

Bangladeshi patients present with non-classic features of acute myocardial infarction and are treated less aggressively in east London, UK

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Objective: To analyse differences in the presentation and management of Bangladeshi and white patients with Q wave acute myocardial infarction (AMI).

Design: Prospective observational study.

Setting: East London teaching hospital.

Participants: 263 white and 108 Bangladeshi patients admitted with Q wave AMI.

Main outcome measure: Character of presenting symptoms, their interpretation by the patient, and the provision of emergency treatment.

Results: There were no significant differences between Bangladeshi and white patients in the time from pain onset to hospital arrival (arrival time 64.5 (117.5) minutes v 63.0 (140.3) minutes, $p = 0.63$), but once in hospital it took almost twice as long for Bangladeshi as for white patients to receive thrombolysis (median (interquartile range) door to needle time 42.5 (78.0) minutes v 26.0 (47.7) minutes, $p = 0.012$). Bangladeshis were significantly less likely than whites to complain of central chest pain (odds ratio (OR) 0.11, 95% confidence interval (CI) 0.03 to 0.38; $p = 0.0006$) or to offer classic descriptions of the character of the pain (OR 0.25, 95% CI 0.09 to 0.74; $p = 0.0118$). These differences persisted after adjustment for age, sex, and risk factor profile differences including diabetes. Proportions of Bangladeshi and whites interpreting their symptoms as "heart attack" were similar (45.2% v 46.9%; $p = 0.99$).

Conclusions: Bangladeshi patients with AMI often present with atypical symptoms, which may lead to slower triage in the casualty department and delay in essential treatment. This needs recognition by emergency staff if mortality rates in this high risk group are to be reduced.

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People of South Asian (India, Pakistan, Sri Lanka, and Bangladesh) origin living in the UK have a 1.5-fold greater susceptibility to ischaemic heart disease than the general population.^{1,2} Despite this there is evidence of underprovision of treatment for both stable coronary disease³⁻⁵ and acute myocardial infarction (AMI),⁶ although not all studies have shown such differences.⁷ The underutilisation of thrombolysis in this group of patients⁶ is particularly worrying since South Asians appear to be more likely than white patients to seek immediate care for anginal symptoms.⁸ Whether such underprovision occurs as a result of difficulty in diagnosis through differences in presentation is not known. We have therefore sought to examine the modes of presentation of Bangladeshi patients (who form the vast majority of South Asians in our catchment area) with AMI admitted for coronary care. In particular, the management of Bangladeshi patients has been compared with that of white patients, and in a subset of patients description of the symptoms of AMI for each group have been elicited and compared.

METHODS

Patients

All patients ($n = 371$) with a Q wave AMI admitted to the coronary care of the Royal London Hospital between May 1998 and April 2001 who were white or of Bangladeshi origin formed the study population. AMI was defined by the presence of cardiac chest pain with ST elevation > 1 mm in two consecutive leads, Q wave development, and a creatine kinase rise greater than twice the upper limit of normal (400 IU/l).

Data collection

Baseline demographic data, together with risk factor profiles, acute treatment, and discharge medication, were recorded prospectively by two dedicated coronary care unit research nurses (ZW and SR) and stored on a purpose built electronic database. In addition, for patients ($n = 63$) admitted between June 2000 and April 2001, data were collected prospectively by one dedicated coronary care unit research nurse (ZW) on the nature of the symptoms experienced by the patients on presentation, their interpretation of these symptoms, and their response to these symptoms. These symptom descriptions were elicited from Bangladeshi patients with the help of a Sylheti health care advocate. The proficiency of Bangladeshi patients in English was recorded on a scale of 1 to 3 (1, unable to speak English; 2, able to speak limited English and needing the help of an interpreter; 3, fluent in English and not needing an interpretation).

Data analysis

For the purposes of analysis the symptoms described by patients were classified as typical if the following words were used in the description of the character of the pain: tightness, heaviness, band-like, weight, pressure, constricting, or heavy. Symptoms were classified as non-classic if the any other descriptors of pain were used (such as burning, stabbing, pinching, sharp, or no pain). Similarly, the site of the pain was classified as central if the patients localised the pain to the upper, lower, or mid-sternum or across the chest, or if they described it as encircling their chest. The site was classified as left sided if it was localised to the precordium or to the left side of the chest. All other sites were classified as "other". Patients

Table 1 Baseline characteristics

	Bangladeshi (n=108)	Whites (n=263)	p Value
Age (years)	63.0 (12.0)	68.0 (19.0)	<0.0001
Male sex	94 (87.0%)	184 (70.0%)	0.002
Risk factors			
Smoking	77 (71.3%)	185 (70.3%)	0.85
Hypertension	47 (43.5%)	101 (38.4%)	0.36
Diabetes	54 (50.0%)	40 (15.2%)	<0.0001
Family history of IHD	14 (13.0%)	77 (29.3%)	0.0005
Previous AMI	31 (28.7%)	48 (18.3%)	0.0014
Treatment on admission			
Aspirin	49 (45.4%)	90 (34.2%)	0.04
β Blockers	24 (22.2%)	31 (11.8%)	0.011
ACE inhibitors	27 (25.0%)	42 (16.0%)	0.042
Statins	14 (13.0%)	26 (10.0%)	0.20
Emergency treatment			
Aspirin	107 (99.1%)	260 (98.9%)	0.84
β Blockers	27 (25.0%)	75 (28.5%)	0.50
Thrombolysis	92 (85.2%)	212 (80.6%)	0.30
Treatment delay (minutes)			
Door to needle time	42.5 (78.0)	26.0 (47.7)	0.012
Pain to needle time	64.5 (117.5)	63.0 (140.3)	0.63
Discharge medication			
Aspirin	97 (90.7%)	228 (88.7%)	0.55
β Blockers	69 (65.1%)	159 (61.9%)	0.81
ACE inhibitors	71 (67.0%)	134 (52.1%)	0.031
Statins	56 (52.8%)	155 (60.3%)	0.27
Infarction			
Peak CK rise (IU/l)	1001 (1739)	813 (1143)	0.10
LVF	27 (25.2%)	53 (20.2%)	0.39

Data are absolute number (%) or value (interquartile range).

ACE, angiotensin converting enzyme; AMI, acute myocardial infarction; CK, creatine kinase; IHD, ischaemic heart disease; LVF, left ventricular failure.

who sought the help of a general practitioner, called an ambulance, or presented to the casualty department as their initial response to their symptoms were categorised as “seeking help from a health care professional”.

Statistical analysis

Results from continuous variables are presented as medians with the interquartile range in parentheses. Pearson χ^2 analysis was used to compare nominal variables between Bangladeshi and white patients, and Mann Whitney U test was used to compare continuous variables between the two groups. Multiple logistic regression analysis was undertaken for the likelihood of Bangladeshi patients presenting with central chest pain and typical cardiac symptoms compared with whites and expressed as an odds ratio (OR) (95% confidence interval (CI)).

RESULTS

Baseline characteristics

Bangladeshis compared with whites were younger, more often male and diabetic, and more likely to report a previous AMI, although they were less likely to give a family history of ischaemic heart disease (table 1). In addition, Bangladeshis were more likely to be taking aspirin and angiotensin converting enzyme inhibitors on admission. One third of the Bangladeshi patients were deemed fluent in English.

Treatment differences

Although there were no significant differences between Bangladeshi and white patients in the time taken to come to hospital (arrival time), once in hospital it took almost twice as long for Bangladeshi patients to receive thrombolysis (door to needle time) (table 1). Despite this, no differences were noted in

Table 2 Nature of chest pain and interpretation of symptoms by racial group

	Bangladeshi (n=32)	Whites (n=31)	χ^2 p Value
Site of pain			
Central	13 (40.6%)	27 (87.1%)	0.0006
Left sided	11 (34.4%)	1 (3.2%)	
Other	8 (25.0%)	3 (9.7%)	
Character of pain			
Typical	8 (25.0%)	18 (58.1%)	0.0132
Non-classic	24 (75.0%)	13 (41.9%)	
Interpretation of symptoms			
AMI	15 (46.9%)	14 (45.2%)	0.99
Other	17 (53.1%)	17 (54.8%)	
Initial response			
Sought health care advice	15 (46.9%)	8 (25.8%)	0.20
Sought family advice	12 (37.5%)	19 (61.3%)	
Other	5 (15.6%)	4 (12.9%)	

Table 3 Multivariate analysis of the likelihood of Bangladeshi patients to present with central chest pain compared with white patients

	Odds ratio (95% CI)	p Value
Crude	0.11 (0.03 to 0.38)	0.0006
Adjustment for age and sex	0.10 (0.03 to 0.39)	0.0007
Adjustment for age, sex, and diabetes	0.12 (0.03 to 0.49)	0.0031
Adjustment for age, sex, diabetes, hypertension, smoking, family history of IHD, and hypercholesterolaemia	0.11 (0.02 to 0.58)	0.0094
Adjustment for age, sex, diabetes, hypertension, smoking, family history of IHD, hypercholesterolaemia, and proficiency in English*	0.10 (0.01 to 0.79)	0.0285

*37.5% of the Bangladeshi patients were deemed fluent in English.
CI, confidence interval.

Table 4 Multivariate analysis of the likelihood of Bangladeshi patients to present with typical cardiac chest pain compared with white patients

	Odds ratio (95% CI)	p Value
Crude	0.25 (0.09 to 0.74)	0.0118
Adjustment for age and sex	0.25 (0.08 to 0.77)	0.0154
Adjustment for age, sex, and diabetes	0.19 (0.05 to 0.70)	0.0124
Adjustment for age, sex, diabetes, hypertension, smoking, family history of IHD, and hypercholesterolaemia	0.13 (0.03 to 0.63)	0.0116
Adjustment for age, sex, diabetes, hypertension, smoking, family history of IHD, hypercholesterolaemia, and proficiency in English*	0.05 (0.004 to 0.46)	0.0091

*37.5% of the Bangladeshi patients were deemed fluent in English.

the proportions of Bangladeshi and white patients receiving thrombolysis, aspirin, and β blockers acutely. On discharge from hospital Bangladeshi patients were more likely to be discharged on angiotensin converting enzyme inhibitors than whites but no differences were noted in other discharge secondary prevention medication (aspirin, β blockers, and statins).

Nature of chest pain

Bangladeshis were significantly less likely than whites to complain of central chest pain (OR 0.11, 95% CI 0.03 to 0.38; $p = 0.0006$ (tables 2 and 3). These differences persisted after adjustment for differences in age, sex, and risk factor profiles including diabetes and for fluency in English. Similarly, Bangladeshis were less likely than whites to offer classic descriptions of the character of the pain (heaviness, tightness, weight, pressure, band-like, gripping) and were more likely to offer non-classic descriptions (sharp, stabbing, pinching, burning) (OR 0.25, 95% CI 0.09 to 0.74; $p = 0.0118$) (tables 3 and 4). These differences persisted after adjustment for age, sex, and risk factor profile differences including diabetes and for fluency in English.

Interpretation of the nature of symptoms by patients

Similar proportions of Bangladeshi and white patients interpreted their symptoms as suggestive of an AMI (table 2). There was a trend for Bangladeshi patients to seek the help of a health care professional (general practitioner, ambulance service) more often than for white patients, but this was not significant (table 2).

DISCUSSION

No previous studies have compared the symptomatic presentation of Bangladeshi versus white patients with AMI. We have shown that Bangladeshi patients are as aware as white patients of the potential significance of their symptoms and arrive in hospital equally quickly. However, Bangladeshi patients are disadvantaged with very much slower door to needle times for the administration of thrombolysis, almost certainly because the description they give of their symptoms

is often atypical and fails to alert emergency staff to the seriousness of their condition. Thus, even after diabetes, age, sex, and other baseline differences were corrected for, Bangladeshi patients were 89% less likely than whites to complain of central chest pain and were over 87% less likely to use classic descriptions of AMI pain. Difficulty in making the initial diagnosis may have been further compounded by the need for interpretation since many of these patients do not speak English. Reassuringly, once the diagnosis was made no treatment differentials were seen and Bangladeshi patients received acute treatment and secondary prevention as often as white patients.

Previous investigators have commented on the increased mortality of patients with AMI discharged from accident and emergency departments and have shown an association with non-typical symptoms.⁹ Extrapolation to our own cohort suggests that Bangladeshi patients presenting with acute coronary syndromes may be sent home more often than whites, indicating that the disadvantage of atypical symptoms may be more serious than our results suggest. Comparison between Mexican Americans and whites has also shown differences in the presentation of AMI, particularly as regards the radiation of chest pain to the jaw and arm.¹⁰ Studies of African Americans,^{11–13} on the other hand, suggest no increase in atypical symptoms compared with whites but have suggested that African Americans are more likely to complain of dyspnoea¹³ and may be less likely to receive thrombolysis.¹²

In this study Bangladeshi patients were more likely than whites to give atypical descriptions of their chest pain, in terms of both its location and its character. This pain was more commonly experienced as left sided or deriving from other non-central locations and more often described as being stabbing, burning, or sharp in nature—descriptions that are often taken to suggest a non-cardiac diagnosis. Interestingly, US studies have suggested that regional differences may also exist such that atypical symptoms are more common in the southern USA, where the adjective “sharp” is often used to describe the intensity of pain rather than its character or quality.¹⁴ Whether a similar explanation underlies the increased use of “sharp” as a description in this Bangladeshi cohort is unclear.

There is evidence to suggest that there are race and sex based differences in the interpretation of cutaneous pain,¹⁵ implying that similar differences may occur in the interpretation of visceral pain although this is far more difficult to test formally.

In spite of the increased likelihood of atypical symptoms, Bangladeshi patients were as likely as whites to interpret their symptoms as being caused by a "heart attack" and were no less likely to seek medical advice. Yet in spite of this concern their initial triage in the casualty department was slower. Although the diagnosis appears to have taken longer to make, once it was made they were treated as well as white patients. The concerns that remain and cannot be answered by the current study are whether Bangladeshis with acute coronary syndromes are more likely to be discharged or misdiagnosed. The assumption must be that this is so since the clear ECG abnormalities associated with Q wave AMI are less likely to be misinterpreted by emergency staff than the more subtle abnormalities of non-ST elevation acute coronary syndromes.

A limitation of the study is that door to ECG times were not collected and a possible delay in the recording of an ECG in the Bangladeshi patients might have compounded their slower management. There are, however, strict chest pain management guidelines in operation in the hospital, which require that all patients presenting with chest pain must have an ECG within five minutes of arrival at the casualty department. As mentioned previously once the diagnosis of AMI was made Bangladeshi patients were managed as well as white patients in accordance with local guidelines. It is thus unlikely that the Bangladeshi patients have been unfairly discriminated against with regard to this particular aspect of the chest pain triage protocol. Another potential limitation is that the interpretation was undertaken by a single advocate and could have been subject to a systematic error. However, over a third of patients were fluent in English and inclusion of proficiency in English in the multivariate analysis did not alter the likelihood of Bangladeshi patients to present more commonly with non-typical symptoms, suggesting that our results are robust. Ideally, histories taken at the time of presentation should have been used for determining the characteristics of symptoms of patients. However, very few case notes (for both Bangladeshi and white patients) used adjectives to describe the quality of pain or its location, necessitating subsequent history taking for this study. Histories were subsequently elicited from both white and Bangladeshi patients, and any limitations in such an approach would have affected both groups equally. Indeed, given that interpretation was available subsequently any differences between the two groups may have been greater at initial presentation than even those found in the current study, since acute admitting staff may not have had access to a suitable interpreter.

This study highlights the finding that a large proportion of Bangladeshi patients with Q wave AMI present with symptoms that are often dismissed as non-cardiac, suggesting that a high index of suspicion needs to be maintained during the triage of these patients in whom coronary artery disease is so common.

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