Testicular feminization syndrome, XY females

The number of propoiti has increased from 66 to 79 and the distribution of the Xg groups is more ultra-male than before, 43 being Xg(a+) whereas the expected number of Xg(a+) in 79 normal males is 52.06. For this comparison $\chi^2_1 = 4.63$ and $P = 1$ in 33. If this deviation persists an explanation may be hard to find.

Females lacking an arm of one X

The evidence that the Xg locus when carried on a normal X is not inactivated is very strong (Ducos *et al.*, 1971; Race and Sanger, 1975). The evidence that Xg is inactivated when carried on an abnormal X (Polani *et al.*, 1970) is also strong and is greatly increased by the recent additions.

Propoiti with short arm deletions or long arm isochromosomes (excluding mosaics with an XO cell line) have increased from 44 to 67, of whom 42 were Xg(a+). Long arm deletions or short arm isochromosomes (again excluding mosaics) have increased from 10 to 20, of whom 13 were Xg(a+). Both distributions are those expected of males with a single X and depart significantly from those expected of normal females: the figures for the missing short arm class are over 5 million times more like those expected of males than females, and for the long arm class 42 times more like the male distribution.

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Association of ABO blood groups and vitiligo

SUMMARY ABO blood group frequencies of 1000 vitiligo patients were studied and compared with those of blood donors and local population. The relative risk of O was significantly reduced in patients in comparison with blood donors but not with local population. This can possibly be explained by the well-known preference of O group donors in the blood bank. On a review of other studies it was felt that there may not be any real association of ABO blood groups with vitiligo.

In the past two decades much work has been done to elucidate the factors that cause vitiligo, but little is known about the genetic and hereditary factors involved in the incidence of this disease. Among the important genetic factors that have been studied are the ABO blood group antigens. The results of these studies on the association of ABO blood groups and vitiligo have, however, been conflicting. A greater incidence of AB blood group was found by El-Hefnawi *et al.* (1953) in 80 vitiligo patients as compared to their controls. Singh and Shanker (1966), in a study of 100 vitiligo patients, also observed a higher incidence of vitiligo in people with blood group AB. Srivastava and Shukla (1965) found an increased 'B' gene frequency in a study of 535 vitiligo patients, whereas Sehgal and Dube (1968) reported a decreased frequency of O group in 173 patients of vitiligo.

The varying sample sizes involved in these studies may possibly be responsible for such conflicting results. The present study, therefore, has been undertaken on a large sample of vitiligo patients to see if there is any real association of ABO blood groups and vitiligo and also to examine the nature of heterogeneity between various studies.

Subjects and methods

One thousand unrelated vitiligo patients of the Hyderabad city attending the outpatient clinic of the

Central Research Institute for Unani were analysed for blood groups. The ABO blood grouping was done according to the technique of Wintrobe (1956) with the help of antisera supplied by blood bank, Osmania General Hospital, Hyderabad. The diagnosis was made on clinical examination in all cases. Patients with skin depigmentation other than vitiligo were excluded by history, clinical examination, and appropriate laboratory investigations. Blood groups in 2000 donors in the Central Blood Bank of Institute of Preventive Medicine, Hyderabad were used as control. The results have also been compared with the distribution of the blood groups in local population obtained from a population survey (Padma and Murthy, 1974). To eliminate any heterogeneity, the 3 samples have been subdivided into 2 each according to religion (Hindus and Muslims). The relative risks of each of the 3 blood groups (A, B, and O) were also studied.

Statistical methods

The data collected on vitiligo patients, local population, and blood donors were analysed statistically on the following lines.

The differences in frequency distribution of ABO blood groups of vitiligo patients, local population, and blood donors were tested by the application of χ^2 test of association (Snedecor and Cochran, 1967). The relative risks for blood group comparisons of A versus rest, B versus rest, and O versus rest of vitiligo patients with that of local population and blood donors were calculated and the significance was tested using Woolf's χ^2 test (Li, 1961).

Results

The frequency distribution of ABO blood groups in vitiligo patients, the local population, and blood donors are given in the Table. It will be seen from this Table that the difference in the distribution of ABO blood groups among vitiligo patients and blood donors is highly significant ($\chi^2 = 16.99$, $P < 0.001$). But the distribution of blood groups in vitiligo patients and the local population is not significant ($\chi^2 = 1.50$, $P > 0.05$).

The frequency distribution of ABO blood groups in the 3 samples divided into 2 groups each on the basis of religion is also shown in the Table. There is no significant difference between patients and the local population both in Hindus ($\chi^2 = 1.33$, $P > 0.05$) and Muslims ($\chi^2 = 1.45$, $P > 0.05$). However, the differences in frequency distribution of ABO between vitiligo patients and Hindu blood donors are highly significant ($\chi^2 = 18.62$, $P < 0.001$). But there is only a marginal difference between patients and Muslim blood donors ($\chi^2 = 6.75$, $P < 0.10$).

The proportion of blood group A in a total sample of vitiligo patients and in Hindus is higher when compared with blood donors but not when compared with the local population. In addition, the proportion of blood group B is higher in the total sample and Muslims when compared with blood donors. The proportion of O in all the 3 samples, i.e. total vitiligo patients, Hindus, and Muslims is lower than those of blood donors, but not lower than those in the local population.

The relative risk of O versus rest as estimated from the comparison with the donors was very significantly reduced from the expected value of 1 under the

Table Frequency of ABO blood group distribution in vitiligo patients, local population, and blood donors

Religion	Clinical category	Total	Blood groups								Vitiligo patients versus
			A		B		AB		O		
			No.	%	No.	%	No.	%	No.	%	
Total sample (Hindus + Muslims)	Vitiligo patients	1000	241	24.1	349	34.9	60	6.0	350	35.0	$\chi^2=1.50$ ($P>0.05$) $\chi^2=16.99$ ($P<0.001$)
	Local population	2496	591	23.6	836	33.7	172	6.8	897	35.9	
	Blood donors	2000	401	20.1	628	31.4	121	6.0	850	42.5	
Hindus	Vitiligo patients	543	136	25.0	180	33.1	28	5.2	199	36.7	$\chi^2=1.33$ ($P>0.05$) $\chi^2=18.62$ ($P<0.001$)
	Local population	1774	415	23.4	586	33.0	111	6.3	662	37.3	
	Blood donors	990	173	17.5	317	32.0	41	4.1	459	46.4	
Muslims	Vitiligo patients	457	105	23.0	169	37.0	32	7.0	151	33.0	$\chi^2=1.45$ ($P>0.05$) $\chi^2=6.75$ ($P<0.10$)
	Local population	722	176	24.4	250	34.6	61	8.5	235	32.5	
	Blood donors	1010	228	22.5	311	30.8	80	8.0	391	38.7	

hypothesis of no association. This estimate did not show any heterogeneity between the religions. The relative risks on comparison with the local population are, however, not significantly different from 1.

Discussion

The reports so far published on the association of ABO blood groups with vitiligo have yielded results of varying nature. In studies on the association of blood groups with diseases, emphasis has been laid on the size and the homogeneity of the disease and control groups chosen (Clarke, 1961). Our study examines the hypothesis of the association of ABO blood groups and vitiligo in a sample within the 2 religious subgroups (Hindus and Muslims). While there are no differences in frequency distribution of ABO blood groups between the 2 religions studied, there is a discrepancy in the comparisons with the 2 types of controls taken, i.e. the blood donors and the local population. It is seen that the comparison of vitiligo patients with blood donors has shown a significantly reduced risk in the case of the O blood group and apparently a higher incidence of vitiligo in individuals with blood group A and B. Comparison of vitiligo patients with the local population does not give such results. Studies of other workers especially that of Sehgal and Dube (1968) also show a higher incidence of vitiligo in people with blood groups A and B and a lower susceptibility in individuals with blood group O. The study of Srivastava and Shukla (1965) also shows a higher risk of vitiligo in people with blood group B. But from the present study it is evident that the reduced risk of O group and an apparent predilection for blood groups A and B is observed only when the relative risk in vitiligo patients is compared with that of blood donors but not so when compared with that of local population. It is possible that the sample of blood donors really contains an excess of O group persons, in view of the well-known preference of O donors in blood banks. In this case the reduced risk of the O blood group may

not be real. It seems, therefore, that there may not be any association of ABO blood groups with vitiligo or, if it is there, it should be towards a reduced risk of O group individuals. Much larger samples or family studies, as indicated by Clarke (1961), may be necessary to arrive at a conclusion.

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