ORIGINAL RESEARCH

Health, lifestyle, belief and knowledge differences between two ethnic groups with specific reference to tobacco, diet and physical activity

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Abstract

Aims. To compare physical activity levels, body mass index, habitual diet, tobacco use and prevalence of non-communicable disease between the two ethnic groups and to identify predictors for differences between groups.

Background. Tobacco use, poor diet and physical inactivity are major lifestyle risk factors for chronic cardiovascular diseases, certain cancers, diabetes and chronic lung diseases. There are higher risk and incidence of these diseases in some ethnic groups, for example Asians have higher incidence of diabetes.

Design. Cross sectional survey.

Methods. Cross sectional survey of Asians of Indian descent and white British adults conducted between October–December 2009. Main outcome variables were lifestyle behaviours and BMI. Self-reported disease diagnosis was also collected. In a regression analysis, predictors of outcome variables were demographic variables and beliefs/attitudes/knowledge towards lifestyle behaviours.

Results/Findings. Body mass index, tobacco use and non-communicable disease (except diabetes) were lower in Indians. Indians reported lower physical activity levels and greater salt use than Whites. Tobacco use was higher in Whites, but knowledge, attitudes and beliefs were similar between Whites and Indians.

Conclusion. Health risk behaviour and morbidity are different between the two ethnic groups. Gender, age, educational level, beliefs, attitudes and knowledge do not explain these differences. Health promotion that aims to improve knowledge will probably not work and innovative methods are needed to improve health in high risk groups.

Keywords: ethnicity, Indian, nursing, public health nursing, White
Introduction

There is a need to address the global ‘tsunami’ of cardiovascular disease (Anand & Yusuf 2011) related to lifestyle risk factors such as tobacco use, poor diet, lack of physical activity and alcohol misuse. Such strategies and policies face a number of practical problems, over and above the political impediments that are now well documented (Baggott 2011, Baum 2002). These include the lack of good quality local data, particularly with regard to variations in health and lifestyles between different populations. In the UK, and elsewhere, ethnic variations have been recognized as elements in health inequalities (POST 2007). Moreover, local authorities and health services have produced local health profiles and joint assessments of need, to assist health policy, planning and intervention, by providing more information about health and lifestyles, and variations between groups, including ethnic groups. But this may not give the level of detail needed and this article presents the results of an in-depth survey of variations in health and lifestyles between two ethnic groups.

Background

Ethnic groups

The risk of some non-communicable diseases is higher in specific ethnic groups. For example, diabetes is more common in South Asians, with Indians having a greater risk of diabetes after accounting for environmental factors (Abate & Chandalia 2007). Furthermore, when Indians do develop diabetes they are at greater risk of ischaemic heart disease than Chinese or Malays in Singapore (Yeo et al. 2006). However, little is known about the risk factors that may predispose South Asians to a greater risk of diabetes.

Ethnicity is a complex concept. Ethnicity can be defined in terms of nationality, country of origin (or parents’ county of origin), skin colour and religion. We used the 2001 UK census classification in this study. This has ethnic groups White, Asian or Asian British, Black or Black British, Chinese, Mixed and Other. There are sub-categories within each main group, for example Indian, Pakistani, Bangladeshi and Any other Asian are those for Asian or Asian British. In this classification the main ethnic group is followed by a colon, then the subgroup, for example ‘Asian or Asian British: Indian’ refers to anyone who self defines as belonging to the Indian ethnic group regardless of whether born in the UK or not.

Leicester is exceptional among UK cities in its ethnic mix. While the largest ethnic group is White: British (60.5%), Asian or Asian British: Indian are by far the next largest group at 25.7%, with the next largest an order of magnitude smaller (White: Other White at 2%). In the UK as a whole the picture is very different with 87-5% White: British followed by White: Other White at 2-6% and Asian or Asian British: Indian the third most common at 2%. Religion is also very different in Leicester with 44-7% being Christian (compared with 71-8% in the UK), 14-7% no religion (14-8% UK), 14-7% Hindu (1-1% UK), 11-0% Muslim (3-0% UK), 4-2% Sikh (0-6% UK) and all other religions combined 0-8% (1-1% UK) (Leicester City Council 2011a).

The unique ethnic mix of Leicester shows different patterns than might be anticipated in other UK cities. For example, the largest minority is Gujarati and Hindu, largely from migration in the 1960s from Africa (especially Uganda and Kenya) and Gujerat. These migrants were typically well educated and largely from business backgrounds, and prospered in the UK. Using the most recent estimate (2007) there are also much smaller Pakistani (2%), Bangladeshi (1%) than Indian (25.7%) populations (Leicester City Council 2008). In the ethnic minority populations Indians are more likely to be employed, Pakistanis and Bangladeshis more likely to be unemployed (Leicester City Council 2011b) with employment rates for Whites 76.3%, Indians 68.5% and Pakistani & Bangladeshi 42.4% in 2002–2003 (Leicester City Council 2008). In general, Leicester’s Asian residents are not concentrated in the most deprived parts of the city, but while this is true of Indians, Pakistanis and Bangladeshis suffer from deprivation (Leicester City Council 2008). Thus combining these groups into one South Asian ethnic group is likely to conceal differences. Three wards – a ward is an administrative area in the UK, having an average of 5500 people (Office for National Statistics 2011) – in this study feature within the 5% most deprived of all areas in the country. Low skills are particularly prevalent amongst the White population on the outer estates of Leicester and Pakistanis, Bangladeshis, Somalis and African Caribbeans in the city, but Asian students have higher educational achievements in Leicester than either the East Midlands or national average (Leicester City Council 2008).

Tobacco use

One of the few papers from the USA that addressed South Asians, An et al. (2008) showed that fewer women smoked compared with men in all six Asian groups, including South Asians, although acculturation increased smoking in women. However, among second generation men or later and those with higher education smoking was less prevalent.

In the UK, Indian men smoke the least (20%) compared to the UK average (24%) although there is a more pronounced difference among women (5% compared with 23%). However, some South Asian ethnic groups differ considerably,
with Bangladeshi men having the highest smoking rate (40%) but Bangladeshi women the lowest (2%) (Cancer Research UK 2011).

**Physical activity**

There have been few comprehensive accounts describing physical activity levels of South Asians (Williams et al. 2010). In a recent study of data from the Health Survey for England (1999–2004) on 5421 South Asians and 8974 Whites, self-reported total physical activity metabolic equivalents of task (MET) scores were consistently lower in UK South Asians than in Whites, even after allowing for variables known to affect physical activity (Williams et al. 2010).

**Diet and BMI**

The Health Survey for England 2004 report (Sproston & Mindell 2006), showed differences in ethnic groups with respect to obesity, and in particular Indian men had lower body mass index (BMI) than the general population although those of Indian women were similar to the general population (NHS 2006). There are also differences in number of people eating at least five fruit and vegetables a day. In the general population (largely White), a lower proportion of men consume five portions of fruit and vegetables per day than Indian men (23% compared to 37%), and the pattern is similar for women (27% White and 36% Indian) (NHS 2006).

**The study**

The Community Interventions for Health (CIH) initiative is the community action arm of the Oxford Health Alliance (OxHA). It ‘focuses on disease prevention through addressing the risk factors for chronic disease … and the barriers to change’ (OxHA 2011b).

Oxford Health Alliance funded four sites under the CIH initiative – Mexico, India, China and the UK (Leicester). The initiative addresses three factors – tobacco use, poor diet and lack of physical activity that increase risk of non-communicable diseases. A baseline survey in Leicester was conducted late 2009, used herein to consider the issue of ethnicity in relation to the above risk factors.

**Aims**

The overall aim of CIH is ‘to develop and showcase sustainable interventions in addressing poor diet, tobacco use and lack of physical activity, demonstrating their effectiveness in a way that is both practical and scientifically rigorous’ (OxHA 2011a). Interventions are evaluated comparing final with baseline measurements. There are well known differences in risk factors for health between different ethnic groups in Leicester, for example Whites had a smoking prevalence of 35% compared to other ethnic groups of 15% (Glendinning et al. 2010). Since the CIH study collected data on ethnicity we were in a position to further explore differences in the main ethnic groups in Leicester. This study uses the baseline community survey only, and the aim is to compare the main ethnic groups in Leicester with respect to risk factors for non-communicable diseases. We considered that public health professionals, nurses in particular, would be able to use the results to inform practice, especially in high risk groups.

Our research question was ‘Are there differences between ethnic groups for the three risk factors for non-communicable diseases (tobacco use, poor diet and low physical activity), BMI and chronic disease’. A secondary aim was to identify predictors of differences between ethnic groups.

**Design**

The methodology is informed by the CIH methods paper (O'Connor Duffany et al. 2011). Herein we use data from the baseline survey to explore differences between two ethnic groups in Leicester. The design is a cross sectional survey.

**Sample/participants**

Randomly selected streets in 12 from 22 wards of Leicester were surveyed. The survey was conducted using interviews in respondents’ homes. Once the households were chosen, an adult residing in the household between the ages of 18–64 years of age was asked to complete the survey. Attention was paid to monitor representation across gender and age to have balanced gender-age cells. Where English was not the first language arrangements were made to conduct the interview in their chosen language if needed.

Power analysis was originally used to calculate the number of participants needed to detect the aimed for improvements in tobacco use, diet and physical activity as part of the wider study. Posteriori analysis shows that for the current analysis small effects would have been detectable with the categorical variables using the standard effect sizes of Cohen for chi square (small is \(w < 0.1\)) at a standard alpha level of 0.05 and a power of 0.8.

**Data collection**

Six outcomes (all self-reported) were measured, all except BMI (continuous, computed from self-reported weight and height) were yes/no binary responses:

- Eating at least five fruit and vegetable portions per day.
• Adding salt to cooking.
• Adding salt to cooked food.
• Smoking daily.
• Taking at least 30 minutes/day in at least moderate physical activity.
• BMI.

In addition, variables measuring beliefs, knowledge and attitudes about tobacco use, diet and physical exercise were measured. Some were binary yes/no and others used Likert scales. Also diagnosed disease was captured.

Ethical considerations
The study received approval from De Montfort University Ethics Committee.

Data analysis
The null hypotheses were that there are no important differences between the two ethnic groups and each of the six outcomes above. Univariate analysis used chi square for nominal variables and Student’s t test or one-way ANOVA for the sole (normally distributed) continuous variable.

Logistic regression was employed where the outcomes were binary. Although the forward, backward and stepwise methods are commonly employed, there are problems with their use, and there is a trend away from deterministic methods to a purposeful selection of variables (Hosmer & Lemeshow 2000). We used SPSS v 18 employing the method and setting values advocated by Hosmer & Lemeshow (Hosmer & Lemeshow 2000). In this method, sequentially, unimportant variables are removed, but the effect of removal on beta values is measured. If removal of an unimportant variable affects any beta value by more than a given percentage (we used the recommended 20%) it is assumed to be a confounding variable and is put back into the regression model. For the sole linear regression (BMI) we employed the Enter method.

We also tested for important differences in beliefs, attitudes and knowledge. For Likert scores we used Mann–Whitney, for nominal (binary yes/no in each case) we used chi square. We considered using the Bonferroni (Abdi 2007) adjusted alpha level whereby we divided the conventional alpha level (0.05) by the number of pairwise comparisons. However, this test is conservative and we simply draw attention to where statistical significance of results is weak when multiple tests are present.

 validity and reliability and rigour
The CIH has an advisory board, expert panel and intervention committee, membership of which can be seen on the website (OxHA 2011a). The survey questionnaire was created by an international panel of medical experts, and piloted in 2008 in Loughborough, a town close to Leicester, to 100 households to assess feasibility. A focus group of six, one each of a subset of the households, identified questions that needed rewording. Changes were made to wording of the instrument to improve comprehension.

Results
Women accounted for 53.6% of respondents and 46.4% men. All participants were aged between 18–64, with roughly equal numbers in each age group. By far the two largest ethnic groups, comprising more than three quarters of the sample, were White: British (White henceforth) and Asian or Asian British: Indian (Indian henceforth – we recognize that many of the ‘Indian’ respondents are British, and this is purely shorthand as repeated use of the proper term ‘Asian or Asian British: Indian’ is clumsy. Similarly White is convenient shorthand n this article for White: British – we recognize there are other White ethnic groups) so further analysis focused on these two groups.

Educational level is seen in Table 1. These data seem implausible, as in the United Kingdom no children should lack formal schooling, as compulsory schooling has been in force in the United Kingdom since 1870 (Glenn 1870). It is possible respondents misunderstood ‘No formal schooling’ as being no formal qualifications. It may be that some children had home schooling, which is formal but not perhaps

<table>
<thead>
<tr>
<th>Table 1 Education.</th>
<th>N</th>
<th>%</th>
<th>British</th>
<th>%</th>
<th>Indians</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal schooling</td>
<td>285</td>
<td>10.5</td>
<td>85</td>
<td>6.8</td>
<td>125</td>
<td>15.0</td>
</tr>
<tr>
<td>Less than primary school</td>
<td>30</td>
<td>1.1</td>
<td>4</td>
<td>0.3</td>
<td>13</td>
<td>1.6</td>
</tr>
<tr>
<td>Primary school completed</td>
<td>44</td>
<td>1.6</td>
<td>12</td>
<td>1.0</td>
<td>23</td>
<td>2.8</td>
</tr>
<tr>
<td>Lower secondary school completed</td>
<td>113</td>
<td>4.2</td>
<td>52</td>
<td>4.2</td>
<td>46</td>
<td>5.5</td>
</tr>
<tr>
<td>Secondary school/High school completed</td>
<td>1036</td>
<td>38.1</td>
<td>597</td>
<td>47.7</td>
<td>239</td>
<td>28.6</td>
</tr>
<tr>
<td>College/University completed</td>
<td>1023</td>
<td>37.6</td>
<td>431</td>
<td>34.5</td>
<td>318</td>
<td>38.1</td>
</tr>
<tr>
<td>Post graduate completed</td>
<td>189</td>
<td>6.9</td>
<td>70</td>
<td>5.6</td>
<td>71</td>
<td>8.5</td>
</tr>
</tbody>
</table>
acknowledged as such. We decided therefore to collapse the first four categories as constituting people who either did not complete their schooling and/or failed to benefit from it, i.e. not successfully completed schooling.

**Univariate analysis**

For salt in cooking, salt added to cooking, eating at least five fruit and vegetables daily, smoking and average physical activity greater than thirty minutes all except one were significantly different for gender, ethnic group, age and educational level (chi square). The one exception was adding salt compared with educational level. BMI was significantly different for gender, ethnic group, age and educational level (Student’s t test for independent groups for gender and ethnic group, and ANOVA for age and education).

**Multivariate analysis**

Using the method of Hosmer and Lemeshow (2000) the variables that remained in the logistic regression equations for each of the five outcomes are seen in Table 2. Herein ‘+’ is a positive beta value and ‘−’ a negative beta value, with NS being not important. A separate linear regression using the Enter method for BMI showed all variables were important, with higher age, being women, White and less well educated associated with higher BMI.

**Beliefs, attitudes and knowledge**

For the question ‘Do you believe that lifestyle changes (such as diet, physical activity and tobacco cessation) can help to manage heart disease, diabetes, or cancer?’ there was no important difference between Whites and Indians (Mann–Whitney, \( P = 0.82 \)).

For the six questions on the effects of physical activity (Likert score, using Mann–Whitney in each case) only one variable was important, (Whites believed that there will be muscle gain more than Indians – \( P = 0.026 \)) even at the standard alpha, and with eight pair-wise comparisons the statistical significance is weak.

For the seven question on barriers to smoking cessation, using chi square two variables were important (with Whites more likely to agree) at the standard alpha level – ‘I am afraid of gaining weight’ \( (P = 0.02) \) and ‘Everyone I know uses tobacco’ \( (P = 0.03) \) and as before the statistical significance is each is weaker than if there was only one test rather than seven.

For the six questions on smoking morbidity, using chi square only one variable was significantly different \( (P = 0.005) \), with Whites more likely to state smoking causes low birth weight. This remains important even allowing for the Bonferroni correction.

For the two questions on tobacco knowledge (is tobacco addictive? are cigarettes labelled low tar or light are less harmful than regular cigarettes?) there was no important group difference (Mann–Whitney) in Likert scales expressing agreement. For the six dietary questions, five (eating more fibre, fruits and vegetables, less sugar, less fat, changing cooking methods) were significantly (chi square) more important for Indians, even after adjusting the alpha level.

For the question on food availability (fresh vegetables, fresh fruit, vegetable oil, canned, frozen or dried vegetables and fruit) all were significantly (chi square) more available to Whites, even using the adjusted alpha level. For the five questions on food affordability, using chi square one just reached significance \( (P = 0.049) \) for fresh vegetables, but the statistical significance given five pair-wise tests is very weak.

**Morbidity**

Diagnosis of several conditions relevant to the risk factors were tested, see Table 3. We do not consider the Bonferroni adjusted alpha level appropriate here as so many \( P \) values

<table>
<thead>
<tr>
<th>Table 2 Variables kept in logistic regression.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnic group</strong></td>
</tr>
<tr>
<td>(0 Indian, 1 British)</td>
</tr>
<tr>
<td>Taking at least 30 minutes/day in at least moderate physical activity</td>
</tr>
<tr>
<td>Eating at least five fruit and vegetable portions per day</td>
</tr>
<tr>
<td>Adding salt to cooking</td>
</tr>
<tr>
<td>Adding salt to cooked food</td>
</tr>
<tr>
<td>Smoking</td>
</tr>
</tbody>
</table>

NS, not significant.
What is already known about this topic

- The risk of some non-communicable diseases (e.g. diabetes) is higher in specific ethnic groups.
- Indians smoke less, eat more fruit and vegetables but exercise less than Whites.

What this paper adds

- Indians use more salt than Whites in Leicester.
- Health beliefs, attitudes and knowledge are similar in Indians and Whites in Leicester, and do not explain health risk differences.

Implications for practice and/or policy

- Smoking cessation interventions should address behaviour change rather than knowledge, especially among the Whites.

Table 3 Morbidity by ethnic group.

<table>
<thead>
<tr>
<th>Disease</th>
<th>P value (chi square in each case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High blood pressure</td>
<td>0·069</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>0·024 (British more)</td>
</tr>
<tr>
<td>Heart disease, heart attack, or stroke</td>
<td>0·023 (British more)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0·001 (Indians more)</td>
</tr>
<tr>
<td>Raised blood glucose (blood sugar) or pre-diabetes</td>
<td>0·626</td>
</tr>
<tr>
<td>Clinical obesity</td>
<td>0·015 (British more)</td>
</tr>
<tr>
<td>Cancer (breast, stomach, colorectal)</td>
<td>0·034 (British more)</td>
</tr>
<tr>
<td>Cancer (lung, mouth, oesophageal)</td>
<td>0·624</td>
</tr>
<tr>
<td>Chronic bronchitis or emphysema</td>
<td>0·035 (British more)</td>
</tr>
</tbody>
</table>

indicate significance, and the results accord with current knowledge (e.g. diabetes being more common in Indians, bronchitis more in Whites, who smoke more).

Of special interest to us is the question of diabetes, in spite of the BMI being lower in Indians, they have more diabetes. However, the difference between BMI of Indian and Whites with self-reported diabetes is not important (Student’s t test for independent groups, $P = 0·167$).

Discussion

The findings are in agreement with the literature. Tobacco use was lower in Indians in Leicester, as was found in recent figures from the USA (An et al. 2008) and the UK (Cancer Research UK 2011). Physical activity was lower in South Asians in the UK (Williams et al. 2010) as we found in Leicester. BMI in Leicester was lower for Indians in agreement with national UK data (Sproston & Mindell 2006), and we also found Indians ate more fruit and vegetables, again in agreement with national data (NHS 2006). In addition we have reported on attitudes, knowledge and beliefs that we did not find reported in the literature.

Main finding of this study

In terms of the three risk factors, Indians take less physical activity, have better dietary intake of fruit and vegetables but use more salt and smoke less. Indians are more likely to have diabetes, but Whites are more likely to have high cholesterol, cardiovascular disease, obesity, cancer and lung disease in Leicester. Indians have similar beliefs as Whites on the advantages of physical activity, but are less likely to do 30 minutes of physical exercise per day. Knowledge of the risks of smoking is similar in both groups. Whites have two barriers to giving up smoking that appear different from Indians, the perception that they might gain weight and the presence of smokers around them. Indians think diet is more important than do Whites with respect to fibre, fruit and vegetables, sugar, fat, salt and cooking methods. Indians eat more fruit and vegetables (despite finding fresh fruit and vegetables more difficult to find) but consume more salt.

Public health professionals, nurses in particular, could use these results to inform their interventions in areas with high proportions of these ethnic groups, for example specific schools, workplaces, wards etc. The results on attitudes, knowledge and beliefs may be of particular interest. Although all UK cities differ in their ethnic mix the results may apply to other cities in the UK with similar populations. For example London, Birmingham and Manchester have areas with large numbers of Indians. The results may also apply to other countries, especially those who have larger numbers of the East African Asian Diaspora that was caused by emigration (in many cases forced) from Uganda and Kenya. It was precisely this ethnic group that settled in large numbers in Leicester in the 1960s.

Limitations of this study

All results are self-reported, and thus medical diagnoses (e.g.) may be inaccurate.
Conclusions

Since knowledge, belief and attitudes are not significantly different in two ethnic groups, but the health risk behaviour and morbidity are different, it is probably not helpful, in this context, to use information to change behaviour. The dangers of smoking in particular are well known in this population, yet many people, especially Whites, smoke. Other innovative methods are needed. Since Indians take less physical exercise it is tempting to suggest they need targeted advice and interventions. However, it is difficult to justify this given they have lower BMI and fewer non-communicable diseases. Indians do have greater risk of diabetes, but this may not be due to diet, given their lower BMI. There is some evidence that South Asians develop diabetes at lower BMI than other ethnic groups, with unpublished work drawing on data from many countries showing that glucose tolerance levels are different for South Asians (D. Mathews, Personal communication).

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Conflict of interest

Other than the funding of the study by OxHA noted below, none.

Author contributions

All authors meet at least one of the following criteria (recommended by the ICMJE) and have agreed on the final version:

• Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data.

• Drafting the article or revising it critically for important intellectual content. “http://www.icmje.org/ethical_1author.html.

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