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Perspective

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Effectiveness of weight Control Interventions among Semiconductor Workers

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Description

Workers in high technology industry are experiencing stressful environment and have been ranked as a high risk group for adverse health effects. The effectiveness of worksite health promotion is important for occupational health. This study is to investigate the effect of health interventions on body measurement changes while examining the role of their lifestyle factors. A multi-settings, quasi-experimental study was conducted that assigned participants into two intervention programs, including exercise program and diet-plus-exercise program. The outcomes include the changes of body weight, waist circumference, body mass index (BMI), and bio physiological indicators. Lifestyle variables include alcohol consumption, cigarette smoking, and regular exercise. Multiple linear regression analyses were performed to test the association. The moderating effect of lifestyle behaviours, such as cigarettes smoking, alcohol drinking, exercise, and vegetable or fruit consumptions on bio physiological changes due to weight control interventions. The effect of dual-task interventions on bio physiological changes can be improved while changing lifestyle factors simultaneously.

Health Interventions

The stressful working environment, semiconductor workers have been ranked as a high-risk group for metabolic syndromes and cardiovascular diseases. Based on periodic health examinations, overweight conditions and hyperlipidemia have been ranked as the top health issues among semiconductor workers. The working style of semiconductor workers is quite different from other occupational categories. The common working shift in the industry alternates between two consecutive 12-hour working days and two days off. In addition, mission-oriented project management has lengthened the working hours for engineering managers. Consequently, a special need for health interventions and exercise programs was noticed in the semiconductor industry. These settings were designated as worksites, schools, community, and home and family. For most employees, worksites are the places where they spend the majority of their time. Workplaces are therefore excellent locations for health promotion program implementation. In a survey of 730 nationally representative American worksites, the 10 most common health promotion programs were back injury prevention, followed by employee assistance, stress management, nutrition, health care consumerism, weight management, cholesterol reduction, physical activity smoking cessation and HIV/AIDS prevention. An effective health promotion program would be favorable both to the organizations' and the employees' health. Literatures have demonstrated that worksite health promotion can reduce worker absenteeism, turnover, and costs triggered by an unhealthy workforce, such as costs due to worksite accidents and loss of productivity. In addition, the health promotion interventions may also reduce employees' inpatient days and medical costs. Most worksite health promotion programs have goals, such as cancer prevention, smoking cessation, cardiovascular disease (CVD) risk reduction, weight control, and physical fitness. The interventions are usually implemented using one or a mix of the following components education (nutrition and exercise knowledge), counseling, physical activity, dietary suggestions, and policy and environmental modifications. With respect to the effectiveness of the intervention, a comprehensive review showed that changes in lifestyle (dietary intake and exercise engagement), weight loss, body mass index (BMI), and biochemical markers (blood pressure, cholesterol, triglyceride, and blood glucose) were generally examined, depending on the individual study design.

As a worldwide growing epidemic, obesity tends to induce metabolic abnormalities that contribute to the incidence of diabetes mellitus, cardiovascular disease (CVD) and hypertension. Weight loss has been proposed as an effective means for the primary prevention of these diseases. In addition to the direct effects of weight loss on body fitness, previous studies have demonstrated effects of weight control on blood pressure, triglyceride, low-density lipoprotein (LDL), and cholesterol. According to the literature, the effectiveness of weight control may be affected by participants' lifestyle patterns, such as smoking, drinking alcohol, exercise habits, dietary preferences and sleep patterns. However, a comprehensive appraisal is needed to test the role of lifestyle variables on the effectiveness of health interventions. Participants were free to choose one of the two intervention groups, including exercise alone and diet-plus-exercise. A maximum of 100 participants including 20 diet-plus-exercise were allocated for each factory. As a result, 904 workers were recruited as an intervention participant. Among them, 691 workers followed a 10,000 steps/day walking exercise program (exercise group), whereas the remaining 213 workers followed the designed exercise program as well as diet consultation program diet-plus-exercise group. This study was approved by the internal review board of Chang Gung Memorial Hospital in Taiwan.

Medical Technology Analysis

Both of exercise and diet-plus-exercise groups were simultaneously conducted during May–September starting right after their annual health examination during 2011–2015. Both exercise and diet-plus-exercise interventions were a three-month basis program. All participants were asked to return to health center in the factory for weekly examination, including taking blood pressure, measuring body weight, measuring waist circumference, and recording pedometer. During the 3-month intervention, the participants in the exercise group were asked to do the best to reach 10,000 paces per day recorded by a pedometer. In addition to 10,000 paces per day, the participants in the diet-plus-exercise group were asked to fill diary for their daily diet and were given face to face counseling biweekly by a nutritionist. The bio physiological tests were performed within one week before and after intervention. For better utilization of workers' annul health examination data, we scheduled the intervention starting from the next

Monday after workers' annul health examination enforced by the government and an additional health examination within one week after intervention for participants. The bio physiological tests were sent to the same unit, the department of laboratory medicine in Chang Gung Memorial Hospital, for standardization. Body weight was measured weekly during the experiment.

Bio physiological tests, including systolic blood pressure, diastolic blood pressure, waist circumference, triglyceride, total cholesterol, low density lipid, high density lipid, impaired fasting glucose and uric acid, were measured before and after intervention. These bio physiological tests were examined and analyzed by medical technology analysis machine in Chang Gung Memorial Hospital Hitachi Automatic Analyser, Hitachi High-Technologies Corporation. In addition, a self-administered questionnaire was implemented to collect basic demographic data and lifestyle variables, including cigarette smoking, alcohol consumption, and regular exercise habit. The participants were asked to answer lifestyle behavior based on their current condition. Statistics have been used to express the study variables. Categorical variables are displayed as frequency and percentage, and numerical variables are shown as the mean and standard deviation. The comparison of bio physiological measures before and after the interventions was made with paired t test whereas an independent t test was applied to compare two study groups. A Pearson's correlation analysis was applied to demonstrate the association between numerical variables, and multiple linear regression models were used to examine intervention effects on bio physiological changes after multivariable adjustments.