (21.9)	100 (28.3)

Values are presented as numbers with percentages in parentheses unless otherwise indicated.

¹ One subject could receive several treatments.

tween skin types. About a third of subjects had a family history of psoriasis, similar to rates from other countries [29].

Three quarters of subjects (75.2%) had localized psoriasis, 85.8% had plaque psoriasis, coupled with pruritus in over 70% of cases. Other symptoms were recorded in 19.7% of cases, including rheumatic manifestations. Frontally, psoriasis was most often localized to the legs, whereas from the back, psoriasis was most often localized to the arms. Data on the percentage body area affected reflect other studies [30]; most patients with psoriasis have limited disease affecting less than one palm-sized area [31].

Psoriasis was diagnosed approximately 10 years earlier. Among subjects with pre-existing psoriasis, 97.3% used topical therapy and 33% used systemic treatment, similar to data reported in European studies [32, 33]. However, the study was not designed to compare the efficacy of different treatments. Importantly, the EPIMAG observed that overall treatment efficacy was considered partial in 52.4% of cases, confirming that there is room for improving psoriasis management in the Maghreb.

Psoriasis flares were triggered by stress in almost 80% of subjects, again reflecting data from studies conducted worldwide. Stress is described as a key disease trigger in up to 60% of patients [29, 34–36]. Change of season and

weight increase were noted as triggering flares in 43.1 and 12.4% of subjects, respectively. Psoriasis prevalence has been shown to be more common in colder climates than in tropical regions [17], and patients who gain weight have been reported to respond less well to treatment [37].

The previous PSOMAG study estimated a low psoriasis frequency detected by GPs and dermatologists in the Maghreb (2.3/1,000; 95% confidence interval, 1.8/1,000–2.8/1,000), which was mainly attributed to the limited number of dermatologists in the Maghreb compared with the population, and to poor awareness of disease pathology [15]. GP awareness was thus increased with a screening training programme included in the EPIMAG study. The PSOMAG highlighted that most patients with psoriasis (up to 90%) were likely not followed or diagnosed. The EPIMAG screening study estimated a fivefold higher psoriasis frequency in the Maghreb following GP training (12.08/1,000), confirming the hypothesis highlighted in the PSOMAG study. These new psoriasis frequency estimates remain well below the recorded ‘true’ estimated prevalence. Psoriasis prevalence in the Maghreb has been estimated between 2.3 and 3.0% [3, 12]. In Europe, psoriasis prevalence estimates vary from 0.6 to 6.5% [14]. In the USA, approximately 2.0% of the population is affected, and the estimated prevalence of diagnosed psoriasis is 3.15% [38]. The psoriasis frequency rates detected by GPs

Table 4. Psoriasis localizations and body parts affected in pre-existing cases

	Algeria (n = 127)	Morocco (n = 104)	Tunisia (n = 142)	Maghreb (n = 373)
Head or neck (front)	48 (37.8)	43 (41.3)	57 (40.1)	148 (39.7)
Number	7	5	9	21
Missing data	41	38	48	127
Mean ± SD	15.0±33.2	16.2±24.7	3.9±4.5	10.5±22.3
Median (range)	1.0 (0.0–90.0)	5.0 (1.0–60.0)	3.0 (0.0–15.0)	3.0 (0.0–90.0)
Head or neck (back)	57 (44.9)	33 (31.7)	58 (40.8)	148 (39.7)
Number	7	6	9	22
Missing data	50	27	49	126
Mean ± SD	15.3±33.1	14.8±22.4	4.2±5.2	10.6±21.8
Median (range)	2.0 (0.0–90.0)	7.5 (1.0–60.0)	1.0 (0.0–15.0)	2.5 (0.0–90.0)
Right arm (front)	71 (55.9)	61 (58.7)	71 (50.0)	203 (54.4)
Number	7	6	15	28
Missing data	64	55	56	175
Mean ± SD	13.6±19.2	16.2±9.6	2.1±1.6	8.0±12.0
Median (range)	2.0 (1.0–50.0)	17.5 (2.0–30.0)	2.0 (0.0–5.0)	2.8 (0.0–50.0)
Right arm (back)	78 (61.4)	66 (63.5)	99 (69.7)	243 (65.1)
Number	8	10	15	33
Missing data	70	56	84	210
Mean ± SD	15.1±18.1	12.1±11.2	2.6±3.2	8.5±12.0
Median (range)	6.0 (1.0–50.0)	7.5 (0.5–30.0)	1.0 (0.0–10.0)	2.5 (0.0–50.0)
Right leg (front)	97 (76.4)	79 (76.0)	110 (77.5)	286 (76.7)
Number	6	8	23	37
Missing data	91	71	87	249
Mean ± SD	7.5±7.9	10.6±9.8	5.0±5.2	6.6±7.0
Median (range)	3.0 (2.0–20.0)	7.5 (0.5–30.0)	4.0 (0.5–20.0)	4.0 (0.5–30.0)
Right leg (back)	63 (49.6)	48 (46.2)	67 (47.2)	178 (47.7)
Number	6	7	13	26
Missing data	57	41	54	152
Mean ± SD	8.3±9.6	12.1±10.3	3.8±5.1	7.1±8.3
Median (range)	3.0 (2.0–25.0)	10.0 (1.0–30.0)	2.5 (0.0–20.0)	3.5 (0.0–30.0)
Trunk (front)	52 (40.9)	34 (32.7)	60 (42.3)	146 (39.1)
Number	7	8	16	31
Missing data	45	26	44	115
Mean ± SD	28.8±32.0	19.2±28.1	4.8±4.6	13.9±22.4
Median (range)	20.0 (3.0–90.0)	5.0 (0.5–80.0)	3.5 (0.0–15.0)	5.0 (0.0–90.0)
Trunk (back)	51 (40.2)	29 (27.9)	58 (40.8)	138 (37.0)
Number	4	6	14	24
Missing data	47	23	44	114
Mean ± SD	2.9±2.0	25.7±30.0	5.9±7.8	10.4±17.7
Median (range)	3.5 (0.0–4.5)	12.5 (4.0–80.0)	4.0 (0.0–30.0)	4.8 (0.0–80.0)
Genitalia (front)	34 (26.8)	22 (21.2)	43 (30.3)	99 (26.5)
Number	4	3	11	18
Missing data	30	19	32	81
Mean ± SD	2.8±4.8	11.3±8.1	1.3±1.3	3.3±5.2
Median (range)	0.5 (0.0–10.0)	10.0 (4.0–20.0)	1.0 (0.0–5.0)	1.0 (0.0–20.0)
Genitalia (back)	3 (2.4)	4 (3.8)	4 (2.8)	11 (2.9)
Number	0	0	0	0
Missing data	3	4	4	11
Mean ± SD	–	–	–	–
Median (range)	–	–	–	–
Left arm (front)	13 (10.2)	60 (57.7)	70 (49.3)	143 (38.3)
Number	0	6	14	20
Missing data	13	54	56	123
Mean ± SD	–	15.3±9.9	2.2±1.6	6.2±8.1
Median (range)	–	15.0 (2.0–30.0)	2.3 (0.0–5.0)	3.0 (0.0–30.0)

Table 4 (continued)

	Algeria (n = 127)	Morocco (n = 104)	Tunisia (n = 142)	Maghreb (n = 373)
Left arm (back)	84 (66.1)	68 (65.4)	96 (67.6)	248 (66.5)
Number	7	9	15	31
Missing data	77	59	81	217
Mean ± SD	13.7±19.1	12.9±11.6	2.6±3.2	8.1±12.0
Median (range)	2.0 (1.0–50.0)	10.0 (1.0–30.0)	1.0 (0.0–10.0)	2.5 (0.0–50.0)
Left leg (front)	100 (78.7)	75 (72.1)	111 (78.2)	286 (76.7)
Number	7	7	24	38
Missing data	93	68	87	248
Mean ± SD	10.0±9.8	10.6±10.6	4.9±5.1	6.9±7.6
Median (range)	3.0 (2.0–25.0)	5.0 (0.5–30.0)	3.5 (0.5–20.0)	4.0 (0.5–30.0)
Left leg (back)	62 (48.8)	48 (46.2)	68 (47.9)	178 (47.7)
Number	5	7	13	25
Missing data	57	41	55	153
Mean ± SD	5.0±5.6	12.1±10.3	3.9±5.1	6.4±7.6
Median (range)	3.0 (2.0–15.0)	10.0 (1.0–30.0)	2.5 (0.0–20.0)	4.0 (0.0–30.0)

Values are presented as numbers with percentages in parentheses unless otherwise indicated.

Table 5. Frequency of new psoriasis cases diagnosed by GPs and dermatologists over the 2-week screening period

	Algeria	Morocco	Tunisia	Maghreb
Patients who consulted	18,820	7,315	10,711	36,846
Psoriasis cases diagnosed	193	110	142	445
Psoriasis frequency, n/1,000	10.26	15.04	13.26	12.08
95% confidence interval, n/1,000	8.82–11.69	12.25–17.83	11.09–15.42	10.96–13.19

and dermatologists in the Maghreb in the PSOMAG and EPIMAG studies confirm that the majority of psoriasis cases are not followed or diagnosed, and that the GP training programme had a strong impact on psoriasis screening.

Secondary analyses showed that investigators assessed almost three quarters (73.2%) of known psoriasis cases as severe. This proportion is higher than European surveys, in which moderate-to-severe psoriasis was confirmed by dermatologists in 79.3% of patients [39], and 74% of participating subjects considered their psoriasis as at least moderately severe [32]. In the absence of rigorous data enabling the characterization of psoriasis severity (apart from the PASI), classification of severe psoriasis was mostly recoded by study working group members, which may have led to bias.

Among pre-existing psoriasis cases, QoL was severely affected in 40.1% of cases, either on a professional or social level. When counting all affected patients (including

those mildly affected), approximately half had disease affecting everyday life, professional activities and social relationships. Psoriasis adversely affected physical activity and social relationships in ≥50% of 330 Kuwaiti patients, as measured by the patient-generated dermatology QoL scale [40]. In another patient questionnaire study, psoriasis affected overall emotional well-being in 88% of patients and enjoyment of life in 82% of patients [41]. An NPF survey found that 71% of patients considered psoriasis a significant issue in everyday life. Around 35% of patients avoided social activities, dating or intimate relationships [7].

The mean number of missing school or work days reported in the EPIMAG (3.2 ± 12.1 over a 6-month period) is lower than those of other studies. An Algerian study estimated this figure at 15 days/year. In a typical month, an NPF survey found that, among employed respondents who missed work days due to psoriasis, 62% missed 5 days or less, 6.6% missed 6–10 days, and 31% missed >10

days; 49% missed work days regularly [41]. The negative impact of psoriasis on professional life and work productivity is undeniable [42].

The EPIMAG is limited by the fact that it does not provide an exhaustive picture, due to the limited sample size and to difficulties in including patients from remote areas. However, strong trends were observed. Although the representativeness of the sample and the quality of the responses provided cannot be verified in detail, acceptance and participation rates were elevated. In addition, small variations in psoriasis evaluation depending on whether the case was pre-existing or newly diagnosed may have biased the uniform description of all psoriasis cases.

In conclusion, the EPIMAG provides new psoriasis epidemiological information, highlights the efficacy and impact of psoriasis screening training and improves the characterization of psoriasis in the Maghreb. Future research may benefit from long-term observational studies with larger patient samples. The EPIMAG demonstrates

that a large majority of psoriasis cases are not followed or diagnosed, despite the strong impact of psoriasis on QoL. It is necessary to improve psoriasis screening and management in the Maghreb. From a public health perspective, it is important to collect data on psoriasis frequency, burden and management, to ensure appropriate national health care policies.

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