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(Accepted 11 June 2000)

Mortality in joggers: population based study of 4658 men

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BMJ 2000;321:602–3

Since 1970 jogging has become an increasingly popular form of exercise, but the public's concern over its harmful effects has been raised following reports of deaths during jogging. During the past two or three decades the number of joggers and jogging races has increased further, prompting an interest in mortality of joggers.

Participants, methods, and results

The Copenhagen city heart study is a prospective population study of cardiovascular disease in 19 698 men and women aged 20 years and over randomly selected from the population of Copenhagen.[1] Overall, 4658 men (response rate 72%) aged 20-79 years with no prior myocardial infarction attended two examinations—one in 1976-8 and the other in 1981-3. Jogging status was ascertained by asking the participants whether they were joggers. The cohort was followed until 30 November 1998. Information about deaths was obtained from the Danish national population register, which is almost 100% complete.

We observed a major trend in jogging habits over the five year period between the first and second examination. At the first examination, 217 (4.7%) men reported active jogging. Of these, 96 (2.1%) were still actively jogging five years later. Between the two examinations, 106 (2.3%) started jogging, showing an almost constant number of joggers. Overall, 4335 men were non-joggers at both examinations. Crude estimates of death rates showed a higher mortality among non-joggers and a lower mortality among persistent joggers.

An analysis of the influence of jogging on time to death was conducted by using a Cox proportional hazards regression model, with age as the time axis.[2] In addition to jogging, the model included diabetes, smoking, household income, education, and alcohol consumption as potential confounding variables, and systolic blood pressure, concentrations of plasma total cholesterol and plasma high density lipoprotein cholesterol, and body mass index as intermediate variables. A significant effect of jogging was found only for the group that were joggers at both examinations, with an estimated relative risk of 0.37 (95% confidence interval, 0.19 to 0.71; P = 0.003). Jogging was therefore included as a binary variable in the final model: persistent jogging or no jogging or jogging at only one of the two examinations. The relative risk of death in persistent joggers was significantly lower than that in non-joggers or those who jogged at only one of the two examinations (0.39, 0.19 to 0.73; P = 0.005) (table). Similar results were found when including only potential confounding variables.

Comment

Regular jogging is not associated with increased mortality in men, as shown by the significantly lower mortality in joggers than non-joggers in our study. The lower mortality of joggers could be an effect of the physical training, but it could also be due to other life-

Jogging and relative risk of death*

	Relative risk of death (95% CI)	P value†
Jogging at examination:		
No or only at one	1.0	
At both	0.39 (0.19 to 0.73)	0.005
Diabetes:		
No	1.0	
Yes	1.75 (1.58 to 1.92)	<0.001
Smoking:		
No	1.0	
Yes	1.74 (1.57 to 1.91)	<0.001
Household income		
Middle or high	1.0	
Low	1.21 (1.09 to 1.33)	<0.001
Education:		
<10 years	1.0	
⩾10 years	0.91 (0.82 to 0.99)	0.04
Alcohol consumption per week:		
<21 drinks	1.0	
Abstainers	1.16 (1.01 to 1.32)	0.03
>21 drinks	1.35 (1.19 to 1.53)	0.001

*Intermediate variables were systolic blood pressure, concentration of plasma total cholesterol and plasma high density lipoprotein cholesterol, and body mass index. Relative risks (from Cox regression model) are shown only for categorical variables.
†Two tailed.

style attributes or a combination of both. Numerous studies in the disciplines of epidemiology, work physiology, psychology, and biochemistry have all pointed towards a beneficial effect of physical activity on health, but the optimal intensity, frequency, and duration of physical activity has yet to be established.

Although our study was observational, the men were randomly selected from a general population. The estimated effect of jogging did not depend on the inclusion of intermediate variables, supporting the association of jogging with lower mortality.

Whether light, moderate, or vigorous exercise should be recommended to the public has changed through the years. Although light exercise has some value, moderate and vigorous exercise is now considered more favourable for health.[3 4] Our study supports this by showing that even a vigorous activity such as jogging is associated with a beneficial effect on mortality.

Contributors: PS initiated and conducted the study and contributed to the writing of the manuscript with PL. JP was responsible for the statistical analysis of the data and contributed to the writing. PS will act as guarantor for the paper.

Funding: Danish Heart Foundation.

Competing interests: None declared.

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(Accepted 11 May 2000)

Is evidence based medicine neglected by royal college examinations? A descriptive study of their syllabuses

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Although the value of evidence based medicine has been debated,[1] the benefits of teaching it to undergraduates[2] and postgraduates[3] have been shown and have been acknowledged in the development of the new undergraduate medical curriculum.[4] However, lack of adequate training is a major obstacle to postgraduates.[3]

Evidence based medicine has four distinct steps[5]: formulate clear clinical questions from a patient's problem; search the literature for relevant articles; evaluate the evidence for its validity and usefulness; apply useful findings in clinical practice.

This report examines the level of skills in evidence based medicine that are formally assessed by the royal colleges in the United Kingdom, through a review of the colleges' syllabuses for postgraduate examinations that are compulsory for specialist training.

Methods and results

We reviewed all syllabuses in effect on 20 October 1999 that were held by 16 faculties or royal colleges in the United Kingdom, representing 15 major specialties. Surgical examinations (held by three royal colleges) were reviewed separately. Subspecialties in surgery and pathology were grouped as a single specialty. Radiology and oncology, which are both examined by the Royal College of Radiologists, were analysed separately.

We reviewed each syllabus to determine whether the skills required for the four steps in evidence based medicine were assessed. The authors initially reviewed the syllabuses independently, and any disagreements (of which there were very few) were resolved by discussion. Where it was clear from the syllabus that a specific section of the examination is dedicated to examining skills in evidence based medicine, we obtained sample or past papers if available.

These skills were not substantially assessed in seven of a total of 17 syllabuses, for five out of 15 major specialties represented: general medicine, surgery, paediatrics, ophthalmology, and radiology. (We did not regard assessment of basic statistics alone as adequate for step three.) A dedicated section of the examination explicitly assesses these skills in five syllabuses (table). Most of these five syllabuses focus on the candidates' ability to evaluate the evidence for validity, but emphasis varies on the skills in evaluating the evidence for its usefulness, formulating a clear clinical question, searching for relevant literature, and implementing useful findings in clinical practice. In the remaining five syllabuses in which skills in evidence based medicine are mentioned (see tables on *BMJ* website), there are no dedicated procedures for examining these skills in anaesthetics, obstetrics and gynaecology, and oncology; in pathology and occupational health, candidates have to submit a dissertation with original research data.

Comments

One third of the specialties do not assess skills in evidence based medicine in their examination system. Examinations often exert a steering effect on the curriculum, and it would be difficult for future doctors to keep their professional knowledge and skills up to date unless these skills are learnt during training and are regularly applied in clinical practice.

Two thirds of the postgraduate examinations have no dedicated sections for the examination of skills in evidence based medicine. Even in syllabuses where these skills are examined, this is generally limited to skills in evaluating the evidence for validity. However,

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BMJ 2000;321:603–4

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Tables showing examinations in which skills in evidence based medicine are and are not assessed are on the BMJ's website.