Report

Dermatology in southwestern Ethiopia: rationale for a community approach

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Abstract

Background Skin diseases represent one of the most frequent causes of morbidity in developing countries; however, little is known about the dermatologic needs of the population. The prevalence of skin disease in two different rural communities in southwestern Ethiopia was determined using descriptive epidemiologic techniques.

Methods A household survey, designed to ascertain demographic information and dermatologic needs, was given to all households in both communities (827). The point prevalence of skin diseases was determined after examination by dermatologists of 768 self-selected individuals (40% of individuals were invited to attend dermatologic examination, either those self-reporting skin disease or identified as positive cases during the household survey); an individual survey form was given to all of these patients.

Results Although 47% (S/UO) and 59% (Kishe) of the households in the two communities reported skin symptoms, the true dermatologic needs of these settlements were far greater than the expressed values, as examination by dermatologists of randomly selected households revealed that 67% of householders not reporting dermatoses had significant skin disease. During the point prevalence study, the commonest complaints were parasitic (scabies, pediculosis, and onchocerciasis) infestations (46% of diagnoses), followed by bacterial and fungal infections (33%); other conditions included endemic nonfilarial elephantiasis. Overcrowding was the main risk factor for infection. Thirty-two per cent (S/UO) and 39% (Kishe) of examined individuals had received previous treatments, which were ineffective in 74% and 63% respectively.

Conclusions Subsistence farmers spend a high proportion of their limited cash income on ineffective treatment. Simple schemes of management for the most common dermatoses, which local health workers could be trained to recognize and manage, could do much to redress the burden of skin disease in this population.

Skin conditions are amongst the commonest causes of morbidity in rural and urban areas of developing countries, accounting for a high proportion of visits to primary healthcare centers, which are often underserved and underfunded.[1] The limited time and financial resources available in primary healthcare are frequently swamped by this high patient burden to the detriment of other important health promoting activities, such as immunization programs or antenatal care. This situation presents a further dilemma in that skills in the management of skin diseases are poorly developed, and inappropriate treatment leads to the wastage of household resources which could be spent to the benefit of the family and the community. Most information about the epidemiology of skin diseases is based on data collected from medical records in specialized centers. Unfortunately, this does not necessarily represent the prevalence of skin disease in the community. Furthermore, when estimating the health needs of the population, these figures are seldom accompanied by data on community prevalence.

There are limited studies of the impact of skin disease on healthcare systems in developing countries. In 1992, dermatologic disorders were reported as the second and fourth most frequent complaints at Shebe and Agaro health centers in the tropical foothill region of Illubabor province, southwestern Ethiopia. Amongst children, skin disease is usually the second most common reason for consultation in rural clinics.[2] As many as 87% of examined school

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children in rural Brazil had treatable transmissible skin conditions, dominated by infections and infestations, such as pediculosis, dermatophytosis, and impetigo.[3] In 1994, a house-to-house survey in rural Tanzania (Ngara district) showed that transmissible skin diseases were highly prevalent, particularly amongst children, and overcrowding was the main risk factor in this population.[4] Similarly, a house-to-house survey in Guerrero, Mexico, revealed that at least every second household included someone with skin disease.[2]

This study was designed to generate information on the dermatologic needs of two different types of rural community in Illubabor province, using a house-to-house survey to ascertain the expressed dermatologic needs and a cross-sectional study to identify the point prevalence of skin diseases. The economic impact and the degree of self-awareness of skin disease were also assessed.

Patients and methods

The region and sample population studied

Illubabor province is a mountainous coffee producing area in southwest Ethiopia, with a mean annual rainfall between 1600 and 2000 mm, and a temperature range between 5.1 and 20°C. It comprises approximately 35,000 km^2 and 3 million inhabitants with an equal sex ratio.[5] Only 10% of the population live in urban settlements; the majority are subsistence farmers living in small rural settings. Oromo is the dominant ethnic group in the province (48.9%) and the major religious groups are Moslems (49.3%) and Christians (40%).[5] The region is medically underserved. A 6-week survey was carried out during the dry season (October–November 1994). Two rural communities were randomly selected: (i) Seca-Quorsa and Ule-Oke (S/UO); two roadside settlements at approximately 1700 m above sea level, with 301 and 254 households (1383 and 1284 residents respectively); both of these settlements were traditionally established and constituted a homogeneous, well-organized community; (ii) Kishe; a riverside lowland settlement at approximately 1300 m above sea level, with 272 households (1312 residents); Kishe was recently created by the relocation of rural workers from other parts of Ethiopia, and constitutes a more heterogeneous evolving community.

Assessment of skin disease

Our team consisted of two dermatologists, a medical officer/interpreter, and two groups of 20 dermatology trained final year medical students from the Jimma Institute of Health Sciences. A detailed household questionnaire was designed to collect data concerning ethnicity, language, literacy, socioeconomic status, occupation, housing, overcrowding conditions, sanitary facilities, source of water supply, habits, and contact with animals. A house-to-house survey was carried out. Maps of the settlements were drawn and the communities were divided into sectors, each of which was visited by one of three subteams formed by a dermatologist or a medical officer accompanied by students and local interpreters. The aim of this house-to-house survey was to collect demographic information and self-reported skin data, and to identify individuals suffering from any skin condition. No specific diagnoses were made at this stage; individuals with skin disease were identified as "positive cases" and were invited to attend a locally held clinic to be examined by a team of dermatologists.

A history of skin disease was recorded by asking the head of the household: "In the past year have you or any member of your household suffered from any of the following symptoms: itchiness, scaly areas, white patches, dark patches, lumps, and/or ulcers?" Data concerning self-awareness of skin disease, percentage of family income spent on treatment, type of therapy, number of treatments, and success or failure of treatments were also recorded. To evaluate the validity of self-reported skin disease, after administering the house-to-house survey, 30 houses in each community were randomly selected and all dwellers were examined by the team of dermatologists. The point prevalence observed by the dermatologists was compared with the prevalence reported by the head of the household during the house survey.

Individuals who reported skin disease, as well as all patients identified as "positive cases" during the household survey, were given a card with a printed household identification number, which was also recorded on the household questionnaire form. These individuals were invited to attend the health post or the local school to be examined by the dermatologists and, those who did so, were given an individual questionnaire. The household identification number was used to trace these individuals back to their respective households. The majority of diagnoses were made clinically, but some samples were taken, and processed by the Mycology Department of the St John's Institute of Dermatology, London.

Data analysis

Seca-Quorsa and Ule-Oke records were analyzed as a single highland roadside community (S/UO). Kishe's records were analyzed separately. Because of the low prevalence of certain specific disorders, skin diseases were classified into nine different categories as reported in previous studies.[6,7] Statistical analysis was performed using the epidemiology program EPI-INFO 6.[8]

Results

The household questionnaire was given to all the dwellings in the two communities (827), achieving 100% response for demographic information. Skin disease was reported by 47% of S/UO households and 59% of Kishe households. In addition, 1917 individuals, 48% of the total population

(3979 individuals), either self-reported skin disease/symptoms or were identified as "positive cases"; of these, 1153 individuals came from S/UO and represented 43.23% of the S/UO population, whereas the remaining 764 individuals came from Kishe and represented 58.23% of the Kishe population. Although they were invited to attend the dermatology clinic and to complete the individual questionnaire, only 40% attended, 497 from S/UO (43.1% compliance) and 271 from Kishe (35.5%), representing 19% and 21% of the population of the communities respectively.

Demographic analysis

The sex and age distributions of the population in the two communities were similar (data not shown). The majority of S/UO's heads of households belonged to the Oromo ethnic/linguistic group (88%) and were born in the same or in neighboring settlements (mainly Jimma and Shebe). In contrast, Kishe's population came from a variety of distant regions; 46% spoke amharic (Ethiopian official language), 23% oromigna, and 31% one of eight other minor dialects. Subsistence farming was the main occupation in both communities, although the economy of S/UO was more organized with a more complex range of occupations (traders, merchants, and teachers).

The majority of dwellings were round, single-bedroomed, mud-floored houses. The number of households with two or more rooms and with superior flooring and roofing conditions was significantly higher in S/UO. There were no statistically significant differences in the number of individuals per household in the two communities. Overcrowding was defined as more than five individuals per room, and was significantly higher in Kishe. None of the communities reported differences in the source of water supply during the dry or rainy seasons, in the disposal systems for human and household waste, or in the overall ownership of animals. For fear of nocturnal predators, many householders gathered their domesticated animals inside their dwellings; inhabitants from S/UO reported a higher degree of close contact with animals, mainly cattle.

Skin diseases

Only 4% of the examined individuals were identified as healthy. Parasitic infestations were the commonest conditions, accounting for 46% of all the diagnoses recorded (see Table 1); infections accounted for 33%, followed by lymphatic disorders (8.9%) and noninfectious inflammatory skin disease, referred to here as dermatitis (7%). Although conditions such as traumatic sores, finger and toe nail dystrophy, and post-inflammatory pigmentary changes were extremely common, analysis was not possible as the patients seldom complained. Many of the patients had multiple conditions; however, only 3.8% had multiple recorded pathology.

Infectious diseases affected 35% and 31% of S/UO and Kishe patients respectively. They were more prevalent in the younger groups in S/UO and in the older groups in Kishe. Bacterial infections were more prevalent in Kishe, mainly due to a higher prevalence of tropical ulcers amongst the 5–14- and 15–49-year-old groups. Impetigo was more prevalent in the younger groups in S/UO. Chronic infections, such as scrofuloderma, were moderately more prevalent in S/UO. The free distribution of medication was used as an incentive for patients to attend examination; however, leprosy patients ordinarily receive free treatment and few of them attended the clinic; therefore, the prevalence of leprosy was not measured in this study. Fungal infections were more prevalent in S/UO in the younger age groups, mainly tinea capitis and favus; 86% of these patients reported itching of the scalp. Other fungal infections were more prevalent in the older age groups in Kishe, particularly pityriasis versicolor and tinea corporis. Tinea pedis was found in both communities in older patients (over 50 years old) who wore shoes. Finally, viral infections, largely molluscum contagiosum and viral warts, were more prevalent in S/UO.

Parasitic infestations affected 44% of S/UO and 50% of Kishe patients. Onchodermatitis was more prevalent in Kishe; 92% of these patients were over 15 years old and 99% reported body itching. Pediculosis capitis was prevalent in both communities in the 5–14-year-old group (48% of cases); itching of the scalp was only reported by 13% of these patients. Pediculosis corporis had a similar overall prevalence in both communities, although it was more common in the older groups in Kishe. Scabies was common in all the settlements, particularly in the under 1-year-old group in S/UO; itching and lack of sleep were the main symptoms. *Tunga penetrans* was only seen in young individuals in S/UO.

Noninfective inflammatory dermatoses (dermatitis) represented 5.5% of all the conditions recorded, affecting 7% of patients. They were more prevalent in Kishe in the 15–49-year-old group (62% of cases). Only two cases of atopic dermatitis were seen. Dermatitis (particularly on the dorsa of the feet of adults wearing plastic shoes) and lichen simplex were also more prevalent in adults in Kishe (2.7% and 1.0% respectively). The recorded prevalence of unspecified erythema or urticaria, disorders of keratinization, erythema ab igne, and pigmentary and lymphatic disorders was low. Recorded pigmentary disorders were mainly chloasma and vitiligo; few cases of post-inflammatory hyper- or hypopigmentation were registered. Lymphatic disorders represented 7.2% of all the diagnoses. Bilateral lymphedema of the lower extremity (also referred to as podoconiosis or endemic nonfilarial elephantiasis) was

Table 1 Frequency of identified cases within each disease category and prevalence (per cent) of each of the nine different groups of skin disease classified per community and overall. Figures in parentheses represent the 95% confidence interval for the prevalence in the total population included in the study

Skin conditions	S/UO		Kishe		Overall		
	Frequency	%	Frequency	%	Frequency	%	95% CI
A. Infections	170	6.4	83	6.3	253	6.36	(5.59–7.13)
1. Bacterial	41	1.6	37	2.8	78	1.96	(1.48–2.44)
2. Fungal	108	4.0	41	3.1	149	3.74	(3.14–4.34)
3. Viral	21	0.8	5	0.4	26	0.65	(0.40–0.90)
B. Infestations	218	8.1	135	10.2	353	8.87	(7.97–9.77)
C. Dermatitis	22	0.8	19	1.4	41	1.03	(0.71–1.35)
D. Erythema and urticaria	3	0.1	3	0.2	6	0.15	(0.03–0.27)
E. Disorders of keratinization	13	0.4	7	0.5	20	0.50	(0.28–0.72)
F. Pigmentary disorders	5	0.2	2	0.1	7	0.17	(0.04–0.30)
G. Lymphatic disorders	37	1.3	18	1.3	55	1.38	(1.02–1.74)
H. Acne	12	0.4	2	0.1	14	0.35	(0.17–0.53)
I. Miscellaneous	9	0.3	8	0.6	17	0.42	(0.22–0.62)

more prevalent in the highlands, affecting 11% of patients aged 15–49 years; interestingly, the prevalence of this condition in the over 50-year-old group was higher in the lowlands (1.8% vs. 1.1% for S/UO). Podoconiosis was more prevalent in women (male : female ratio, 0.4). Lymphostatic verrucosis (mossy foot) was more prevalent in Kishe in the over 50-year-old group (4.5% vs. 0.8% in S/UO). The prevalence of unilateral lymphedema of the lower extremity was greater in Kishe, particularly in the 15–49- and the over 50-year-old groups. Acne, possibly related to the application of oil or butter to the scalp and forehead, was more prevalent in S/UO in the 15–49-year-old group.

Previous treatment for skin disease

Table 2 shows the number of patients who reported having received treatment in the preceding year. The majority of patients from Kishe attended Shebe health center and described a cure rate of 37%, whereas S/UO patients attended the local health station and reported a cure rate of 26%. Overall, 55% of patients with onchodermatitis had received treatment (67% with diethyl carbamazine administered at the local health center), 28% with tinea capitis (10% at the health center, 50% at the health station, and 35% using traditional medicine), and 53% with favus (33% at the health station and 67% using traditional medicine); 38% of pyoderma, 27% of scabies, 58% of tropical ulcer, and 40% of dermatitis patients reported previous unsuccessful treatments. Patients from S/UO spent between 15 and 250 Ethiopian birr (1 US dollar is equivalent to 5.5 birr) on treatment, whereas Kishe patients spent 17 to 100 birr. The minimum wage for paid labor in Ethiopia is 35 Ethiopian birr per month, but most subsistence farmers earn substantially less than the minimum salary in cash terms.

Table 2 Frequency of individuals receiving previous treatment for skin disease. Source of treatment, treatment used, and effectiveness. Numbers of patients and percentages are given

Previous treatment	S/UO		Kishe	
Yes	155	32%	104	39%
No	329	66%	162	60%
Source of treatment				
Hospital	4	2%	2	2%
Health center	58	37%	62	62%
Health station	68	44%	30	29%
Pharmacy	11	7%	6	6%
Traditional healer	19	12%	3	3%
Treatment used				
Drugs from hospital/health center	93	60%	66	65%
Drugs from pharmacy	33	21%	29	28%
Local remedies	28	18%	7	7%
Effectiveness				
Effective	40	26%	39	37%
Ineffective	110	71%	60	58%
Do not know	5	3%	5	5%

Relationship between skin disease and risk factors

Skin disease in the previous year was reported by 47% and 59% of the households in S/UO and Kishe respectively. Dermatologic examination of all the members in 30 randomly selected households in each community revealed a positive predictive value of self-reported skin disease of 100%; in contrast, 67% of households not reporting skin

disease had at least one member with a skin condition. For the analysis of risk factors, households reporting a prior "history of skin disease" were compared with those without. In both communities, households considered to be overcrowded exhibited a higher frequency of a "history of skin disease," with an odds ratio of 2.03 for S/UO ($P = 0.00003$, 95% confidence interval (CI) = 1.4–2.1) and 2.7 for Kishe ($P = 0.00006$, CI = 1.6–4.6). Using the household identification number, it was possible to trace 96% of the examined patients from S/UO back to their households; 477 patients were distributed in 207 households (37.1% of households). Similarly, 84% of Kishe patients (228) were traced to 120 households (44.1%). It is noteworthy that some households had more than one patient (1–6 patients). Households with and without examined patients were compared. Both communities showed a close association between overcrowded conditions and patients in the household, with an odds ratio of 2.3 for S/UO ($P = 0.00003$, CI = 1.5–3.4) and 2.6 for Kishe ($P = 0.0001$, CI = 1.5–4.4). By contrast, there was no association between possession/close contact with animals and skin disease. Finally, the association between a previous history of skin disease in the household and the presence of patients during the survey was highly significant for both communities. The odds of a household containing patients with skin disease, if there was a positive history of skin disease, was 9.7 for S/UO ($P = 0.00005$, CI = 6.3–14.9) and 98.9 for Kishe ($P < 0.00005$, CI = 28–417). Also, a positive correlation between a previous history of skin disease and the number of patients per household was seen in both communities.

Bacterial infections were more prevalent in young males (male : female ratio, 2.5; 61% of cases in the 0–14-year-old group). The majority of cases of impetigo were secondary to scabies (33%), tinea capitis (12.5%), and insect bites (16.7%). All fungal infections were more prevalent in males. Sharing a comb was commonly reported by tinea capitis patients (76% vs. 67% in the general population). Favus was more common in young males, and 65% of them slept on the floor. Viral infections were also more prevalent in males (ratio, 3.6). Infestations affected both sexes similarly; however, onchodermatitis was more prevalent in males (6 : 1) and 90% of them bathed in the river (vs. 60% in the normal population). The majority of pediculosis capitis patients shared the bed/floor with other members of the household and were illiterate (91%); 84% combed their hair and 78% shared the comb. Similarly, 88% of pediculosis corporis patients were illiterate, 70% slept on the floor (vs. 57% in the normal population), and 86% shared their bed/floor; however, only 40% reported sharing their clothes. Of the scabies patients, 63% slept on the floor, 93% shared it, and 47% shared their clothes with somebody.

Dermatitis, mainly foot dermatitis or lichen simplex, was more prevalent amongst individuals with a higher social status; 35% were literate and 55% slept on beds. The majority of these patients reported that they bathed once a week (72%), 79% in the river, and 69% used soap for bathing.

Discussion

The higher complexity of the social structure of the highland settlements, Seca-Quorsa and Ule-Oke, is probably related to their long-term establishment and the more traditional progression in their organization. Kishe's younger population, as well as its more heterogeneous ethnic and linguistic mix, are the result of the resettlement program. These observations may explain certain social differences, such as the poorly developed economic infrastructure and the greater overcrowding in Kishe, as the majority of houses in this settlement contained a single room.

The response rate of the head of the households for demographic information was 100%; however, the overall response rate of individuals invited to attend the dermatology clinic was much lower: 40%. The compliance for attending dermatologic examination was lower in Kishe than in S/UO (35% vs. 43% of invited individuals). This is surprising as a higher proportion of Kishe's households self-reported skin disease (59% vs. 47%), and the percentage of "positive cases" invited to attend for examinations was also higher in Kishe (58% vs. 43% of the respective populations). The lower degree of social development, the more rudimentary infrastructure, and the relative lack of organization in Kishe, as well as the many different dialects spoken, could have resulted in misinformation and the unawareness of some individuals to attend the dermatology clinic.

The low response rate of individuals invited to attend the dermatology clinic may also be due to the high level of previously unsuccessful treatments, which may have led to considerable skepticism in the communities, and could not be dispelled by the offer of free treatment during this survey. A third of S/UO and Kishe patients reported previous treatments for skin diseases, and the majority of patients from both communities attended their local health facility. Distance may be an additional factor affecting the uptake of medical care: patients attended the nearest health facility available irrespective of the high rate of ineffective treatments. Patients appeared to have been spending between 50% to over 100% of their cash income in the treatment of skin diseases, which proved to be ineffective in 63% of Kishe and 74% of S/UO cases. In a subsistence economy, cash transactions play a smaller role in the overall community finances, and therefore even a small drain on

these resources significantly reduces the balance available for other needs, such as additional food protein.

Although all patients were invited to attend the dermatology clinic, those patients who attended, and therefore were examined and completed the individual questionnaire, were a self-selected sample. This undoubtedly must be taken into account in the interpretation of the results, particularly in the analysis of risk factors. Consequently, the positive correlation observed between self-reported and actual disease is a result of households expressing their dermatologic needs and facilitating the identification of cases in the households during the survey. We believe that the overall distribution of disease categories and the analysis of prevalence are not particularly biased by this fact, and are representative of the dermatologic needs of the communities.

Self-reported skin disease mainly included infectious and/or parasitic diseases, as these were most prevalent in the communities and the criteria for the self-reporting of disease included symptoms which were suggestive of such conditions. In both communities, positive correlations were observed between overcrowding and self-reported skin disease in the household and households with clinically identified patients, although this was lower for those identified on the basis of history alone. This confirms the observation that the validity of self-reported skin disease is limited; its negative predictive value was only 33%, emphasizing that the real dermatologic needs are far higher than those reported by individuals. A positive history of skin disease, however, could well indicate a higher level of awareness of disease in the household, and therefore a higher compliance rate when the patients were invited to attend the clinic.

The overall prevalence of infectious diseases in Kishe was higher than in S/UO. Risk factors, such as overcrowding and the poorer living conditions in Kishe, may have influenced this prevalence. Impetigo, however, was more prevalent in young children in S/UO, and was associated with scabies and tinea capitis, also more prevalent in this age group in S/UO. The higher prevalence of tinea capitis and favus in S/UO suggests that these diseases are hyperendemic in the area; however, this is a point prevalence study and so is unable to detect seasonal variability or unstable prevalence rates; therefore, an outbreak of fungal infection at the time of the survey is also possible. Many tinea capitis patients reported sharing combs with other members of the community; in a previous study amongst school children in a similar area in Ethiopia, we described a 17% carrier rate for dermatophytes. Sharing combs may represent an important mechanism for dermatophyte transmission within these communities. The larger number of adult males with the disease may indicate a higher exposure to skin disease in the male population, or that the women were working in the fields at the time of the clinic.

Onchodermatitis was more prevalent in the older groups in the lowlands near the river. Patients presented with the chronic papular form of onchodermatitis. This form of the disease is usually thought to require a longer evolution time. The high prevalence amongst the over 50-year-old group in Kishe, however, cannot be interpreted on the basis of chronic exposure, as many individuals in this age group originated from nonendemic areas in Ethiopia. Scabies was more prevalent in the younger groups, particularly infants, in the highlands; in these settlements, the night temperatures are very cold and therefore close contact at night, especially mother–child contact, is more likely. A high proportion of scabies patients reported sharing their bed and their clothes; this cultural characteristic must be considered when designing treatment regimens.

Noninfective inflammatory dermatoses had a low prevalence, and were more common amongst individuals with a higher socioeconomic status. Bilateral lymphedema of the lower limbs (endemic nonfilarial elephantiasis or podoconiosis) has been associated with exposure to volcanic soils and the absorption of clay minerals.[9] Kloos *et al.*[10] found a 9% prevalence of podoconiosis amongst the indigenous population of a settlement in western Ethiopia, and 5% for settlers from nonendemic areas. Similarly, Frommel *et al.*[11] described a prevalence of 5.06% amongst individuals living in the Ethiopian Rift Valley. The prevalence of endemic nonfilarial elephantiasis was higher in the highlands, affecting 11% of patients, mainly females in the 15–49-year-old group. Podoconiosis and endemic Kaposi's sarcoma, in Africa, share an endemic geographic distribution, being more prevalent in areas at higher altitude, with volcanic soils, cooler temperatures at night, and moderate seasonal rainfall.[9] Interestingly, no cases of Kaposi's sarcoma were identified in this study. Seca-Quorsa and Ule-Oke are both settlements located in the highlands, and the soils are red volcanic clays. The high prevalence of endemic nonfilarial elephantiasis in the over 50-year-old group in Kishe (5.8%) could be related to the acquisition of the condition prior to the relocation program. There are no reports on the follow-up of individuals who migrated from an endemic to a nonendemic area.

Our study has shown that a high proportion of individuals in the surveyed area had skin diseases and sought treatment. This is a significant economic burden on households, particularly as treatment is often ineffective. These findings provide a strong argument for the production of simple and affordable schemes for the management of skin disease at a health post level by the training of local inhabitants. The challenge of community dermatology in developing countries is the implementation of these measures through the existing health services at a reasonable

cost and quality,[12] provided that these programs are organized and monitored by management teams at higher levels of the health pyramid in conjunction with local dermatologists.

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HIV and autoimmunity

HIV-1 infection has been known to present several kinds of autoimmune rheumatic manifestations, and similarities of immunological abnormalities between HIV-1 infection and autoimmune diseases such as systemic lupus erythematosus (SLE) have also been reported. The mechanisms of autoimmunity in HIV-1 infection have been debated. Several autoantibodies such as anti-nuclear antibody, anti-DNA antibody, anti-cardiolipin antibody, anti-platelet antibody, anti-lymphocyte antibody, and the like can be detected in the serum of HIV-infected patients. T cell and B cell dysfunction due to HIV-1 infection is known to be similar to that observed in SLE, including polyclonal B cell activation, T cell activation (such as expression of HLA class II molecules), and T cell anergy (such as the decline in IL-2 production and the mixed lymphocyte reaction). These changes may be related to the autoimmune manifestations of HIV-1 infection.

HIV-1 gp120 is known to play an important role in the immune dysregulation observed with HIV-1 infection, either directly or via the stimulation of cytokine production. The postulated mechanism of gp120-mediated immune dysfunction is shown in Figure 1, based upon reported results including our own. Gp120 can bind to CD4 molecules on T cells and macrophages, and induces the down-modulation of CD4 molecules and the expression of HLA class II molecules (HLA-DP), which are known to be expressed on a population of activated T cells and which appear at an earlier phase of T cell activation (G1A phase) than other HLA molecules (DR and DQ). In our experiments, other activated T cell markers (HLA-DR, IL-2 receptor, and transferrin receptor) were not expressed in response to gp120 stimulation, as reported by others. The mitogen-induced IL-2 production from gp120-stimulated CD4+ T cells and the mixed lymphocyte reaction (MLR) in them are decreased (T cell anergy).

From Sekigawa I, Kaneko H, Hishikawa T, *et al.* HIV infection and SLE: their pathogenic relationship. *Clin Exp Rheumatol* 1998; **16:** 175–180.

