Short Communication

Levels of Physical Activity for Colon Cancer Prevention Compared with Generic Public Health Recommendations: Population Prevalence and Sociodemographic Correlates

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Abstract

Background: **The proportion of Australian adults achieving physical activity levels believed to be sufficient for colon cancer prevention was estimated, and sociodemographic correlates (age, gender, educational attainment, occupation, marital status, and children in household) of meeting these levels of activity were analyzed.**
Methods: **Data from the 2000 National Physical Activity Survey were used to estimate the prevalence of participation in physical activity in relation to three criteria: generic public health recommendations, weekly amount of at least moderate-intensity physical activity currently believed to reduce risk of colon cancer, and weekly amount of vigorous-intensity physical activity believed to reduce risk of colon cancer.**
Results: **Overall, 46% of adults met the generic public health criterion, 26% met the colon cancer criterion based on participation in at least moderate-intensity physical activity, and 10% met the colon cancer criterion based on vigorous-intensity physical activity. Women were less likely than men to meet the colon cancer criteria. Younger and more educated persons were more likely to meet all three criteria. The most pronounced differences between gender, age, and educational attainment groups were found for meeting the amount of vigorous-intensity physical activity believed to reduce risk of colon cancer.**
Conclusions: **The population prevalence for meeting proposed physical activity criteria for colon cancer prevention is low and much lower than that related to the more generic public health recommendations. If further epidemiologic studies confirm that high volumes and intensities of activity are required, the public health challenges for colon cancer will be significant.** (Cancer Epidemiol Biomarkers Prev 2005;14(4):1000–2)

Introduction

The recommended amounts and types of physical activity believed to confer general health and disease-specific benefits differ. For instance, mirroring the recommendations of the U.S. Surgeon General and NIH consensus reports on physical activity and health (1), the National Physical Activity Guidelines for Australians recommend the accumulation of 30 minutes of moderate-intensity activity on most, preferably all, days (2, 3). This is interpreted as at least 150 min/wk, for the purpose of population surveillance. In addition, they recommend regular participation in vigorous exercise for added health and fitness benefits, although the emphasis is on moderate-intensity activity.

For colon cancer prevention, there is relatively consistent evidence from prospective epidemiologic studies that long-term involvement in activity and participation in more intense activities may provide stronger protection (4). There is also some evidence that this may also be the case for breast and prostate cancer (5). Most studies that have simultaneously examined frequency, intensity, and duration of physical activity have shown that ~3.5 to 4 hours of vigorous activity per week would be needed to achieve a significant reduction in risk of colon cancer (6). These studies have also shown that 7 to 35 hours per week of moderate-intensity physical activity are likely to be required to achieve the same level of risk reduction provided by more intense physical activity. However, most of the biological mechanisms proposed to underlie the effect of physical activity on colon cancer risk reduction (e.g., propulsive peristalsis stimulated by the vagus nerve, enhanced immune function, decreased insulin, and increase of prostaglandin synthesis) suggest that more intense physical activity may be of greater benefit (6, 4). Additionally, the evidence on the relationship of physical activity with reduced risk of colon cancer is more consistent and of higher quality for vigorous-intensity than for moderate-intensity activities.

Population studies show sociodemographic variations in the proportion of adults who meet the generic public health guidelines for physical activity. For instance, the 1999 Australian National Physical Activity Survey showed that females, older, less-educated persons, those from a non-English cultural background, with a higher body mass index, and who were unaware of the current physical activity messages were less likely to meet the generic national guidelines (2). Another population study of the prevalence of participation in specific vigorous physical activities in Australian adults found gender difference in the 40- to 54-year age category only (7).

This study uses data from a population-based sample of Australian adults to estimate and compare the prevalence and demographic correlates of meeting the generic public health physical activity guidelines versus the levels of activity believed to be important for colon cancer prevention.

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Materials and Methods

National surveys to assess participation in physical activity were conducted in 1997, 1999, and 2000 (9-2, 10-3). We focus on the data collected in the year 2000 only. Participants ages 18 to 75 years were selected using a two-stage sampling procedure to take part in a survey using a computer-assisted telephone interview. Details of the sampling procedure have been described previously (2). The household response rate was 76%. Of the eligible individuals contacted, the individual response rate was 84%. The sample comprised 3,590 participants.

To assess respondents' levels of physical activity, a standard self-report physical activity instrument was used (2). Participants were asked to report the frequency and duration of engagement in three categories of physical activities during the previous week. These included walking continuously for at least 10 minutes for recreation, exercise, or transport; other moderate-intensity, leisure-time physical activity (e.g., gentle swimming, social tennis); and vigorous-intensity, leisure-time physical activity (e.g., cycling, jogging, competitive tennis). Reliability and validity of earlier versions of the instrument have been described previously (8).

For each participant, the sums of the weekly total minutes of walking, moderate-intensity, and vigorous-intensity physical activity were computed. Based on current evidence on the dose-response relationship between physical activity and colon cancer (6), three criteria were used to identify relevant levels of participation:

1. Accrual of ≥150 minutes of at least moderate-intensity activity through five or more sessions in the previous week. This criterion reflects the recommended physical activity guidelines for Australians (and other developed nations) and was computed for comparison purposes.
2. Accrual of ≥420 minutes of at least moderate-intensity activity in the previous week. This criterion represents the lower boundary of the estimated amount of at least moderate-intensity physical activity believed to reduce colon cancer risk (6).
3. Accrual of ≥210 minutes of vigorous activity in the previous week. This criterion represents the lower boundary of the estimated amount of vigorous activity believed to reduce colon cancer risk (6).

For criteria 1 and 2, vigorous-intensity minutes were weighted by a factor of 2 (based on current Australian population surveillance methods) to account for its greater intensity (2). As the evidence on the relationship between frequency of physical activity and colon cancer risk reduction is inconclusive (6), for criteria 2 and 3 the segmentation (number of sessions) of the total amount of physical activity was not specified.

Respondents' age, gender, educational attainment, marital status, occupation, and children in household were analyzed as predictors of meeting the above criteria. Although information on ethnicity was also available, the proportion of non-English-speaking participants was too small (i.e., 6%) to yield reliable population prevalence estimates and was not included in the analyses. To obtain estimates of physical activity prevalence that is representative of the national population, weighted data were used. These adjusted for differences in proportions of age groups, gender, and region between the actual sample and the Australian population.

Hierarchical logistic regressions were constructed to analyze the associations between demographic correlates and physical activity criteria. In step 1, the main effects of age, gender, educational attainment, occupation, marital status, and children in household were analyzed. In steps 2 and 3, two-way and three-way interaction effects, respectively, were examined. Due to multiple significance testing, a probability level of 0.01 was adopted.

Results

Estimates of national prevalence rates for the three physical activity criteria indicated that less than half of the adult population was engaging in enough physical activity to meet the generic national guidelines (Table 1). A much smaller percentage of the population was achieving the amount of physical activity believed to reduce colon cancer risk (26% for criterion 2 and 10.3% for criterion 3).

As occupation, marital status, and children in household were not significant predictors of meeting any of the examined criteria, they were excluded from the final logistic regression models. No significant gender differences were found in meeting the generic national guidelines. In contrast, significant differences were observed for the physical activity criteria believed to reduce colon cancer risk, with women less likely to achieve such levels of activity than men. These gender differences were more pronounced for accrual of 210 min/wk of vigorous physical activity. Age and educational

Table 1. Prevalence estimates of, and adjusted odds ratios for demographic factors associated with, achievement of physical activity criteria

Predictor	150 min/wk—5 sessions		420 min/wk—at least moderate		210 min/wk—vigorous	
	% (95% CI)	Adj OR (95% CI)	% (95% CI)	Adj OR (95% CI)	% (95% CI)	Adj OR (95% CI)
Sample	46.1 (44.5-47.7)	—	26.0 (24.6-27.4)	—	10.3 (9.3-11.3)	—
Gender						
Male	46.8 (44.3-49.3)	1.00 (—)	29.7 (27.4-32.0)	1.00 (—)	13.7 (12.0-15.4)	1.00 (—)
Female	45.5 (43.3-47.7)	0.93 (0.81-1.06)	22.4 (20.6-24.2)	0.72* (0.62-0.84)	7.0 (5.9-8.11)	0.51* (0.40-0.64)
Age						
<30	57.8 (54.0-61.6)	1.00 (—)	35.8 (32.1-39.5)	1.00 (—)	18.8 (15.8-21.8)	1.00 (—)
30-44	42.0 (39.2-44.8)	0.59* (0.48-0.72)	23.3 (20.9-25.7)	0.54* (0.44-0.67)	10.8 (9.0-12.6)	0.57* (0.43-0.75)
45-59	41.3 (38.2-44.4)	0.50* (0.41-0.62)	21.6 (19.0-24.2)	0.52* (0.42-0.65)	5.4 (4.0-6.8)	0.30* (0.21-0.42)
60+	43.6 (40.0-47.2)	0.61* (0.49-0.77)	22.8 (19.8-25.8)	0.58* (0.46-0.74)	3.4 (2.1-4.7)	0.17* (0.11-0.28)
Educational attainment						
<Year 12	38.9 (36.2-41.6)	1.00 (—)	20.7 (18.5-22.9)	1.00 (—)	6.1 (4.8-7.4)	1.00 (—)
Year 12/diploma	48.5 (45.8-51.2)	1.20† (1.02-1.42)	28.9 (26.4-31.4)	1.26† (1.04-1.52)	13.1 (11.3-14.9)	1.56† (1.14-2.13)
Degree	52.5 (49.4-55.6)	1.67* (1.41-1.99)	29.0 (26.2-31.8)	1.45* (1.19-1.77)	11.8 (9.8-13.8)	1.81* (1.31-2.50)

NOTE: Weights were used to obtain estimates of prevalence that were representative of the national population. No significant two- or three-way interaction effects were observed.

Abbreviations: Adj OR, adjusted odds ratio; 95% CI, 95% confidence interval.

*$P < 0.001$ in relation to reference categories.

†$P < 0.05$ in relation to reference categories.

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attainment were associated with the examined physical activity criteria. In general, younger individuals and individuals with a higher educational attainment were more likely to meet the three criteria. The greatest differences between the age and educational attainment groups were observed for accrual of 210 min/wk of vigorous physical activity.

Discussion

The population prevalence among Australian adults of participation in levels of physical activity that may be optimal for reducing colon cancer risk are low, especially among women, older persons, and those with a lower educational attainment. Even in the youngest age group (18-29 years), the participation rates were low, with 36% accruing 420 min/wk of at least moderate-intensity physical activity and only 19% accumulating 210 min/wk of vigorous physical activity. A low prevalence of regular participation in vigorous physical activity among adults has been previously reported by national surveys of physical activity in Australia (7) and in other developed countries (9). Some of the biological mechanisms proposed to underlie the relationship between physical activity and colon cancer predict that more intense physical activities would have the greatest protective role (4, 6). Therefore, these low rates of participation in vigorous physical activity are a potential cancer prevention concern.

How feasible and realistic is it to recommend levels of physical activity currently achieved by only a small portion of the population? Raising recommended physical activity levels from 150 minutes (generic national guidelines) to 420 minutes a week (one of the criteria for colon cancer prevention) may have low feasibility. The majority of adults in industrialized countries (over 50%) are sedentary in their leisure time (1). Whereas the public health recommendation to be active for 30 minutes on most days may be realistic, recommending $\geq$60 minutes of physical activity a day may be unrealistically ambitious. This argument applies, all the more, to the promotion of vigorous physical activity, which is less prevalent (7) but may be more relevant to the prevention of colon cancer. To seriously address physical activity in the context of the cancer prevention agenda, a considerable investment of resources and creativity will be required if the putative volumes and intensity targets are to be met by more than a small portion of the adult population.

Current public health guidelines on physical activity (1) are generic, focused on activating the sedentary, and are not designed to highlight the specific health gains associated with regular activity (e.g., prevention of diabetes, cancer, or heart disease). To increase the likelihood of engaging sedentary adults in physical activity that may be sufficient for colon cancer risk reduction, the recommended levels of physical activity must be realistic and appraised as feasible. Thus, what might be needed is not an across-the-board increase in the recommended levels of activity to achieve generic health benefits but a more differentiated and graded set of physical activity guidelines. These might include specific information on the health benefits associated with the various levels and intensities of activity and advice on how to achieve them.

Alternatively, attempts could be made to shift the entire distribution (10) of participation in physical activity in the population by promoting the idea that, where feasible, all adults should engage in more, and more intense, physical activity. Policy and promotional initiatives may need to create more opportunities for types of vigorous activities acceptable to certain segments of the population. In this regard, several studies have shown that participation in specific types of vigorous activities is a function of age and gender (7, 11, 12). It has been shown that participation in vigorous physical activity in younger age may be a reliable predictor of maintaining a high level of physical activity in old age (13). Therefore, public health policies may need to focus on encouraging younger adults, especially females, to participate in vigorous physical activity. Consideration needs to be given as to how to provide opportunities for participation by older adults that will replace those offered by school and club sport structures during the school and the young adult years (14).

There are some limitations to our study. As not all types and contexts of physical activity were measured, it is possible that the prevalence estimates of participation in physical activity were underestimated (15, 16). The method used to assess physical activity in the present study differed from those used in studies looking at the relationship between physical activity and colon cancer. Other potential sociodemographic correlates of physical activity, such as place of residence (urban versus rural), could not be examined as they were not included in the survey. This is a cross-sectional study and, as such, cannot inform us on life span changes in meeting the physical activity criteria believed to reduce risk of colon cancer (17).

The population prevalence of participation in sufficient amounts of physical activity believed to reduce colon cancer risk is low. Because it has been estimated that 12% to 14% of colon cancer can be attributed to lack of involvement in vigorous physical activity, public health policy may need to more seriously consider how to most effectively promote participation in more intense physical activities by all segments of the population.

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