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Physical Inactivity. Workshop V. AHA Prevention Conference III. Behavior Change and Compliance: Keys to Improving Cardiovascular Health

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Physical Inactivity

Workshop V

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The inverse relation between physical activity and coronary heart disease is established. As noted in the AHA's recent statement on exercise, "[i]nactivity is recognized as a risk factor for coronary artery disease."[1] Physical activity reduces the risk of coronary heart disease via several metabolic and physiological mechanisms. It may retard the atherogenic process by raising the high-density lipoprotein level and lowering blood pressure, reduce the risk of ischemia by improving the efficiency of the pumping heart, reduce the risk of acute thrombosis by retarding the rate of clot formation, improve glucose tolerance, and reduce the risk of fatal arrhythmia by reducing the sensitivity of the myocardium to catecholamines.[1] Other mechanisms may yet be uncovered.

Over the past 30 years leisure-time physical activity has increased in North America, rising at about the same rate as the prevalence of nonsmoking.[2] It is likely that, with additional effort, participation in moderate physical activity could be appreciably increased and the rate of coronary heart disease further reduced.

The single most important issue in the promotion of physical activity is the dose. How vigorous does the activity need to be? And how much does one need to do?

Most promotional efforts have advocated vigorous activity, that is, activity requiring 50% to 60% or more of the cardiorespiratory capacity of young people (eg, running, swimming laps). However, of the many studies showing that regular physical activity is associated with a reduced risk of coronary heart disease, very few have demonstrated that such intense activity is required. High-intensity activity may be necessary to achieve the maximum benefit, but the evidence is clear that high intensity is not necessary to appreciably reduce the risk of coronary heart disease.

The amount of moderate activity to be recommended is less apparent. Epidemiological studies with at least three levels of exposure uniformly indicate a reduction in risk between the least active group and the next least active.[3] Therefore, no threshold or minimum daily requirement appears to exist. With the possible exception of a few very active people, everyone would benefit from just a little more activity. This approach, however, does not identify those who would benefit the most.

People who are sedentary or irregularly active are at highest risk of coronary heart disease and stand to benefit the most from even small increases in physical activity. It is estimated that 20 000 fewer deaths per year would occur if half of those who participate in no leisure-time physical activity would do something just a few times per week.[4] Even people who have been inactive for several years will benefit. Recent information suggests that people who increase their activity during adulthood reduce their risk to the level of those who have been active for many years.[5]

The promotion of regular and moderate physical activity will benefit from continued improvement in our understanding of the factors associated with inactivity, continued improvement in the scientific evaluation of intervention activities, and the application of established health promotion principles. In recent years, considerable progress has been made in delineating the various factors associated with inactivity. These include demographic factors, such as being older, black, female, poorly educated, or overweight or having a history of being physically inactive. Cognitive factors associated with inactivity include the perception that there are no benefits from activity or that poor health precludes exercise, perceived lack of time, little enjoyment of activity, and lack of confidence in one's ability to be active. Other factors include personal attributes, such as low levels of self-motivation and self-regulatory skill, environmental characteristics, such as inadequate social support, and activities that are less convenient, more costly, and more vigorous.[6,7]

The incorporation of any behavior as a regular and permanent part of daily living proceeds through several stages. Some people, for example, are not thinking about increasing their activity, and others are thinking about it but have not yet acted. The Stages of Behavioral Change Model,[8] originally developed for smoking cessation, describes these stages and should be a useful model for the development and evaluation of physical activity promotion programs as well.[9]

Successful, multifaceted programs promoting physical activity have been implemented in worksites and schools; efforts at these sites should continue. Physicians' offices appear to be another useful setting for promotion of physical activity. Because of the benefits

of moderate physical activity such as walking and gardening, methods for promoting "at-home" exercise will become more important.

Workshop Report

A physical activity–induced reduction in clinical cardiac events due to ischemic heart disease may be mediated by a variety of factors. Endurance exercise training results in a reduction in myocardial work and oxygen demand, and these changes cause relative reductions in heart rate and blood pressure at rest and during submaximal exercise and also produce an overall general reduction in sympathetic tone.[1] Increases in or maintenance of myocardial oxygen supply may result from decreases in the rate of progression of coronary atherosclerosis,[10] a decrease in the tendency for platelet aggregation or increased fibrinolytic activity,[11] an increase in the size or dilating capacity of the coronary arteries,[12] or an increase in collateral artery formation.[13] None of these effects have been definitely linked to the decreased incidence of coronary artery disease mortality observed in more active or physically fit persons.

The population of the United States is less active than is desirable for maximal health. Few people are physically active in the workplace, at home, or in travel. Therefore, leisure-time physical activity assumes a major role in total physical activity.

Recommendations

Studies are needed to (1) define how physical activity may alter the initiation or progression of atherosclerosis, (2) describe the physiological and biological mechanisms through which physical activity influences coronary artery disease (eg, insulin sensitivity, lipoprotein metabolism, or thrombolytic processes), (3) define possible gender-specific cardiovascular and metabolic adaptations to exercise that may have effects relating to a difference on the pathophysiology of coronary artery disease, (4) quantify the cardiovascular, musculoskeletal, and other risks of physical activity, (5) develop improved methods of measuring physical activity, particularly light to moderately intense activities not traditionally considered to be sport or exercise, especially for women, (6) investigate the relative importance of lifetime variations and current patterns of physical activity in the prevention of coronary artery disease, and (7) evaluate the independent and interactive contributions of physical inactivity and the other established risk factors in affecting cardiovascular disease incidence.

In addition to research recommendations, it also is important to establish improved surveillance mechanisms for physical activity and physical fitness in order to monitor trends and progress toward the Year 2000 objectives.

Physical Activity Guidelines

A critical public health issue is the type, intensity, and amount of exercise required to produce cardiovascular benefits. Although the minimal and optimal amounts of physical activity for benefit are not known, there is substantial evidence to indicate that there is considerable benefit at intensities and amounts below traditional guidelines for exercise training to enhance performance. Epidemiological studies indicate that the people at greatest risk for developing cardiovascular disease are the 20% to 30% of the population that is most inactive and unfit, and that there is an inverse gradient of risk across activity categories up to at least 3000 kcal of leisure-time physical activity per week.[3] Efforts to get the least active people to do something will provide them with benefits whether or not they meet traditional exercise guidelines. This does not mean, however, that modest amounts of activity provide maximum reduction in coronary heart disease risk. Accumulation of activity over the course of the day may produce physiological adaptations comparable to those to the same amount of activity in a single session; this should make it easier for many people to fit activity into their daily routines than if they attempt to get their activity all at one time.[14]

As yet, no clear threshold of a minimal required intensity of activity for benefit has been identified. The concept of intensity should be considered in both absolute and relative terms. In absolute terms, moderate activities, such as moderately brisk walking, stair-climbing, gardening, and recreational sports, require 3-4 metabolic equivalents. Intensity also must be considered in terms relative to a person's level of fitness. For instance, an activity that is of relatively low intensity for a person who is very fit may be a high-intensity activity for an elderly or unhealthy person.

Moderately intense activities are associated with lower risk of orthopedic injuries and cardiovascular events than are vigorous activities. They are more likely to entice sedentary and unfit individuals to participate and persist and are less likely to require medical supervision than if the only focus is on more vigorous sports and activities. The more options provided, the greater the likelihood that people will adopt an appropriately active lifestyle.

Recommendations

Programs. Physical activity education and intervention programs for health care professionals and the public should present alternatives to the traditional exercise prescription. Moderate levels of physical activity such as brisk walking should be promoted and the functional and health benefits of such activities emphasized. Life-style interventions in which increased activity is integrated into daily routines may be easier for many people to adopt than traditional programmed exercise.

Research. Research is needed to identify minimal, optimal, and excessive amounts of physical activity as well as the intensities of effort that are associated with good cardiovascular health.

Interventions

General characteristics of interventions to increase physical activity should be considered in relation to individual needs, circumstances, and preferences. Physical activity should be viewed as an adaptive process developed over time according to circumstances and conditioned by family routines and other organizational and environmental conditions. These vary for people across life stages and social and economic resources and roles. Comprehensive reviews of intervention strategies at individual, community, and societal levels have begun to identify effective components of interventions.[7]

The physical environment may be modified to enhance physical activity. Intervention strategies to increase the stimuli that prompt physical activity include self-monitoring and goal-setting.[15,16] In addition, the positive effects of a variety of reinforcement strategies, such as feedback,[15,17] social reinforcement,[15,17] and contracts,[16,18] have been documented.

The most powerful strategies modify the consequences or rewards as well as the antecedents or cues for physical activity.[9,19] Like most behaviors, maintenance of physical activity is difficult without continuous or periodic reinforcement. Some strategies that have been used to increase maintenance include social reinforcement[15,20] and relapse prevention.[21,22] Consistent with new epidemiological research on moderate exercise, research demonstrates that building physical activity into life-style routines produces more long-term success than do the more structured, less flexible programs.[20,23]

These general principles of behavior change have been found to apply across the life span from childhood through the adult years. As interventions are developed, it is important to capitalize on circumstances of life stages, life transitions, and the environmental contexts in which they occur. For example, these principles can be adapted readily to families, schools, workplaces, and other contexts in which cues or reinforcements for exercise can be developed and employed.

Recommendations

Interventions designed to change activity levels should include the systematic application of behavioral strategies that have been shown to reliably influence activity (eg, antecedents such as goal setting and self-monitoring and consequences such as contracting and social reinforcement).

Research. (1) Additional research is needed on factors that facilitate both adoption and maintenance of activity by women and men of all ages, races, and socioeconomic strata. These factors include enjoyability and controllability, decision-making processes that influence a person's being active or sedentary, and social influences such as support and reinforcement. (2) A major research effort, focused on the basic behavioral and biological mechanisms that influence activity, is needed to create more effective interventions. (3) Further research is needed to establish the benefits of physical activity in improving employee well-being, performance, and productivity. (4) Research should be sponsored to systematically develop and evaluate the effects of mass media campaigns for promoting physical activity levels in specific segments of the population.

Programs. (1) Interventions should be tailored to life stage, stage of readiness, health and risk factor status, and other individual psychosocial and demographic characteristics. (2) Lifelong activity should be emphasized in schools, worksites, community centers, and churches, as should frequently available athletic activities. (3) Communities should provide safe and climate-appropriate physical activity facilities. (4) Community organizations serving the same constituencies should be encouraged to cooperate in supporting facilities, programs, and resources for physical activity in their community. (5) Information on opportunities for physical activity should be readily accessible to all segments of the community. (6) Community sponsorship of events such as fun walks enhances community awareness of physical activity, but should be supplemented by other sustainable program activities. (7) Communities should promote and support the use of existing resources, such as malls and hospital grounds, for moderate physical activity.

Policies. (1) Corporations, schools, hospitals, and government employers need to recognize the needs of employees for time, space, facilities, and other incentives to pursue physical activity objectives. (2) More support (eg, through fuel taxes) for mass transit is needed to reduce auto traffic and encourage more walking and biking, and to provide more walking or cycling pathways for transportation and recreation. (3) Insurance coverage for exercise counseling and rehabilitation services should be encouraged. (4) School physical education and intramural programs should focus on lifelong activities. (5) Technical assistance and demonstration projects should be provided or funded by federal and state agencies to disseminate information to communities, organizations, and individuals. (6) State and local departments of education should include a comprehensive school health education program with a component that addresses physical activity in the curriculum. (7) The American Heart Association should work with other public, private, professional, and voluntary organizations to assist in helping the US population meet the goals of Healthy People 2000, especially objectives 1.8 to 1.11. (8) Information and promotional materials about physical activity should be developed and distributed in medical settings to help health care providers implement individually appropriate physical activity counseling.

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