

Psoriasis – epidemiology and clinical spectrum

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Summary

Despite psoriasis being a common skin disease, there are still a number of unanswered questions. One of these is the prevalence of the disease, as there is a lack of specific data, with the majority of studies reporting estimates only. Population based studies are rare and longitudinal observations on changing prevalence rates are lacking. This contrasts with other T-cell mediated autoimmune diseases where the number of those affected is rising.

Epidemiological studies revealed that a distinct group of diseases is quite frequently associated with psoriasis, e.g. arthritis, colitis, diabetes and hypertension. In contrast, atopic dermatitis and allergies are less frequently seen compared to normal rates of occurrence. As the psoriatic immune response pattern relates to activated Th-1 cells, psoriasis and atopic dermatitis appear to be mutually exclusive due to the Th-1/Th-2 dichotomy.

Difficulties in defining psoriasis frequency

The prevalence rates of psoriasis are constantly quoted to be around 2%. The idea that two out of 100 persons show psoriatic lesions is put forward so often that it appears futile to argue. Closer inspection however, reveals that this figure still stands on uncertain grounds in that almost no defined population-based studies have been performed; the few exceptions include Lomholt's famous study on the Faroe Islands¹⁶ and Hellgren's study in Sweden.¹¹ In fact nearly all data reported in the literature represent rough estimates.

A most comprehensive survey on the epidemiology of psoriasis was compiled recently by Faber and Nall.¹⁰ Their contribution can rightly be considered to be a 'classic' of dermatologic epidemiology dealing with almost every aspect in this field. In their overview the differences described for various countries, geographical regions as well as ethnic groups were marked. For instance, the per cent frequency rates range from 0% (Samoa) to 11.8%

(Arctic-Kasach'ye).¹⁰ For most of the data given the range extends from around 0.5 to close to 2.5%.

In the USA the prevalence of psoriasis was estimated to be around 4.6% while in Canada it was 4.7%.¹⁸ Only 0.7% of American Blacks showed psoriasis.¹⁵ The estimated prevalence in India is 0.7% and Jacyk made a similar estimate in Nigeria.¹⁹ More precise information on the annual incidence of psoriasis in the USA was provided by Bell *et al.*¹ who showed an age and sex adjusted incidence of 60.4/100 000 for Rochester, Minnesota.

Data for Europe including the UK, Norway and Croatia as given examples show little variation with a range from 1.6% (UK), 1.4% (Norway) and 1.55% (Croatia). In East Africa the figure was 0.7% and in the Henan district of China only 0.4% were seen affected.¹⁰ Thus one may assume that there are 5.1 million affected persons in Europe, 4.9 million in the USA and 2.5 million in Japan.

A systematic population survey on a total of 3892 persons was conducted by Branderup and Green in Denmark.² In this study the point prevalence was 4.2% for males and 3.3% for women. Because possible false-positive answers to questionnaires were in the range of 25% the prevalence figures were adjusted to 3.2% in men and 2.5% for women. It is of interest that 88% of

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the self-reporting Danes with psoriasis had received medical treatment for their skin condition and 71% by a dermatologist supporting the validity of the data presented by Branderup and Green.²

Lomholt's study was conducted on three of the Faroe island comprising almost one-third of the entire Faroese population.¹⁶ It probably represents the most important field study in psoriasis ever carried out. Lomholt visited a total of 1915 homes with 2341 households and identified 2.8% of the people to be affected. Among these psoriasis patients nearly all (91%) had affected relatives.

Taking together in these latter studies conducted in the Nordic countries the estimated prevalence of psoriasis is almost 50% higher than commonly stated. Also, considering that single lesions could be overlooked, the actual number of persons carrying the psoriatic genotype may be even higher. In fact in the Branderup and Green study² approximately two-thirds of patients suffered from light psoriasis and one-third showed more severe symptoms.

It is interesting to note that in none of these epidemiological studies were changes with time noted. Throughout the years of close epidemiological observation no significant changes in annual incidence rates were reported. This is somewhat surprising in view of the suspected role of environmental factors in eliciting and maintaining skin lesions. As psoriasis is a multifactorial disease, continuous exposure to a changing environment (e.g. hazards of bacterial infections, exposure to possible antigens and superantigens, variable intake of foods, etc.) changes in prevalence rates and/or modification of the clinical phenotype would seem likely.

In addition, this is in contrast with other organ-specific diseases with autoimmune pathogenesis including rheumatoid arthritis, Crohn's disease, diabetes and others, all of which demonstrate increasing prevalence rates. Atopic dermatitis, which is by several factors more common than psoriasis and shows strong correlation with exposure to environmental factors, has shown significant increases during recent decades. Perhaps the environmental influence on the pathogenesis of psoriasis is of less importance than it is in the other autoimmune conditions mentioned above. However, when one considers the great variability of the psoriatic tissue reaction with different degrees of activity, extent of body involvement, frequency of relapses, variable age of onset, a distinct role of trigger factors seems likely. Their nature appears to be subtle so that confronted with a denominating genetic susceptibility the impact of environmental factor(s) could be small. However this remains a hypothesis at present.

Table 1 Studies to be conducted on the epidemiology of psoriasis.

Population based studies on prevalence rates
Further characterization of disease subtypes
Longitudinal studies for the detection of disease patterns
Search for environmental factors
Studies which may help to find means of prevention

Finally, one of the features of autoimmunity is that the proportion of females affected outweighs males significantly. However, in psoriasis differences between male and female patients were noted only in the age of onset¹² and no significant sex differences were seen to exist in the overall estimate.¹⁰ Although there is good evidence to consider psoriasis as a T-cell-mediated autoimmune disorder with pathogenic similarities to the diseases mentioned above, reasons for the lack of sex disparity remain unknown.

In summary epidemiological studies have provided many data especially on geographical and ethnical distribution of psoriasis. Still, a number of problems listed in Table 1 require further clarification to meet the need for identification of subtypes and disease patterns.

Spectrum of clinical disease

The clinical morphology of psoriatic lesions shows features which are so characteristic that the diagnosis can be made without difficulties. Occasional diagnostic problems may arise in psoriatic erythroderma, Sezary syndrome as well as erythrodermic eczema, which make it necessary to take biopsies.

Apart from merely diagnosing erythro-squamous lesions it appears to be of importance to classify more precisely the type of psoriasis under study. In textbooks the characterization of psoriasis is restricted to the lesional morphology (nummular, inversa, geographica, annularis, circinata, etc.) in addition to important distinctions such as pustular and nonpustular psoriasis (Table 2). However, equally important seems to be to

Table 2 Clinical forms of nonpustular and pustular psoriasis.

Non-pustular psoriasis	Pustular psoriasis
Type I, early onset	Generalized von Zumbusch type
Type II, late onset	Impetigo herpetiformis
Guttate psoriasis	Localized Palmo-plantar pustular psoriasis
Psoriatic erythroderma	Acrodermatitis continua
Drug-induced psoriasis	Annular pustular psoriasis



Figure 1 Single lesions with signs of central clearing indicating low lesional activity; relapses are infrequent.

describe the actual clinical status as the momentary stage of disease activity. One reason is that the psoriatic phenotype reflects a changing spectrum of disease expression.

At the University of Kiel Department of Dermatology a phenotype database of more than 45 000 patients with skin diseases and a psoriasis-specific data base of 3700 patients enabled us to recognize two distinct patient cohorts: one with early [peak age of onset 16 and 21 years (F/M)] onset and a smaller cohort with late onset (fifth decade of life²). Patients with early onset (type I) are more likely to show widespread and recurrent disease as compared with late onset patients (type II). They also demonstrate a history with affected parents (44% in type I, 0% in type II), and show a significantly higher frequency of HLA Cw6 as compared with late onset patients (85% vs. 14%) and for DR7 (70% vs. 30%).^{4,12} Data obtained by studying the large Swedish patient cohort^{6,7} indicate that gene(s) located



Figure 2 Stable, confluent lesions covering large body areas. Relapses occur after prolonged time periods (5–12 months).

within a susceptibility region near Cw6 determine a distinct phenotype with an early onset age.

In addition, major differences exist between 'acute' and 'chronic' disease. In the latter form lesions may persist unchanged for months or even years whereas acute disease shows sudden outbreak of lesions within short time (days). There are many 'in between' when individual lesions start expanding over larger areas or when the number of 'chronic' plaques increases with time (Figs 1–8). No descriptive terms are available at present to characterize these phenotypic variables.

Another important feature of psoriasis relates to the great variability to relapse. There are patients who show frequent relapses within months or even weeks while in others recurrence of disease takes long time periods, sometimes even years. Patients with frequent relapses tend to develop more severe disease with rapidly enlarging lesions covering significant portions of the body surface. In these patients with frequent relapses it would be interesting to know whether disease activity



Figure 3 Dissemminated expanding lesions, generalized body involvement with frequent relapses and early onset disease.

and severity increases with the number of recurrences so that relapses become more frequent with time and body involvement.

In Table 3 three parameters are listed which appear

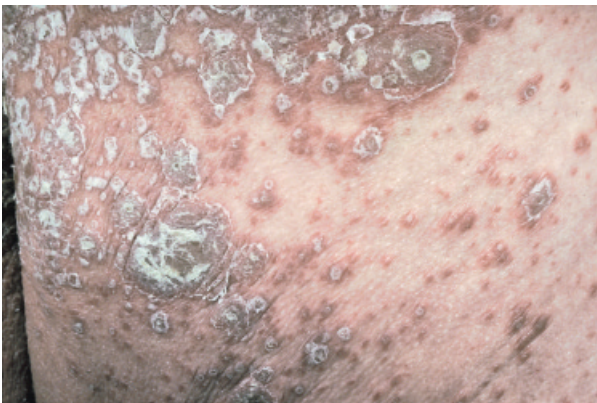


Figure 4 Peracute onset disease with rapidly expanding highly inflammatory lesions following streptococcal infection. Type I psoriasis in a young male.

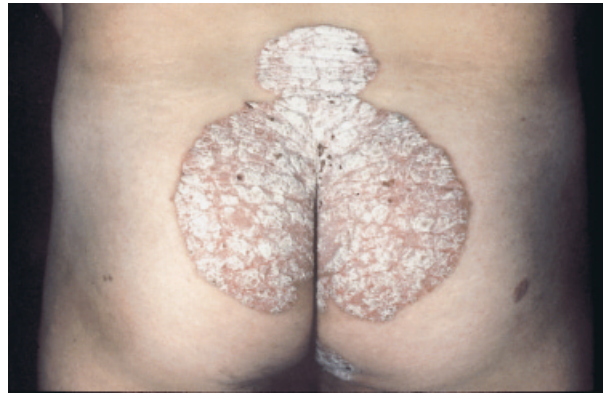


Figure 5 Single lesion, not extending, absence of relapsing disease.

as major determinants of disease severity: extent of body involvement, lesional activity and the frequency of relapses. The extent of body involvement is often minimum with lesions on restricted areas (parietal scalp, knees and elbows, lower back), moderate with more lesions of the plaque type present and severe when large parts of the body surface are covered. It appears important to add criteria for the dynamic behaviour of the lesions, whether these extend or remain stable and thirdly, to take into account the frequency of relapses occurring during a given time, e.g. 1 year (Table 3). As a proposed scale 'minimum', 'moderate' and 'severe' are given and different figures are listed. As the course of the disease is determined largely by the type of disease (reflected by early and late onset)^{4,10} this is included as a multiplier of 2 for type II psoriasis and 5 for early onset type I psoriasis (Table 3). Using this scale the disease ranges from 10 (minimum involvement in patients with late onset) to 75 in type I patients with extensive involvement, extending lesions and frequent relapses.



Figure 6 Actively expanding plaques of various sizes, early onset with frequent relapses.



Figure 7 Plaque lesions turning into active disease with numerous newly developing and expanding lesions. Type I psoriasis.

Preliminary observation indicates that using this scale the variations between observers are smaller compared with the PASI.

Taking into account these features these parameters can be used to characterize psoriasis disease activity (Table 3). This estimate pays attention to the fact that the proliferative–inflammatory potentials in psoriasis are not static but often in disequilibrium which results in rapid onset and more extensive involvement (see Figs 1–8). Unfortunately presently used parameters for categorizing psoriasis (e.g. PASI) do not allow such distinctions to be made.

Associated diseases

The association of arthritis with psoriasis represents one of the very first examples of disease association in dermatology. The observation was made by Alibert in 1818 and was called ‘psoriasis arthritic’, a term which is still used by many. The frequency of seronegative arthritis in psoriasis patients is estimated to be 5–8%.²⁰



Figure 8 As in Fig. 7 persistent psoriatic plaque with rapidly forming, highly erythematous lesions in the vicinity. Erythema precedes scaling as a sign of acute disease which involves the entire body surface.

However data reported in rheumatological literature using more defined parameters for the clinical diagnosis show increased rates of association. The calculated prevalence for psoriatic arthritis for the Caucasian population is suggested to range from 0.05 to 0.24%

Table 3 Definition of psoriasis severity.

	Minimum	Moderate	Severe
Extent of body involvement	2	4	6
Lesional activity (stable vs. unstable)	1	2	3
Frequency of relapses	2	4	6
Total	5	10	15
Final score (type II) × 2	10	20	30
Final score (type I) × 5	25	50	75

Table 4 Frequency of allergic disorders in psoriasis.

	Observed/expected (O/E ratio)	P
Atopic dermatitis	0.02	0.0001
Allergic asthma	0.07	0.001
Urticaria	0.17	0.0001
All contact dermatitis	0.34	0.0001

which is half of the prevalence rate of seropositive rheumatoid arthritis.²⁰ In identical twins significant concordance rates of 30–40% were found for psoriatic arthritis as compared with concordance rates in excess of 60% for psoriasis.^{3,9} This suggests differences in genetically determined susceptibility.

Association with cardiovascular disease has been found by several studies; however, no details concerning the type of psoriasis are given. Similarly, obesity was seen more often in psoriasis as compared with nonpsoriatic skin patients.¹³

The association with diabetes has been a matter of debate. Faber and Nall in their 1974 survey found that among 5600 patients 3.5% reported to have diabetes.⁹ Others, including ourselves, observed an increased association with diabetes.¹³

In our comparative analysis of patients hospitalized for the treatment of skin disorders we compared disease association in psoriasis patients with nonpsoriatic age-matched control patients.¹³ It was noted that among the various disorders allergic skin diseases were markedly underrepresented (Table 4). These include atopic dermatitis, allergic asthma, urticaria and allergic contact dermatitis. Atopic dermatitis was some 50 times less often seen in psoriasis patients as compared with patients with other skin diseases.

It has been suggested that psoriasis and atopic dermatitis are mutually exclusive, possibly because of the presence of opposing immune response patterns. Later when the dichotomy of the T-cell biology became known psoriasis was recognized as a Th 1-regulated disorder while atopy became a classical Th 2 condition. Thus the observation that both psoriasis and atopic dermatitis rarely occur at the same time underlines the existence of the two contrasting immune patterns expressed in these two common skin diseases.

Conclusions

Close examination of the psoriatic phenotype reveals a number of features which allow recognition of subtypes. As in juvenile diabetes mellitus, inflammatory bowel

disease, rheumatoid arthritis, and other disorders with suspected T-cell-mediated autoimmune pathogenesis, recognition of phenotypically distinct patient cohorts will make it easier to detect susceptibility loci on relevant genes than in ill-defined patient groups. Also, pharmacologic studies using better defined patient cohorts may provide more acceptable results. One may foresee that within the next years gene loci will be identified in psoriasis subtypes, and that these will help us to understand dysregulated immune functions of the acquired, and possibly also the innate, immune system in addition to subtle defects in keratinocyte biology.

For these purposes we concentrate on type I psoriasis patients, this type appears to be a distinct phenotype.

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