ABO blood group and social class: a prospective study in a regional blood bank

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Abstract

Study objective—The aim of the study was to investigate an association previously reported in a retrospective study between the A phenotype and social classes I and II.

Design—The study was a prospective survey using a cohort of blood donors.

Setting—Participants were donors at a regional blood bank in southern Ireland servicing a population of ~380 000.

Participants—Of 2442 donors considered for inclusion in the study, 21 refused to participate, 33 provided insufficient information, and 184 were excluded because they were not wholly of Irish extraction, leaving a total of 2204 subjects, 64% of whom were male.

Measurement and results—Occupation, age and birth place were obtained from a short questionnaire given to all potential donors during the study period. Social class was defined according to the United Kingdom Registrar General’s criteria. No association between the ABO phenotype and social class could be found, either on the whole sample, or on currently employed persons, or on separate analysis of the sexes.

Conclusions—The balance of current evidence is against a variation in ABO distribution by social class designation.

It is well established that differences in ABO blood group distribution exist, both within and between ethnic groups and by geographical area.1 The reason for this is unknown but may indicate a protective value in the presence or otherwise of the A or B antigen, either directly or in close association with another as yet unrecognised gene system. A sizeable literature exists on the association between ABO group and various disease processes,2 3 though no causative mechanism has yet been elucidated.

A social class gradient in the prevalence of many medical conditions is also well recognised, but assumed to relate to socioeconomic circumstance rather than genetic predisposition.4 In this context, a recent retrospective study identified an apparent increased prevalence of group A in social groups I and II. The authors went on to postulate a marker status for the A antigen, presumably expressed in both economic prosperity and better health, thus explaining in part the social class association with disease.5

However, because of the methodological difficulties associated with retrospective study designs, we determined to re-examine this hypothesis prospectively in an ethnically homogenous population.

Methods

A regional blood bank in southern Ireland was selected, servicing a population of approximately 380 000. It was estimated, based on a predicted group A phenotype prevalence of 28% overall in the region and on the expected social class distribution in that cohort of blood donors, that a sample size of 2500 would be sufficient to detect a 3% increase in prevalence of group A within social classes I and II compared with III, IV and V, and a 9% increase in social class I alone compared with the remainder.

A short questionnaire was devised to record date of birth, place of own birth and that of both parents. Current occupation was recorded in detail in accordance with the Registrar General’s criteria.6 If unemployed, the longest held occupation was recorded. If financially dependent, as in the case of, for instance, full time housewives or students, the occupation of financial supporter was elicited. Data collection was by one of two interviewers, supervised by the donor organiser (DS).

All potential donors (ranging in age from 18 to 65 years) who presented at a session were considered. Each was asked to complete the questionnaire, without reference to blood group record, which was later added. The general purpose, but not the precise hypothesis in question, was known to both donor and interviewer. No donor was excluded and the information was treated as completely confidential. The completed forms were coded by a single observer (CK) before data processing. Statistical analysis was by $\chi^2$ method.

Results

In all, 2442 donors presenting in 35 regular centres were considered. Of these, 21 individuals refused to participate and 33 provided information considered insufficient for accurate coding of occupation. Sixty four per cent of donors were male.

One hundred and eighty four donors were either not Irish by birth or had at least one non-Irish parent. These were excluded from the main analysis and are considered separately. Of the remainder, 82%, were from the Munster region served by the blood bank. The overall blood group phenotype distribution was almost precisely as expected from previous data, with 58.4% being group O, 26.9% group A, 12.4% group B, and 2.2% group AB.7 The social class (SC) distribution was as follows: SC I 3.9%, SC II 28%, SC III non-manual 15.7%, SC III manual 25.8%, SC IV 19.8%, SC V 6.7%.

There was no difference between the sexes in
Table 1 Distribution of blood group by social class in 2204 Irish subjects. There are no significant differences between groups. ($X^2 = 5.6$, df = 15, $p > 0.05$).

<table>
<thead>
<tr>
<th>Social class</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>24 (28)</td>
<td>9 (10)</td>
<td>3 (3)</td>
<td>51 (59)</td>
</tr>
<tr>
<td>II</td>
<td>161 (26)</td>
<td>76 (12)</td>
<td>1 (2)</td>
<td>373 (60)</td>
</tr>
<tr>
<td>IIIM*</td>
<td>89 (26)</td>
<td>43 (12)</td>
<td>6 (2)</td>
<td>208 (60)</td>
</tr>
<tr>
<td>IIIH*</td>
<td>163 (29)</td>
<td>71 (12)</td>
<td>12 (2)</td>
<td>322 (57)</td>
</tr>
<tr>
<td>IV</td>
<td>124 (29)</td>
<td>54 (12)</td>
<td>11 (3)</td>
<td>275 (56)</td>
</tr>
<tr>
<td>V</td>
<td>34 (23)</td>
<td>21 (14)</td>
<td>4 (3)</td>
<td>88 (60)</td>
</tr>
<tr>
<td>Total</td>
<td>595 (27)</td>
<td>274 (12)</td>
<td>49 (2)</td>
<td>1286 (58)</td>
</tr>
</tbody>
</table>

*NM, M = non-manual, manual

The data presented here do not support the hypothesis of a variable distribution of the ABO antigen system in association with social class.

Discussion

The data presented here do not support the hypothesis of a variable distribution of the ABO antigen system in association with social class.

The main data on birth cohorts of 1958 and 1972 likewise failed to show evidence of a class difference in ABO group distribution, though these studies had the drawback of being among females only and so subject to the complex problem of classifying financially dependent women. The present study included both sexes and exhibited no differences when these were classified separately, or alternatively by own or financial supporter's employment status.

The impact of ethnicity was not satisfactorily explained in that study and may provide a potential explanation of their findings. Examination for instance of surname is not a substitute for assessing place of parents' birth, as was possible in our study. Since all immigrant groups to Britain in the last 150 years have a lower indigenous rate of group A phenotype than native British, one would expect a higher rate of this latter group in the longer established and hence more prosperous classes, rather as seen. Thus, ethnic group would act as a confounder for social class, as seen in the Chilenian population where the class gradient was explained by the high prevalence of A in the colonists of Spanish extraction compared with the predominantly O type native Indians. The Irish population had no such potential bias, and indeed no change over time was shown, either compared with Dawson's study, or when examining the data by age, a span of 40 years at least.

The relationship between blood group and disease is principally associative, involving for instance geographical trends for a number of common conditions. Indeed, where group A subjects have been clinically linked with disease,
the effect has not always been advantageous, as for instance in the increased tendency to thrombosis associated with coronary heart disease.3

The ideal way to study a question of this kind is through a random population sample. However, our results are closely in agreement with previous population estimates.8

We conclude that ABO distribution does not vary in relation to social class designation, and that while the possibility of the antigen system acting as a marker for the class gradient seen in disease is an interesting one, there is no clear evidence to support it.

We gratefully acknowledge the help of the Director and staff of the Limerick Blood Transfusion Service.


7 Dawson GWP. The frequencies of the ABO and Rh(D) blood groups in Ireland from a sample of 1 in 18 of the population. Ann Hum Genet 1964; 28: 49-59.


