

SOCIAL MEDICINE STUDIES BASED ON CIVILIAN MEDICAL BOARD RECORDS

III. PHYSICAL AND OCCUPATIONAL CHARACTERISTICS OF MEN WITH CERTAIN SKIN DISEASES

BY

A. M. STEWART, J. W. WEBB*, AND D. HEWITT

From the Social Medicine Unit, University of Oxford

In a recent symposium on "Modern Trends in Dermatology", first place was given to a paper stressing the relevance of ecological factors to diseases of the skin (Banks, 1954). The conviction that such factors are important may nowadays be widespread, but there is still no statistical foundation for the belief. Mortality from cancer of the skin has been widely studied, but very little information is available concerning the prevalence of the less serious diseases which make up the bulk of dermatological practice. In the absence of any serious mortality from these diseases, death registration, the basis of the "social *post mortem*", has little of interest to contribute. Nor is the official collection of hospital statistics much help, for it refers only to in-patients (Registrar-General, 1954). It is reasonable, therefore, to turn to the ledgers kept by the Civilian Medical Boards, since these not only provide large numbers of case records but also enable them to be related to the population at risk. This is the course followed in the present study, which describes the distribution among men of military age (17-44 years) of four common types of skin disease (acne, eczema, dermatitis, and psoriasis). The sources of material and methods of analysis have been described in the first paper of this series (Stewart, Webb, and Hewitt, 1955a). The methods of calculation and the definition of Standardized Prevalence Ratios (S.P.Rs *passim*) are identical with those used in the study of varicose conditions (Stewart and others, 1955b).

MATERIAL

Table I shows the total number of cases recorded in three regions (Essex, Leicester, and Northampton). Previous work has shown that:

- (1) it is unwise to put much weight on regional differences in the recorded prevalence of any

disease which is compatible with reasonably good health,

- (2) the relatively low prevalence rates in Northampton are probably due to under-recording of mild cases.

TABLE I
RECORDED PREVALENCE OF FOUR SKIN DISEASES AMONG MEN EXAMINED AT THREE CIVILIAN MEDICAL BOARD CENTRES (1941-44)

Area	Acne		Dermatitis		Eczema		Psoriasis	
	No.	Per 1,000	No.	Per 1,000	No.	Per 1,000	No.	Per 1,000
Essex	330	27.6	97	8.1	85	7.1	74	6.2
Leicester ..	975	42.0	140	6.0	209	9.0	92	4.0
Northampton ..	413	26.2	71	4.5	69	4.4	39	2.5
All Areas ..	1,718	33.7	308	6.0	363	7.1	205	4.0

For the present purpose such differences are not important, since the method of calculating S.P.Rs allows for regional variation in standards of recording. *Within* each region, however, observed variations between age groups are of interest, for in this case independent results serve to corroborate *relative* prevalence rates even when the *absolute* rates are not strictly comparable.

FINDINGS

In each region the prevalence of *acne* was high in the youngest age group (17-19), and still higher in the second group (20-24), and thereafter declined rapidly. In each set of records the prevalence of *eczema* increased with age up to 40 yrs (by which time it was at least four times as common as in the late teens). *Dermatitis* maintained a comparatively even level from age to age. In all three regions, *psoriasis* showed a steep age gradient; the combined figures suggesting that this disease is some seven times as common among men in their early forties as

* In receipt of grant from the Medical Research Council.

among youths of 17-19. Unlike acne, psoriasis tends to persist or recur throughout life. Since it is rarely fatal (in the whole of England and Wales only forty deaths in the four years 1949-52 were ascribed to psoriasis and pityriasis rosea) and may manifest itself at any age, it follows that prevalence (as opposed to incidence) rates must increase with age. The unexpected steepness of the observed age gradient suggests one of two things. Either the disease had appeared for the first time in the twenties and thirties more often than would be expected from a perusal of standard text books, or the number of days per year on which affected persons showed signs which were worth recording had increased steadily with age.

BODY MEASUREMENTS.—Table II shows S.P.Rs for various divisions of the height, weight, and body-build scales on the original code.

TABLE II
STANDARDIZED PREVALENCE OF FOUR SKIN DISEASES
IN RELATION TO HEIGHT, WEIGHT, AND BODY-BUILD

Group		Standardized Prevalence Ratios			
		Acne	Dermatitis	Eczema	Psoriasis
Height (in.)	Under 64	76	124	85	} 91
	64-	86	93	105	
	66-	101	108	95	} 95
	68-	106	90	95	
	70-	114	} 95	} 121	} 100
	72-	119			
$P(\chi^2)$		<0.001	>0.30	>0.30	>0.20
Weight (lb.)	Under 120	76	100	83	80
	120-	93	91	88	104
	130-	98	121	97	118
	140-	110	90	117	105
	150-	128	103	97	} 89
	160-	141	83	138	
$P(\chi^2)$		<0.001	>0.30	<0.10	>0.30
Body-Build Ht ³ /Wt (approx.)*	12.2	129	86	116	93
	12.6	101	100	96	} 89
	12.9	106	116	92	
	13.2	96	110	107	86
	13.5	101	91	103	118
	13.9	86	80	76	151
$P(\chi^2)$		<0.01	>0.50	>0.30	<0.10

* The scale 12.2-13.9 represents gradation from stocky to slender build.

It will be seen that risk of *acne* increased significantly with height and also with weight. On balance, the association with weight was the stronger, as is shown by the high S.P.R. (129) for men with the most rotund body-build (*i.e.* those with a Ht³/Wt index of approximately 12.2). The highest risk was, however, found among the heaviest men, *whether or not* they were overweight for their height. The full range of variation was even greater

than that shown in Table II, the S.P.Rs rising from 64 for men of less than 110 lb. to 165 for men of 170 lb. or over. The six ratios shown in Table II are so nearly co-linear (linear correlation coefficient between S.P.R. and weight = +.99) that it seems appropriate to describe the dependence of risk on weight by the linear equation of best fit. This was found to be:

$$R_{(A)} = 1.08 W - 45.2$$

where W refers to weight in pounds and R_(A) to the risk of acne, expressed as a percentage of the risk for all men of a given age. A similar relationship was found when S.P.Rs were calculated separately for each area. It was also found to hold good for men in their late twenties and thirties as well as for the younger, more susceptible age groups.

Neither *dermatitis* nor *eczema* yielded any significant correlation with body measurements, though the latter condition showed a suggestively low prevalence among light men.

The only other definite finding in relation to body measurements was an association between *psoriasis* and slender build, as indicated by the S.P.R. of 151 for men with a Ht³/Wt ratio of approximately 13.9. The number of cases of *psoriasis* was much smaller than those of the other diseases, and the result, as shown in Table II, is not statistically significant, but a conventional level of significance can be achieved by reducing the number of degrees of freedom in the χ^2 test.

SOCIAL CLASS.—Table III compares the prevalence of the four skin diseases among men of different social class.

TABLE III
COMPARATIVE PREVALENCE OF FOUR SKIN DISEASES
IN THE REGISTRAR GENERAL'S SOCIAL CLASSES

Social Class	Standardized Prevalence Ratios					
	Acne			Dermatitis	Eczema	Psoriasis
	All Ages	17-24	25-44			
I and II ..	105	114	95	61*	105	89
III ..	100	103	94	99	99	102
IV ..	108	102	119	89	92	95
V ..	89	73**	125	148***	110	103
Value of χ^2 for 3 d.f.	4.011	12.032	7.663	14.306	0.822	0.431
$P(\chi^2)$..	0.30- 0.20	0.01- 0.001	0.10- 0.05	0.01- 0.001	0.90- 0.80	0.95- 0.90

* Significant at the 0.05 per cent. level.
** Significant at the 0.02 per cent. level.
*** Significant at the 0.05 per cent. level.

Three sets of S.P.Rs for *acne* are given because of contrary findings for younger and older age groups. Thus young men from the labouring classes were

only half as likely to suffer from acne as young men from the professional classes. After the age of 25, however, the highest prevalence was at the lowest end of the social scale. S.P.Rs for Social Classes IV and V show that this reversal of the social gradient occurred independently in all three regions:

Social Class	Region	Age Group	
		17-24	25-44
IV and V..	Leicester	90	122
	Northampton	85	111
	Essex	84	125
All ..	All	100	100

The dual relationship between acne and social class probably has a simple dietary-cum-occupational explanation. Stein (1947) reported the complete disappearance of acne in a concentration camp and its reappearance on liberation. In normal life it is likely that a plain diet keeps down the prevalence of non-occupational cases (*i.e.* acne vulgaris), but with advancing age acneiform eruptions which result from exposure to external irritants (*e.g.* chloracne) must form a higher proportion of the total. This may be the reason why acne appears to be, at one and the same time, a disease of affluence and of poverty.

Among the older men examined by Civilian Medical Boards the prevalence rates for *acne* and *dermatitis* tended towards a similar social class distribution, but the contrast between unskilled and professional classes (which was of similar magnitude in the three sets of records) was consistently greater for dermatitis than for acne.

Neither *eczema* nor *psoriasis* showed the least sign of deviating from an even prevalence in all levels of society.

OCCUPATION.—Table IV summarizes the findings relating to occupation. The twelve groups shown in this Table are clearly too heterogeneous for a precise study of occupational dermatoses. But although lack of numbers precluded the calculation of separate S.P.Rs for many occupations distinguished in the original code, several quite small groups were identified with high risks. Thus the excess of *acne* in textile workers was eventually traced to the men engaged on bleaching and dyeing (S.P.R. 142), and that in the mixed building and farming group to farm workers (S.P.R. 73 at ages 17-24 and 173 at ages over 25). Exceptionally high rates for acne were also observed among the central lathe turners who are exposed to mineral oils (seventeen cases in Leicester compared with seven "standard" cases), and for a sub-group of the Registrar-General's Order XIII

(*i.e.* Makers of products not specified elsewhere but excluding workers in rubber) the S.P.R. for acne was 219. This group includes workers in plastics, among whom occupational skin disease has previously been reported (Schwartz, Tulipan, and Peck, 1947).

TABLE IV
COMPARATIVE PREVALENCE OF FOUR SKIN DISEASES IN TWELVE OCCUPATIONAL GROUPS†

Occupational Group	Acne			Derma- titis	Eczema	Psoriasis
	All Ages	17-24	25-44			
Professional, Administrative	112	153***	85	D	E	D
Commercial ..	93	91	98	78	111	D
Clerical ..	101	112	D*	D*	113	D
Boot and Shoe	93	93	93	79	108	112
Textile ..	122*	129	117	D	115	118
Metal manufacture	105	113	79	121	80	132
Trade not defined‡	98	87	132	101	98	D
Warehouse ..	97	109	81	E	D	D
Transport ..	94	96	89	115	86	E
Building and Agriculture	94	85	109	130	87	D
Unskilled ..	91	72***	138*	156***	102	D
Other.. ..	109	109	108	97	94	91
Value of χ^2 for 11 d.f. ..	12.727	29.123	20.807	27.815	4.357	6.032
P (χ^2).. ..	0.50-0.30	<0.01	0.05-0.01	<0.01	0.98-0.95	0.90-0.80

† Individual occupations were considered to be significantly different from standard if their contribution to the sum of χ^2 for all occupations would have been significantly large in a test based on 1 d.f.; these are marked by asterisks (see Table III).

‡ Occupations common to several trades (*e.g.* fitters, cutters, inspectors, etc.).

By and large, unskilled labourers had a higher prevalence of *dermatitis* than men who had learnt a particular trade, but the ratio for builders (S.P.R. 177), who are known to suffer from cement dermatitis, was even higher than for unskilled workers. No evidence was found of any occupational factor affecting the prevalence of *eczema* or *psoriasis*.

At the outset of the investigation some doubt had been felt about the propriety of attempting a separate analysis of the records of eczema and dermatitis since it was thought that the examining doctors might have used these terms indiscriminately or have had difficulty in distinguishing industrial dermatitis from idiopathic eczema. It is therefore interesting to observe that the conditions labelled dermatitis and eczema were in fact quite sharply differentiated from one another by social and occupational features as well as by age distribution.

DISCUSSION

The principal finding of the section on physical measurements is the relationship between weight

and risk of acne. It must at first seem surprising that a disease which is influenced by endocrine factors did not reveal a stronger correlation with body-build than with absolute size, but it may be that (of the three variables used in this section) weight most adequately represents the measure which has the greatest relevance to skin function, namely, the ratio of weight to surface area. Discussing the best method for determining the surface area of subjects of metabolism experiments, Du Bois (1936) says:

In dealing with people of normal build and particularly in dealing with the averages of large numbers of persons of normal build, it makes no difference whether one uses $11.0 W^{2/3}$. . . or employs a method involving both height and weight.

It follows that the ratio of weight to surface area would, on average, be proportional to the cube root of weight. Over the range 100 to 200 lb. any linear dependence of risk upon this ratio would be indistinguishable from linear dependence on weight *per se*. Thus body-weight, by measuring (however indirectly) the "load" on the sebaceous glands, could be a measure of acne risk, just as height (by indicating the "load" on the inferior vena cava and its branches) has proved to be a measure of varicosity risk (Stewart and others, 1955b).

Though the smaller numbers did not support any firm conclusion with regard to eczema, there was some resemblance between the physique distribution of this disease and that of acne. For the result which most nearly approached statistical significance was that relating to weight, with a general tendency for prevalence to increase with increasing weight.

It is not so easy to offer a physiological explanation for slender individuals being excessively prone to psoriasis. This, however, is a disease in which hereditary influences are thought to play an important role, and it may be that an inherited tendency to slender build is linked with the psoriatic diathesis. This hypothesis could be tested by comparing the body measurements of patients with and without a family history of the disease.

Sheldon and his associates believe that skin diseases tend to be associated with "cerebrotonia" and thus, by implication, with ectomorphic build (Sheldon, Stevens, and Tucker, 1940). Since a high value of the index $Ht \div \sqrt[3]{Wt}$ is a definite indication of ectomorphy, the present findings for psoriasis accord with this view. On the other hand, the findings for acne, dermatitis, and eczema are incompatible with such expectations.

In view of the known association between asthma and eczema, it is perhaps worth mentioning that in unpublished analyses of the present set of Civilian Medical Board records a very strong association

was found between prevalence of asthma and light weight. Eczema, on the other hand, was less common among the light men. Asthma also appeared to be a disease of affluence (the S.P.Rs being 172 for Social Class I and II, 98 for Social Class III, 84 for Social Class IV, and 66 for Social Class V), although the cases of eczema were distributed regardless of social class. It is arguable that the body-build contrasts are misleading, and that they are really due to the fact that asthma *causes* loss of weight. It is, however, certain that, whatever the common factor in asthma and eczema may be, it is not closely linked with social status.

SUMMARY

A study has been made of the physical and occupational characteristics of several hundred men who, at the time of their pre-service medical examinations, were suffering from acne, dermatitis, eczema, or psoriasis.

Acne was found to be especially prevalent in men of Social Class I and II in the age group 17-24, but at ages over 25 it was more common among the unskilled classes. At all ages there was a positive correlation between prevalence of acne and body-weight.

Psoriasis was found to be associated with slender build, but not with occupation or social status.

No significant variations were found in the prevalence of eczema, except with respect to age.

Dermatitis was particularly common among builders and unskilled workers but was not related to height and weight or body-build.

The significance of these findings is discussed with reference to somatotyping and to the eczema-asthma syndrome.

We should like to record our thanks to the Nuffield Provincial Hospitals Trust and the Medical Research Council, who contributed generously towards the expenses of the investigation. We are also indebted to Dr. F. Acheson, Dr. W. Boake, Dr. A. E. Naish, Dr. J. Parfit, and Dr. M. Russell, who gave valuable assistance in the coding of the medical data.

REFERENCES

- Banks, A. L. (1954). In "Modern Trends in Dermatology (Second Series)", ed. R. M. B. MacKenna, chap. 1. Butterworth, London.
- Du Bois, E. F. (1936). "Basal Metabolism in Health and Disease", 3rd ed. Baillière, Tindall and Cox. London.
- Registrar-General (1954). "Statistical Review of England and Wales for the year 1949". Supplement on Hospital In-patient Statistics. H.M.S.O., London.
- Schwartz, L., Tulipan, L., and Peck, S. M. (1947). "Occupational Diseases of the Skin". Lea and Febiger, Philadelphia.
- Sheldon, W. H., Stevens, S. S., and Tucker, W. B. (1940). "The Varieties of Human Physique." Harper, New York.
- Stein, R. O. (1947). *Wien. Klin. Wschr.* 59, 576.
- Stewart, A. M., Webb, J. W., and Hewitt, D. (1955a). *British Journal of Preventive and Social Medicine*, 9, 19.
- (1955b). *Ibid.*, 9, 26.