Original Article

Relationship Study between Exercise and Acute Myocardial Infarction in Different Time Periods

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Abstract

Objectives: The aim of the study was to explore the association between different time periods and acute myocardial infarction. **Methods:** In the study, 124 patients with coronary heart disease were selected as the study participants, and they were divided into observation group and control group averagely, with 62 patients in each group. The control group chose not to exercise, the observation group chose to exercise, and they were divided into morning exercise group and the evening exercise group. The exercise information of patients was collected by the questionnaire, and the relationship between different sports intensity, different movement frequency, duration of different movement, and movement in different time periods was compared with that of acute myocardial infarction. **Results:** The corrected odds ratio (OR) value of the observation group and the control group was 0.68, and the incidence of acute myocardial infarction was lower in the case of exercise. Different exercise intensity, different exercise frequency, different exercise duration, and different time periods have an important impact on the occurrence of acute myocardial infarction. If the exercise intensity is high, the frequency is high, and the duration is long, they can prevent myocardial infarction. Compared with the control group, the observation group morning exercise group and evening exercise group correction values of OR were 0.61 and 0.57, the difference is distinct, and the difference was statistically significant ($P < 0.05$). Compared with the morning exercise group, the risk of acute myocardial infarction was 0.92. **Conclusions:** The risk of acute myocardial infarction in patients with coronary heart disease with high exercise intensity, high frequency, and long duration was lower. Moreover, an exercise in the morning and evening had a similar protective effect on the prevention of acute myocardial infarction.

Keywords: Coronary heart disease, morning exercise, myocardial infarction

Introduction

Now in the world, cardiovascular disease has become the first cause of death in human beings, and the number of people dying from heart disease is increasing every year. According to the latest WHO report, in 2017, an estimated 17 million 500 thousand people died of cardiovascular diseases, accounting for 31% of the world's deaths. Of these deaths, about 7 million 400 thousand people die from coronary atherosclerotic disease ("coronary heart disease"), accounting for 13.1% of the total number of deaths. Coronary heart disease is not only the most common cause of death in high-income countries but also the number of deaths caused by coronary heart disease in low- and middle-income countries.[1] Now, more than three-fourth of the world's coronary heart disease deaths occur in low- and middle-income countries. Acute myocardial infarction is the leading cause of cardiac death in patients with coronary heart disease, mostly caused by plaque rupture or erosion and coronary artery thrombosis. The occurrence of acute myocardial infarction can be induced by a variety of factors. The most common causes are emotional fluctuation, middle- and high-intensity physical activity, severe exercise, lack of sleep, and binge eating and so on.[2]

Overview

Many previous studies have shown that physical activity is associated with the risk of coronary heart disease, whether it is casual physical activity, work-related physical activity, or exercise-related physical activity can reduce the risk of coronary heart disease. Exercise is a subclass of physical activity. It is

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planned, structured, and repetitive physical activity aimed at improving or maintaining the physical health. Exercise can prevent the progress of coronary heart disease and reduce the symptoms of patients with cardiovascular disease, which not only reduces the mortality of patients diagnosed with coronary heart disease but also increases the survival rate of patients with coronary heart disease.[3,4] As an effective measure to improve the personal health and reduce the risk of chronic diseases and disability, the exercise has been recommended to people. In recent years, exercise has also been widely promoted as an adjunctive therapy for vascular diseases. Although the benefits of exercise have been recognized, some studies have shown that, even in healthy people, there is still a phenomenon of sports triggering and opportunistic death.[5] This results in people's worries about sports, especially for patients with coronary heart disease.

Methods

This study uses a case-control strategy to control the effects of known confounding factors (such as the patient's age and place of residence). In the study, 124 patients with coronary heart disease were selected as the study participants, and they were divided into observation group and control group averagely, with 62 patients in each group. The control group chose not to exercise, the observation group chose to exercise, and they were divided into morning exercise group and the evening exercise group. The types of sports are classified according to the Baecke Physical Activity Questionnaire. The patient responded to the questionnaire by reporting the intensity, duration, frequency, and time period of the exercise. We provide 14 kinds of sports items that are most common in China as options, including walking, jogging, slow cycling, fast cycling, square dancing, slow swimming, fast swimming, soldiers' ball, clever hairball, tennis, basketball, other aerobic exercises, Tai Chi, and soft initial exercise. Each activity has its own activity code and metabolic equivalent (MET) strength, and various motions are divided into high-intensity exercise, medium-intensity exercise, and low-intensity exercise according to the METs.[6] We have also introduced the concept of overall energy activity expenditure. Energy expenditure in physical activity (EEPA) combines exercise intensity, exercise duration, and exercise frequency. It can be converted to total exercise in units of (MET * min)/week. According to the habitual movement of patients, they were divided into two groups. The patients who exercised between 6:00 and 10:00 were the morning exercise group, and the patients who exercised between 18:00 and 22:00 were the evening exercise group. The general information of the research object is shown in Table 1.

Table 1: General information of the research object

Basic features	(MET * min)/week	*P*
Year	62.7±11.7	0.057
Gender		
Male	79.9	
Female	20.1	
Left ventricular ejection fraction (%)	55.4±10.8	<0.001
BMI (kg/m^2)	24.6±3.4	0.090
Family history of coronary heart disease (%)	17.8	0.024
History of hypertension (%)	52.6	<0.001
Diabetes history (%)	19.8	0.019
History of lipid metabolism disorders (%)	71.8	0.854

BMI: Body mass index

Results

Table 2 shows that athletes are less likely to have acute or myocardial infarction than those who are not. Odds ratio

Table 2: Association between exercise and acute and muscular infarct

Motion variable	Acute myocardial infarction (%)	OR (95%CI)	Correction OR[b] (95%CI)	*P*
Movement				
No	50	1	1	∉
Yes	50	0.64 (0.48-0.87)	0.67 (0.47-0.94)	∈0.023
Exercise intensity				
None	50	1	1	
Low intensity	33.9	0.71 (0.51-0.99)	0.80 (0.55-1.18)	0.259
Medium strength	9.4	0.67 (0.37-1.23)	0.60 (0.30-1.20)	0.150
High strength	6.9	0.42 (0.25-0.73)	0.39 (0.22-0.73)	0.003
Exercise duration (min/day)				
None	50	1	1	
<30	6.9	0.79 (0.37-1.72)	0.81 (0.34-1.93)	0.637
30-60	17.0	0.59 (0.39-0.87)	0.65 (0.41-1.02)	0.062
>60	26.1	0.67 (0.47-0.95)	0.67 (0.47-0.99)	0.048
Exercise frequency (times/week)				
None	50	1	1	
<3	8.9	1.52 (0.71-3.25)	1.87 (0.79-4.42)	0.155
3-5	4.0	0.53 (0.26-1.08)	0.94 (0.43-2.05)	0.869
>5	37.1	0.60 (0.44-0.83)	0.57 (0.39-0.82)	0.003

bStatistically significance ($P < 0.05$), ∉ - not an element of *P*, OR: Odds ratio, CI: Confidence interval

(OR) value is 0.64 (95% confidence interval (CI): 0.48–0.87; $P < 0.05$), the corrected OR value is 0.67 (95% CI: 0.47–0.94; $P \leq 0.05$). People with high-intensity exercise have a lower risk of acute myocardial infarction than those who do not exercise. The relationship between exercise and acute ischemic infarction is shown in Table 2.

Table 3 shows the association between exercise at different time periods and the occurrence of acute myocardial infarction.

Compared with the control group, the observation group morning exercise group and evening exercise group correction values of OR were 0.61 and 0.57, respectively; the difference is distinct, and the difference was statistically significant ($P < 0.05$). Compared with the morning exercise group, the risk of acute myocardial infarction was 0.92.

Table 3: Association of exercise and acute myoinfarction at different time stages

Movement	OR (95%CI)	Correction OR[b] (95%CI)	*P*
Morning exercise group (6:00-10:00)	0.52 (0.34-0.80)	0.61 (0.36-0.98)	0.042
Evening exercise group (18:00-22:00)	0.61 (0.42-0.90)	0.57 (0.37-0.87)	0.009
Morning exercise group (6:00-10:00)	1	1	
Evening exercise group (18:00-22:00)	1.18 (0.73-1.91)	0.92 (0.54-1.64)	0.824∉

bStatistically significance ($P < 0.05$), ∉- not an element of *P*, OR: Odds ratio, CI: Confidence interval, OR: Odds ratio, CI: Confidence interval

Conclusions

According to the results of this study, high-intensity exercise has a stronger protective effect against acute myocardial infarction than low-intensity exercise. We recommend that Chinese people perform high-intensity sports such as walking and jogging.

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Conflicts of interest

There are no conflicts of interest.

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