CPH News and Views

A semi-monthly column on emerging topics related to healthy workplaces

Issue # 24: Occupational and leisure time physical activity: Do they have similar effects on cardiovascular health?

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A physically active lifestyle is acknowledged as among the best investments for a long life, free from chronic diseases. The international physical activity recommendations are for moderate intensity aerobic (endurance) physical activity of at least 150 minutes per week or vigorous-intensity aerobic activity of at least 75 minutes per week, or an equivalent combination (8). Adults who follow these guidelines experience considerable health benefits (9).

People with high physical work demands - being occupationally physical active for several hours per day, 5 days per week - might therefore expect to live a long life, free from chronic diseases. However, workers with high physical work demands (often low and semi-skilled workers) are well known to have an elevated incidence of cardiovascular disease and premature mortality. This finding is generally considered to be caused by an unhealthy lifestyle and poor socioeconomic conditions. Recent studies have surprisingly found instead that high physical activity at work actually increases the risk for cardiovascular disease (7) and mortality (2). While the characteristics of leisure-time physical activity are well documented to promote health, occupational physical activities have now in contrast been shown as hazards for health (3,4). These studies indicate that high physical activity during work may impose a qualitatively different effect on cardiovascular health than high physical activity during leisure time. The question is: *How can this be?*

One possible explanation could involve cardiorespiratory fitness, which is a strong predictor of cardiovascular disease and mortality. Workers who are highly physically active in leisure time have a much higher cardiorespiratory fitness than those with low leisure physical activity. In contrast, workers with high and low occupational physical activity have rather similar levels of cardiorespiratory fitness (5). This may be explained by the different characteristics of occupational and leisure physical activity. Improvement in cardiorespiratory fitness requires physical activity involving large muscle groups at a relatively high level of intensity (>60% of maximal heart rate or maximal oxygen consumption), with continuous duration of at least 3 min (1). Leisure activities like brisk walking, running, cycling, swimming, basketball, and soccer are good examples. In contrast, occupational physical activities are very seldom performed at such high intensity with large muscle groups over a relatively long continuous duration. Therefore, the different type, intensity and duration of occupational and leisure physical activity may explain their different effects on cardiorespiratory fitness (5).

Another possible explanation requires a closer look at the characteristics and settings of occupational and leisure physical activity. Activity patterns at leisure are dynamic contractions of large muscle groups with relatively high intensity and low duration (often less than 1.5 hour), increasing whole body metabolism and cardiac output. “Leisure” also implies the ability to rest when desired. In contrast, typical activity patterns at work include heavy lifting, prolonged standing, highly repetitive work, working with the hands lifted to shoulder height or higher, and working with the back twisted or bent forward often for several hours per day. Many of these activities involve static loading, which is disadvantageous to both the musculoskeletal and cardiovascular systems. Moreover, “unskilled” and semiskilled workers who perform heavy labor usually have routinized (monotonous) work and little ability to influence the intensity or duration of physical tasks, as well as an inability to rest when fatigued.

The underlying physiological mechanisms behind the increased risk for cardiovascular disease remain unresolved (6). One possible explanation is that physical labor for several hours per day, for many days in a row, induces prolonged intravascular turbulence and increased wall shear stress, inducing inflammatory processes in the arterial walls and leading to athero-sclerosis. Another potential mechanism is daily prolonged elevated blood pressure from occupational physical activities like pulling, pushing, lifting and working with the hands lifted to shoulder height or higher, as well as high static peaks in blood pressure from heavy lifting.

Effective prevention programs for cardiovascular disease among workers with high occupational activity may need a combination of initiatives, such as the following:

- Participatory ergonomics (to reduce heavy lifting and other physical strenuous tasks)
- Psychosocial (to improve decision-making opportunities at work and collegial collaboration)
- Organizational (to adapt work schedules and routines to peoples' needs)
- Physical exercise (e.g. endurance or strengthening activities, to reduce the relative cardiovascular workload)

In addition to these primary prevention activities, workplace health promotion efforts can support weight loss, especially among overweight workers, in order to reduce the relative cardiovascular workload from physically demanding jobs.

Andreas Holtermann was educated in Human Movement Science, NTNU, Trondheim, Norway. His main research interests are risk for health impairments (e.g. cardiovascular disease, musculoskeletal disorders, sickness absence) from physical work demands, and prevention initiatives at the worksite for cardio-vascular disease and musculoskeletal disorders among work groups with high physical demands.

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