Journal of Medical Genetics (1970). **7**, 52.

ABO and Rh Blood Groups in Relation to Marital Status and Childlessness in Blood Donors

T. M. ALLAN

From the North-East Scotland Blood Transfusion Centre, Royal Infirmary, Aberdeen

In a previous paper (Allan, 1969) data were presented on the ABO and Rh blood groups in relation to blood donors' sibs. In the present paper data are presented on the ABO and Rh blood groups in relation to blood donors' marital status and childlessness. In a subsequent paper data will be presented on the ABO and Rh blood groups in relation to the number, sex, and mortality of blood donors' children.

As in the previous paper the data have been obtained from a questionary completed by 5785 blood donors aged 20–65 of the Aberdeen and N.E. Scotland Blood Service. (This questionary, with its accompanying letter, is reproduced as an Appendix to the previous paper.) In the present paper, however, the results are compared with those from the only similar survey hitherto reported—that of Bennett and Walker (1956), on whose questionary, completed by 2609 blood donors aged 50–65 of the Cambridge and East Anglian Blood Transfusion Service, my own was very largely modelled. By chance the East Anglian and N.E. Scotland regions thus represented are broadly alike, in being predominantly agricultural areas with no large city but with market and fishing towns.

A comparison is also made, in respect of marital status, with the results from Roberts' (1942) series of blood donors from the North Welsh coastal counties of Carnarvon, Denbigh, and Flint.

Results

Marital status. Table I gives the sex ratio of the N.E. Scotland blood donors, by marital status and blood group. It shows that the descending order of sex ratios is AB–O–A–B for married donors, both Rh-negative (CDE-negative) and Rh-positive (i.e. donors defined, for transfusion purposes, as D, C, or E-positive). It also shows that, for single donors, both Rh-negative and Rh-positive, the descending order is the reverse, i.e. B–A–O–AB. The variations among these ratios are, collectively, far from significant for single donors, but are almost significant for married donors ($\chi^2 = 7{\cdot}7$ for 3 d.f.; $p < 0{\cdot}10$).

Table II gives the ratio of married to single N.E. Scotland donors by ABO blood group. It shows that the descending order of ratios of married to single donors is AB–O–A–B for males and the reverse for females. The variations by blood group in the percentage of donors who are married are significant for female donors ($\chi^2 = 8{\cdot}6$ for 3 d.f.; $p < 0{\cdot}05$); and the differences between the male and female patterns of variations are also significant ($\chi^2 = 10{\cdot}0$ for 3 d.f.; $p < 0{\cdot}02$).

Table III gives the ratio of married to single female donors, by ABO blood group, in Bennett and Walker's (1956) East Anglian series and in Roberts' (1952) two North Welsh series. It shows that, as in the N.E. Scotland series (Table II), the ratio of married to single female donors is higher for A than for O donors in all three series. It also shows that, again as in the N.E. Scotland series (Table II), the ratio is higher for B than for A donors in both of the North Welsh series, despite

TABLE I

SEX RATIO OF N.E. SCOTLAND BLOOD DONORS, BY MARITAL STATUS AND ABO AND RH BLOOD GROUP

Marital Status	ABO Blood Group	N.E. Scotland Rh-positive Donors			N.E. Scotland Rh-negative Donors		
		M	F	M/F	M	F	M/F
Married donors	AB	64	32	2·00	19	4	4·75
	O	1111	712	1·56	247	145	1·70
	A	726	484	1·50	147	94	1·56
	B	219	162	1·35	36	33	1·09
Total		2120	1390	1·53	449	276	1·63
Single donors	B	62	67	0·93	13	10	1·30
	A	185	260	0·71	43	56	0·77
	O	275	402	0·68	49	81	0·60
	AB	15	23	0·65	3	6	0·50
Total		537	752	0·71	108	153	0·71

Received 30 October 1969.

TABLE II

N.E. SCOTLAND BLOOD DONORS, BY MARITAL STATUS, SEX, AND ABO BLOOD GROUP

ABO Blood Group	Total N.E. Scotland Male Donors			Total N.E. Scotland Female Donors			% of N.E. Scotland Donors Married		
	Married	Single	M/S	Married	Single	M/S	M	F	M/F
AB	83	18	4·61	36	29	1·24	82%	55%	1·49
O	1358	324	4·19	857	483	1·77	81%	64%	1·27
A	873	228	3·83	578	316	1·83	79%	65%	1·22
B	255	75	3·40	195	77	2·53	77%	72%	1·07
Total	2569	645	3·98	1666	905	1·84	80%	65%	1·23

TABLE III

RATIO OF MARRIED TO SINGLE FEMALE BLOOD DONORS

Female Donors' ABO Group	East Anglian Female Donors			North Welsh Female Donors with non-Welsh Family Names			North Welsh Female Donors with Welsh Family Names		
	Married	Single	M/S	Married	Single	M/S	Married	Single	M/S
B	88	34	2·59	29	39	0·74	27	37	0·73
A	585	171	3·42	147	243	0·60	86	128	0·67
O	600	192	3·13	136	270	0·50	101	209	0·48
AB	46	13	3·54	15	23	0·65	9	14	0·64
Total	1319	410	3·22	327	575	0·57	223	388	0·57

TABLE IV

PERCENTAGE OF CHILDLESS MALE N.E. SCOTLAND AND EAST ANGLIAN BLOOD DONORS, BY ABO AND Rh BLOOD GROUP

Male Donors' ABO and Rh Blood Groups	N.E. Scotland Male Donors aged 20–65			East Anglian Male Donors aged 50–65		
	No. of Donors	Donors Childless	% Childless	No. of Donors	Donors Childless	% Childless
A Rh-positive	726	126	17·4	460	84	18·3
O Rh-positive	1111	161	14·5	480	89	18·5
O Rh-negative	247	35	14·2	107	20	18·7
A Rh-negative	147	20	13·6	103	19	18·4
B Rh-positive	219	26	11·9	86	10	11·6
AB Rh-positive	64	5	7·8	36	6	16·7
B Rh-negative	36	1	2·8	13	2	15·4
AB Rh-negative	19	0	—	5	0	—
A+O	2231	342	15·3	1150	212	18·4
B+AB	338	32	9·5	140	18	12·9
Total	2569	374	14·6	1290	230	17·8

the fact that, as Roberts (1942) pointed out, the series with Welsh family names contains an almost significant excess of group A married women—an excess which he ascribes to a proportion of husbands with Welsh family names having wives with English family names, and to the latter having a higher group A frequency than wives with Welsh family names.

Childlessness. Table IV gives the incidence of childlessness in the male donors of the N.E. Scotland series and the East Anglian series, by ABO and

TABLE V

PERCENTAGE OF CHILDLESS FEMALE N.E. SCOTLAND AND EAST ANGLIAN BLOOD DONORS, BY ABO AND Rh BLOOD GROUP

Female Donors' ABO and Rh Blood Groups	N.E. Scotland Female Donors aged 20–65			East Anglian Female Donors aged 50–65		
	No. of Donors	Donors Childless	% Childless	No. of Donors	Donors Childless	% Childless
O Rh-negative	145	29	20·0	121	26	21·5
A Rh-positive	484	87	18·0	477	105	22·0
O Rh-positive	712	122	17·1	479	85	17·8
A Rh-negative	94	15	16·0	108	26	24·1
AB Rh-positive	32	6	18·8	36	5	13·9
B Rh-positive	162	28	17·3	74	15	20·3
B Rh-negative	33	4	12·1	14	4	28·6
AB Rh-negative	4	0	—	10	0	—
A+O	1435	253	17·6	1185	242	20·4
B+AB	231	38	16·5	134	24	17·9
Total	1666	291	17·5	1319	266	20·2

TABLE VI

PERCENTAGE OF CHILDLESS MALE PLUS FEMALE N.E. SCOTLAND AND EAST ANGLIAN BLOOD DONORS, BY DONORS' ABO BLOOD GROUP

Male plus Female Donors' ABO Blood Group	N.E. Scotland Male plus Female Donors aged 20–65			East Anglian Male plus Female Donors aged 50–65			Total Male plus Female Donors		
	No. of Donors	Donors Childless	% Childless	No. of Donors	Donors Childless	% Childless	No. of Donors	Donors Childless	% Childless
A	1451	248	17·1	1148	234	20·4	2599	482	18·5
O	2215	347	15·7	1187	220	18·5	3402	567	16·7
B	450	59	13·1	187	31	16·6	637	90	14·1
AB	119	11	9·2	87	11	12·6	206	22	10·7
Total	4235	665	15·7	2609	496	19·0	6844	1161	17·0

Rh blood group. It shows that, in both series and in both Rh blood groups, the percentage of childlessness is higher for A and O than for B or AB male donors. For the two series combined the incidence of childlessness is 16·4% (554 out of 3381) for total A+O donors but only 10·5% (50 out of 478) for total B+AB donors, the difference being significant ($\chi^2 = 10{\cdot}7$ for 1 d.f.; $p < 0{\cdot}01$).

Table V gives the incidence of childlessness in the corresponding female donors. For the two series combined the incidence is again higher for total A+O donors, viz. 18·9% (495 out of 2620), than for total B+AB donors, viz. 17·0% (62 out of 365), but in this case the difference is far from significant.

Table VI gives the incidence of childlessness in the male plus female donors of the N.E. Scotland and East Anglian series, and shows that the descending order of percentages of donors who are childless is A–O–B–AB in both series. For the two series combined the percentage differences between the four ABO blood groups are, collectively, significant ($\chi^2 = 11{\cdot}8$ for 3 d.f.; $p < 0{\cdot}01$). Moreover, the descending order of incidence of childlessness in the N.E. Scotland male plus female donors is A–O–B–AB in each of the age-groups 20–34, 35–49, and 50–65.

Conclusion

Similar results to those from the present N.E. Scotland blood donor series are obtained from the only other two comparable series, i.e. from the East Anglian series in respect of childlessness in male donors, and from the East Anglian and North Welsh series in respect of marital status in A and O female donors. This agreement makes it less unlikely that similar results will be obtained from future series.

Summary

In a series of 5785 Aberdeen and North-East Scotland blood donors aged 20–65 completing a

questionary, the descending order of ratios of married to single donors is AB–O–A–B for males, and the reverse, i.e. B–A–O–AB for females, the difference between the patterns being significant. Moreover, the ratio of married to single female donors is higher for A than O donors not only in the above series but also in Bennett and Walker's (1956) East Anglian series and in Roberts' (1942) North Welsh series.

In the N.E. Scotland and East Anglian series combined the percentage of male donors who are childless is significantly higher for A + O than for B + AB donors. Moreover, of these the descending order of percentages of male plus female donors who are childless is A–O–B–AB in both series; and for the two series combined the differences between these percentages are, collectively, significant.

It is concluded that the measure of agreement between the series—first, between the N.E. Scotland and East Anglian series in respect of childlessness, at least in male donors, and second, between these two series and the North Welsh series in respect of marital status in A and O female donors—makes it less unlikely that similar results will be obtained from future series.

This survey was part of a research programme supported by the Scottish Hospital Endowments Research Trust and the Scottish National Blood Transfusion Association. I am grateful to these two organizations for their generosity; to Professor Raymond Illsley for advice on the questionary; to the Aberdeen and N.E. Scotland blood donors for their replies; to Mrs. Rosaleen Noble for the care which she devoted to the large amount of clerical work involved; to Mr. William Brass for statistical analysis of the data; and to Dr. H. B. M. Lewis for helpful comment on the draft.

References

Allan, T. M. (1969). ABO and Rh blood groups in relation to blood donors' sibs. *Journal of Medical Genetics*, **6**, 80–84.

Bennett, J. H., and Walker, C. B. V. (1956). Fertility and blood groups of some East Anglian blood donors. *Annals of Eugenics*, **20**, 299–308.

Roberts, J. A. F. (1942). Blood-group frequencies in North Wales. *ibid.*, **11**, 260–271.