

SCIENTIFIC LETTER

Lifetime physical activity patterns and risk of coronary heart disease

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The beneficial effect of physical activity on cardiovascular morbidity and mortality and on all cause mortality is widely acknowledged.¹ However, most of the studies mainly or exclusively relied on reported current activity patterns and investigated mortality measures. In particular, consequences of changing physical activity patterns on cardiovascular disease morbidity have rarely been described.²

We therefore thoroughly reanalysed a case–control study of patients with stable coronary heart disease (CHD) to describe lifetime physical activity patterns and to estimate the risk for CHD associated with lifetime physical activity patterns after careful adjustment for other established risk factors.

METHODS

A detailed description of the study design and methods has been reported in a previous paper on the effects of current physical activity levels on CHD risk and the inflammatory response profile.³ Briefly, 312 patients aged 40–68 years with stable, angiographically confirmed CHD were enrolled. The control group consisted of 479 volunteers who were occasional blood donors and were frequency matched with the patient group for age and sex. The participation rate was 78% of eligible patients and 84% of eligible controls. The study was approved by the ethics committee of the University of Ulm.

Each participant was interviewed about physical activity patterns during each of the following age spans: 20–39 years, 40–49 years, 50 years and older. Physical activity within each age span was rated on a four-level ordinal scale (rarely active, a little active, somewhat active and very active). The physical activity patterns between 20–39 (referred to as early adulthood) were compared with the physical activity patterns in later adulthood, defined as 40–49 years for participants younger than 50 years at recruitment (22% of total) and as 50 years and older for participants aged 50 years or older (78% of total).

RESULTS

In total, 791 participants were enrolled in the study: 312 patients with stable CHD (85.6% men, mean age 57.7 (SD 7.4) years) and 479 controls matched for age and sex (mean age 55.8 (7.2) years). Established cardiovascular risk factors such as history of cigarette smoking, hypertension and diabetes were more unfavourably distributed among patients with CHD than among controls.

Table 1 shows the change of self-reported physical activity patterns between early and later adulthood: 10.6% of patients with CHD and 6.3% of controls reported having been rarely or a little physically active in both life spans; and 56.4% of patients with CHD and 71.4% of controls reported a somewhat or very active physical activity pattern in both life spans. The independent association between physical activity patterns and risk of CHD was then quantified by means of

unconditional logistic regression analysis (table 1). Compared with participants who reported having been rarely or a little physically active in both life spans, those who changed their physical activity pattern to a somewhat or very active lifestyle had an odds ratio (OR) for CHD of 0.45 (95% confidence interval (CI) 0.17 to 1.19). When this category was broken up, it became evident that the risk reduction was driven by participants who changed their physical activity pattern from rare or a little physical activity before age 40 to very active activity in later adulthood (OR 0.10, 95% CI 0.02 to 0.46).

Participants who reported a somewhat or very active physical activity pattern between age 20–39 years and a change to rare or little physical activity in later adulthood had an OR of 0.65 (95% CI 0.33 to 1.30) compared with those with rare or little physical activity in both life spans. Lastly, participants with a somewhat or very active physical activity pattern in both life spans had an OR for CHD of 0.38 (95% CI 0.20 to 0.72) in comparison with those reporting rare or little physical activity in both life spans after adjustment for covariates.

Results were similar when the analysis was restricted to participants aged 50 or over ($n = 616$) and the physical activity pattern between 20–39 years was compared with that between 40–49 years to reduce the likelihood that the reported behaviour change was a consequence of the disease manifestation.

DISCUSSION

In this case–control study of patients with angiographically defined and stable CHD we found a strong and independent inverse association between a more intense physical activity pattern in adulthood and CHD morbidity. These results suggest that keeping up a physically active lifestyle in adulthood may be beneficial for preventing CHD in later life. Furthermore, these data provide evidence that changing from a sedentary to an active physical activity pattern, even if initiated at older age, may result in a strong reduction of CHD risk.

The benefits of vigorous physical activity on cardiovascular disease morbidity and mortality have been well documented, and accumulating evidence suggests that engaging in even moderate physical activity is beneficial in preventing CHD.¹ These effects are seen even with simple activities such as low-intensity walking, which may lead to considerable reductions in mortality,⁴ and they have also been reported for older people.

Besides the limitations of a case–control study such as retrospective ascertainment of behavioural patterns over decades, which implies the potential of recall bias, it should be kept in mind that we assessed physical activity by self-reports on a simple ordinal scale without measuring physical fitness. However, relative assessment of physical activity by self-reports correlates well with measured physical fitness

Table 1 Self-reported physical activity patterns in early and later adulthood in patients with CHD and controls matched for age and sex with crude and adjusted ORs for CHD associated with physical activity

Physical activity pattern		Total no	Patients with CHD	Controls	p Value	OR for CHD (95% CI)	
In early adulthood*	In later adulthood†					Partly adjusted‡	Multivariable adjusted§
Rarely or a little active	Rarely or a little active	63	33 (10.6%)	30 (6.3%)		1 (reference)	1 (reference)
Rarely or a little active	Somewhat or very active	36	16 (5.1%)	20 (4.2%)		0.64 (0.28 to 1.46)	0.45 (0.17 to 1.19)
	<i>Somewhat active</i>	19	12 (3.9%)	7 (1.5%)		1.39 (0.47 to 4.10)	1.44 (0.42 to 4.93)
	<i>Very active</i>	17	4 (1.3%)	13 (2.7%)		0.24 (0.07 to 0.84)	0.10 (0.02 to 0.46)
Somewhat or very active	Rarely or a little active	174	87 (27.9%)	87 (18.2%)		0.75 (0.42 to 1.37)	0.65 (0.33 to 1.30)
Somewhat or very active	Somewhat or very active	518	176 (56.4%)	342 (71.4%)	0.0002‡	0.39 (0.23 to 0.67)	0.38 (0.20 to 0.72)

*20–39 years old.

†40–49 years old if <50 years and ≥50 years otherwise.

‡Difference between the four main categories adjusted for age and sex.

§Adjusted for age, sex, body mass index, education level, occupational physical strain, cigarette smoking, alcohol consumption, history of hypertension and history of diabetes.

CHD, coronary heart disease; OR, odds ratio.

and it even seems to correspond better with disease end points than an absolute measure of physical fitness, especially for older people.⁵

Physical activity patterns may differ between men and women, and sample size limitations did not allow for sex-specific analyses; however, all presented results were controlled for sex. Despite the moderate size of the study, overall, some of the comparisons were based on small numbers, leading to rather wide confidence intervals. In particular, the apparently increased risk for participants who changed from rarely or a little active to somewhat active needs to be interpreted with caution given the wide confidence intervals.

In conclusion, our results suggest that a more active physical activity pattern is clearly associated with a reduced risk of CHD, and that changing from a sedentary to a more physically active lifestyle even in later adulthood may strongly decrease CHD risk.

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