What is already known on this topic

Restenosis after a percutaneous coronary intervention is one of the principal limitations of the technique

Genotype at the angiotensin converting enzyme insertion or deletion polymorphism is proposed to be important in restenosis

What this study adds

Weaker associations between the angiotensin converting enzyme DD genotype and restenosis were found in larger and more rigorous studies than in other studies

Publication bias or detection biases, or both, can produce artefactual associations at least as large as those that might be expected for common polymorphisms in complex diseases

the angiotensin converting enzyme DD genotype and myocardial infarction.¹⁹ These findings have important implications for genetic epidemiology, suggesting that publication bias or detection biases can produce artefactual associations at least as large as those that might be realistically expected for common polymorphisms in complex diseases.

We thank the investigators for supplying additional information and Alison Palmer for plotting the figures. RC holds a British Heart Foundation personal chair. JD holds the Raymond and Beverly Sackler Research Award in the Medical Sciences.

Contributors: All authors contributed to the design, analysis, and interpretation of the study. FB and JD will act as guarantors for the paper.

Funding: FB was supported by a Rhodes scholarship.

Competing interests: None declared.

- 1 Serruys PW, de Jaegere P, Kiemeneij F, Macaya C, Rutsch W, Heyndrickx G, et al. A comparison of balloon-expandable-stent implantation with balloon angioplasty in patients with coronary artery disease. Benestent Study Group. *N Engl J Med* 1994;331:489-95.
- 2 Tiret L, Rigat B, Visvikis S, Breda C, Corvol P, Cambien F, et al. Evidence, from combined segregation and linkage analysis, that a variant of the angiotensin I-converting enzyme (ACE) gene controls plasma ACE levels. *Am J Hum Genet* 1992;51:197-205.
- 3 Ohishi M, Fujii K, Minamino T, Higaki J, Kamitani A, Rakugi H, et al. A potent genetic risk factor for restenosis [letter]. *Nat Genet* 1993;5:324-5.

- 4 Beohar N, Damaraju S, Prather A, Yu QT, Raizner A, Kleiman NS, et al. Angiotensin-I converting enzyme genotype DD is a risk factor for coronary artery disease. *J Invest Med* 1995;43:275-80.
- 5 Kamitani A, Rakugi H, Higaki J, Ohishi M, Shi SJ, Takami S, et al. Enhanced predictability of myocardial infarction in Japanese by combined genotype analysis. *Hypertension* 1995;25:950-3.
- 6 Samani NJ, Martin DS, Brack M, Cullen J, Chauhan A, Lodwick D, et al. Insertion/deletion polymorphism in the angiotensin-converting enzyme gene and risk of restenosis after coronary angioplasty. *Lancet* 1995;345:1013-6.
- 7 Van Bockxmeer FM, Mamotte CD, Gibbons FA, Burke V, Taylor RR. Angiotensin-converting enzyme and apolipoprotein E genotypes and restenosis after coronary angioplasty. *Circulation* 1995;92:2066-71.
- 8 Kaski JC, Zhang Y, Calvino R, Vasquez-Rodriguez JM, Castro-Beiras A, Jeffrey S, et al. Angiotensin-converting enzyme insertion/deletion polymorphism and restenosis after coronary angioplasty in unstable angina pectoris. *Am J Cardiol* 1996;77:875-7.
- 9 Amant C, Bauters C, Bodart JC, Lablanche JM, Grollier G, Damchin N, et al. D allele of the angiotensin I-converting enzyme is a major risk factor for restenosis after coronary stenting [see comments]. *Circulation* 1997;96:56-60.
- 10 Hamon M, Amant C, Bauters C, Richard F, Helbecque N, Passard F, et al. Dual determination of angiotensin-converting enzyme and angiotensin-II type 1 receptor genotypes as predictors of restenosis after coronary angioplasty. *Am J Cardiol* 1998;81:79-81.
- 11 Ribichini F, Steffenino G, Dellavalle A, Colajanni E, Camilla T, Vado A, et al. Plasma activity and insertion/deletion polymorphism of angiotensin I-converting enzyme: a major risk factor and a marker of risk for coronary stent restenosis. *Circulation* 1998;97:147-54.
- 12 Gensini F, Battaglini B, Fatini C, Guazzelli R, Falai M, Chioccioli M, et al. Polimorfismo I/D del gene ACE e A1166C del gene AT1R quali fattori di rischio di restenosi dopo angioplastica coronarica. *Minerva Cardioangiol* 1999;47:516.
- 13 Guarda E, Fajuri A, Marchant E, Martinez A, Jalil J, Illanes G, et al. D/D genotype of the gene for angiotensin converting enzyme as a risk factor for post-stent coronary restenosis [see comments]. *Rev Esp Cardiol* 1999;52:475-80.
- 14 Okamura A, Ohishi M, Rakugi H, Katsuya T, Yanagitani Y, Takiuchi S, et al. Pharmacogenetic analysis of the effect of angiotensin-converting enzyme inhibitor on restenosis after percutaneous transluminal coronary angioplasty. *Angiology* 1999;50:811-22.
- 15 Gülek A, Gülek S, Karabulut H, Bokesoy I, Tuter E, Pornir G, et al. Relation between the insertion/deletion polymorphism of the angiotensin I converting enzyme gene and restenosis after coronary stenting. *J Cardiovascular Risk* 2000;7:403-7.
- 16 Völzke H, Hertwig S, Rettig R, Motz W. The angiotensinogen gene 235T variant is associated with an increased risk of restenosis after percutaneous transluminal coronary angioplasty. *Clin Sci* 2000;99:19-25.
- 17 Koch W, Kastrati A, Mehilli J, Bottiger C, van Beckerlath N, Schornig A. Insertion/Deletion polymorphism of the angiotensin I-converting enzyme gene is not associated with restenosis after coronary stent placement. *Circulation* 2000;102:197-202.
- 18 Zee RYL, Fernandez-Ortiz A, Macaya C, Pintor E, Lindpaintner K, Fernandez-Cruz A. ACE D/I polymorphism and incidence of post-PTCA restenosis: a prospective, angiography-based evaluation. *Hypertension* 2001;37:851-5.
- 19 Keavney B, McKenzie C, Parish S, Palmer A, Clark S, Youngman L, et al for the International Studies of Infarct Survival (ISIS) Collaborators. Large-scale test of hypothesised associations between the angiotensin-converting-enzyme insertion/deletion polymorphism and myocardial infarction in about 5000 cases and 6000 controls. *Lancet* 2000;355:434-42.

(Accepted 17 April 2002)

Science commentary: Coronary angioplasty and stenting

Two main interventions are available for opening up blocked coronary arteries: balloon angioplasty and open heart surgery. In percutaneous coronary angioplasty a wide lumen catheter is fed from the groin up to the aortic root and into the coronary arteries. A guide wire is passed through the catheter and across the stenosis in the coronary artery. The wire is used to guide a balloon (with a stent mounted on it if necessary) into the diseased section of the artery. The balloon is inflated, pushing the atheroma outwards and enlarging the lumen of the artery. A stent can be expanded to fit the artery. Once the stent is in place (confirmed by angiography), the wires and the catheter are removed.

Arterial restenosis remains a serious problem after percutaneous coronary angioplasty. It tends to occur

within three months of the procedure and is due to proliferation of smooth muscle as a reaction to vessel injury. Restenosis used to occur in over 30% of patients after percutaneous coronary angioplasty, but with the use of stents and advances in stent design and improved techniques for implanting them the rates now lie between 10% and 20%.^{1,2} This is comparable to the 10% of vein grafts that are lost in the year after bypass grafting. The main risk factors for restenosis after percutaneous coronary angioplasty are diabetes, thrombus formation or inflammation in the coronary tree, and small vessel size.

Two recent trials found no difference between percutaneous coronary angioplasty plus stenting and bypass surgery for death or myocardial infarct in

Science commentary

Waller Department of Cardiology, St Mary's Hospital, London W2 1NY
Iqbal Malik
specialist registrar
Abi Berger
science editor, BMJ

patients without diabetes within two years of the procedure. Angina does, however, recur more commonly after percutaneous coronary angioplasty and stenting than it does after bypass surgery.³⁻⁴ Despite this, percutaneous coronary angioplasty remains the more popular choice, and the number of procedures that are performed each year is increasing. Percutaneous coronary angioplasty usually requires just one or two days in hospital, and patients can expect to be back at work within a week. Surgery is much more invasive and requires lengthy rehabilitation.

No trials have looked specifically at people with diabetes, but subgroup analyses of existing trials indicate that angioplasty is not as successful as surgery for these patients.³⁻⁵ This reflects the higher acute risk of percutaneous coronary angioplasty in a diabetic patient and the higher restenosis rate. However, with the advent of the glycoprotein IIb-IIIa receptor blockers (given intravenously at the start of the procedure), new data indicate that the risks may match that of people with no diabetes.⁶⁻⁷ These agents reduce platelet aggregation, which in turn reduces the risk of clot formation. A multicentre trial presently under way in the United Kingdom compares percutaneous coronary angioplasty and stenting and the concomitant use of glycoprotein IIb-IIIa blockers with modern coronary artery bypass grafting. Preliminary results are expected within two years.

Stent development has enabled percutaneous coronary angioplasty to catch up with bypass graft

surgery. Stent insertion using intravascular ultrasound guidance is the key to longer term success. In addition, localised radiotherapy at the time of stent implantation helps to reduce proliferation of smooth muscle. The newest stents (which are expensive and not yet in general use) are made of metal coated with a cytostatic agent such as sirolimus or paclitaxel.⁸⁻⁹ These agents are released slowly and locally to reduce proliferation of smooth muscle. Early trials with these newer stents suggest that less than 5% of people will have arterial restenosis.

- 1 George CJ, Baim DS, Brinker JA, Fischman DL, Goldberg S, Holubkov R, et al. One-year follow-up of the Stent Restenosis (STRESS I) Study. *Am J Cardiol* 1998;81:860-5.
- 2 Serruys PW, de Jaegere P, Kiemeneij F, Macaya C, Rutsch W, Heyndrickx G, et al. A comparison of balloon-expandable-stent implantation with balloon angioplasty in patients with coronary artery disease. Benestent Study Group. *N Engl J Med* 1994;331:489-95.
- 3 Serruys PW, Unger F, Sousa JE, Jatene A, Bonnier HJ, Schonberger JP, et al. Comparison of coronary-artery bypass surgery and stenting for the treatment of multivessel disease. *N Engl J Med* 2001;344:1117-24.
- 4 SOS Investigators. *The stent or surgery (SOS) trial*. Orlando, FL: American College of Cardiology Scientific Sessions, 2001.
- 5 Seven-year outcome in the bypass angioplasty revascularization investigation (BARI) by treatment and diabetic status [see comments]. *J Am Coll Cardiol* 2000;35:1122-9.
- 6 Bhatt DL, Marso SP, Lincoff AM, Wolski KE, Ellis SG, Topol EJ. Abciximab reduces mortality in diabetics following percutaneous coronary intervention. *J Am Coll Cardiol* 2000;35:922-8.
- 7 Lincoff AM, Tcheng JE, Cabot CF, Califf RM, Booth JE, Sapp S, et al. Marked benefit in diabetic patients treated with stent and abciximab combination: 6 month outcome of the EPISTENT trial. *J Am Coll Cardiol* 1999;133:45A.
- 8 Leon M for the Sirius Trial Investigators, Paris Course on Revascularization (EuroPCR), Paris, France, 2002.
- 9 Morice M-C, Serruys PW, Sousa E, Fajadet J, Hayashi EB, Perin M, et al. A randomized comparison of a sirolimus-eluting stent with a standard stent for coronary revascularisation. *N Engl J Med* 2002;346:1773-80.

The full version of
this article appears
on bmj.com

Socioeconomic and ethnic group differences in self reported health status and use of health services by children and young people in England: cross sectional study

Sonia Saxena, Joseph Eliahoo, Azeem Majeed

Research and
Development
Directorate,
University College
London Hospitals
NHS Trust, London
NW1 2LT

Sonia Saxena
lecturer in primary
care

Joseph Eliahoo
statistician

School of Public
Policy, University
College London,
London
WC1H 9QU

Azeem Majeed
professor

Correspondence to:
S Saxena
sonia.saxena@pcps.ucl.ac.uk

BMJ 2002;325:520-3

Abstract

Objectives To examine whether self reported health status and use of health services varies in children of different social class and ethnic group.

Design Cross sectional study from the 1999 health survey for England.

Subjects 6648 children and young adults aged 2-20 years.

Setting Private households in England.

Main outcome measures Proportion of children (or their parents) reporting episodes of acute illness in the preceding fortnight and prevalence of self reported longstanding illness. Proportion reporting specific illnesses. Proportion reporting that they had consulted a general practitioner in the preceding fortnight, attended hospital outpatient departments in the three preceding months, or been admitted to hospital in the preceding year.

Results Large socioeconomic differences were observed between ethnic subgroups; a higher

proportion of Afro-Caribbean, Indian, Pakistani, and Bangladeshi children belonged to lower social classes than the general population. The proportion of children and young adults reporting acute illnesses in the preceding two weeks was lower in Bangladeshi and Chinese subgroups (odds ratio 0.41, 95% confidence interval 0.27 to 0.61 and 0.46, 0.28 to 0.77, respectively) than in the general population. Longstanding illnesses was less common in Bangladeshi and Pakistani children (0.52, 0.40 to 0.67 and 0.57, 0.46 to 0.70) than in the general population. Irish and Afro-Caribbean children reported the highest prevalence of asthma (19.5% and 17.7%) and Bangladeshi children the lowest (8.2%). A higher proportion of Afro-Caribbean children reported major injuries than the general population (11.0% v 10.0%), and children from all Asian subgroups reported fewer major and minor injuries than the general population. Indian and Pakistani children were more likely to have consulted their general