

Chrome sensitivity in Israel

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Fifty-two Israeli Jewish patients suffering from chrome sensitivity (C.S.) were investigated with regard to their ethnic origin, age of onset of the dermatitis, occupational history and socio-economic level. Forty-eight patients suffering from various skin conditions and drawn from the outpatient dermatological clinic were used as controls. The socio-economic status of C.S. patients was found to be very low, regardless of ethnic origin. Ninety-four percent of the patients were non-Ashkenazi Jews and a significantly increased proportion of those (24 %) were of Kurdish descent. There were no major differences in their occupations. Patients of Kurdish origin manifested the disease at a significantly earlier age than other non-Ashkenazi patients, although the socio-economic conditions of the different ethnic groups of patients were similar.

Key words: Age of onset - chrome sensitivity - ethnic origin - Kurdish Jews - socio-economic level.

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Chrome sensitivity (C.S.) is the most common form of contact dermatitis encountered in Israel, the majority of cases being housewives with eczematous changes on the dorsa of the hands and fingers and on the flexor aspects of the forearms. Bichromate-containing detergents and bleaching agents are believed to be the cause of this clinical entity (Feuerman 1971). Recently three Jewish families with more than one member affected with C.S. were observed. Since two of these kindreds were of Kurdish origin, we wondered whether there might be a pattern to the distribution of this condition within the Jewish communities in Israel. The Jewish population of Israel consists of Ashkenazi Jews, originating from Central and Eastern Europe; Sephardic Jews, whose ancestors were expelled from Spain in 1492 and subsequently settled mainly in North Africa, Greece, Turkey, Bulgaria and Yugo-

slavia; and other non-Ashkenazi Jews originating from various Asian and African countries. One of these non-Ashkenazi groups is the Kurdish Jews who before their immigration to Israel were settled in the mountain ranges of Kurdistan, which are today politically divided among Iraq, Iran and Turkey. They were geographically isolated from the major Jewish centers of these three countries and were distinguished by a tradition and a language of their own (Cohen et al. 1963). The greater part of the Jewish-Israeli population is immigrants who arrived during the last 30 years. Many came from countries where they had been living in various degrees of isolation for centuries. Since the genetic structure of populations may be altered through both genetic and environmental factors over such long periods of time, it is not surprising that Jewish communities differ in the frequencies of

various genetic traits and diseases (Cohen 1971). Furthermore, Israeli Jews of various ethnic origins also differ in their socio-economic level; Oriental Jews usually belong to the lower socio-economic classes. They tend to have larger families, lower educational levels and more crowded housing conditions than Ashkenazi Jews, and are more frequently employed in simple manual jobs (Statistical Abstracts of Israel 1976). The present study attempts to clarify whether genetic and/or specific environmental factors contribute to the appearance of C.S. within the Jewish population of this country.

Material and Methods

All 65 Jewish patients who had been treated for C.S. in the outpatient dermatological clinic during the years 1971-76 for C.S.

were invited by letter for reexamination. Of these, 52 responded and were interviewed with respect to their origin, family history and occupational history as well as their educational level and housing conditions. The housing density was calculated by dividing the number of persons usually living in the dwelling by the total number of rooms occupied by members of the family. In addition each patient underwent a dermatological examination. The diagnosis of C.S. was based, in every case, on typical clinical manifestations and a positive patch test with 0.25 % potassium bichromate in water.

Forty-eight patients visiting the dermatology clinic for various skin disorders in 1976 were matched with the C.S. patients for age and sex: Tinea - 6 patients, drug eruption - 6, psoriasis - 5, varicose ulcers - 4, acne - 4, male-pattern alopecia - 4, candi-

Table 1. Ethnic origin of patients with chrome sensitivity

		Ethnic group						Ashkenazi	Total
		Kurdish	Iraqi (1)	Moroc- can	Sephar- di	Other non- Ashke- nazi	Total non- Ashke- nazi		
Patients	No.	12	10	6	7	14	49	3	52
	%	23.0	19.4	11.5	13.4	26.9	94.2	5.8	100.0
Controls	No.	0	9	5	5	8	27	21	48
	%	0	18.9	10.4	10.4	16.6	56.3	43.7	100.0
Jewish popula- tion of Israel (2)	No.	-	-	-	-	-	818,467	991,073	1,809,540
	%						47.6	52.4	100.0

(1) Not including Kurdish Jews from Iraq

(2) Aged 14 years and over - *Statistical Abstracts of Israel 1976*

X² test of heterogeneity between patients and controls of six different ethnic origins:

$$X^2 = 26.65;$$

$$d.f. = 5;$$

$$P < 0.01$$

X² test of heterogeneity between patients and controls (total non-Ashkenazi vs. Ashkenazi):

$$X^2 = 16.47;$$

$$d.f. = 1;$$

$$P < 0.001$$

Table 2. Age at onset and ethnic origin of patients with chrome sensitivity

Age at onset (years)	No. of patients				
	Kurdish	Other non- Ashkenazi	Total non- Ashkenazi	Ashkenazi	Total
13-29	9	11	20	0	20
30 and over	3	24	27	3	30
Total	12	35	47	3	50
Mean age of onset \pm s.d.	23.3 \pm 4.1	36.0 \pm 6.1	32.9 \pm 5.8	42.0 \pm 4.4	33.4 \pm 5.2

The difference between Kurdish and other non-Ashkenazi Jews is significant at the 1% level as determined by Fisher's exact test for 2×2 tables. The difference between total non-Ashkenazi and Ashkenazi groups is not significant.

diasis - 3, pyoderma - 3, nevi - 3, herpes zoster - 2, alopecia areata - 2, erythema nodosum - 2, and one case each: neurofibromatosis, pityriasis rosea, scleroderma and aphthous stomatitis. These controls were interviewed in the same way as the C.S. patients and by the same person (A.W.)

Data on the Israeli-Jewish population aged 14 years and over concerning educational level, housing conditions and family size based on the ethnic origin of the father were obtained from the Statistical Abstracts of Israel for 1976. Chi-square test of heterogeneity was performed by standard methods (Snedecor 1956).

Results

Sex. Among the 52 treated C.S. patients 43 (83%) were females and among 48 control subjects 40 (83%) were females.

Ethnic origin. Among the 52 C.S. patients 94% were non-Ashkenazi Jews in comparison with 56% in the controls (Table 1). In the Jewish population of Israel aged 14 years and over, 48% are non-Ashkenazi Jews. Twenty-four percent of the patients (12) were of Kurdish origin, while none of the controls was Kurdish; it is estimated

that about 10% of the population of Jerusalem are Kurdish Jews. These differences are highly significant. There were no significant differences in the proportion of Moroccan, Iraqi, Sephardi or other non-Ashkenazi Jews between patients and controls.

Age of onset. The age of onset varied among C.S. patients from 13 to 64 years with a mean of 33.4 years (Table 2). All three Ashkenazi patients developed C.S. after the age of 30, while 42% of non-Ashkenazi acquired the disease before this age; however, this difference is not statistically significant. Nine of the 12 Kurdish patients (75%) acquired the disease before the age of 30 as compared to 31.4% of the 35 other non-Ashkenazi patients. This difference is significant ($P < 0.01$)

Occupational history. Of 43 female patients, 37 had their own households while six lived with their parents. Sixteen of the housewives held jobs outside their house and 13 of these did simple manual work as compared to five out of 18 controls. Seven female patients did cleaning work in other households in comparison with two in the controls. Eight of the nine male patients were working in the construction industry at the time they developed C.S. The time

Table 3. Educational level of patients with chrome sensitivity

		Years of schooling				Total
		0	1-8	9-12	13+	
A. Patients	No.	13	17	20	2	52
	%	25.0	32.6	38.4	3.8	100.0
B. Controls	No.	3	13	18	14	48
	%	6.2	26.9	37.3	29.0	100.0
C. Israeli Jews (1)	No.	143,670	564,339	848,789	334,600	1,901,398
	%	7.6	29.8	44.9	17.7	100.0
D. Israeli Jews born in Asia & Africa (1)	No.	134,503	248,457	196,150	43,588	622,698
	%	21.6	39.9	31.5	7.0	100.0

(1) Aged 14 years and over - *Statistical Abstract of Israel 1976*

X² tests of heterogeneity between patients and controls with 0-8 vs 9+ years of schooling:

A vs. B : X² = 5.65; d.f. = 1 ; P < 0.02

A vs. C : X² = 9.90; d.f. = 1 ; P < 0.01

A vs. D : X² = 0.34; d.f. = 1 ; P > 0.5

of exposure until manifestations of cement dermatitis varied between 1 and 21 years (mean of 13 years). The ninth patient was a policeman, father of six children, who participated regularly in household duties. *Educational level.* The percentage of il-

literate subjects was 25.0 % in the patient group as opposed to 6.2 % in controls and 7.6 % in the Jewish population of Israel aged 14 years and over (Table 3). Only 3.8 % of C.S. patients had some form of higher education (13 years of schooling or

Table 4. Housing density of patients with chrome sensitivity

		No. of persons per room				Total
		≤ 1	1,01-1,99	2,0-2,99	≥ 3,0	
A. Patients	No.	7	10	25	10	52
	%	13.7	19.7	47.0	19.6	100.0
B. Controls	No.	19	15	14	0	48
	%	39.5	31.5	29.0	0	100.0
C. Israeli Jews (1)	No.	907,392	510,408	289,234	141,781	1,848,815
	%	47.4	27.0	18.4	7.2	100.0
D. Israeli Jews born in Asia & Africa (1)	No.	169,998	158,788	191,791	102,123	622,700
	%	27.0	25.8	30.8	16.4	100.0

(1) aged 14 years and over - *Statistical Abstract of Israel 1976*

X² tests of heterogeneity between patients and controls for up to 1,99 and 2,00+ persons

A vs B : X² = 16.0; d.f. = 1; P < 0.001

A vs C : X² = 49.3; d.f. = 1; P < 0.001

A vs D : X² = 18.2; d.f. = 1; P < 0.001

Table 5. Family size of patients with chrome sensitivity

		No. of persons per family				Total	Mean size of family
		1-2	3-4	5-6	≥ 7		
A. Patients	No.	2	10	11	29.	52.	6.9
	%	3.8	19.4	21.3	55.5	100.0	
B. Controls	No.	13	15	8	11.	47	4.2
	%	27.7	31.9	17.0	23.4	100.0	
C. Israeli Jews (1)	No.	674,874	756,149	349,722	198,492	1,972,237	3.7
	%	35.8	35.2	18.5	10.5	100.0	
D. Israeli Jews born in Asia & Africa (1)	No.	144,452	197,350	174,353	112,719	628,874	4.5
	%	23.2	31.2	27.4	18.2	100.0	

(1) aged 14 years and over - *Statistical Abstract of Israel 1976*

χ^2 test of heterogeneity between patients and controls with 1-4 vs. 5 and more persons per family:

A vs. B : $\chi^2 = 13.6$; d.f. = 1; $P < 0.01$

A vs. C : $\chi^2 = 66.6$; d.f. = 1; $P < 0.001$

A vs. D : $\chi^2 = 44.8$; d.f. = 1; $P < 0.001$

more) in comparison with 29.0% for the group of controls and 17.7% for the Jewish population of Israel of comparable age. These differences are significant, but the educational differences between C.S. patients and the Jewish population of Israel originating from Asia and Africa were not significant. No significant differences were observed between Ashkenazi and non-Ashkenazi patients or between Kurdish and other non-Ashkenazi patients in regard to their educational level.

Housing conditions. The housing density of C.S. patients was significantly high in comparison to the controls, and the total Israeli Jewish population of comparable age, as well as the Israeli Jewish population of Oriental origin (Table 4). No significant differences were observed between the different ethnic groups of patients in respect to their housing density.

Family size. The family size of C.S. patients was significantly larger than that of the control group and the Israeli Jewish population of comparable age (Table 5). It was

also significantly larger than that of the Israeli Jewish population of Oriental origin of comparable age. No significant differences were observed among patients of different ethnic origins in respect to their family size.

Localization of dermatitis. In 43 of 52 patients (82.7%), the primary site of dermatitis was on the dorsa of the hands and fingers. In six of these, the dermatitis became generalized; in nine the dorsa of the feet, and in three the legs and thighs became involved later. In only three patients was the primary site on the dorsa of the feet. Two patients stated that dermatitis appeared simultaneously on the dorsa of the hands and feet.

Course and prognosis. Nine of 52 patients were cured at the time the study was conducted. The duration of active disease in the nine healed cases ranged between 4 and 14 years, with a mean of 7.5 years. Four of 52 patients still had active lesions 20 years or more after onset. Six of the eight patients with cement dermatitis changed their oc-

cupation which in two resulted in a considerable amelioration of the condition. In two others, partial improvement was noted.

Comment

Most C.S. patients were females, an observation which differs from that of several European authors who reported a preponderance of males among their patients (Cronin 1971, Magnusson et al. 1966, Fregert et al. 1969). This is probably due to the scarcity of chrome in European detergents (Nater 1963) in comparison with Israeli detergents (Feuerman 1971). The mean age of C.S. onset was 33.4 years, indicating the long exposure time necessary for the development of C.S.

This could be ascertained directly in the group of cement workers where the date of first exposure was known and the average exposure time was 13 years before manifestations of the sensitivity (The chromate content of Israeli cements is not known.) However, this is not surprising since bichromate is not a very potent contact allergen (Kligman 1966). The course of C.S. varied greatly among our patients from those who were clinically healed and with a negative patch test after 4 years, to those with lesions remaining active more than 20 years after the initial onset. Burrows (1972) showed that only 8% of cement dermatitis patients were clear 10–13 years after the initial investigation. Hovding (1970) re-examined patients after 5 years and concluded that the possibility of a favorable course should be kept in mind when assessing the prognosis of the incapacity caused by this disease. Similar to other reports (Burrows & Calnan, 1965, Peter 1968) our patients showed that the effect of change of occupation was unpredictable, which may be due to nonoccupational contact perpetuating the disease.

Ninety-four percent of our patients were

non-Ashkenazi Jews in comparison with 56% in the control group and 48% in the Israeli-Jewish population of comparable age. Non-Ashkenazi Jews in Israel usually belong to the lower socio-economic classes, with larger families, lower educational levels, more crowded housing conditions and more manual jobs than Ashkenazi Jews (Statistical Abstracts, 1976). Such conditions may cause more frequent and prolonged contact with bichromate-containing detergents and bleaching agents in non-Ashkenazi housewives, and this in turn may explain the increased frequency of C.S. among non-Ashkenazi Jews. The socio-economic level of C.S. patients was significantly lower than that of the controls and of the whole Israeli Jewish population of comparable age and even of the Israeli Jews born in Asia and Africa, who have the lowest socio-economic conditions among Israeli Jews. Yet, no significant differences in the socio-economic level were observed between patients of different ethnic origin. Thus the socio-economic level of our C.S. patients seems to be very low, regardless of ethnic origin. Twenty-four percent of our patients and none of the controls were Jews of Kurdish origin. We estimate that about 10% of the population of Jerusalem are Kurdish Jews. Furthermore, Kurdish patients were affected at a much earlier age than the other patients although their socio-economic level was not lower. These differences could indicate a genetic predisposition among Jews of Kurdish descent to develop C.S., but environmental factors, such as the frequency of contact and the concentration of detergents used, could not be ruled out. Genetic factors worthy of future investigation in C.S. patients may be HLA determinants and factors which are frequent among Kurdish Jews such as glucose-6-phosphate dehydrogenase deficiency (Cohen 1971).

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