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A case-control study on environmental and familial risk factors for colorectal cancer in Hong Kong: physical activity reduces colorectal cancer risk

Key Messages

1. The public should be educated about the health hazards associated with a sedentary lifestyle and the benefits of increased physical activity.
2. Health care policies aiming at increasing the physical activity of the general population should include:
   a. Improvement in workplace policy and design to increase activity of sedentary workers by encouraging the use of stairs and incorporating exercise facilities close to offices.
   b. Increased accessibility of sports and recreational facilities to the public and increased emphasis on physical exercise lessons in the school curriculum.

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Introduction

Colorectal cancer is the most commonly investigated malignancy in relation to physical activity. Three previous studies on physical activity and colorectal cancer in different Chinese populations showed positive association between either occupation-related or leisure-time activity level with colon cancer. No convincing association could be found for rectal cancer.

In Hong Kong, like most developed countries, physical inactivity is the prevalent lifestyle. In one local study,[1] 59% of subjects did not exercise over a 1-month period; and less than 30% reported exercise for a duration of more than 30 minutes at least twice a week. The relationship of such sedentary lifestyle with colorectal cancer, the second commonest malignancy in Hong Kong, was unknown till now.

Methods

This report describes the results of a hospital-based case-control study conducted in three Hospital Authority hospitals from April 1998 to March 2000. We assessed, in a comprehensive manner using a validated questionnaire, the association of colorectal cancer with various types of physical activity, including occupation-related activity, leisure-time exercise, and overall activity pattern. Among 1120 and 960 subjects identified for the case and control groups, we recruited and interviewed 822 cases and 926 controls, respectively. This sample size was adequate for detecting an odds ratio of 1.8 for risk factors of uncommon (5%) exposure and 1.4 for risk factors of common (one third) exposure. The results were adjusted for potential confounders including energy and nutrient intakes, body build, smoking and drinking habits as well as hereditary predisposition.

Results

Association of overall activity pattern with colorectal cancer risk 2 years prior to interview

Cases slept for significantly longer duration than controls (mean weekly duration: 56.9±13.0 hours for cases and 54.9±13.2 hours for controls, $P<0.005$). Compared with those at the lowest tertile (<49.0 hours), subjects who slept for more than 59.5 hours per week had significantly increased colon and rectal cancer risk before and after adjustment of confounders ($OR_{adjusted\ colon\ cancers}=1.45$; 95% CI, 1.07-1.98; $OR_{adjusted\ rectal\ cancers}=1.82$; 95% CI, 1.29-2.25).

For the weekly duration spent in moderate to very active physical activities, those at the highest tertile (>38.5 hours) had a significantly lower risk of colorectal cancer than those at the lowest tertile (<29.2 hours) before and after adjustment for confounders ($OR_{adjusted}=9.75$; 95% CI, 0.58-0.97) [Fig 1].

Increasing intensity of weekly physical activity expressed as metabolic equivalent tasks (MET) hours per week resulted in progressive reduction in the risk of

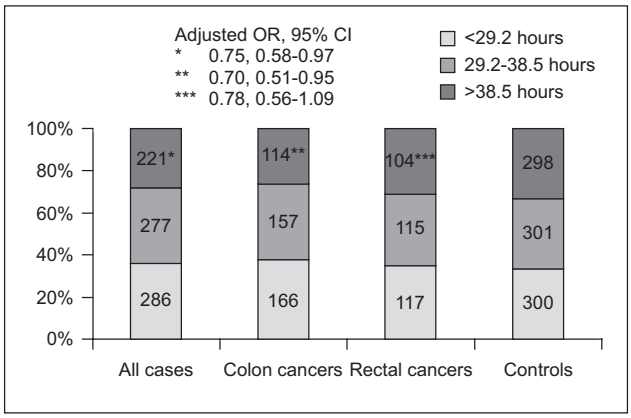

Fig 1. Weekly duration of moderate to active physical activities in tertiles and colorectal cancer risk

colorectal cancer in a dose-response manner ($OR_{adjusted\ mid\ tertile}$=0.91; 95% CI, 0.71-1.16 and $OR_{adjusted\ highest\ tertile}$=0.67; 95% CI, 0.52-0.87, P for trend 0.003). The results were the same for the subsites of colon and rectal cancers (P for trend 0.005 and 0.023, respectively) [Fig 2].

Lifelong job-related activity level and its association with colorectal cancer

There was no difference in the total working duration, the rate of retirement, and the duration of retirement between cases and controls.

Compared with sedentary jobs, those with jobs of medium and heavy activity level had significantly reduced risk of colorectal cancer, which persisted even after adjustment for potential confounders (P for trend 0.002) [Fig 3]. For rectal cancer, subjects with medium to heavy jobs had a significantly reduced risk when compared with those whose work activity was sedentary to light ($OR_{adjusted}$= 0.76; 95% CI, 0.58-0.99). When the data were reanalysed after exclusion of retired subjects, the same results were obtained (data not shown).

Association of leisure-time activity level with colorectal cancer risk 2 years prior to interview

At the reference date, 380 (46.7%) cases and 450 (49.0%) controls participated in some form of physical exercise in their leisure time (P>0.05). Only 5.0% of cases and 9.5% of controls exercised most days of the week. This reluctance in exercising agreed with previous local studies.[1-3] Moreover, the frequency of exercise in our controls, as stratified according to sex and age, was very similar to those from the subjects of the Hong Kong Cardiovascular Risk Factor Prevalence Study.[1] This finding suggested that the activity level of our hospital controls was very similar to that of the general population and information bias was minimal. Those who exercised at least 28 times a month had a significantly reduced risk of colorectal cancers than those who exercised less often ($OR_{adjusted}$=0.59; 95% CI, 0.39-0.89). On subsite analysis, the adjusted results remained significant for colon cancers ($OR_{adjusted}$=0.53; 95% CI, 0.31-0.89).

Combined assessment of all three aspects of activity level

Subjects were reclassified into five groups depending on the number of target activity levels achieved. Compared with subjects who achieved none of the target activity levels, those who achieved at least two activity levels had significantly reduced colon and rectal cancer risk. Moreover, the risk of colon and rectal cancer reduced with increasing combined activity level in a dose-response manner (P for trend 0.000 and 0.001 for colon and rectal cancer, respectively). The result remained the same after adjustment of potential confounders (Fig 4).

Conclusions

A sedentary lifestyle is associated with increased colon and rectal cancer risk in Hong Kong Chinese. Increases in physical activity level resulted in progressive reduction in

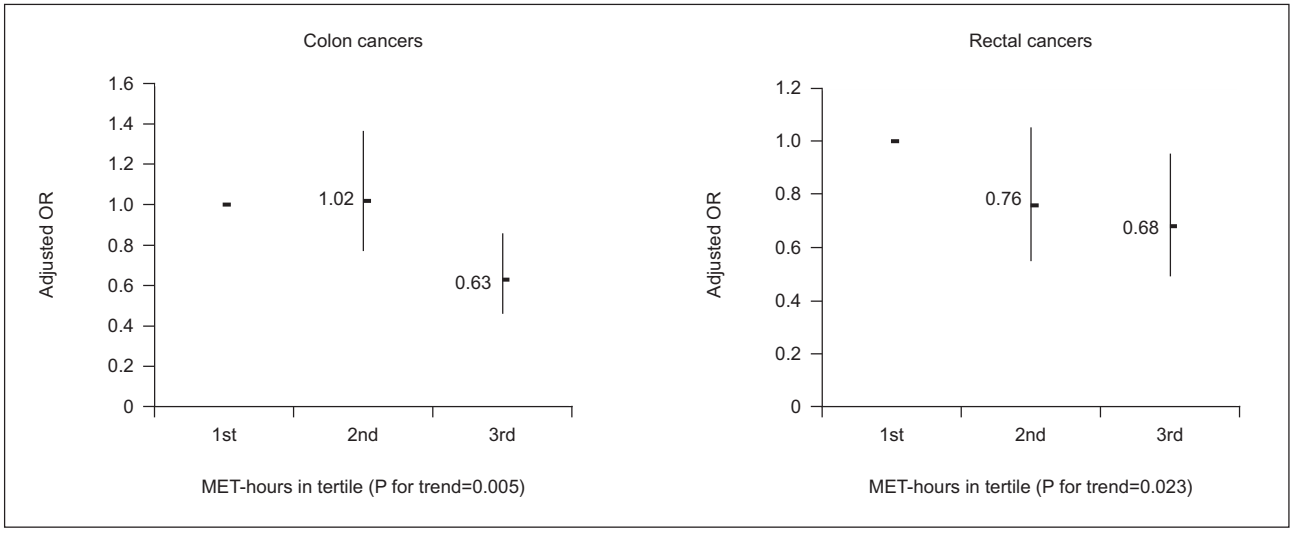

Fig 2. Weekly overall activity intensity with adjusted colon and rectal cancer risk

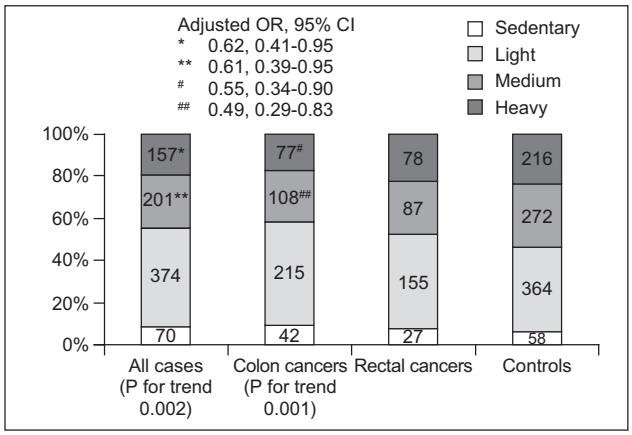

Fig 3. Self-reported lifelong occupational activity level and colorectal cancer risk

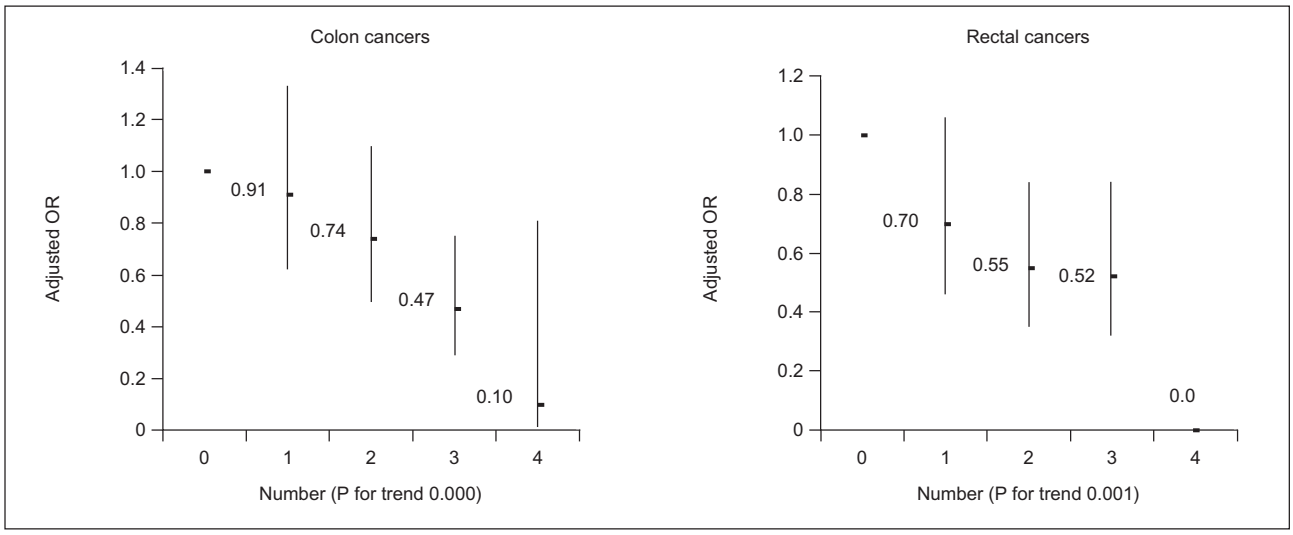

Fig 4. Adjusted colon and rectal cancer risk according to the number of target activity levels achieved

both colon and rectal cancer risk. These results remained consistent when different components, including overall activity, occupation-related activity and leisure-time exercise, were considered individually or in combination. Individuals who achieved two, three and four target activity levels can reduce their colorectal cancer risk by 35%, 50% and >90%, respectively.

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