Blood pressure and migration: a study of Bengali immigrants in East London

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SUMMARY The role of blood pressure in explaining the increased risk of ischaemic heart disease (IHD) in Bengali immigrants living in the East End of London was studied in a comparative population study. In addition the effect on blood pressure of age, body mass, and duration of stay in the UK was evaluated. The Bengalis had significantly lower mean systolic and diastolic blood pressures though these differences disappeared after adjustment for age and body mass. Both groups, however, showed similar rises of blood pressure with increasing age and body mass. The effect on blood pressure of duration of time spent in the UK by the Bengalis could not be separated from that due to age, given the association between them. It seems unlikely that increasing duration of stay in inner London per se has a hypertensive effect on Bengali immigrants coming from a rural community. Further, the increased IHD risk in this group is not explained, even in part, by an increase in blood pressure.

Immigrants from Bangladesh living in the East End of London are reported as having a greater than expected incidence of myocardial infarction.1 It is likely that high dietary fat and, in men, cigarette smoking explain part of the increased risk as compared to the indigenous population.2 A third possibility is that elevated blood pressure might be relevant. Thus the environmental change associated with migration from the rural region of Sylhet in Bangladesh to the urbanised and relatively multi-deprived area of inner London might result in a rise in blood pressure, and the latter could be related to duration of stay in the United Kingdom. The objectives of this study were, therefore:
1 to compare the blood pressure in Bengali immigrants with that of the indigenous population;
2 to compare the effects of age and other possible predictors on blood pressure in the two populations; and
3 to determine the effect of duration of stay in the UK on blood pressure in the Bengalis.

Methods

SUBJECTS Subjects were drawn from the age-sex register of a local multi-ethnic general practice. All patients aged 35–64 were identified, and attempts were made during the course of a 12 month period to invite them to attend a special screening clinic in the surgery, or to have them screened at the health centre on attendance for another reason. The original population from the age-sex register was 2082, including 1086 Caucasians of UK origin and 655 Bengalis, but the high population mobility in this area resulted in considerable inaccuracy in the age-sex register. Using similar methods to those of a previous study,3 the best estimate was that 989 European and 312 Bengali patients were available for screening, of whom 617 (63%) Europeans and 155 (50%) Bengalis were screened during the 12 month period.

METHODS All assessments were made by a single observer (EL). The Bengali patients were asked to bring, if necessary, an English speaker with them, though an interpreter was available. Information on age for the Bengalis was verified where possible using official documents though in a few cases an estimate of age had to be used. The Bengalis were also asked to state the year in which they first arrived in the UK. It was a fairly common occurrence for individuals to record a number of prolonged (of more than one year) trips back to Bangladesh, and thus the date of first arrival cannot indicate an accurate total “exposure” to the UK. Data to calculate the latter, however, were inadequate, and thus duration was measured from first arrival. In addition, all patients had their height and weight recorded, a smoking history obtained, and blood pressure measured seated after a five minute rest using the random zero sphygmomanometer.
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ANALYTICAL METHODS

The data were analysed using the computer programs SPSS-X and SAS. Quetelet's index (weight/height²) was used as an index of body mass. The effect on blood pressure of age, sex, race, Quetelet's index, smoking (as a yes/no variable), and, for the Bengalis, year first in the UK were examined using multiple regression.

Results

The Bengalis had not migrated to the UK uniformly over time, the males having arrived mainly between 1955 and 1965 whereas the majority of the females had arrived since 1965 (fig 1). In addition there was a strong relation between age and year first in the UK (fig 2), suggesting that migration occurred at a relatively constant age. In studying the potential effect of age and time since arrival in the UK on blood pressure, these two variables are thus too confounded to allow separation. All the multiple regression analyses for the Bengalis could have been done using either (but not both) age or time since arrival as predictor variables, but the results are presented using age, because it was clearly important in predicting the blood pressure of Europeans. The Bengalis had a significantly lower mean blood pressure than the Europeans (table 1). This was true for both systolic (-9mm Hg) and diastolic (-4mm Hg) pressures. Similarly, there were fewer Bengalis above arbitrary cut off points of blood pressure with only one third of the European rate for those over 99mmHg diastolic (table 1). On reviewing the medical records, relatively fewer Bengalis were receiving hypotensive therapy and thus the differences were unlikely to have been due to treatment rates.
The larger difference was therefore in systolic pressure and as, a priori, it was considered that environmental factors would have a greater effect on systolic than on diastolic pressure, regression analyses were restricted to the former. Both age and Quetelet's index (QI) were significantly associated with systolic blood pressure in both groups (tables 2 and 3). The Bengalis were on average younger (mean age 47-4 years, SD 6·1) than the Europeans (mean 50-3, SD 8·6) and of lower body mass (QI mean 23·8 v 26·1; SD 3·4 v 5·1) so that both age and QI are confounding variables. The effects of age and Quetelet's index (as measured by their respective regression coefficients) were slightly (but not significantly) greater in the Europeans and persisted when analysed for both males and females. When the total group was examined the best fitting model came from using log of blood pressure as the outcome and employing a quadratic rather than linear term for age. A model using a linear and quadratic term gave very similar results but for parsimony the quadratic term alone was used. In this way both age and Quetelet's index were both highly significantly related to blood pressure whereas sex, smoking habit, and ethnic group had no significant effect on improving the fit. The regression coefficient for ethnic group was −0·02 with standard error 0·22, p = 0·3 (that is, the Bengalis had a 2% lower blood pressure than the Europeans after adjustment for age and weight for height). The regression coefficients from this study are comparable to those from the Regional Heart Study and a study based on the results from screening performed by BUPA.

**Table 2 Relation of age to mean systolic blood pressure**

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (years)</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>50-54</th>
<th>55-59</th>
<th>60-64</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bengali</td>
<td>119</td>
<td>127</td>
<td>126</td>
<td>133</td>
<td>135</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>European</td>
<td>122</td>
<td>131</td>
<td>133</td>
<td>141</td>
<td>144</td>
<td>151</td>
</tr>
</tbody>
</table>

**Table 3 Relation of Quetelet's index (in quintiles) to systolic blood pressure**

<table>
<thead>
<tr>
<th>Group</th>
<th>Range of Quetelet's index for quintile</th>
<th>21-8</th>
<th>23-9</th>
<th>26-1</th>
<th>29</th>
<th>&gt;29-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bengali (n)</td>
<td>123</td>
<td>128</td>
<td>129</td>
<td>135</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>European (n)</td>
<td>129</td>
<td>129</td>
<td>136</td>
<td>141</td>
<td>148</td>
</tr>
</tbody>
</table>

(Professor N J Wald, personal communication) where an identical model was tried (table 4).

**Discussion**

In this study the Bengalis in East London had a lower age and sex adjusted blood pressure than the Europeans with a lower prevalence of those with a raised blood pressure, but the differences in blood pressure became non-significant after adjusting for Quetelet's index. Age also was associated with an increased blood pressure in both groups with no evidence of a greater effect in the Bengalis, rather the reverse. If there is an effect of duration of stay in the UK on the blood pressure in the Bengalis then its magnitude is unlikely to be greater than that due to age in the Europeans, assuming that no age effect occurs in Bengalis. Although any duration effect in the Bengalis could not be separated out from an age effect, it seems that the assumption of no age effect in Bengalis while there is an effect of duration of stay in the UK is not very likely.

There are some problems with these data that are worth noting. First, the highly mobile nature of the population studied, particularly the Bengalis, means that those with a settled domicile were more likely to be screened and thus be non-representative of the total (Bengali) community. Secondly, the response rates of possible attenders were under 65% in both groups, and we cannot rule out different selection features operating that might affect blood pressure in different
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Table 4  Multiple regression analysis of log (to the base E) of systolic blood pressure

<table>
<thead>
<tr>
<th>Study</th>
<th>(Coefficients (standard errors)</th>
<th>Quetelet's index</th>
<th>Constant ($R^2$)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age (squared)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current study: All</td>
<td>$7.7$ ($0.74$)</td>
<td>$1.03$ ($0.12$)</td>
<td>$4.43$ ($0.2$)</td>
<td>772</td>
</tr>
<tr>
<td>Bengalis</td>
<td>$5.75$ ($2.31$)</td>
<td>$0.92$ ($0.40$)</td>
<td>$4.49$</td>
<td></td>
</tr>
<tr>
<td>Europeans</td>
<td>$7.83$ ($0.79$)</td>
<td>$1.0$ ($0.13$)</td>
<td>$4.42$</td>
<td></td>
</tr>
<tr>
<td>BUPA* (excl. treated hypertensives)</td>
<td>$3.2$ ($0.11$)</td>
<td>$1.08$ ($0.03$)</td>
<td>$4.53$ ($0.1$)</td>
<td>2169</td>
</tr>
<tr>
<td>Regional Heart Study</td>
<td>$4.7$ ($0.26$)</td>
<td>$1.16$ ($0.05$)</td>
<td>$4.55$ ($0.1$)</td>
<td>7725</td>
</tr>
</tbody>
</table>

* Professor N J Wald, personal communication
† Regional Heart Study, personal communication

directions. Thirdly, age was probably inaccurate in a number of Bengalis with, anecdotally, a bias towards underestimating the true age.

Despite these problems it is very unlikely that blood pressure explains any increased ischaemic heart disease (IHD) risk in Bengalis. Studies of other migrant groups from the Indian subcontinent living in the UK have also failed to show a raised BP, to explain the overall IHD mortality risk in this group. Female Punjabis living in West London show a blood pressure rise with age similar to that in Caucasian women. Studies of UK factory workers show similar blood pressure rises with age in Caucasian, West Indian, and Asian men, though in that study the Caucasians had a smaller proportion below an arbitrary cut off point. Both these latter studies demonstrated that body mass accounted for much of the ethnic difference and further that, in the Punjabi women, body mass increase probably also explained an apparent effect of duration of stay in the UK. Cross-sectional studies can only make inferences as to the likely behaviour of different cohorts. Only a prospective study would answer the duration question. The available data, however, suggest that duration of stay in the UK, representing a quantal change in environment, is likely to have little effect on blood pressure in migrants from the Indian subcontinent other than that explained by an increase in bodyweight.

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References

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