

Patients' knowledge of anatomical location of major organs within the human body: a comparison between Asians and non-Asians

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Objective. This study was designed to ascertain lay knowledge of the anatomical location of major organs within the human body amongst the Asian and non-Asian population in Leicester and to explore the relationships of this knowledge to level of education and social class.

Method. The study was based on a cross sectional random sample stratified by from the FHSa Nominal Index Register and data was collected using a personally administered questionnaire in the preferred language of the respondent. Subjects marked the position of the major organs (heart, lungs, kidneys, bladder, liver, brain and stomach) on an image of the human body. The answers were judged against a correct 'response area' produced from a survey of 20 GPs.

Results. The overall response rate to the survey was 88.5% with 449 Asians and 447 non-Asians participating. After adjustment for age, sex, education and social class differences, non-Asians were significantly more likely to correctly identify the position of the lungs ($P = 0.01$) and less likely than Asians to correctly identify the position of the stomach ($P < 0.0001$). There were no differences found in the knowledge of the position of the other organs. Higher educational attainment was significantly associated with the ability to locate the kidneys ($P = 0.0052$) and the liver ($P = 0.0001$) and higher social class was associated with greater ability to locate the position of the lungs ($P = 0.01$).

Conclusions. Patients show considerable lack of knowledge of the position of major organs within the body. Health professionals will need to address this before embarking upon health promotion.

Keywords. Asian, non-Asian, anatomical knowledge, organ location.

Introduction

Approximately 6% of the population in the UK now consists of minority ethnic groups.¹ Within Leicester over 25% of the population now belong to minority ethnic groups and of this the vast majority are of Asian in origin.²

A health care system which is to be sensitive to the needs of a multicultural and multiracial population must recognize that if the majority population (for the purposes of this study, 'non Asians') has potential difficulties in accessing health care and understanding health and disease then minority populations which have

intrinsic differences in so far as language, culture and religion are concerned are likely to be more severely disadvantaged in attempting to gain health knowledge for understanding health promotion and prevention of disease.³⁻⁵

Previous studies amongst the non-Asian population in the UK have attested the lay person's ignorance of human anatomy and of medical terms.^{6,7} In 1970 when Boyle sought to assess the anatomical knowledge of patients, he found that the organs which patients had most difficulty in locating were the liver, the stomach, the lungs and the thyroid gland.

Three principal factors have been shown to influence health and disease knowledge amongst the lay population as it affects different body organs. These are social class, age and educational attainment. Knowledge of the heart and blood vessels for example has been shown to have a social class gradient with social classes I and

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II giving more correct answers than social classes IV and V.⁸ Several studies have demonstrated a relationship between health knowledge relating to different body organs to be determined by age,^{10,11} with younger people scoring better than older people.

Health knowledge relating to organ function has demonstrated an educational gradient with the percentage of university graduates answering questions correctly greater than that for those who attended further education colleges, which in turn was greater than that for people educated at secondary school level only.^{9,10}

Why is it so important that patients should be familiar with basic human anatomy?

First it must be recognized that different cultural groups are subject to different disease patterns and mortality rates.¹¹⁻¹³ Therefore it is particularly important that minority ethnic groups such as Asians are familiar with the anatomy of organs to which these diseases and their complications relate, otherwise it would be very difficult for a lay population to relate organ dysfunction to the correct organ and consequently fail to present themselves early in their disease process. There are also implications for patients undergoing operative procedures if doctors or other health care professionals have not taken care to explain with the use of diagrams exactly where different organs to be operated on are located. Anecdotal evidence suggests that patients experience considerable distress when awaking from an anaesthetic to find a scar at a completely different site to where they expected it because they believed the organ being operated upon to be located in a site other than the correct anatomical position!

Apart from the difference in the incidence of certain diseases between cultures, there are cultural differences in the way the symptoms are experienced and interpreted as they relate to organs. Indeed, some organs have a key part to play in people's medical culture. In the case of Asians, for example, the heart is a seat of good and bad, and blood pressure is always to be measured in the right arm because the right arm is the good arm which maintains the link to the heart and so affects blood pressure. Asians in this study felt that the blood pressure could not be measured in the left arm at all and would therefore never present the left arm when blood pressure was being taken. This is just one example of the gulf that may exist between patient and doctor communication and expectations.

It has been estimated that about 40% of patients may not comply with their doctors' advice on treatment because they do not share a common understanding of their condition with their doctor.¹⁴ Misunderstandings arise particularly when doctors use medical and anatomical terms which are unfamiliar to the patient.⁶ It is important therefore to explore patient beliefs regarding the human anatomy within a consultation and in particular the perceived vulnerability of organs to particular disease processes given the risk factors

present. It is only with such an approach that we can expect patient compliance with medical treatment. It is also important that medical treatment and the rationale upon which it is based should be presented in a language that patients can understand which takes into account cultural expectations with medical terms being explained and jargon avoided.¹⁵

The aims of this study were to study lay knowledge of the anatomical location of major body organs comparing the Asian and non-Asian population in Leicester in the context of education and social class (after age/sex adjustment), and to reflect on possible implications for doctor-patient communications, health education and patient understanding of medical procedures.

Method

A detailed account of the methodology can be found elsewhere¹⁶ but brief details are given here. The subjects for this study were randomly selected from general practitioner (GP) surgeries within the city of Leicester in wards in which >95% of the Asian population are known to reside.¹⁷ A one in four sample, stratified by ethnic group and age (Table 1) was drawn from the Leicestershire Family Health Services Authority nominal index register. A total of 896 people (449 Asian and 447 non-Asian) were interviewed by trained fieldworkers.

TABLE 1 *Number of patients sampled in each age and ethnic group**

Age group	Asian		Non-Asian	
16-24	140	(125)	109	(105)
25-44	255	(212)	149	(141)
45-59	81	(74)	94	(76)
60-69	28	(25)	71	(67)
70+	13	(13)	71	(58)
Totals	518	(449)	494	(447)

() = actual respondent numbers

* Numbers sampled in each age category are in proportion to the distribution of Asians and non-Asians from the City of Leicester survey (1983).¹⁷

Statistical methodology

Information from the completed questionnaires was coded and results analysed using the SAS statistical package on the Leicester University Vax computer system. Initial comparisons between Asians and non-Asians were made using either the Chi-square test for nominal variables, or the Mann-Whitney U test for ordered categorical variables. To investigate further any differences between Asians and non-Asians after adjustment for differing age, sex, social class and educational

attainment, the logistic regression models were fitted to the data, using the GLIM statistical package.

To ascertain differences between first and second generation Asians a variable was created within three levels: (i) Asians who received most of their education in the UK (up to age 16); (ii) Asians educated in their country of origin, and (iii) non-Asians.

Very few non-Asians were non-UK educated. When these variables were entered into the model, it was possible to make comparisons between the three categories after adjustment for age, sex and social class.

The part of the questionnaire relating to this paper concentrated on lay anatomical knowledge of Asians and non-Asians in Leicester. In order to have a standard against which responses from a questionnaire could be accepted as correct or incorrect a small survey of 20 GPs within service practice, involved in undergraduate and postgraduate education and working amongst populations with a good spread of patients in different social class groups, was carried out within Leicester. These doctors were asked to draw the position of the heart, lungs, kidneys, bladder, liver, brain and stomach on images showing the front and back of a body. The response by each GP for each of these organs was put on tracing paper. It was then possible by putting each of these trace responses onto the body image to produce a representative response area for each organ and its position relative to the diagram. This was the standard by which respondents could be judged as correct or incorrect as far as anatomical positioning of body organs was concerned.

Results

The age, social class and educational attainment distributions of the 896 people interviewed (449 Asian and 447 non-Asian) are given in Table 2.

Participants in the survey were asked to locate major organs on an image of the human body. Seven areas of the human anatomy were considered, these being the heart, lungs, kidneys, bladder, liver, brain and stomach. For the heart, kidneys, bladder, liver and brain there were no significant differences between Asians and non-Asians with respect to the percentage able to correctly identify the location of these organs in the body after adjusting for age and sex (see Table 3).

After adjustment for age and sex differences, knowledge of the anatomical location of the stomach and lungs were significantly different between Asians and non-Asians ($P = 0.02$ lungs: $P < 0.0001$ stomach). These differences still held when both education and social class were adjusted for. Non-Asians were 1.22 times (95% confidence interval (CI) 1.05–1.43) more likely than Asians to identify correctly the anatomical location of the lungs after adjustment for age, sex, educational attainment and social class. Non-

TABLE 2 Percentages of patients (City of Leicester survey)¹⁷

Age	Asian (n = 449)	Non-Asian (n = 447)
Age (years):		
16–24	27.8 (28.4)	23.5 (21.9)
25–44	47.2 (47.0)	31.5 (30.4)
45–59	16.5 (16.4)	17.0 (19.0)
60–69	5.6 (5.8)	15.0 (14.4)
70+	2.9 (2.2)	13.0 (14.4)
Social Class ^a :		
1	4.3	2.7
2	12.2	11.9
3 (non-manual)	22.4	19.9
3 (manual)	33.4	38.4
4	18.1	17.6
5	3.8	5.9
6 (unclassified)	5.5	3.7
7 ^b	0.2	0
Education completed:		
By age < 16 years	39.9	51.0
By age 16–18 years	36.1	34.7
After university/polytechnic	13.5	4.9
After training for a trade/ apprenticeship	0.5	4.0
After professional training	1.8	2.5
Still studying	5.2	2.9
Not known	2.9	0

^a Registrar general's classification.

^b Student or in armed forces.

Asians were significantly less likely than Asians to correctly identify the stomach (OR = 0.57, 95% CI 0.49–0.67),

The higher the educational attainment of an individual the more likely they were to be able to locate certain organs. Differences in educational attainment after adjustment for age, sex, social class and ethnic group were found for knowledge of the kidneys ($P = 0.0052$) and liver $P = 0.0001$. In the former those completing their education at FE or professional level were 1.2 times (95% CI 1.03–1.61) more likely to correctly identify these organs than people completing their education under the age of 16. Those who completed their education in the 16–18+ trade category were 1.76 times (95% CI 1.32–2.34) more likely to identify the liver correctly than those completing their education under the age of 16.

There were differences in anatomical knowledge of the lungs for social class after adjusting for age, sex, education and ethnic group ($P = 0.01$). Overall, the higher the social class the better the anatomical knowledge. Asians and non-Asians did not differ significantly in the way their responses varied with either education or social class for any of the other responses.

TABLE 3 Which part of the body to the following organs occupy?

	% Correct location		Results of significance testing	
	% Asian (n = 449)	% Non-Asian (n = 447)	Adjusted for age, sex, education and social class	Odds of correct identification (95% CI) Non-Asian:Asian
Heart	71.1	74.9	<i>P</i> = 0.15	1.13 (0.96–1.34)
Lungs	56.2	63.8	<i>P</i> = 0.01	1.22 (1.05–1.43)
Kidneys	52.7	51.7	<i>P</i> = 0.74	1.03 (0.89–1.19)
Bladder	50.0	55.7	<i>P</i> = 0.13	1.12 (0.97–1.30)
Liver	25.6	23.0	<i>P</i> = 0.57	0.95 (0.80–1.13)
Brain	95.6	94.2	<i>P</i> = 0.62	0.92 (0.65–1.29)
Stomach	63.8	41.6	<i>P</i> < 0.0001	0.57 (0.49–0.67)

There were no significant differences between either first and second generation Asians in the way anatomical knowledge varied with either education or social class.

Discussion

It is now almost 25 years since Boyle (1970) demonstrated that there was a considerable gulf in the understanding of anatomical knowledge between patients and doctors. This study confirms that the divide still exists, with 5–50% of respondents unable to locate major organs within the human body. Asians and non-Asians showed similar levels of knowledge apart from the lungs (non-Asians greater knowledge) and stomach (Asians greater knowledge). This study confirms previously demonstrated links between the educational attainment and social class of patients and their understanding of human anatomy (i.e. the lower the educational attainment and/or lower the social class of a person the worse their knowledge is).

These results have important implications for health education. If, as on the evidence of this study, people do not know where major organs are located within their body and doctors or other health care professionals do not take the trouble to explain with the aid of diagrams which area of the body is affected or what is likely to take place during an operative procedure, we are failing to communicate with patients.

This lack of communication may sometimes lead to litigation when things go wrong. How can health care professionals be expected to inform people about disease processes and symptoms of disease relating to different organs for health promotion purposes when there is ignorance about the location of the organ(s) under discussion within the body? The fact that second generation Asians were no better than first generation Asians in terms of anatomical knowledge suggests that the

problem is deep rooted. There appears to be an urgent need to develop medical communication systems which allow us to empower patients with knowledge about the nature of symptoms and illness within their body, the physiological effects of that illness and any medical intervention that is needed. Confusion regarding anatomy was illustrated in a post-interview conversation with a respondent, 'you see it always happens when I'm constipated that gases build up in my stomach and travel to my brain resulting in a headache' (a 52-year-old Asian respondent).

The Royal College of General Practitioners has recently commissioned interactive graphics computer programs which will enable doctors to explain anatomical and clinical terms more accurately to patients, especially those from different cultures. Such computer programs will also enable doctors to be made culturally aware of the significance of certain organs to patients from ethnic minorities and symptoms and diseases relating to these organs.

Computer programs detailing human anatomy are already available. These allow doctors with desk top computers in their consulting room to provide graphic illustrations of human organs within the body and hence facilitate better explanations of disease processes to patients but they are not geared to ethnic minority patients. Evaluation of such programs and the impact they have on lay knowledge of anatomy is needed. For those doctors without computers, anatomical charts or diagrams may facilitate explanations, but finding the time for the use of such tools within a short consultation may prove more difficult. A similar programme of health education in schools may also be useful to raise awareness amongst second- and third-generation Asians.

McAvoy and Raza have demonstrated the usefulness of video in promoting health promotion¹⁸ and this may be a useful tool for consideration of teaching a basic human anatomy within Asian homes where video machines appear to be widely available.

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