Prevalence and determinations of physical inactivity among public hospital employees in Shanghai, China: a cross-sectional study

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Abstract This study aims to explore the prevalence and determinations of physical inactivity among hospital employees in Shanghai, China. A cross-sectional study of 4612 employees aged 19 to 68 years was conducted through stratified cluster sampling from different classes of Shanghai hospitals in 2011. The total physical activity was evaluated using the metabolic equivalent according to the Global Physical Activity Questionnaire. Among the participants, 38.5%, 32.3%, and 64.6% of the employees are inactive at work, commuting, and taking leisure time, respectively. Up to 41.8% of the men and 37.8% of the women (P = 0.012) are physically inactive. When the age and educational level are adjusted, male doctors and medical technicians show a higher percentage of physical inactivity than male workers in logistics (P = 0.001). Among females, employees who are working in second- and third-class hospitals show a higher proportion of physical inactivity than those who are working in community health care centers. Logistic regression analyses show that the odds ratios (ORs) of leisure-time physical inactivity associated with the intensity of physical activity at work are 2.259, 2.897, and 4.266 for men (P < 0.001) and 2.456, 3.259, and 3.587 for women (P < 0.001), respectively. The time during commuting activities is significantly associated with leisure-time physical inactivity in either sex (OR = 2.116 for men and 2.173 for women, P < 0.001).

Hospital employees, particularly doctors and medical technicians, show a higher proportion of physical inactivity than other inhabitants in Shanghai. The time and intensity of activity at work and commuting are associated with leisure-time activities.

Keywords physical inactivity; prevalence; determination, employee; public hospital; cross-sectional study

Introduction

Numerous studies have shown the important health benefits of physical activities in various socio-demographic populations [1–4]. However, physical inactivity has been determined as the second most important risk factor for poor health after tobacco smoking. Physical inactivity contributes between 12% and 19% of the risks associated with the five major non-communicable diseases (NCDs) in China, namely, coronary heart disease, stroke, hypertension, cancer, and type 2 diabetes mellitus. Physical inactivity imposes a substantial economic burden on the country because it is solely responsible for more than 15% of the yearly medical and non-medical costs of the main NCDs in the country [5].

Despite well-known evidence, the estimated global number of adults (aged 15 years or older) who are insufficiently active was 31% in 2008 (men 28% and women 34%) [6]. Data from a nationwide surveillance (n = 50 717) in 2007 showed that the prevalence of low-level or no physical activity is 31.1% of the 15- to 69-year-old individuals in China [7].

Job strain and stress may be considered risk factors in the health of employees. A meta-analysis suggested that work-related stress is associated with an unhealthy lifestyle, but longitudinal analyses suggested that both show no direct cause-effect relationship [8]. Nurses are at a higher risk of occupational stress than other occupations in China [9]. A study on hospital-based Chinese physicians revealed that both job strain and effort-reward imbalance
are recruited (response rate = 87.1\% of employees) from each of the urban and suburban districts. The sampled population represents 32,930 employees, whereas the four CHCCs are composed of two centers (one from each of the urban and suburban districts), whereas the four CHCCs are composed of two centers from each of the urban and suburban districts.

Methods

Survey population and sampling

A cross-sectional study is conducted on a representative sample of employees aged 19 to 68 years from different classes of public hospitals in Shanghai, China. The hospitals are divided into three classes, namely, third-class hospitals, second-class hospitals, and community health care centers (CHCCs). The stratified cluster sampling used in 2011 is employed, and 4612 participants are recruited (response rate = 87.1\%) from four hospitals and four CHCCs. The four hospitals are composed of two third-class hospitals (a comprehensive hospital and a special disease hospital) and two second-class hospitals (one from each of the urban and suburban districts), whereas the four CHCCs are composed of two centers from each of the urban and suburban districts.

Survey questionnaire and physical activity measure

The physical activity measure used in this study is the Global Physical Activity Questionnaire (GPAQ) [13], which comprises 19 questions about physical activities performed in a typical week. With the support of the World Health Organization (WHO) in 2002, the GPAQ was developed as part of the WHO STEPwise approach to chronic disease risk factor surveillance (STEPS). The STEPS approach has been widely introduced as a feasible approach in monitoring the eight key risk factors of NCDs, particularly in developing countries [14].

The GPAQ measure asks about the frequency (d) and time (min/h) spent doing moderately and vigorously intensive physical activities in three domains: (1) work-related physical activity (paid and unpaid, including household chores), (2) active commuting (walking and cycling), and (3) discretionary leisure-time (recreation) physical activities.

The original text of the questionnaire is not changed after its translation from English to Chinese. Bull et al. [15] studied the reliability and validity of GPAQ in nine countries, including China; the results indicate that GPAQ is a suitable and acceptable instrument for monitoring physical activity in the population health surveillance system. All data collection and processing follow the GPAQ analysis protocol guidelines [13]. The questionnaire is self-completed by the participants during the survey.

Physical activity data treatment, definitions, and analysis

Energy expenditure estimation is based on the duration, intensity, and frequency of physical activities performed in a typical week. Metabolic equivalent (MET), the unit for measuring the energy expended during physical activity, is applied to the physical activity variables derived from GPAQ. MET is the ratio of the metabolic rate of a specific physical activity to the metabolic rate at rest. One MET is equivalent to the energy cost of sitting quietly (1 kcal·kg\(^{-1}·h\)\(^{-1}\)), and the oxygen uptake (in ml·kg\(^{-1}·min\)\(^{-1}\)) with one MET is equal to the oxygen cost in sitting quietly, which is approximately 3.5 ml·kg\(^{-1}·min\)\(^{-1}\). MET values and formulas for the computation of MET minutes are based on the intensity of specific physical activities. A moderately intensive activity during work, commuting, and recreation is assigned a value of 4 METs, whereas vigorously intensive activities are assigned a value of 8 METs. The total physical activity score is computed as the sum of all MET-min/week from moderately to vigorously intensive physical activities performed during work, commuting, and recreation [13].

Physical activity levels were initially classified as low, moderate, or high (vigorous) intensity from the definition of the GPAQ analysis framework [13]:

1. High: Any one of the following two criteria: (a) a vigorously intensive activity for at least three days and accumulating at least 1500 MET-min/week or (b) seven or more days of any combination of walking and moderately or vigorously intensive activities accumulating at least 3000 MET-min/week.

2. Moderate: Any of the three following criteria: (a) three or more days of vigorously intensive activity performed at least 20 min/d, (b) five or more days of moderately intensive activity and/or walking for at least 30 min/d, or (c) five or more days of any combination of walking and moderately or vigorously intensive activities accumulating at least 600 MET-min/week.

3. Low: No activity is reported, or some activity is reported but not enough to meet high and moderate categories. The intensity is defined as physical inactivity in this study.