REVIEW ARTICLE

Psoriasis in Latin America and the Caribbean: a systematic review

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Abstract

Psoriasis is a chronic inflammatory disease that generally affects the skin, nails and joints. The burden of psoriatic disease in Latin America and the Caribbean (LAC) remains largely unknown. To estimate the burden of psoriasis in LAC. We conducted a systematic review following the MOOSE and PRISMA statements. We searched published studies in MEDLINE, EMBASE, LILACS and CENTRAL from 1st January 2000 to 5th August 2015. We included studies that reported incidence, prevalence, health resource use and health expenditures, treatment patterns, comparative effectiveness of different drugs, patients reported outcomes, adherence to treatment and patient preferences in LAC. Risk of bias was assessed evaluating selection of participants, control of cofounders, measurement of exposure and outcome and conflict of interest. Pairs of reviewers independently selected, extracted and assessed the bias risk of the studies. The systematic review was registered at PROSPERO (CRD42016038325). A total of 18 studies from 12 LAC countries were included. Most were observational studies, between which there was a large heterogeneity of outcomes. Population-based studies were not found and most data came from hospital registries. One study reported an incidence of psoriatic arthritis in 6.26 cases per 100 000 person-years. Another study found an incidence of psoriasis 1020 per 100 000 patient-year attending at a dermatology clinic. The prevalence reported in the Argentinean health service was 74 cases per 100 000. Further, psoriasis has been shown to have a substantial negative impact on quality of life. A number of studies also indicated that non-communicable disease burden increases with the presence and severity of psoriasis. With regard to treatment pattern, methotrexate was the dominant systemic therapy. In conclusion, there is an important lack of information from LAC concerning the burden of psoriasis. Further studies investigating the burden of psoriasis in representative LAC populations are needed.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Introduction

Psoriasis is a chronic inflammatory disease that usually affects the skin but can also affect the nails and joints. While its cause is multifactorial, the autoimmune reaction triggered by T lymphocytes is principally responsible for the damage caused by the disease.[1] Psoriasis has three main histologic features: epidermal hyperplasia, increased vascularity and a leucocyte inflammatory infiltration in the dermis. The most common form of the disease is vulgar (85–90% of cases), while other types include guttate psoriasis, erythrodermic and pustular variants.[1,2] The disease is more common in Caucasians, and there is no clear difference between genders. Population-based studies show that prevalence ranges from 0.91% to 8.8% in adults, and 0% to 2.1% in children.[3] In the United States, incidence is estimated to be 40.8 per 100 000 person-year in children and 78.9 per 100 000 person-year in adults.[3,4] The disease can appear at any time of life, although it is usually more common among 30–39 years old and 50–69 years old with a lower starting age for women.[3]

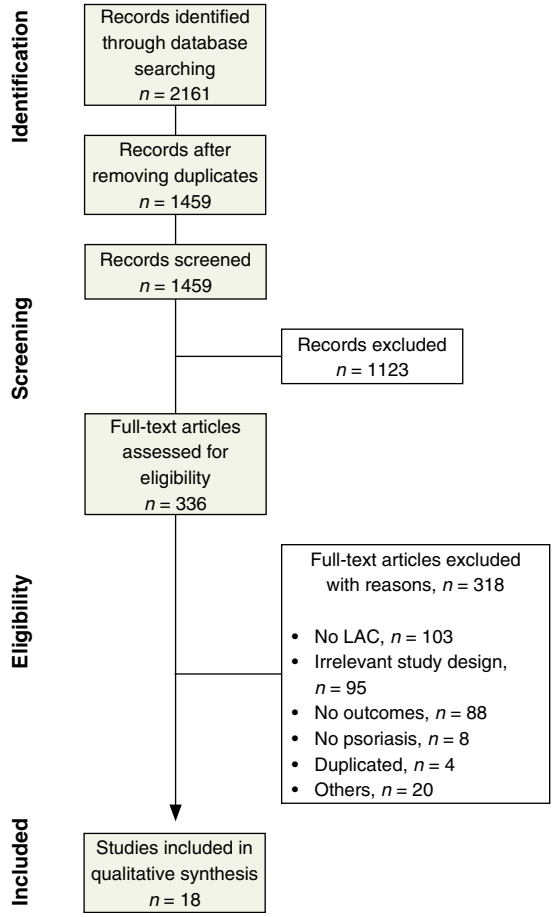

Figure 1 Study flow diagram.

The burden of psoriatic disease in Latin America and the Caribbean (LAC) remains largely unknown. From the scarce evidence available, it appears that both the prevalence and incidence of psoriasis and psoriatic arthritis (PsA) are lower in LAC than in other parts of the western world. Psoriasis and PsA are almost negligible among native populations from the Andean region.[5] A consensus of experts from Latin America countries estimated the average regional prevalence of psoriasis at 2.14% (range 1.13–2.9%) and that of PsA at 15.25% (range 10–18%).[5] The Iberoamerican Registry of Spondylarthritis (RESPONDIA) study included patients with a diagnosis of PsA had a longer mean disease duration from onset of symptoms to diagnosis and were more likely to have dactylitis, nail involvement, enthesitis and peripheral arthritis in lower and upper extremities.[6]

Nevertheless, the body of research about psoriasis in LAC is relatively insubstantial and significant gaps in our knowledge remain. We performed a systematic review to summarise the complete body of evidence about the epidemiology and burden of disease of psoriasis in LAC.

Methods

We followed the Meta-Analysis of Observational Studies in Epidemiology guidelines[7] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA Statement)[8,9] for reporting systematic reviews and meta-analysis. The protocol was registered in PROSPERO (Registration number CRD42016038325).

Search strategy and selection criteria

A systematic search was performed from 1st January 2000 to 5th August 2015 in the MEDLINE, EMBASE, CENTRAL and LILACS databases. The following search terms were used as follows: Latin America, South America, Central America, Psoriasis, Arthritic Psoriasis, Psoriatic Arthritis, Psoriasis Arthropathica, Psoriatic Arthropathy and Psoriatic Arthropathies, combined with the names of the countries in LAC. The full search strategy can be found in Appendix S1.

We included randomised controlled trials, cohort studies, case–control studies, cross-sectional studies, case series and economic evaluations that include LAC participants only or separate data of LAC participants. Studies were included only if they reported at least 50 cases. Criteria for study inclusion in the review were availability of data on incidence, prevalence, burden of disease estimates, health resource use and health expenditures (cost of diagnosis, hospitalisation, costs of therapeutic options), treatment patterns, comparative effectiveness of different drugs available, patients reported outcomes, adherence to treatment, patient preference or medical unmet needs. No language restriction was applied. Only studies published or reported since 2000 were included. In cases where data or data subsets overlapped temporally or were reported in multiple publications, we selected the study with the larger sample size and better representation of the country's population.

Study screening and data extraction

Duplicate studies were initially removed by a reference management software. Pairs of independent reviewers screened titles and abstracts of all identified citations and were categorised into one of the following categories: excluded, related reference, related review (references were searched), low/moderate probability of inclusion and high probability of inclusion. Except those categorised as excluded, all articles were retrieved in full text for further analysis. As a second screening process, two reviewers independently extracted and assessed the risk of bias of each full-text article. The following data were extracted from the selected articles: author, year of publication, country, type of study, type of psoriasis, outcome, population age, year data set, sample size and specific groups.

Disagreements were resolved by consensus. All phases of the study selection were completed using EROS® (Early Review Organizing Software, IECS, Buenos Aires).[10]

Assessment of risk of bias in included studies

The risk of bias of observational studies was assessed using a checklist of essential items based on STROBE[11] (Strengthening the Reporting of Observational studies in Epidemiology), and other methodological papers: Sanderson *et al.*,[12] Fowkes *et al.*,[13] QATSO[14] and Berra *et al.*[15] Risk of bias was assessed using a checklist of essential items: selection of participants, control of cofounders, measurement of exposure and outcome and conflict of interest.

Randomised controlled trials, quasi-randomised controlled trials, cohort studies and case–control studies were assessed considering non-comparative data (i.e. control arms of intervention

Table 1 Characteristics of included studies

Author	Country	Type of Study	Type of psoriasis	Outcome	Population age	Year dataset	*n*	Specific Group
Suite (2006)[17]	Trinidad & Tobago	Cross-sectional	Skin/Joints	Incidence	Adults	1998–2002	7400	Hospital-based
Soriano (2011)[18]	Argentina	Cross-sectional	Joints	Incidence/ Prevalence	Adults	2000–2006	138 288	Hospital-based
Trujillo (2002)[19]	Cuba	Cross-sectional	Joints	Prevalence/ Treatment patterns	Adults	2002	200	Multicenter
González-Vacarezza (2014)[20]	Uruguay	Economic evaluation	Joints	Health resource use and health expenditures	Adults	2014	NR	National Health System of Uruguay
Lopes (2014)[21]	Brazil	Cross-sectional	Skin	Health resource use and health expenditures	Adults	2004–2010	203	Systems of State Health Department
Silveira (2014)[22]	Brazil	Cross-sectional	Skin	Treatment patterns	Adults	2014	218	State Health Secretariat of Sao Paulo
Goff (2015)[23]	South, central, Caribbean and Andean America Latin	Cross-sectional	Skin/Joints	Burden of disease estimates	Adults	2010	NR	Multicenter
Baeta (2014)[24]	Brazil	Cross-sectional	Skin	Burden of disease estimates	Adults	2011–2012	190	Hospital-based
Espinoza Hernandez (2014)[25]	Mexico	Case control	Skin/Joints	Prevalence	Adults	2010–2011	209	Hospital-based
Molina (2007)[26]	Argentina	Cross-sectional	Joints	Patient-reported outcomes	Adults	2007	148	Multicenter
Ponce Rodriguez (2012)[27]	Peru	Cross-sectional	Skin/Joints	Patient-reported outcomes	Adults	2010-2011	110	Hospital-based
Valenzuela (2011)[28]	Chile	Cross-sectional	Skin/Joints	Patient-reported outcomes	Adults	2011	153	Hospital-based
Vivas Toro (2014)[29]	Venezuela	Cross-sectional	Skin	Patient-reported outcomes	Adults	2002–2012	178	Hospital-based
Acosta Medina (2009)[30]	Cuba	Case series	Skin	Patient-reported outcomes	Adults	2008	100	Hospital-based
Gyulai (2015)[31]	Argentina, Brazil, Chile, Peru, Colombia, Venezuela, Costa Rica, Honduras, and Mexico.	Cross-sectional	Skin/Joints	Treatment patterns	Adults	2015	111	Multicenter
Silva (2014)[32]	Brazil	Case series	Skin/Joints	Treatment patterns	Adults	2014	120	Hospital-based
Pérez Rodríguez (2011)[33]	Cuba	Quasi-experimental	Skin	Treatment patterns	All ages	189	100	Hospital-based
Kivelevitch (2012)[34]	Argentina	Cross-sectional	Skin	Adherence to treatment and patient preference	Adults	2012	176	Hospital-based

NR, not reported.

studies or all cases where exposures are those of patients with psoriatic disease). Randomised controlled trials for comparative data were assessed with the Cochrane tool.[16]

Pairs of independent reviewers assessed the risk of bias through EROS®. Disagreements were resolved by consensus.

Results

The search retrieved 1459 references after removing duplicates, and 1123 of them were excluded by title and abstract. The full texts of 336 remaining studies were retrieved for detailed evaluation, and we finally included 18 that met our inclusion criteria (Fig. 1).

Most included studies were conducted in South America, particularly in Brazil (five studies). The years of publication of included studies ranged from 2002 to 2015, with a mode of 2014. Moreover, the majority of the included studies reported only skin psoriasis (37.5%). Of the 18 studies included, 13 were cross-sectional (72.2%), three case series (16.7%), one economic evaluation (5.6%) and one quasi-experimental study (5.6%). See details of the studies in Table 1.

Most observational studies have a high risk of bias in participant selection. For an economic evaluation and a quasi-experimental study, we used the same quality assessment tool as we considered only the non-comparative data provided. The risk of bias of each study was reported by risk of bias domains (Table 2).

Incidence

Only two studies which described incidence of psoriasis in LAC were found. One of which evaluated incidence from 7400 patients' medical records over a 5-year period in a dermatology clinic in a general hospital in Trinidad and Tobago and reported 379 cases (5.1%).[17] This is equivalent to 1020 per 100 000 patient-year attending at the dermatology clinic. There were 183 females (48%) and 196 males (52%). The majority of cases (77%) presented between 20 and 69 years with a peak between 50 and 59 years and a mean in women of 44 years (SD 21) and 43 for men (SD 18.6).

The second study examined PsA in medical records of 138 288 clients of a private health insurance programme in Buenos Aires, Argentina over the period January 2000 to January 2006.[18] Thirty-five new cases of PsA were diagnosed, with an age mean of 53.8 (SD ± 16), and including 23 males (66%). The incidence rate for PsA was 6.26 cases per 100 000 person-years (95% CI 4.2–8.3). In females, there were 3.64 cases per 100 000 person-years (95% CI 1.6–5.7), in males 10.02 cases per 100 000 person-years (95% CI 5.9–14.1), and the age group with highest incidence was 45–64 years with 11.6 cases per 100 000 person-years (95% CI 6.9, 18.3).

Prevalence

A cross-sectional study including patients with psoriasis from seven provinces of Cuba found a prevalence of 6% among all cases of dermatological consultation with a mean age of 44 years (range 17–74 years) and 46.5% men.[19]

The study described above from Argentina also reported PsA prevalence of 74 cases per 100 000 (95% CI 57–94),[18] with a prevalence of 45.8 (95% CI 22–84.4) for females and 114 (95% CI 70–176) per 100 000 clients.

Table 2 Risk of bias of included studies.

Author	Conflict of interest	Confounder control	Exposure and outcome measurements	Participant selection (selection risk)
Suite (2006)[17]	Low Risk	Low Risk	Moderate Risk	Low Risk
Soriano (2011)[18]	Low Risk	Low Risk	Low Risk	High Risk
Trujillo (2002)[19]	Low Risk	Low Risk	Low Risk	High Risk
Lopes (2014)[21]	Low Risk	Low Risk	Low Risk	Moderate Risk
Silveira (2014)[22]	Unclear Risk	Low Risk	Low Risk	High Risk
Goff (2015)[23]	Low Risk	Low Risk	Low Risk	Low Risk
Baeta (2014)[24]	Low Risk	Low Risk	Low Risk	High Risk
Molina (2007)[26]	Unclear Risk	Low Risk	Low Risk	High Risk
Ponce Rodriguez (2012)[27]	Low Risk	Moderate Risk	Moderate Risk	High Risk
Valenzuela (2011)[28]	Low Risk	Low Risk	Moderate Risk	Low Risk
Vivas Toro (2014)[29]	Unclear Risk	Low Risk	Low Risk	Low Risk
Gyulai (2015)[31]	Low Risk	Moderate Risk	High Risk	High Risk
Kivelevitch (2012)[34]	Low Risk	Low Risk	Low Risk	High Risk
González-Vacarezza (2014)[20]	Low Risk	Unclear Risk	Unclear Risk	Unclear Risk
Silva (2014)[32]	Low Risk	Low Risk	Low Risk	Low Risk
Acosta Medina (2009)[30]	Low Risk	Low Risk	Low Risk	High Risk
Espinoza Hernandez (2014)[25]	Low Risk	Low Risk	Low Risk	High Risk
Pérez Rodriguez (2011)[33]	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk

Health resource use and health expenditures attributable to psoriasis

A cost-utility assessment regarding quality-adjusted life-year (QALY) benefits of the biological medications adalimumab, etanercept and infliximab as treatment for moderate-to-severe PsA across the National Integrated Health System of Uruguay was published in 2014.[20] With a time horizon of 40 years, Infliximab was the most cost-effective anti-TNF drug, with a cost of USD 47,294 per QALY gained.

In Brazil, these biologics are not available through the public health system and the lawsuits of 190 patients demanding their provision were analysed.[21] Most patients (69.5%) obtained their biologics. The highest request rate was for infliximab (57.4%), followed by efalizumab (21.6%), etanercept (16.3%) and adalimumab (4.7%). The majority of the analysed lawsuits did not explicitly justify the prescription of a biological medicine or provide information regarding previous treatment, evolution of the disease, supplementary exams or diagnoses according to the ICD-10.

Also in Brazil, a cross-sectional study including 203 patients that had, through lawsuits filed against the state of São Paulo in the period 2004–2010, gained access to biologics for treatment of psoriasis with adalimumab (6.9%), efalizumab (21.2%), etanercept (17.2%) and infliximab (54.7%), evaluated the standards and adherence of management of psoriasis common to major international guidelines.[22] Their results showed that access to biologics is largely through prescriptions by private practitioners, and that only 16.7% of patients met the guidelines before beginning biologic treatment with topical and non-biological systemic therapy.

Burden of disease

A cross-sectional study evaluated temporal trends and geographic variation in psoriasis-associated disease burden using the data of The Global Burden of Disease (GBD) Study 2010.[23] The primary outcome was regional burden of disease associated with psoriasis, as measured by disability-adjusted life years (DALYs). The results for LAC expressed in DALYs rates per 100 000 persons were the following: Latin America, Southern 18.3 (95% CI 9.0, 30.3); Latin America, Tropical 13.8 (95% CI 6.3, 22.9); Caribbean 13.6 (95% CI 6.8, 22.0); Latin America, Andean 13.6 (95% CI 6.5, 21.6); Latin America, Central 13.4 (95% CI 6.6, 21.4).

A cross-sectional study from Brazil, including 190 patients seen in a university hospital from July 2011 to May 2012, investigated the association of psoriasis with comorbidities and cardiovascular risk factors such as hypertension, diabetes, obesity and dyslipidemia in a population of psoriatic patients.[24] The results showed a greatly increased prevalence of hypertension (43.7%), diabetes (15.3%), smoking (50.5%), overweight (31.1%) and obesity (33.2%) in the 190 patients with psoriasis compared with the general population. Patients' cardiovascular risk profile in 159 cases was moderate (38.4%) and high (8.8%) according to the Framingham Risk Score (FRS), and 47.2% of patients had moderate or high risk of fatal and non-fatal coronary events in 10 years.

A case–control study form Mexico included 103 patients with psoriasis and 106 controls.[25] The mean age of patients was 48.37 years, and 55% were women. Metabolic syndrome was significantly more common in psoriatic patients than controls (OR 1.74; 95% CI: 1.19–2.53; $P < 0.001$). Higher frequency of diabetes mellitus (17.3 vs. 6.6%; $P = 0.001$), alcoholic habits (8.7 vs. 0.9%; $P = 0.009$), higher levels of systolic blood pressure ≥130 mmHg (123.3 vs. 117.9; $P = 0.002$) and triglycerides were found (178 vs. 147; $P = 0.01$) in patients with psoriasis.

Patient-reported outcomes

A multicentric study from Argentina was designed to determine the influence of sociodemographic features on clinical manifestations, disease activity, functional status and quality of life (QoL) in 148 patients with PsA from rheumatology clinics in 2006.[26] Disease activity was evaluated by swollen joint count, global visual analogue scale (gVAS) and BASDAI. The functional status and the quality of life (QoL) were assessed by BASFI, SF-12 (Standard Version 1.0), and ASQoL in all patients. The mean age of patients was 53.2 years, 58.5% were women, and 10.8% were treated with biologics (infliximab, etanercept and adalimumab). PsA patients with lower social class presented a lower QoL, demonstrated by elevated gVAS (5.3 ± 3.0 vs. 4.3 ± 2.5, $P = 0.0003$), higher BASDAI (4.3 ± 2.8 vs. 4.0 ± 2.3, $P = 0.02$), higher BASFI (4.0 ± 3.3 vs. 3.0 ± 2.8, $P = 0.0003$) and higher ASQoL (7.9 ± 5.9 vs. 5.4 ± 4.6, $P < 0.0001$) than those with upper social class.

In Peru, the impact of psoriasis in QoL was assessed by the Psoriasis Area and Severity Score (PASI) and compared with a validated Spanish version of the Dermatology Life Quality Index (DLQI) of 110 psoriatic patients that attended a reference hospital.[27] In accordance with DLQI, psoriasis had a moderate effect on the QoL in most of the patients (54.5%), and a significant correlation between PASI and DLQI ($r = 0.64$; $P < 0.001$) was found.

Another cross-sectional study in a Chilean university hospital evaluated the epidemiological features and the impact on QoL.[28] A total of 153 patients were studied using an epidemiological and QoL-related survey (Spanish version of the Dermatology Life Quality Index, DLQI). The mean DLQI was 14 ('very large impact') and the impact on QoL was significantly higher for men (mean DLQI 15) than for women (mean DLQI 13) ($P = 0.027$). Patients with recent disease (onset within the last 5 years) had a DLQI of 20.12, which is significantly higher than the DLQI 10.76 observed in patients with long-standing disease (more than 20 years).

In Venezuela, a retrospective study based on the medical records of 178 patients with psoriasis consulting in a

dermatologic hospital department between 2002 and 2012 assessed clinical and epidemiological characteristics and QoL of their population.[29] QoL was demonstrated by the Spanish version of the Dermatology Life Quality Index (DLQI) obtaining 76.4% with regular QoL, 51.29% acceptable, 41.23% good and 10% with bad QoL.

To assess the relation between Psoriasis Area and Severity (PASI) and QoL, one study in a medical centre from Havana included 100 adult patients with psoriasis.[30] Of these, 52% were female and 58% suffered moderate erythema, infiltration and desquamation. In 89% of patients, the severity of psoriasis was mild, in 11% moderate and there were no patients with severe effects. However, the QoL was effected in 79% of the patients with a minimum impact in 49.4% and moderate in 36.7%. They concluded that severity of psoriasis was slightly higher in women. They did not find significant relation between PASI and QoL.

Treatment pattern

A worldwide survey that included 481 dermatologists from 63 countries was focused on safety, dosing, administration, folic acid supplementation and combined therapy related with methotrexate use for psoriatic patients.[31] Starting and maintenance doses of 10 mg of methotrexate or lower were reported by 67% and 42% of LAC respondents respectively, and relatively large differences in the dosing patterns by geographical locations were found. The primary mode of administration was oral, and the majority of respondents administered folic acid supplementation.

Another case series at a state referral centre in Brazil included 74 psoriatic patients treated with anti-TNF alpha. It found that 95.9% of patients had been treated with traditional therapies before the administration of biologics.[32] Forty-nine individuals (66.2%) were treated simultaneously with methotrexate, in doses ranging from 10 to 15 mg/week. The main reason for therapy with biologics was an insufficient response to standard therapies (55.4%). The biologics used were infliximab (48.6%), etanercept (32.4%) and adalimumab (18.9%), with a median treatment period of 18.0 months (IQR 9.0–36.0).

In Cuba, two studies described treatment patterns. In one of the studies, described above, 96% of the patients had received some treatment for the condition.[19] Topic steroids in 89.5% of cases, and tar based ointments (an ancient formula used since the 19th century) in 53%. Calcipotriol, PUVA or other cytostatic therapies were reported in less than 10% of the cases. The other study was quasi-experimental and evaluated 100 patients who were exposed to a magnetic field (50 Hz) for 10 min, 5 days a week.[33] A clinical evaluation (PASI) was conducted at baseline, 2, 4 and 8 weeks. The results were classified into whitening (22%), responder (75%), non-responder (8%) and worsening (1%). Scalp psoriatic patients were the better responders with 88% whitening.

Adherence to treatment

One cross-sectional study conducted in Argentina included 176 patients from a public hospital.[34] A survey with 21 questions was applied to measure self-medication and non-adherence rates to therapy. The questionnaire found that 77% of patients were non-adherent to treatment (97% had used topical, 29% systematic treatment and 26% used both), and 33% were self-medicated. The two groups combined accounted for 82% of the study population. No significant differences between the variables studied, either for non-adherence, self-medication or the combined group were found.

Discussion

Our results show the remarkable lack of information in LAC concerning the outcomes included in the present review.

Population-based incidence and prevalence of psoriasis in LAC are hard to estimate. In some cases, the available information tends to overestimate its frequency because it comes from hospital records; meanwhile, the general trend is to underestimate the incidence and prevalence of the disease, due to poor registration. Additionally, differences in diagnostic criteria and report types contribute to important heterogeneity in the results, explaining the big differences in the epidemiology of psoriasis between different countries of the region. Only three studies (non-population based) of incidence and prevalence were included but, as previously mentioned, this does not allow us to draw firm conclusions, and even less to extrapolate the data to the general population of the region or to make reliable comparisons between countries.

Parisi *et al.* conducted a systematic review in 2013 to study the global epidemiology of psoriasis, and found the same lack of information for LAC. Most prevalence studies were based on the prevalence of psoriasis in Europe or United States. The prevalence of psoriasis in adults reported varied widely, from 0.91% (United States) to 8.5% (Norway). The incidence of the disease ranged from 78.9/100 000 person-years (United States) to 230/100 000 person-years (Italy).[3]

Regarding the use of health resources and health costs attributable to psoriasis in LAC, we identified a study in Uruguay that evaluated the cost-effectiveness of different biologic agents for the treatment of psoriasis. Infliximab demonstrated a better profile compared to adalimumab and etanercept, although all showed an adequate cost-effectiveness profile. In Brazil, two studies showed that the use of biological therapies result mainly from legal claims because such medication is not included in the protocol for treatment in the public health system. We did not find studies describing global costs attributable to psoriasis for the countries of the region. The situation for USA or Canada is very different. The very high-quality information regarding health costs related to psoriasis in these countries indicate that the economic burden of psoriasis is substantial and significant, with spending on psoriasis in the US at approximately USD 112

billons in 2013. Although the comparison with such health systems may not be adequate, these differences highlight the importance of developing large databases that could serve as reliable resources for future studies on these outcomes, while supporting clinical decisions.[35,36]

Our systematic review included one article that compared the burden of disease (measured in DALYs) in different regions of LAC. Large differences were found between South America, Central America and the Caribbean. The highest burden of disease was found in Central America and the Caribbean, and the lowest in South America. Another study in Brazil showed an association between psoriasis and major cardiovascular risk factors with increased risk of cardiovascular-related mortality, an association that has been reported in other studies.[37,38] Globally, the mean number of DALYs per 100 000 people attributed to psoriasis was 15.6, which has remained constant from 1990 to 2010. In 2010, with regard to disease burden, psoriasis was ranked 144 of 176 conditions, and comprised 0.04% of the total global DALYs from all conditions. The five GBD regions with the highest psoriasis-related DALY rates in 2010 were in high-income countries (Asia, North America and Europe) and southern Latin America. The five regions with the lowest psoriasis-related DALY rates in 2010 were central Latin America and sub-Saharan Africa.[23]

Three studies that showed a moderate-to-severe impact on QoL of psoriasis were included in this review. This effect is directly related to the ability to control the illness, and better index of QoL was demonstrated for higher socioeconomic class patients with more advanced education and for those with a longer history of disease. These findings are similar to previously published information, although not from the same region of interest as the present review.[39,40] De Korte *et al.* conducted a systematic literature review which showed that patients with psoriasis reported physical discomfort, impaired emotional functioning, a negative body and self-image, and limitations in daily activities, social contacts and (skin-exposing) activities, and work. In addition, more severe psoriasis was associated with lower levels of QoL, and there was a tendency for higher age to be associated with slightly lower levels of physical functioning and slightly higher levels of psychological functioning and overall QoL.[41]

Regarding treatment patterns, the results for the region of a global survey found that, although it was not possible to establish a common pattern of usage, methotrexate is the most frequent first line systemic therapy, followed by phototherapy. In relation to biological therapies, a study from Brazil reported that the main cause for implementation of biological therapy is the lack of response to standard therapies, and the most commonly administered biological agents were infliximab, etanercept and adalimumab. As for topical treatment, a study in Cuba reported the habitual use of topical steroids as first line. In clinical practice, patients may be grouped into mild-to-moderate and moderate-to-severe disease categories. The first group can often be managed with topical agents, while the second may need phototherapy or systemic therapy with established therapies such as methotrexate and phototherapy.[42] There are some data in LAC countries that suggest that patients receive therapy according with the current recommendations.

Patient preferences and adherence to systemic or local psoriatic treatments were also poorly studied in recent years in LAC. Data from the few studies included for these outcomes demonstrated that up to 82% of patients may show some kind of poor adherence pattern, highlighting the fact that this problem causes great impact on disease progression. Although studied populations are different, reports from other regions also showed important difficulties related to treatment adherence, this topic being one of the pitfalls of this disease, even in the era of new therapeutic agents such as monoclonal antibodies.[43]

High-quality evidence, particularly population-based studies, is necessary to determine the burden of disease in LAC. In the future, it will also be important to address research related to patient's preferences, given the population diversity of the region and the importance of this aspect in relation to adherence to treatments. Our review highlights the important gaps in evidence, but it is hoped it may help to improve many aspects related to the management of psoriasis in LAC.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Search Strategies.