



Effectiveness of physical activity intervention among government employees with metabolic syndrome



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ABSTRACT

Background/Objective: Our study aimed to assess the effects of physical activity interventions via standing banners (point-of-decision prompt) and aerobics classes to promote physical activity among individuals with metabolic syndrome.

Methods: We conducted a cluster randomized controlled intervention trial (16-week intervention and 8-week follow-up). Malaysian government employees in Putrajaya, Malaysia, with metabolic syndrome were randomly assigned by cluster to a point-of-decision prompt group ($n = 44$), an aerobics group ($n = 42$) or a control group ($n = 103$) based on sample size calculation formula. Step counts were evaluated by Lifecorder e-STEP accelerometers for all participants. Metabolic syndrome was defined according to the 'harmonizing' definition, in which individuals who have at least three of the five metabolic risk factors (waist circumference, high-density lipoprotein cholesterol, triglycerides, fasting glucose levels, systolic and diastolic blood pressure) will be classified as having metabolic syndrome. A total of 80% of the enrolled government employees with metabolic syndrome completed the programme. Data were analyzed using SPSS for Windows (version 20, SPSS, Chicago, IL).

Results: There were significantly higher step counts on average in the aerobics group compared to the control group over assessments. Assessments at baseline, post-intervention and follow-up showed a significant difference in step counts between the intervention and control groups. The greatest reductions in the proportions of individuals with metabolic syndrome were observed in the aerobics group with a reduction of 79.4% in the post-intervention assessment compared to the assessment at baseline.

Conclusion: The findings of this study suggest that physical activity intervention via aerobics classes is an effective strategy for improving step counts and reducing the prevalence of metabolic syndrome.

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1. Introduction

Metabolic syndrome is of public health concern. Individuals with metabolic syndrome could be an essential group to target for the primary prevention of type 2 diabetes mellitus and cardiovascular disease.^{1,2} In addition, metabolic syndrome could be a useful screening tool for healthcare professionals to focus on when dealing with the health risks associated with abdominal obesity.³

Hence, a pragmatic early management that can be easily implemented for a large number of people is warranted.

Despite a vast amount of evidence substantiating the favourable effects of physical activity on the individual components of metabolic syndrome such as body weight measures, blood pressure, lipid profile and glucose level, there is a paucity of published physical activity intervention studies regarding metabolic syndrome,⁴ particularly among Malaysians.

The findings of the Fourth National Health and Morbidity Survey⁵ revealed that 35.2% of adults aged 18 years or older in Malaysia were not physically active, with the highest prevalence of physical inactivity being in Putrajaya (57.3%).

The work setting is believed to be the best place for distributing

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physical activity-related information. The workplace-based intervention implemented in the study will function as a guide in designing intervention programmes for the prevention and management of metabolic syndrome at the community level. There were 12.60 million persons in the employed labour market in Malaysia in December 2012 based on the Malaysia's Principal Statistics of the Labour Force.⁶ In addition, most adults spend the majority of their day in buildings and on the site around buildings. Therefore, physical activity interventions for workplaces provide enormous opportunities for aiding many sedentary people become more active. Workplace-based health interventions that promote physical activity may produce considerable cost savings, a reduction in absenteeism and decrease in disability costs.^{7,8} This is in line with the National Strategic Plan for Non-Communicable Diseases (NSP-NCD) which offered the essential framework for actions needed to decrease the prevalence of non-communicable diseases in Malaysia.⁹ For workplace interventions to have a broader health benefit, it was proposed to specifically target employees who are not currently engaged in walking or other physical activity.

Many studies have examined the use of point-of-decision prompts, such as signs, banners or posters, in several environment settings to promote the use of stairs instead of escalators or elevators.^{10–13} For instance, motivational posters significantly increased stair use among females but not their male counterparts in Berlin underground stations.¹² Point-of-decision prompts on stair risers increased stair use among both male and female students with striking effect in a study carried out in Japan.¹⁰ Similar interventions had no effect among the Chinese population in Hong Kong.¹¹ Physical activity classes, such as aerobics classes which provide promising social support.¹⁴ Physical activity classes are promising.¹⁴ For example, instructor-led aerobics classes frequently take place in public settings, such as community centres, parks and the workplaces.¹⁵

The aim of the present study was to examine the effects of physical activity interventions via point-of-decision prompt (POD) and aerobics classes (aerobics) in promoting physical activity in individuals identified as having metabolic syndrome.

We hypothesized that there is significant difference in the number of steps per day between the baseline, post-intervention and follow-up assessments in the point-of-decision prompts group and aerobics group. Furthermore, it was hypothesized that there is significant difference in the number of steps per day between the intervention and control groups over the baseline, post-intervention and follow-up assessments.

2. Materials and methods

2.1. Study design

The study was a randomized controlled intervention trial (16-week intervention and 8-week follow-up). Three assessments were conducted at baseline, post-intervention and follow-up, respectively. Metabolic syndrome was defined according to the 'harmonizing' definition,¹ in which individuals who have at least three of the five metabolic risk factors (waist circumference, high-density lipoprotein cholesterol, triglycerides, fasting glucose levels, systolic and diastolic blood pressure) will be classified as having metabolic syndrome.

2.2. Participants

Putrajaya is the federal government administrative centre, and is located about 35 km south of the capital city of Kuala Lumpur. Putrajaya was divided into 11 geographically continuous areas with identified boundaries to minimize the possibility of participants

from different groups influencing each other. This technique has previously been applied to prevent exposure of the control group to the intervention effect.¹⁶

This study was carried out at three government agencies in the area of Putrajaya, Malaysia. Putrajaya is the federal government administrative centre and is located about 35 km south of the capital city of Kuala Lumpur. The participants were employees of the government agencies.

Three geographic regions containing government agencies were randomly selected. Accordingly, three government agencies from the three geographic regions were randomly selected. The three government agencies were then randomly assigned to three groups, namely the POD group, the aerobics group and the control group. Thereafter, participant screening and recruitment was carried out in the specified government agencies.

The participants were randomly selected government employees who agreed to take part in the study. The participants were males or females aged between 18 and 59 years who had metabolic syndrome according to the 'harmonizing' definition¹ and were at different stages of change with respect to physical activity behaviour, namely Stage 1 (pre-contemplation), Stage 2 (contemplation) or Stage 3 (preparation). The following people were excluded: pregnant women; individuals on medication that may have affected body weight, lipid profile, blood pressure and fasting glucose; people with medical histories that included type 2 diabetes mellitus, cardiovascular disease, hyperthyroidism and cancer; individuals with physical impairments that may have influenced the physical activity intervention; and individuals who answered 'Yes' to one or more questions in the Physical Activity Readiness Questionnaire.

Three groups of government employees were enrolled. The final samples comprised 189 participants, with 44 participants in the POD group, 42 participants in the aerobics group and 103 participants in the control group (Fig. 1). A sample size formula for several comparisons with the control¹⁷ was used, which was initially proposed by Fleiss.¹⁸

2.3. Sociodemographic information

Each participant completed a sociodemographic questionnaire asking about: gender, ethnicity, religion, age, marital status, education, job position and contact information.

2.4. Physical examinations

A blood pressure in mmHg was measured in each participant twice, two minutes apart after resting for five minutes using an automated digital blood pressure monitor (Omron HEM-907, Omron, Japan).¹⁹ The average of the two readings was recorded. A systolic blood pressure ≥ 130 mmHg or a diastolic blood pressure ≥ 85 mmHg was considered abnormal.¹

A waist circumference was measured in each participant between the lowest rib and the iliac crest at the end of normal expiration using an inelastic measuring tape to the nearest 0.1 cm. Waist circumference < 90 cm in men and < 80 cm in women was considered normal whereas ≥ 90 cm in men and ≥ 80 cm in women was considered abnormal.¹

2.5. Biochemical assessment

A fasting morning blood samples was obtained from each participant and kept on dry ice until sent for laboratory examination (Gribbles Pathology [M] Sdn Bhd, Bangi, Malaysia). Biochemical parameters being assessed were total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides and glucose.

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