

WHAT IS ALREADY KNOWN ON THIS TOPIC

The risk of suicide during treatment with commonly prescribed selective serotonin reuptake inhibitors and tricyclic antidepressants is similar, but the risk with venlafaxine has not been evaluated in population based studies

WHAT THIS STUDY ADDS

Venlafaxine users were more likely to commit or attempt suicide than patients using citalopram, fluoxetine, or dothiepin

Venlafaxine users had a higher burden of suicide risk factors at start of treatment; adjustment for measured confounders reduced the excess risk

Because residual confounding was possible, the elevated risk of suicide associated with venlafaxine therapy should not be seen as causal

on mortality, including cause of death.^{3,9} None the less, in secondary data cause of death is associated with some misclassification, particularly as completed suicide is most often unwitnessed and loaded with stigma. We therefore cannot rule out potential misclassification and underascertainment, although we anticipate that misclassification of completed suicides is less likely among people with severe depression (venlafaxine users), who would be closely monitored. Attempted suicide is a less clearly defined outcome, and misclassification could occur.

Conclusions

We found a higher risk of suicide associated with venlafaxine compared with citalopram, fluoxetine, and dothiepin, which could reflect a causal association. However, because venlafaxine was channelled towards patients with more severe and treatment resistant depression, adjustment for measured risk factors could have left residual confounding that could explain some or all of the excess risk associated with venlafaxine.

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Contributors: See bmj.com.

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Competing interests: All other authors have no personal financial interest in the drug studies. RTI Health Solutions has received research funding from several companies, including Lilly, GlaxoSmithKline, and Pfizer, who market antidepressants and potentially gain or lose financially from the results of the study.

Ethical approval: This study was approved by the institutional review board at RTI International and the General Practice Research Database Scientific and Ethical Advisory Group.

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IQ in childhood and vegetarianism in adulthood: 1970 British cohort study

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ABSTRACT

Objective To examine the relation between IQ in childhood and vegetarianism in adulthood.

Design Prospective cohort study in which IQ was assessed by tests of mental ability at age 10 years and vegetarianism by self-report at age 30 years.

Setting Great Britain.

Participants 8170 men and women aged 30 years participating in the 1970 British cohort study, a national birth cohort.

Main outcome measures Self-reported vegetarianism and type of diet followed.

Results 366 (4.5%) participants said they were vegetarian, although 123 (33.6%) admitted eating fish or chicken. Vegetarians were more likely to be female, to be of higher social class (both in childhood and currently),

and to have attained higher academic or vocational qualifications, although these socioeconomic advantages were not reflected in their income. Higher IQ at age 10 years was associated with an increased likelihood of being vegetarian at age 30 (odds ratio for one standard deviation increase in childhood IQ score 1.38, 95% confidence interval 1.24 to 1.53). IQ remained a statistically significant predictor of being vegetarian as an adult after adjustment for social class (both in childhood and currently), academic or vocational qualifications, and sex (1.20, 1.06 to 1.36). Exclusion of those who said they were vegetarian but ate fish or chicken had little effect on the strength of this association.

Conclusion Higher scores for IQ in childhood are associated with an increased likelihood of being a vegetarian as an adult.

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INTRODUCTION

Children and adolescents who score higher on standard tests of intelligence have a lower risk of coronary heart disease in later life.^{1,3} The underlying mechanisms are still unclear. Findings that higher intelligence is linked with a lower likelihood of starting to smoke^{4,5} and a higher likelihood of giving up,⁶ suggest that the ability to learn, reason, and solve problems may be important in determining how people respond to information on risk.⁷

Vegetarianism has for centuries been adopted primarily because of objections to the use of animals for food. According to Benjamin Franklin, a vegetarian diet results in "greater clearness of head and quicker comprehension."⁸ But in the early part of the 20th century medical opinion on the potential benefits of a vegetarian diet was unenthusiastic: "Vegetarianism is harmless enough, though it is apt to fill a man with wind and self-righteousness," declared Robert Hutchison in an address to the BMA in 1930. In the past few years, however, growing epidemiological evidence suggests that the benefits from vegetarianism may be considerable: lower serum cholesterol concentrations, lower blood pressure, and a reduced risk of obesity and coronary heart disease.⁹⁻¹¹

We used the 1970 British cohort study to examine prospectively the effect of childhood IQ on the likelihood of being a vegetarian as an adult.

METHODS

The 1970 British cohort study comprises 17 198 live births in Great Britain between 5 and 11 April 1970. Mental ability was assessed at age 10 years using a modified version of the British ability scales, with four subscales for word definitions, word similarities, recall of digits, and matrices.¹² We carried out a principal components analysis of the positively correlated scores from these tests to establish the presence of a general cognitive ability factor ("g").¹³ We saved g scores for participants on the basis of the first unrotated principal component from the principal components analysis. We transformed the g score to the IQ equivalent: mean (SD) 100 (15). At age 30 participants were asked about being vegetarian and diet followed. Information on socioeconomic status was reported by the parents when participants were 10 (parental occupational social class) and by the participants when 30 (current occupational social class, academic or vocational qualifications, and income). Overall 11 204 participants provided information on vegetarian status at 30 years, of whom 8170 (72.9%) had data on IQ score at age 10 and were included in our analyses.

We used analysis of covariance and the χ^2 test to examine the characteristics of the participants, and logistic regression to examine prospectively the relation between childhood IQ score and later vegetarianism.

RESULTS

In total 366 (4.5%) of 8170 participants of the 1970 British cohort study with IQ scores at age 10 years said they were vegetarian: nine (2.5%) were vegan

and 123 (33.6%) said they were vegetarian but consumed fish or chicken. Vegetarians were more likely to be female, to be of a non-manual occupational social class (in childhood and currently), and to have higher academic or vocational qualifications (see bmj.com): 8.5% of vegetarians (n=31) had a higher degree or equivalent vocational qualification compared with 3.5% of non-vegetarians (n=275). This evidence of higher socioeconomic status was not reflected in the vegetarians' annual income, which was similar to that of non-vegetarians. When strict vegetarians were compared with vegetarians who consumed fish or chicken, no differences were found between them in any of these characteristics (data not shown).

IQ in childhood was associated with all indicators of socioeconomic status. Mean childhood IQ was higher in participants from non-manual occupational backgrounds, both in childhood and currently; in those with higher academic or vocational qualifications; and in those with higher annual gross earnings (data not shown).

On average, vegetarians had a higher childhood IQ score than non-vegetarians. The mean (SD) childhood IQ score for vegetarians compared with non-vegetarians was 106.1 (14.7) and 100.6 (15.2) for men and 104.0 (14.1) and 99.0 (14.7) for women, differences of 5.5 and 5.0 points (P<0.001).

No difference was found in IQ score between those who were strictly vegetarian and those vegetarians who consumed fish or chicken. Among vegetarians who were vegan, mean IQ scores were lower. On average, vegans had a childhood IQ score that was nearly 10 points lower than other vegetarians: mean (SD) IQ score 95.1 (14.8) in vegans compared with 104.8 (14.1) in other vegetarians (P=0.04), although this should be viewed with caution as only nine participants were vegan.

The odds ratio for being vegetarian at age 30 for one standard deviation increase in childhood IQ score was 1.38 (95% confidence interval 1.24 to 1.53; table). After controlling for sex, this odds ratio increased to 1.42 (1.28 to 1.59). Separate adjustment for social class, both in childhood and currently, and academic or vocational qualifications, attenuated these relations, particularly when academic or vocational qualifications were added to the model—but the associations remained statistically significant. In multivariate analysis the odds ratio for being vegetarian was 1.20 (1.06 to 1.36) for one standard deviation increase in childhood IQ score. When the analysis was repeated after removing those who said

Odds ratios (95% CI) for being vegetarian at age 30 years for a one standard deviation increase in childhood IQ score in 8170 participants of the 1970 British cohort study

Adjustments	Odds ratio
Unadjusted	1.38 (1.24 to 1.53)
Sex	1.42 (1.28 to 1.59)
Parental social class	1.35 (1.21 to 1.51)
Current social class	1.29 (1.15 to 1.45)
Academic or vocational qualifications	1.16 (1.03 to 1.30)
All	1.20 (1.06 to 1.36)

they were vegetarian but consumed fish or chicken, this result was essentially unchanged (1.19, 1.03 to 1.39). Additional adjustment for annual earnings had no effect on the strength of the relation between childhood IQ and later vegetarianism (data not shown).

DISCUSSION

Participants of the 1970 British cohort study with higher intelligence test scores in childhood were more likely to report being a vegetarian at age 30 years. This relation was partly accounted for by educational attainment and by occupational social class in adult life but remained statistically significant after adjustment for these factors.

Several investigators have examined the link between education (a strong correlate of mental ability¹⁴) and vegetarianism, but findings are mixed. Pooled data from a meta-analysis of vegetarianism and mortality¹⁰ showed that of four studies reporting data on educational attainment two showed higher levels in vegetarians than in non-vegetarians, whereas in two other studies the opposite association was seen. In previous analyses of the 1970 British cohort study, a greater consumption of non-meat products, such as bread and fresh fruit, was apparent in people with high educational attainment.¹⁵

Although the vegetarians in this cohort were, on average, more intelligent, better educated, and of higher occupational social class than the non-vegetarians, these advantages were not reflected in their income. It may be that ethical considerations determined not just diet but also employment. Vegetarians were less likely than non-vegetarians to be working in the private sector and more likely to be working in charitable organisations, local government, or education.

Some of the reported vegetarians said they consumed fish or chicken. We found no difference in IQ scores, or any marker of socioeconomic status, between this group and the strict vegetarians. It may be that vegetarianism exists as a continuum, with those who describe themselves as vegetarian but who are prepared to eat white meat or fish having the same trait but less of it than those who avoid consuming animal flesh.

The strengths of this study are its size, the representativeness of the sample for the British population born around the same time, and the breadth of data on socioeconomic status.

Our study also has some limitations. Firstly, some attrition has occurred in the cohort over time. Participants at the 30 year follow-up did gain significantly higher IQ scores at age 10 than non-participants, although the size of the differences was modest (0.3 of a standard deviation). Unless the relation between childhood mental ability and vegetarianism is in the opposite direction in non-participants, little bias will have been introduced in our study. Secondly, we had no information on how long our participants had been vegetarian. Evidence from a subset of 3795 participants (46.5%) followed up at age 16 years suggests that most of those who were vegetarian at age 30 had chosen vegetarianism as adolescents or young

WHAT IS ALREADY KNOWN ON THIS TOPIC

Vegetarianism may be viewed by those of higher intelligence as a healthier option than consuming meat

WHAT THIS STUDY ADDS

Higher scores for IQ in childhood are associated with an increased likelihood of vegetarianism in adulthood

adults, some years after their IQ was measured. The difference in childhood IQ scores between vegetarians and non-vegetarians at age 30 was also apparent at age 16; compared with non-vegetarians at this age, vegetarians scored on average 4.1 points higher on the mental ability test at age 10.

Although our results suggest that children of higher intelligence may be more likely to become vegetarian in later life, it does not rule out the possibility that such a diet might have some beneficial effect on subsequent cognitive performance.

Our finding that children with greater intelligence are more likely to report being vegetarian as adults, coupled with evidence on the potential benefits to cardiovascular health of a vegetarian diet, may help to explain why higher IQ in childhood or adolescence is linked with a reduced risk of coronary heart disease in adult life. Alternatively, it is possible that the link between childhood IQ and vegetarianism in later life is not on a causal chain of mechanisms related to health. People with a higher IQ may well differ from those with less superior brain power in many of their lifestyle decisions: for instance, choice of newspaper, type of books read, preferred form of entertainment. The association between IQ and vegetarianism may be merely an example of many other lifestyle preferences that might be expected to vary with intelligence, but which may or may not have implications for health.

The 10 year follow-up was carried out by the Department of Child Health, Bristol University. The 30 year follow-up was carried out under the auspices of the Joint Centre for Longitudinal Research (comprising the Centre for Longitudinal Studies, Institute of Education, University of London; the International Centre for Health and Society, University College Medical School, London; and the National Centre for Social Research). We thank the UK Data Archive, University of Essex, for providing the data. The original data creators, depositors, or copyright holders, the funding agencies, and the UK Data Archive bear no responsibility for the analyses and interpretation presented here. GDB is a Wellcome fellow. IJD is the recipient of a Royal Society-Wolfson Research merit award.

Contributors: See bmj.com.

Competing interests: CRG and GDB are lapsed vegetarians, IS is a committed vegetarian, and IJD is an omnivore. The IQs of three of the authors have never been tested; IJD opts not to disclose.

Ethical approval: Not needed.

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BMJ UPDATES

Drug eluting stents don't reduce mortality in the long term compared with bare metal stents

Research question

What are the comparative long term death rates associated with bare metal and drug eluting stents in people with coronary heart disease?

Answer

Drug eluting stents offer no long term survival advantage, and questions remain about their long term safety

Why did the authors do the study?

Bare metal stents and drug eluting stents are both established treatments for coronary artery disease, and there's some evidence that the drug eluting stents make restenosis less likely in the short term. They may, however, be associated with rare but potentially catastrophic late failure. These authors wanted to compare the two types of stent over a long period, looking specifically at the risk of death up to four years after implantation.

What did they do?

They searched systematically for all randomised controlled trials comparing drug eluting and bare metal stents in patients with coronary artery disease. Their search included research databases, resources dedicated to reviewing and disseminating trial results, experts, reference lists from identified trials, conference proceedings, trial investigators, and stent manufacturers. They found 17 head to head trials including a total of 8221 patients who were followed up for between one and four years. They assessed the trials for quality, and most were good.

These authors did various analyses comparing the overall mortality, cardiac mortality, and non-cardiac mortality associated with the two types of stent after one, two, three, and four years of follow up. They also did separate analyses for stents eluting paclitaxel or sirolimus.

What did they find?

The overall mortality associated with bare metal stents was not significantly different from that for drug eluting stents at any time point up to four years (odds ratios (95% CI) for death were 0.94 (0.66 to 1.34), 1.11 (0.76 to 1.61), 1.25 (0.91 to 1.73), and 1.46 (0.92 to 2.31) at one, two, three, and four years). The authors also found no differences in cardiac mortality. For non-cardiac death, however, drug eluting stents were significantly riskier over two years (odds ratio 1.72 (1.01 to 2.94)). The risk was still increased, but not significantly, at three and four years of follow up (1.45 (0.93 to 2.25) and 1.65 (0.89 to 3.10)). In sensitivity analyses, the excess non-cardiac deaths were confined to trials of sirolimus eluting stents.

What does it mean?

These analyses suggest that popular drug eluting stents save no more lives in the long term than traditional bare metal stents. They also hint at long term problems with some drug eluting stents, leading to a possible increase in the risk of non-cardiac death. The excess deaths were mostly from cancer, stroke, and infectious diseases, and it's still unclear how these deaths might be linked to a drug eluting stent. These authors were unable to inform the ongoing debate about late restenosis. In their analysis, drug eluting stents were no more prone to restenosis after 30 days than bare metal stents, but events were rare, so these findings are inconclusive. The long term safety of these widely used devices remains unresolved.

Nordmann et al. Mortality in randomized controlled trials comparing drug-eluting vs. bare metal stents in coronary artery disease: a meta-analysis. *European Heart Journal* 2006;27:2784-814

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