Ethnicity, Gender, and Socioeconomic Status as Risk Factors for Esophagitis and Barrett’s Esophagus

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Barrett’s esophagus is thought to be a disease occurring predominantly in White Caucasian males of higher socioeconomic status. There are no published studies simultaneously examining risk of Barrett’s esophagus according to ethnicity, gender, and socioeconomic status within a single data set. The authors conducted a retrospective case-control analysis within a cross-sectional study to determine risk of Barrett’s esophagus in relation to sociodemographic variables in a large United Kingdom population. All patients undergoing upper gastrointestinal endoscopy at two clinical centers between January 2000 and January 2003 were evaluated. Data on ethnicity, age, gender, socioeconomic status, and the presence of Barrett’s esophagus and esophagitis at endoscopy were collected. A total of 20,310 patients were analyzed. Barrett’s esophagus was more common in White Caucasians (401/14,095 (2.8%)) than in South Asians (16/5,190 (0.3%)) (adjusted odds ratio (OR) = 6.03, 95% confidence interval (CI): 3.56, 10.22), as was esophagitis (2,500/14,095 (17.7%) vs. 557/5,190 (10.7%); adjusted OR = 1.76, 95% CI: 1.57, 1.97). Patients with Barrett’s esophagus were also more likely to be male (adjusted OR = 2.70, 95% CI: 2.18, 3.35) and of higher socioeconomic status (adjusted OR = 1.58, 95% CI: 1.16, 2.15 (top tertile vs. bottom tertile)). White Caucasian ethnicity, male gender, and higher socioeconomic status are independent risk factors for Barrett’s esophagus.

Abbreviations: CI, confidence interval; OR, odds ratio.

Barrett’s esophagus is defined as a metaplastic change from squamous epithelium to columnar epithelium in the distal esophagus (1). The exact cause of the condition remains unclear. There is a well-recognized association between Barrett’s esophagus and increasing age, with the condition being reported as rare below the age of 40–50 years (2–4). It is also generally believed that Barrett’s esophagus is more common in White Caucasian males of higher socioeconomic status, although, to our knowledge, no studies have examined these factors simultaneously within a large data set. A systematic review identified five studies evaluating racial differences in Barrett’s esophagus, but there were only 56 patients with Barrett’s esophagus whose ethnicities were accurately reported (5–10).

A popular explanation for the occurrence of Barrett’s esophagus is that it results from mucosal damage caused by gastroesophageal reflux (11, 12). When visible upon upper gastrointestinal endoscopy, this mucosal damage is termed “erosive esophagitis.” However, not all patients with gastroesophageal reflux and erosive esophagitis go on to develop Barrett’s esophagus, and not all patients with Barrett’s esophagus have a history of gastroesophageal reflux.
As with Barrett’s esophagus, there are few data on the sociodemographics of esophagitis.

In order to establish which groups are most at risk of Barrett’s esophagus and esophagitis, we conducted a case-control analysis within a large cross-sectional study to determine the influence of ethnicity, gender, and socioeconomic status on the development of both conditions in a United Kingdom population.

MATERIALS AND METHODS

Study design and sample

The study was performed at two clinical centers in the United Kingdom, the Royal Infirmary in Bradford and City Hospital in Birmingham, both of which serve populations with a varied racial and socioeconomic background. The relevant local research ethics committees approved the study.

All persons who had undergone upper gastrointestinal endoscopy between January 2000 and January 2003 had their endoscopy reports retrieved from the computer databases held at the two hospitals. Data concerning ethnicity, age, and gender were extracted, along with data on the presence or absence of Barrett’s esophagus at endoscopy and the length of the Barrett’s segment (if recorded). Ethnicity was categorized as White Caucasian, South Asian (persons originating from the Indian Subcontinent), or Afro-Caribbean, according to self-reported information given by the patient. These data were collected routinely within the Bradford Royal Infirmary endoscopy database but were retrieved for all Birmingham patients from the City Hospital patient administration system. Data for the Bradford Royal Infirmary patients were captured using the Unisoft GI Reporting Tool (Unisoft Medical Systems, Enfield, United Kingdom), and subsequent analyses were performed using the Unisoft Auditors Kit.

We used two definitions for the diagnosis of long-segment Barrett’s esophagus: firstly, the presence of 3 cm or more of columnar-lined esophagus at endoscopy and the presence of confirmed intestinal metaplasia upon biopsy, and secondly, a less rigorous definition that did not require the presence of intestinal metaplasia. We defined short-segment Barrett’s esophagus as the presence of less than 3 cm of columnar-lined esophagus at endoscopy. The distinction between long- and short-segment Barrett’s esophagus is made because the squamocolumnar junction is often irregular, and the presence of columnar-type epithelium in the extreme distal esophagus may be a normal finding. In addition, information on the presence of intestinal metaplasia, evidence of dysplasia (a premalignant condition characterized by increased cell growth, cellular atypia, and altered cell differentiation) and its severity, and the presence of coexistent esophageal adenocarcinoma was obtained from histopathology records. To be able to explore reasons for any detectable difference in the prevalence of Barrett’s esophagus, we also recorded the presence of esophagitis at endoscopy, along with Savary-Miller grade, which is a measurement of the severity of esophagitis according to endoscopic appearance (14).

Cases were defined as patients who had long-segment Barrett’s esophagus according to either of the two definitions given above, short-segment Barrett’s esophagus, or esophagitis of any severity at endoscopy. Those with coexisting Barrett’s esophagus and esophagitis were only included as Barrett’s cases, not as esophagitis cases. Patients who had undergone more than one endoscopy were classified as having Barrett’s esophagus if it had been diagnosed at any of their endoscopies, and only one procedure from such patients was counted. Controls were all other patients who had undergone endoscopy for indications including symptoms attributable to the upper gastrointestinal tract, anemia, and diarrhea, excluding patients with preexisting esophageal adenocarcinoma and those with Barrett’s esophagus for whom no segment length had been recorded and who could therefore not be further categorized.

Socioeconomic status was assigned according to residential postcode using the Townsend Material Deprivation Index. This index is calculated from four census variables: the percentage of unemployed residents in that area, the proportion of homes that are overcrowded (defined as more than one person per room), the proportion of households with no car, and the proportion of households that do not own their own home (15). The unemployment and overcrowding scores are transformed on a logarithmic scale, and using the mean and standard deviation for each of the four variables, they are then transformed to a normal distribution and summed to obtain an overall score. The range of Townsend scores for England and Wales varies between −7.55 and 11.8, with positive scores indicating greater levels of deprivation. We divided these data into three equal groups, with scores from 10.95 to 4.92 indicating lower socioeconomic status, scores from 4.91 to 0.26 indicating middle socioeconomic status, and scores from 0.25 to −5.77 indicating higher socioeconomic status.

To ensure that the reasons for any detected differences were not due to ethnic biases in the likelihood of undergoing endoscopy, we obtained information from the 2001 census to compare the proportions of White Caucasians and South Asians receiving endoscopy at each hospital with the population statistics for that city (16). We also stratified data on the indication for performing endoscopy according to ethnicity.

Statistical analysis

The associations between age, gender, ethnicity, socioeconomic status, and the presence of long-segment Barrett’s esophagus or esophagitis were expressed as odds ratios with 95 percent confidence intervals. The influences of age, gender, and socioeconomic status on the relation between ethnicity and long-segment Barrett’s esophagus and esophagitis were investigated using a logistic regression model. All statistical analyses were performed using StatsDirect statistical software, version 2.2.5 (StatsDirect Ltd., Sale, United Kingdom) and SPSS for Windows, version 11.5 (SPSS, Inc., Chicago, Illinois).

RESULTS

In total, 20,412 patients underwent endoscopy during the 3-year period studied. There were 10,762 females and 9,650
males, and the mean age of the included patients was 56 years (range, 16–99). One hundred and two patients were not of the ethnicities of interest, and their numbers were too low to allow meaningful comparison; therefore, they were excluded from further analyses. Demographic details and other characteristics of the remaining 20,310 patients according to ethnicity are given in table 1.

There were 736 (3.6 percent) patients with Barrett’s esophagus of 3 cm or more at endoscopy, with a mean segment length of 6.5 cm (range, 3–25); 419 (21.1 percent) of them had confirmed intestinal metaplasia upon biopsy. Of those described in table 1, 202 had short-segment Barrett’s esophagus, and 67 did not have the length of their Barrett’s esophagus recorded. These patients were excluded from the control group for subsequent analyses of long-segment Barrett’s esophagus. Short-segment Barrett’s esophagus was more common in White Caucasians than in South Asians, with a univariate odds ratio of 2.78 (95 percent confidence interval (CI): 1.81, 4.47), but there was no difference for South Asians as compared with Afro-Caribbeans (odds ratio (OR) = 1.27, 95 percent CI: 0.42, 3.19). Multivariate analysis using a logistic regression model adjusting for age, gender, and socioeconomic status gave an adjusted odds ratio for White Caucasians as compared with South Asians of 2.76 (95 percent CI: 1.68, 4.54).

Univariate analysis showed that patients with long-segment Barrett’s esophagus were more likely to be male (OR = 2.51, 95 percent CI: 2.03, 3.12) and of higher socioeconomic status (top tertile vs. bottom tertile: OR = 3.27, 95 percent CI: 2.45, 4.43). Barrett’s esophagus of at least 3 cm was also more common in White Caucasian patients ($n = 401$ (2.8 percent)) than in South Asian ($n = 16$ (0.3 percent)) and Afro-Caribbean ($n = 2$ (0.2 percent)) patients. The univariate odds ratio for the presence of long-segment Barrett’s esophagus in White Caucasians as compared with South Asians was 9.73 (95 percent CI: 5.91, 17.21), and for Afro-Caribbeans compared with South Asians it was 0.63 (95 percent CI: 0.07, 2.70). White Caucasian ethnicity remained a strong risk factor for long-segment Barrett’s esophagus as compared with South Asian ethnicity following logistic regression (OR = 6.03, 95 percent CI: 3.56, 10.22) (table 2). When the Bradford and Birmingham patients were analyzed separately, six of 2,053 South Asians (0.3 percent) in Bradford had Barrett’s esophagus versus 220 of 7,533 White Caucasians (2.9 percent), and in Birmingham, 10 of 3,137 Asians (0.3 percent) had Barrett’s esophagus versus 181 of 1,652 White Caucasians (2.7 percent). These differences between the two centers were not statistically significant.

When the less rigorous definition of long-segment Barrett’s esophagus, which did not include the presence of intestinal metaplasia, was used, the univariate odds ratio for White Caucasian ethnicity as compared with South Asian ethnicity decreased (OR = 6.04, 95 percent CI: 4.44, 8.40), as did the adjusted odds ratio (OR = 4.12, 95 percent CI: 2.97, 5.72). There was a trend towards South Asians’ being less likely to have biopsies taken than White Caucasians, but this was not statistically significant (OR = 0.62, 95 percent CI: 0.38, 1.04). There were 34 patients with dysplasia upon biopsy (16 low-grade, one moderate-grade, and 17 high-grade), all but one of whom were White Caucasian. In addition, there were 16 cases of esophageal adenocarcinoma in patients with Barrett’s esophagus, and all were White Caucasian. Three additional White Caucasian patients had esophageal adenocarcinoma not associated with Barrett’s esophagus.

All 736 patients with long-segment Barrett’s esophagus were excluded from subsequent esophagitis analyses. Esophagitis of any grade at endoscopy was also more common in White Caucasians than in South Asians (univariate OR = 1.82, 95 percent CI: 1.65, 2.02). Proportions according to Savary-Miller grade are shown in figure 1. Again, White Caucasian ethnicity remained a significant risk factor for esophagitis in logistic regression analysis adjusting for age, gender, and socioeconomic status (OR = 1.76, 95 percent CI: 1.57, 1.97) (table 3). Male gender and higher socioeconomic status were also risk factors for esophagitis (table 3).

When we examined the relation between age and gender and the presence of Barrett’s esophagus, we found that the rate of prevalence increase in males between age 30 years and age 50 years was substantially greater than that in females (figure 2).

With regard to ethnic differences in the likelihood of undergoing endoscopy, we found that 2,053 endoscopies at the Bradford center were performed in South Asian patients (21.2 percent), while the population statistics stated that 18.9 percent of the Bradford population was of South Asian.

| TABLE 1. Characteristics (number or mean) of patients undergoing upper gastrointestinal endoscopy at two clinical centers, according to ethnicity, United Kingdom, January 2000–January 2003 |
|-----------------|-----------------|-----------------|
|                | White Caucasian | South Asian     | Afro-Caribbean |
| Mean age (years) | 59 (17.5)*     | 48 (17)         | 56 (17)        |
| Gender          |                 |                 |                |
| Male            | 6,728           | 2,405           | 458            |
| Female          | 7,367           | 2,785           | 567            |
| Diagnosis upon upper gastrointestinal endoscopy | | | |
| Esophagitis     | 2,500           | 557             | 122            |
| Long-segment Barrett’s esophagus (and intestinal metaplasia upon biopsy) | 401 | 16 | 2 |
| Long-segment Barrett’s esophagus | 684 | 44 | 8 |
| Short-segment Barrett’s esophagus | 172 | 24 | 6 |
| Barrett’s esophagus (length unspecified) | 60 | 6 | 1 |
| Dysplasia       | 33              | 1               | 0              |
| Adenocarcinoma  | 19              | 0               | 0              |
| Mean Townsend index† | 1.6 (3.7) | 4.4 (3.2) | 4.9 (3.0) |

* Numbers in parentheses, standard deviation.  † Townsend Material Deprivation Index (15). See text for explanation.
origin. At the Birmingham center, 3,137 (29.2 percent) of those undergoing endoscopy were South Asian, as compared with 19.5 percent of the local population. The Bradford Royal Infirmary is the only hospital providing endoscopy in that city, so this would suggest that there is, if anything, a slight overrepresentation of South Asian patients undergoing endoscopy. It is more difficult to comment on the Birmingham data, since City Hospital is only one of several clinical centers serving the local population.

Similar proportions of patients of all three ethnicities underwent endoscopy for symptoms of heartburn and acid reflux (12–14 percent), while fewer White Caucasians underwent endoscopy for dyspepsia than South Asians and Afro-Caribbeans (14 percent vs. 26 percent and 22 percent, respectively).

**DISCUSSION**

To our knowledge, this study is the first to confirm, in a large group of patients, the previously held belief that White Caucasian ethnicity is an important risk factor for Barrett's esophagus. This association appeared to apply equally when White Caucasians were compared with both South Asians and Afro-Caribbeans, although the latter relation was slightly less robust because of smaller numbers of Afro-Caribbean patients. We know of no anecdotal reports of a high incidence of Barrett's esophagus in persons of ethnicities other than White Caucasian, nor are excesses of esophageal adenocarcinoma reported in non-White-Caucasian ethnic groups. The observed effect was obtained using a rigorous definition of long-segment Barrett's esophagus, requiring the presence of intestinal metaplasia for the diagnosis, as recommended by the American Society of Gastrointestinal Endoscopy (17). There was a trend towards White Caucasian patients being more likely to have biopsies taken than their South Asian counterparts, which may have contributed to the observed effect; however, this finding was still highly significant when an endoscopic diagnosis alone was used to define Barrett’s esophagus. Separate analyses of the Bradford and Birmingham patients detected no

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**TABLE 2.** Influence of age, gender, ethnicity, and socioeconomic status on the presence of long-segment Barrett’s esophagus among patients undergoing upper gastrointestinal endoscopy at two clinical centers, United Kingdom, January 2000–January 2003

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total no.</th>
<th>No. with long-segment Barrett’s esophagus*</th>
<th>Unadjusted OR†</th>
<th>95% CI†</th>
<th>Adjusted OR‡</th>
<th>95% CI‡</th>
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<td></td>
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<td></td>
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<td>287</td>
<td>2.51</td>
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<td>South Asian</td>
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<td>16</td>
<td>1.00</td>
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<td></td>
</tr>
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<td>White Caucasian</td>
<td>13,577</td>
<td>401</td>
<td>9.73</td>
<td>5.91</td>
<td>17.21</td>
<td>6.03</td>
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<td>1,012</td>
<td>2</td>
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<td>0.07</td>
<td>2.70</td>
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<td>2.16</td>
<td>1.59</td>
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<tr>
<td>High</td>
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<td>201</td>
<td>3.27</td>
<td>2.45</td>
<td>4.43</td>
<td>1.58</td>
</tr>
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* Defined as Barrett’s esophagus of ≥3 cm upon endoscopy with confirmed intestinal metaplasia upon biopsy.
† OR, odds ratio; CI, confidence interval.
‡ Variables included in the model: age, gender, and socioeconomic status.

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**FIGURE 1.** Esophagitis grade among patients undergoing upper gastrointestinal endoscopy at two clinical centers, according to ethnicity, United Kingdom, January 2000–January 2003.
significant differences between the two populations. The ethnic populations of the two cities are not identical. Most of the South Asian patients in Bradford originate from Pakistan, while the Birmingham South Asians are Pakistanis, Punjabi Sikhs and Hindus, Gujaratis, and Bengalis.

The reason for the association with White Caucasian ethnicity is unclear. The most obvious possibility is that persons of White Caucasian ethnicity are more at risk of developing gastroesophageal reflux disease, since there has been shown to be an increase in acid reflux and a reduction in esophageal clearance among patients with Barrett’s esophagus compared with controls (18, 19). Our study confirms that ethnicity is also a risk factor for esophagitis, but the effect is smaller in magnitude than that for Barrett’s esophagus. It is therefore unlikely that this is the full explanation for the association between ethnicity and Barrett’s esophagus. There may be other genetic or environmental factors that increase the risk of Barrett’s esophagus in White Caucasian patients. A large study has shown that both erosive esophagitis and reflux symptoms are more common among dyspeptics living in the United Kingdom than among their counterparts living in Malaysia (20), and a recent systematic review supports this finding (21). The magnitude of the difference observed between the two populations was larger than in our study. This difference may be explained by environmental factors that predispose persons living in the West to these conditions—such as a higher prevalence of obesity and high body mass index, which have been shown to be associated with gastroesophageal reflux disease and erosive esophagitis (22–24). There may also be genetic influences causing an increase in esophagitis among White Caucasians in our study. Studies of twins have shown that the concordance of reflux symptoms is higher in monozygotic twins than in dizygotic twins, suggesting that there is an important genetic contribution to the etiology of gastroesophageal reflux disease (25, 26).

The observation that male gender is an independent risk factor for esophagitis is supported by other data (24), but our finding that higher socioeconomic status is also a risk factor for esophagitis has not, to our knowledge, been reported previously. The gender effect may be due to differences in parietal cell mass between males and females (27), differences in lower esophageal function, or higher body mass index in males. The association with high socioeconomic status seems paradoxical, given that previous studies have shown an increased risk of esophagitis with high body mass index (22, 23), which is associated with lower

### Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total no.</th>
<th>No. with esophagitis</th>
<th>Unadjusted OR*</th>
<th>95% CI*</th>
<th>Adjusted OR†</th>
<th>95% CI†</th>
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<td>1.82</td>
<td>1.65, 2.02</td>
<td>1.76</td>
<td>1.57, 1.97</td>
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<td>Afro-Caribbean</td>
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<td>118</td>
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<td>0.99, 1.23</td>
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<td>1.36</td>
<td>1.23, 1.51</td>
<td>1.15</td>
<td>1.03, 1.28</td>
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</tbody>
</table>

* OR, odds ratio; CI, confidence interval.

† Variables included in the model: age, gender, and socioeconomic status.

### Figure 2

Distribution of Barrett’s esophagus among patients undergoing upper gastrointestinal endoscopy at two clinical centers, according to age, United Kingdom, January 2000–January 2003. Bars, 95% confidence interval.
socioeconomic status (Dr. Iain Buchan, University of Manchester, personal communication, 2004). However, there may also be differences in diet or drug therapy between socioeconomic groups that explain the observed effect.

The effect of age on Barrett’s esophagus observed in our study is consistent with previous literature, although the study by Cameron et al. (2) suggested that prevalence begins to increase only after the age of 50 years, whereas our study suggests that this effect occurs as early as 30–40 years of age. This discrepancy could be due to population differences or the time period in which the study was conducted. The diagnosis of Barrett’s esophagus at an earlier age in men is consistent with other studies (4, 28, 29). However, no studies have observed the rate of prevalence increase being substantially larger at an earlier age in men than in women. This may explain, at least in part, why esophageal adenocarcinoma has one of the most marked gender differences of all cancers that affect both sexes (30, 31). Males develop Barrett’s esophagus at a much earlier age and therefore have more time to develop dysplasia and adenocarcinoma with fewer competing causes of mortality.

The increased incidence of Barrett’s esophagus with higher socioeconomic status is presumably explained by the similar finding in esophagitis patients. This should also confer an increased risk of esophageal adenocarcinoma in persons of higher socioeconomic status, and this was reported in a case-control study that used educational level as a marker for socioeconomic status (32). However, a more recent report using an area-based indicator of deprivation similar to that used here showed no evidence of any relation between socioeconomic status and esophageal adenocarcinoma (33).

There are some limitations to our study. The results we report pertain to a group of patients undergoing endoscopy and may not be applicable to the general population. We cannot exclude the possibility that differences in healthcare-seeking may explain our results. This is unlikely to have been a major factor, however, since similar proportions of Asians and Caucasians were referred with reflux symptoms, and research suggests that clinical features are poor predictors of Barrett’s esophagus (13).

We also were unable to obtain data on body mass index, diet, family history, smoking status, and alcohol intake, which may have been confounding factors. There is some debate over the level of body mass index used to define obesity in South Asians, with a lower level being proposed than that for White Caucasians (34). In addition, a previous meta-analysis of body mass index and ethnicity reported that body mass index is generally higher in Afro-Caribbeans than in White Caucasians (35). This would suggest, therefore, that any confounding role played by body mass index would make our reported interethnic differences greater in magnitude. Although we did not assess smoking and alcohol drinking in our study, intakes of tobacco and alcohol are generally higher in lower socioeconomic groups. If smoking and alcohol were implicated in the pathogenesis of Barrett’s esophagus, one would expect Barrett’s esophagus to be associated with lower socioeconomic status. Furthermore, three previous case-control studies that have examined this issue have not proven an association (36–38).

In addition, a large number of gastroenterologists performed the endoscopy in this study. There may have been some variation in the accuracy of diagnosing Barrett’s esophagus and esophagitis, although data suggest that such variation is likely to have been very small (39, 40).

In conclusion, we have shown within a large cross-sectional study that White Caucasian ethnicity, male gender, and higher socioeconomic status are all independently associated with an increased risk of Barrett’s esophagus.

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REFERENCES


