ABO Blood Type and Longevity

Mark E. Brecher, MD,* and Shauna N. Hay, MPH

Key Words: Epidemiology; Death; ABO; Blood group; Longevity

Abstract

To assess the observation that blood type B might be a marker for longevity, we reviewed the records and determined the ABO blood types of all patients who died in our hospital in 2004. Age was stratified by decade of death, and linear regressions were calculated by ABO percentage. ABO survival curves were compared.

In 2004, 906 patients died; 35 were excluded (stillborn infants). Of the remaining 871 patients, ABO types were available for 772 (88.6%). The percentage of patients with group B blood declined with age ($P < .01$). None of the other blood type percentages had a statistically significant increase or decrease. The group B survival curve was statistically worse than non-B groups ($P \leq .01$); there were no differences in survival among groups A, O, and AB ($P = .47$).

In our patient population, the percentage of patients with group B blood declines with age. The survival curve in group B was worse than that in groups A, O, and AB. These findings suggest that in our patient population, blood group B is not a marker for longevity but may be a marker for earlier death.

Based on a survey of 269 centenarians (people older than 100 years) living in Tokyo, Japan, it was suggested that blood type B might be a marker for longevity.¹ To assess the validity and generalizability of this observation, we determined the ABO blood type of patients dying in our tertiary care hospital located in the United States. If blood group B was a marker of longevity, it would be expected that the percentage of patients with blood group B would increase with age at the time of death and the percentages of the other groups would decline. Similarly, it would be expected that the survival of patients with blood group B would differ significantly from patients with the other ABO blood groups.

Materials and Methods

A retrospective review of blood bank and electronic clinical records was conducted for all patients who died at our institution from January 1, 2004, through December 31, 2004. Stillborn infants were excluded from analysis. Age at time of death was stratified by decade of death, and linear regressions were calculated by ABO type. Survival curves comparing the different ABO blood groups were also constructed.

Statistical significance was taken at a $P$ value of .05 or less. Survival curves were compared by means of a log-rank test (MedCalc for Windows, Mariakerke, Belgium).

Results

A total of 906 patients died in 2004 at our institution, and 35 (stillborn infants) were excluded from the study. Of the remaining 871 patients, ABO types were available for 772 patients (88.6%). The age distribution ranged from day...
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Discussion

Shimizu et al\(^1\) reported on a survey of the ABO blood types of centenarians (people older than 100 years) living in Tokyo. The frequencies of blood types A, O, B, and AB of the 269 centenarians were 34.2%, 28.3%, 29.4%, and 8.2%, respectively, whereas the frequencies in 7,153 control subjects were 38.6%, 30.1%, 21.9%, and 9.4%, respectively. The blood type B was statistically more frequent among the centenarians than in the control subjects (29.4% vs 21.9%; \(P = .04\)). From these findings, the authors concluded that blood group B might be associated with exceptional longevity.

The association of ABO blood type with health and longevity should not be surprising. It has been shown that ABO blood groups are a major determinant of plasma levels of factor VIII (FVIII) and von Willebrand factor (vWF).\(^2\) People with blood group O have approximately 25% lower plasma levels of both glycoproteins.\(^2\) Low plasma levels of FVIII and vWF have long been established as causes of excess bleeding, and there is evidence that elevated FVIII and vWF levels may represent risk factors for ischemic heart disease and venous thromboembolic disease. For example, blood group A in women younger than 50 years has been reported to be a significant risk factor for myocardial infarction.\(^3\) Similarly, a multinational study (United Kingdom, Sweden, and the United States) assembled from multiple sources (drug-surveillance programs, retrospective record searches, questionnaires, and information from the Committee on Safety of Drugs in the United Kingdom) found that the odds ratio or relative risk of venous thromboembolism was 1.9 when comparing subjects

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**Table 1**

<table>
<thead>
<tr>
<th>Decade of Death</th>
<th>O (n = 390)</th>
<th>A (n = 265)</th>
<th>B (n = 91)</th>
<th>AB (n = 26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (n = 88)</td>
<td>47 (53)</td>
<td>25 (28)</td>
<td>14 (16)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>2 (n = 34)</td>
<td>20 (55)</td>
<td>10 (50)</td>
<td>5 (26)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>3 (n = 34)</td>
<td>17 (50)</td>
<td>9 (26)</td>
<td>8 (24)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>4 (n = 47)</td>
<td>11 (23)</td>
<td>28 (60)</td>
<td>8 (17)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>5 (n = 99)</td>
<td>48 (48)</td>
<td>36 (36)</td>
<td>11 (11)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>6 (n = 144)</td>
<td>78 (54)</td>
<td>46 (32)</td>
<td>15 (10)</td>
<td>5 (3)</td>
</tr>
<tr>
<td>7 (n = 129)</td>
<td>56 (43)</td>
<td>54 (42)</td>
<td>14 (11)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>8 (n = 117)</td>
<td>53 (45)</td>
<td>45 (38)</td>
<td>15 (13)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>9 (n = 88)</td>
<td>48 (55)</td>
<td>32 (36)</td>
<td>3 (3)</td>
<td>6 (6)</td>
</tr>
<tr>
<td>10 (n = 7)</td>
<td>5 (71)</td>
<td>2 (29)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Linear regression slope</strong></td>
<td><strong>0.06</strong></td>
<td><strong>0.30</strong></td>
<td><strong>0.68</strong></td>
<td><strong>&lt;0.01</strong></td>
</tr>
<tr>
<td><strong>P (2-tailed)</strong></td>
<td><strong>0.06</strong></td>
<td><strong>0.01</strong></td>
<td><strong>0.06</strong></td>
<td><strong>0.80</strong></td>
</tr>
</tbody>
</table>

* Values are given as number (percentage) unless otherwise indicated.

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with non-O blood groups with subjects with blood group O. The strongest association (odds ratio, 2.7) was found among pregnant women. More recently, in a study from Denmark, blood groups A and AB were reported to be associated with increased risks for deep venous thrombosis (DVT) and pulmonary embolism in pregnancy (odds ratio, 3.9) and the puerperium (odds ratio, 2.4). Associations with the ABO blood groups and other disease states have been reported. For example, it has been found that people with blood group O are at increased risk of peptic ulcers. This seems to be due to enhanced binding of Helicobacter pylori to the epithelial cells of people with blood group O and to an enhanced inflammatory response seen with group O leukocytes (increased interleukin-6 and tumor necrosis factor). It has also been reported that inflammation-related risk factors for lung cancer death were significantly stronger among males with phenotype O than A in the Copenhagen Male Study. Endometrial and ovarian cancers have been reported to occur more frequently and have a poorer prognosis in women with group A blood than in women with non-A blood group types. Finally, the distribution of ABO blood types has been reported as a strong predictor of national suicide and homicide rates.

A priori, it is impossible to say what the ultimate influence of differing risk factors that have been associated with ABO blood groups would have on overall longevity. Thus, we looked at the overall survival of people dying in our hospital and the percentages by blood group (stratified by decade of death). In both analyses of this data set, people with group B blood fared statistically worse than people with groups A, O, and AB. This observation would seem to contradict the findings by Shimizu et al. However, their observation was based on observing centenarians. The present study included no centenarians, which may be a reason for the discordance in the conclusions of the 2 studies. It is also worth noting that in the study by Shimizu et al, the percentage of people with group B blood in an “old” control subgroup (n = 740; aged 70-93 years) was 21.5% and in an “elderly old” control subgroup (n = 118; aged 80-93 years) was 22.9%. Both percentages were very similar to that for the overall control group (n = 7,153) of 21.9%. Thus, their observation of increased longevity seemed limited to the extreme of old age (centenarians).

In our patient population, the percentage of patients with blood group B and survival decline with age (P < .01). These findings suggest that in our patient population, group B is not a marker for longevity but may be a marker for earlier death. Larger studies will be necessary in other locations and for a longer period to determine if this is a reproducible observation and to possibly identify possible explanations for any observed effect of blood type on longevity (eg, race). Such a multi-institutional study is being planned.

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References