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PREVALENCE OF SKIN DISEASES AMONG ADOLESCENTS 12–16 YEARS OF AGE

Per-Åke Larsson[1] and Sture Lidén[2]

Departments of Dermatology, [1]Central Hospital of Falun and [2]University Hospital of Umeå, Umeå, Sweden

Abstract. A prevalence study of 8298 pupils in compulsory school grades 7–9 was performed in the county of Västerbotten (AC county) in northern Sweden. Prevalence figures for 19 skin diagnoses are presented. A female dominance was found in the prevalence of atopic dermatitis, striae distensae and plantar warts, and a male dominance in multiple pigmented naevi. A sharp drop in atopic dermatitis was found at 13 years. Acne vulgaris showed a negative correlation with atopic dermatitis, ephelides, multiple pigmented naevi and spider naevi and a positive correlation with striae distensae. Atopic dermatitis was negatively correlated to ephelides and multiple pigmented naevi as well as acne. Pronounced variations in the occurrence of plantar warts were registered between different schools. Of the 19 diagnoses registered, only hereditary palmo-plantar keratodermia has a geographical distribution compatible with an increased prevalence of the disease in the AC county. Consequently the figures presented for the other diagnoses are considered to be representative for a north European Caucasian population.

Key words: Prevalence of skin disease; Adolescents; Skin disease associations

In areas with a stable population, specific genetic traits may be found. This is the case both in northern Sweden and in Finland. Norio et al. have given an account of rare hereditary diseases which occur more often in Finland than in other countries (22). In the county of Västerbotten (the AC county; AC is the official letter code used by the authorities) in northern Sweden, certain unique conditions of dermatological interest have been described: epidermolysis bullosa lethalis (4) and the Sjögren–Larsson syndrome (30). An increased incidence of hereditary palmo-plantar keratodermia (KPP) (5) and possibly also the Urbach-Wiethe disease (lipoid proteinosis) (16) have been found more often in the northern parts of Sweden than in other areas. In addition, variations in the frequencies of certain blood groups have been found between different parts of the AC county (3).

With these facts as a background a study of the prevalence of certain skin diseases in AC county was considered meaningful. Apart from a dermatological mapping the study would also reveal possible associations between different skin diseases. Furthermore, it was designed in such a way that it would permit a conclusion as to whether the prevalence figures obtained are valid only for the AC county or also for a north European Caucasian population.

INVESTIGATION PROCEDURE

In the present investigation a large number of school pupils were examined with regard to certain skin lesions. The investigation was performed during the autumn of 1975 and spring 1976. Permission was obtained from school and health authorities before teachers, parents and pupils were informed about the study. The study group consisted of all the pupils in grades 7–9 of the compulsory school in AC county in northern Sweden. The majority of the population is Caucasian but a certain amount of Lappish influence could be expected in the thinly populated western part of the county.

The examinations were performed in one class at a time in a period set aside for this purpose. Boys and girls were examined separately. The organization of this part was handled by school nurses. The pupils were examined all over their body surface except for the part covered by brief underwear. The investigator (P. Å. L.), a dermatologist with completed specialty training, filled in a form for each pupil. This form contained boxes indicating normal/abnormal, appearance of all body regions including hair, nails and eyes. Occurrence/non-occurrence of a number of the most common skin lesions such as tumours (in a wide sense), acne, warts and lesions in the flexural areas was indicated for each individual. Other diagnoses also registered systematically are seen in Table II. They comprise lesions which are easily seen and which are usually easy to classify also in mass screenings. In addition rare skin diseases not indicated in Table II were also registered.

In this way 8298 individuals (4258 boys and 4040 girls) were examined. This equals 86.3 % of the total number of pupils registered in the whole county during the school year in question. The composition of the population with regard to age and sex is seen in Table I.

Table I. *Age distribution of the population*

Age, years	12	13	14	15	16	17
Males	104	1 123	1 371	1 329	315	16
Females	124	1 126	1 301	1 242	242	5
Total	228	2 249	2 672	2 571	557	21
%	2.7	27.1	32.2	31.0	6.7	0.2

The data were processed in a computer to make possible certain studies of associations between different skin diseases and comparisons between four different regions of the county. Region 1, the southwest region, corresponds to subregions 1 and 2 in the work of Beckman et al. (3); region 2 (northwest) to subregions 3–5 and the western part of 6; region 3 (northeast) to subregions 7–9, 11 and the eastern part of 6; region 4 (south east) to subregions 10, 12–14. Statistical analyses of differences were performed by use of χ-square tests with Yate's correction.

An attempt was made to assess the significance of the fact that 13.7% of the pupils did not attend the examinations. A questionnaire was sent to about 10% of those pupils, i.e. to 130 individuals. Fourteen of those could not be reached by post. Of the remaining 116, 76 answered the questionnaire. All those pupils replied 'no' to the question 'is a skin disease the cause for non-attendance at the examination?'.

When necessary, the criteria for diagnosis are given under the headings for each disease.

RESULTS

The composition of the population with regard to age and sex is seen in Table I. Only 21 pupils were as old as 17 years. Hence this age group is omitted from figures and tables in which various age groups are presented.

The occurrence of 19 different skin lesions is shown in Table II where total numbers as well as prevalence figures for both sexes are given. This overall picture is commented upon for most of the headings in the following.

Acne vulgaris. The acne lesions were graded according to the Pillsbury classification (24) in three different grades of severity. To classify a pupil as having acne, a score of at least 15 points was to be obtained on the face, 30 points on the chest and back, respectively. Marked open comedones and

Table II. *Absolute numbers and prevalence values (%) of skin lesions*

	Males		Females		Total	
	n	prev.	*n*	prev.	*n*	prev.
Dermatoses with a genetic trait						
Acne vulgaris	1 597	37.5	1 432	35.4	3 029	36.5
Atopic dermatitis	97	2.3	155	3.8	252	3.0
Psoriasis	6	0.1	21	0.5	27	0.3
Keratodermia palmo-plant.	15	0.4	14	0.3	29	0.3
Ichthyosis vulgaris	5	0.1	2	0.0	7	0.1
Pigmentary lesions						
Ephelides	809	19.0	742	18.4	1 551	18.4
Naevi pigmentosi >30	732	17.2	395	9.8	1 127	13.6
Café au lait marks	377	8.9	350	8.7	727	8.8
Becker's naevus	38	0.9	21	0.5	59	0.7
Halo naevus	51	1.2	22	0.5	73	0.9
Vitiligo	18	0.4	13	0.3	31	0.4
Vascular lesions						
Angioma stellatum	72	1.7	100	2.5	172	2.1
Naevus flammeus	28	0.7	46	1.1	74	0.9
Nail changes						
Racket nail	4	0.1	4	0.1	8	0.1
Fingernail biting	849	19.9	658	16.3	1 507	18.2
Miscellaneous						
Verrucae vulgares	855	20.1	809	20.0	1 664	20.1
Striae distensae	788	18.5	1 456	36.0	2 244	27.0
Extra digit	7	0.2	5	0.1	12	0.1
Polythelia	106	2.5	98	2.4	204	2.5
Total no. examined	4 258		4 040		8 298	

Fig. 1. Keratodermia palmo-plantaris hereditaria of the Unna-Thost type, showing dorsal, knuckle pad-like hyperkeratoses over the proximal interphalangeal joints—a frequent finding in the present investigation.

closed comedones surrounded by a small erythema were awarded 1 point per lesion. Pustules smaller than 2 mm and erythematous papules were awarded 2 points and deeper infiltrates and pustules larger than 2 mm were awarded 3 points.

Table III shows the age distribution of acne vulgaris as defined above. Thus girls have acne more often than boys in the 12–13-year age group. In the 15–16-year group acne is more common in boys. The more severe types of acne are found predominantly on the chest and only rarely on the face. The back takes an intermediate position. Most of the pupils with acne had lesions on the face only (74.8%) while 15.6% had acne both on the face and on the back.

Atopic dermatitis. All pupils diagnosed as having atopic dermatitis had dry eczema and/or lichenification in flexures or in other predilection sites. In the case of atypical lesions the diagnosis was confirmed by means of a positive family anamnesis.

The overall prevalence of atopic dermatitis was 3.0% (Table II) with a decreasing trend with increasing age from the 12-year group onward (Table III). The girls outnumbered the boys in the age group 14–16. The ratio girls to boys is 1.7 for the total population.

Psoriasis. Psoriasis was diagnosed on the basis of unequivocal clinical findings. No cases in which the diagnosis was in doubt were included. Individuals with changes only in the capillitium were not classified as psoriatics.

A total of 27 pupils with psoriasis were found, 21 girls and 6 boys, corresponding to a prevalence of

Table III. *Prevalence (%) of certain common diagnoses related to age and sex*
M=boys, F=girls, T=total population

	Age, years														
	12			13			14			15			16		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Acne vulgaris	15.4	37.1	27.2	21.6	31.1	26.4	37.8	36.9	37.4	48.3	37.0	42.8	53.3	38.8	47.0
Atopic dermatitis	6.7	5.6	6.1	3.1	3.5	3.3	1.8	4.2	3.0	2.0	3.7	2.8	1.0	3.3	2.0
Ephelides	22.1	20.2	21.1	23.2	19.0	21.1	19.7	17.7	18.7	15.0	17.0	16.0	16.8	24.8	20.3
Café au lait marks	6.7	3.2	4.8	6.7	7.9	7.4	10.1	8.8	9.5	9.1	9.8	9.5	9.5	8.7	9.2
Fingernail biting	16.3	8.9	12.3	18.9	17.7	18.3	20.9	16.4	18.7	19.6	16.2	17.9	21.6	14.0	18.3
Verrucae vulgares	23.1	28.2	25.9	20.3	20.5	20.4	21.4	20.6	21.0	18.5	18.9	18.7	20.3	17.4	19.0
Striae distensae	1.9	27.4	15.8	8.9	30.1	19.5	17.4	38.7	27.8	25.8	39.0	32.2	31.7	38.4	25.7

Table IV. *Seasonal variations in prevalence of skin lesions*

Spring: April–June, Autumn: September–December

	Spring %	Autumn %
Acne vulgaris	33.3	39.9
Atopic dermatitis	2.9	3.2
Ephelides	24.2	12.9
Naevi pigmentosi >30	14.0	13.1
Café au lait marks	10.9	6.5

0.5 and 0.1%, respectively (Table II). No further analysis of this limited material was considered meaningful.

Keratodermia palmo-plantaris hereditaria (Unna-Thost: KPP). The diagnosis of KPP was considered probable if the horny layer of the palms and soles was thickened and had the characteristic yellow tint. In dubious cases the parents were questioned by telephone, or else one of the pupil's hands was immersed in water, whereupon the hydrated, white hyperkeratosis could be seen easily.

Altogether 29 individuals with this disease were registered (Table II). Hyperkeratosis was always found on palms and soles but in many cases it was also present on the dorsum of the hands and fingers. Two main patterns of dorsal hyperkeratosis were seen. One rare pattern showed a continuous spread of the hyperkeratosis from the palms or soles covering the sides of hands and fingers/feet and toes and extending in various degrees dorsally. The margin between affected and non-affected skin was always distinct. The hyperkeratosis varied within wide limits with regard to thickness and desquamation. In most cases desquamation was not seen. The other more common pattern of dorsal hyperkeratosis is seen in Fig. 1. Here circumscribed, erythematous, hyperkeratotic thickenings are seen mostly over the proximal interphalangeal joints. These lesions can be seen without concomitant desquamating dorsal hyperkeratosis. They have the appearance of knuckle pads.

Ephelides. The pupils were registered as having freckles if they had at least 20 lesions on their face and if these were visible also during the winter. 18.4% fulfilled these criteria (Table II). No definite differences related to age or sex were found (Table III).

During the spring months 24.2% had ephelides, versus 12.9 in the autumn (Table IV).

Naevi pigmentosi. Lesions with a sharp, regular margin, flat or raised, with various degrees of brown pigmentation were regarded as pigmented naevi. Pupils having more than 30 such lesions were included in this diagnostic group.

With these criteria, almost twice as many boys as girls had multiple naevi (Table II).

Café au lait marks. In this category were included sharply marginated light brown maculae with a diameter exceeding 1 cm. The outline had to be regular. Such lesions were found in 8.8% of the total population (Table II). In both sexes they increased from the 12-year age group (Table III). The anatomical distribution in the individuals having these lesions is seen in Table V. 90.5% had one lesion only and 0.7% 5 or more lesions. During the spring months the prevalence was 10.9% and in the autumn 6.5% (Table IV).

Becker's naevus. To qualify as a Becker's neuvus a lesion had to show a speckled brown pigmentation with irregular border. Hair growth was not considered necessary for inclusion in this group. Most lesions were of palm size or larger. They were more common in boys (Table II) and were found on the trunk and on the arms (Table V).

Halo naevus. These lesions were more com-

Table V. *Anatomical distribution of lesions (%)*

	Face–neck	Arms	Legs	Trunk
Café au lait marks	2.6	8.1	15.7	76.7
Becker's naevus		26.3		74.6
Halo naevus				100
Vitiligo	23.5	23.5	29.4	70.6
Angioma stellatum	94.2	6.4[a]		
Naevus flammeus	14.1	8.5	26.8	54.9
Verrucae vulgares	1.1	71.1[a]	34.5[b]	2.8[c]

[a] Hands, [b] feet, [c] locations other than face, hands and feet.

Table VI. *Prevalence (%) of plantar warts in four different regions of AC county*

Geographical region no.	Mean	Range
1	3.7	2.2–4.9
2	4.9	1.7–6.9
3	5.7	3.6–8.9
4	7.7	5.0–13.9

mon in boys (Table II), showed no definite variations with age and were found exclusively on the trunk (Table V).

Vitiligo. No vitiligo lesions were found among the 12-year-old pupils. In the other age groups the prevalence was similar for both sexes. The lesions were found mainly on the trunk (Table V).

Angioma stellatum. The prevalence was higher among girls (Table II). 93% had only one angioma, mostly located on the face (Table V). Angioma on the hands was more common in girls (6.4%) than in boys (0.6%).

Naevus flammeus. Only capillary hemangiomas (port wine naevi) were registered. The so-called salmon patches at the nape of the neck were not included. N. flammeus, too, is more common in girls (Table II). They are most often found on the trunk (Table V).

Fingernail biting. The pupils with short nails were questioned if they were nail biters. Only those answering in the affirmative were included in this group. Slightly more boys than girls are registered in the total material (Table II). The frequency of girls with this habit doubles between 12 and 13 years whereas the boys show a marginal slow and gradual increase (Table III).

Verrucae vulgares. Only papillomatous verrucae vulgares were registered, not v. planae. 71.3% of the pupils with warts had only one or two warts and 28.7% three or more. The prevalence was essentially the same in all age groups (Table III). Plantar warts were found in 22.4% of the girls but in only 12.0% of the boys. The number of plantar warts varied within wide limits between the different schools (Table VI). The prevalence increases from region 1 to region 4. This parallels an increasing degree of urbanization. However, no correlation was found with the size of the school.

Striae distensae. Both fresh red striae and older white striae were included. Striae were common in both sexes with a highly significant dominance for the girls up to 15 years of age (Table III).

Polythelia (Supernumerary nipples). Brown papules or maculae with a central small nipple, preferably in the mamillary line, were classified as supernumerary nipples. They were found on the left side only in 50.5%, on the right side only in 39.9% and bilaterally in 9.6%.

Associations between different skin lesions

Acne. Pupils with acne deviate from non-acne pupils with regard to several skin lesions (Table VII). The acne constitution seems to reduce the tendency to develop atopic dermatitis, ephelides, multiple pigmented naevi and spider naevi but to favour the formation of striae. The low frequency of ephelides in acne individuals may be due to seasonal influence, partly or totally.

Atopic dermatitis. Atopic dermatitis clearly reduces the tendency to develop several skin lesions (Table VII). Angioma stellatum is not significantly reduced but is included for the sake of completeness.

Warts. Warts occur less frequently in individuals with active atopic dermatitis, in 2.5% compared with 3.2% in non-atopics. Also individuals with three or more warts are less frequent among the atopics, 22% vis-à-vis 28.8%.

Table VII. *Associations between acne vulgaris and atopic dermatitis and other skin lesions*

Figures in per cent of the total population. The table shows how often individuals with/without the diseases indicated to the right also have the diagnoses to the left

	Acne vulgaris	
	Yes	No
Atopic dermatitis	1.9	3.7
Ephelides	10.6	23.3
Naevi pigmentosi >30	11.5	14.8
Angioma stellatum	1.1	2.7
Striae distensae	34.6	22.7
	Atopic dermatitis	
	Yes	No
Acne vulgaris	23.4	36.9
Ephelides	12.3	18.9
Naevi pigmentosi >30	7.5	13.8
Angioma stellatum	1.6	2.1
Nail biting	11.9	18.4

Table VIII. *Prevalence (%) of keratodermia palmo-plantaris hereditaria and active atopic dermatitis in four different regions of AC county*

	Region no.			
	1	2	3	4
KPP	1.1	0	0.5	0.2
Atopic dermatitis	3.8	3.2	2.3	3.4

Regional and seasonal variations in the prevalence of skin lesions

Small but statistically significant differences were found between the prevalence figures for the four different regions of AC county in 11 instances. After correction for seasonal influence, only KPP and possibly also atopic dermatitis were considered to exhibit biologically relevant variations between the regions (Table VIII).

The seasonal variations for five diagnoses are shown in Table IV. Thus, acne is slightly less prevalent in the spring, while café au lait marks and ephelides increase. No obvious differences can be seen in the occurrence of atopic dermatitis or multiple pigmented naevi.

DISCUSSION

In mass investigations of this kind a rapid examination technique is required, which could jeopardize diagnostic accuracy. In the present study the diagnoses were selected with the possibility of easy recognition by an experienced dermatologist as the prime criterion. Subclassifications as to severity and anatomical location were designed to make rapid decisions possible. The reliability of the examination can thus be expected to be sufficient for explorative mass screening.

The non-response group comprised 13.7% of the total number of pupils. Possible non-random reasons for not participating in the examinations include cosmetically disfiguring, embarrassing skin lesions. In the randomized sample of 10% of the non-responders no such cases were encountered. It must be remembered that the effective response rate in this group was only 66%. However, when all factors are considered it seems unlikely that the dermatological characteristics of the non-responders were such as to influence the outcome of the study. On the other hand, severe hereditary skin diseases could not be expected to turn up among the pupils in a compulsory school, as most of these diseases require institutionalized care.

Statistical significance figures are not presented in the results. When the population is so large as in the present study it is very easy to obtain statistically significant differences. However, the biological significance of such differences is frequently highly questionable. In estimating the relevance of differences between various groups of our population this fact has been borne in mind and it has resulted in the deletion of a great number of smaller, although statistically significant, differences. The statistical analyses have been used mainly as indicators for directed questions on the associations between diseases.

A census study of this format is a cumbersome task. It might be questioned why a sampling of the population has not been undertaken. However, in view of the partly pronounced variations in different genetic markers already known (3) it was considered that a sampling procedure was hazardous and would entail a great risk of non-representativity.

The population in AC county is obviously genetically heterogeneous (3). With one, or possibly two, exceptions this heterogeneity does not influence the pattern of skin lesions as judged from the present data. All the four regions compared show basically the same prevalence of all the other 17 diagnoses when correction for seasonal influence has been made. Region no. 4 in the county is representative of the whole Swedish population as judged from blood group data (3). HLA typings of inhabitants of this region show an increase in B 27 as the only main deviation from other Swedish and North European materials (9). Thus it seems likely that the prevalence figures published in the present study are representative of a North European, Caucasian population.

Several differences in prevalence between the sexes were registered. The observed ratio of 1.7 between girls and boys with atopic dermatitis is in accord with earlier studies. Figures of 1.3 (2), 1.6 (12) and 2 (28) have been given. The higher prevalence figure for psoriasis in girls confirms the result from a neighbouring county where in a census study 11 girls and 3 boys were found in the age group 10–19 years (14). Lomholt (19) reported an earlier outbreak of psoriasis in girls than in boys. This is probably the explanation of the sex difference in the actual age interval. The higher prevalence in boys

of pigmented lesions such as multiple naevi pigmentosi. Becker's naevus and halo naevus indicates a hormonal influence in their formation. This is the case also for striae distensae which are much more common in girls. The more frequent occurrence of plantar warts in girls has been described earlier (26).

Acne vulgaris and striae distensae start earlier in girls. The boys show a higher prevalence of acne from the age of 15. For acne this is in good agreement with earlier studies (8) and also with the rate of sexual maturation and the importance of hormones in the pathogenesis of the disease. Atopic dermatitis decreases markedly between 12 and 13 years. This gives some support to the widely held layman's view that atopic dermatitis vanishes at puberty.

The seasonal differences are small to moderate also in diseases with a known annual rhythm. This is explained by the fact that no summer examinations were performed.

Acne vulgaris. The prevalence figures for this state are clearly heavily dependent upon the criteria applied for the diagnosis. Peak incidences of over 80% have been given (21). With the rather rigid criteria adopted in this study the figures are comparatively low with an overall prevalence of 36.5% and a peak prevalence at 16 years of 53.3% in the boys and 38.8% in the girls. In a recent national survey in the US the diagnosis of acne was registered in 23.2% in the age group 12–17 years (17).

Atopic dermatitis. In his monograph on atopic dermatitis Rajka (25) comments upon the paucity of prevalence studies of this disease. In a questionnaire study in the US of children 5–15 years of age, a prevalence of 4.4% was found (2). In another study in the US the prevalence was 1.07% in the age group 12–17 years (17) and in English school children 1.1% (7). The difference in prevalence between region 3 (2.3%) and the other three regions (3.2–3.8%) is difficult to explain with exogenous factors, a genetic trait being the most plausible cause.

Hereditary palmo-plantar keratodermia of the Unna-Thost type has been registered frequently in certain parts of northern Sweden. Thus Bergström (5) reported an incidence of 0.55% of this autosomally dominant disease among 15 569 school children in the county of Norrbotten immediately north of AC county. In our material the prevalence is 0.3%. In Northern Ireland an incidence of 1 : 40 000 has been reported (ref. in 28). Dorsal hyperkeratoses were often found in our population as well as in Bergström's (5) where it was registered in 93% of the cases. This seems to be a local variant of the diffuse palmo-plantar keratodermia with dominant inheritance. The prevalence of all forms of ichthyosis vulgaris (autosomal dominant and sex-linked) was 0.1%, or 7 pupils out of the total population. This figure should be compared with the figure 1 per 250 in an English study (33).

The pigmentary lesions present certain diagnostic difficulties. As pointed out previously (32), clinical differentiation between pigmented naevocellular naevi and lentigines is highly inaccurate. In histological examinations these authors found that about 20% of the lesions classified as naevi turned out to be lentigines in 20 individuals 20–25 years old. The possibility of discerning café au lait marks is dependent upon the degree of pigmentation of the skin. Thus our figure 10.9% that we obtained in the spring examination is probably more reliable than the mean value of 8.8%. This also tallies closely with the prevalence figure of 10% given in (27). The pigmented hairy epidermal naevus of Becker has been estimated to occur in one in 4000 new patients seen (10). The author's view that this is a misleading underestimate is corroborated by our prevalence figure 0.7%.

Spider naevi have been reported to occur in a high proportion of normal children and young adults. In children up to 15 years of age a prevalence of more than 15% is reported (34), in the group 11–15 years 30% and 16–20 years 11% (20). Our figure of 2.1% is thus remarkably low in comparison. The spiders are located either on the face (94.2%) or on the hands in our material (Table V). In the monumental work of Martini (20), the upper thorax and arms are also indicated as predilection sites in addition to the face and hands.

Nail biting is a common habit. Our prevalence figure of 18.2% tallies rather well with the 29% found in a material of tenth graders in 1942 (6), the 23% in naval recruits in 1945 (23) and the 15% in a population 15–74 years of age from region 4 in AC county in 1972 (1). The habit seems to persist rather unchanged over decades, and in war and peace.

Verrucae vulgares occurred in a uniformly high frequency in all the age groups studied (Table III) with a maximum of 25.9% in the youngest age group (12 years). Harman et al. (13) indicate a rapid increase in the incidence of warts since 1950. In 1955, English school children were found to have

plantar warts in 6.5% and other warts in 9.7% of the cases (ref. in 13). In a study from Denmark presented in 1958 (26) school children of the same age group as ours were reported to have plantar warts in 3.2% in girls and 1.8% in boys. These figures should be compared with 9.2% and 4.7% in the present study and with the absence of plantar warts in a study from Holland in 1959 (35). It has been reported that persons with multiple warts (three or more) have atopic stigmata, actual or anamnestic, in 85% (11). This could not be verified in the present study but it must be remembered that only active atopic dermatitis was registered, not atopic anamnesis. The pronounced variation in prevalence of plantar warts between different schools and geographical regions may be explained by local variations in contact with the wart virus.

The normal appearance of striae in adolescents of both sexes has been reported previously. In these studies from the early 50's the frequency was higher; 39% of the boys (15) and 72% of the girls (26). This might indicate a genetic as well as an exogenous difference.

The influence of acne vulgaris on the occurrence of a number of skin lesions (Table VII) suggests that a hormonal factor is of importance in the pathogenesis of these lesions. In a population of 210 acne patients 'endogenous eczema' (comprising atopic dermatitis, pompholyx and nummular eczema) was found in only 3.2% as compared with 19% in 116 controls (18). Our results point in the same direction, even if the difference is less pronounced and when variations in experimental design are taken into account. The acne constitution also seems to reduce the tendency to form freckles, pigmented naevi and spider naevi. In contrast, striae are formed more often in acne subjects. The apparent low prevalence of freckles may be partly or wholly due to seasonal variation also in acne and hence no conclusions should be drawn from this isolated finding. On the other hand it is conceivable that pigment formation is partly regulated by hormonal influences (31) and thus might be a link in the same chain of events as those underlying acne.

The low frequencies of ephelides and multiple pigmented naevi among atopics indicate an influence of the atopic state on pigment formation. The low frequency of acne in atopics is compatible with the xerosis of the atopic skin and with the low values of sebum excretion reported (25). Atopic dermatitis does not seem to favour fingernail biting. If tension is a factor of importance in onychophagia this tension can obviously be diverted by scratching the itchy atopic skin.

To the associations commented upon here must be added the associations between sex and certain diagnoses (Table II). This creates a complex pattern which is not readily explained by assuming one common factor underlying all these states. Probably there are several factors interacting with each other. The nature of these factors is not evident but a mathematical-statistical analysis of the multiple associations may help in formulating certain hypotheses.

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P.-Å. Larsson, M.D.
Department of Dermatology
Central Hospital
S-971 01 Falun
Sweden