INTERNATIONAL MEDICAL RESEARCH JOURNAL

HEALTHY WORKER PROGRAMME FOR WEIGHT MANAGEMENT AND QUALITY OF WORKING LIFE IMPROVEMENT: A QUASI-EXPERIMENTAL STUDY PROTOCOL

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ABSTRACT

Sedentary work and lifestyle, coupled with unhealthy diets, contribute towards obesity and increase risks for early development of non-communicable diseases. The workplace is a good place for lifestyle intervention for weight management. Physical activity promotion at the workplace has also resulted in improved job satisfaction and reduced work stress. Quality of working life (QOWL) is important for retaining and attracting employees to a workplace. This study aimed to evaluate the Healthy Worker Programme physical activity and dietary intake workplace interventions for weight management and improvement of quality of working life. A quasi-experimental study was used to evaluate a 6-month Healthy Worker Programme, based on the socio-ecological model, it promoted healthy diets and physical activity. It included workplace environmental modification, co-worker and individual motivation. The programme was carried out at a worksite while another worksite with no health programme was the control site. Primary outcomes were weight and body mass index. Secondary outcomes were physical activity, dietary intake and QOWL. Assessments of outcomes were conducted at baseline, third and sixth months of the programme. The sustainability of the programme was assessed three months after the programme ended. There is a lack of workplace physical activity and dietary intake interventions in Malaysia and sustainability of health changes. If the Healthy Worker Programme reduces weight among overweight and obese workers, improves QOWL and is sustainable, it would be beneficial to workers and the organisation. This may reduce productivity loss and healthcare burden costs.

KEYWORDS: Obesity, Health Promotion, Occupational Health, Quality of Working Life, Lifestyle Intervention

INTRODUCTION

Obesity is a public health problem that has affected many countries worldwide (1). Malaysia faces the same dilemma with an increasing trend of overweight and obesity prevalence (2). The National Health Morbidity Survey 2019 found 50.1% of Malaysian adults were overweight or obese (3). Overweight and obesity are major risk factors for the development of non-communicable diseases such as cardiovascular disease, diabetes and cancer (4). According to the World Health Organization (WHO), the main cause of overweight and obesity is an energy imbalance where there has been a rise in intakes of energy-rich foods that are high in fat (5). Energy imbalance can occur at the worksite due to the sedentary nature of the job such as prolonged hours of sitting (6). Exposure to and consumption of calorie-dense foods, such as those high in fats and sugar, in the work environment and at other places may contribute to overweight and obesity among workers. The increase in the sedentary nature of work needs to be countered with the promotion of physical activity (7). Those who are active at work, or have a sedentary job but meet the recommended physical activity outside work are associated with less abdominal adiposity (8).

While the quality of life (QOL) has been assessed as an outcome of workplace health promotions, there appears to be a lack of studies reporting quality of working life (QOWL) as an outcome. This may be important from an organisational and occupational health point of view. QOWL is that part of QOL that is influenced by work and is important for retaining and attracting employees. QOWL includes factors such as job satisfaction, stress at work, home-work interface, general well-being and employee engagement (9). It is an important aspect of the organisational outcome of workplace health promotion.

In Malaysia, there has been some initiative to promote health at the worksite, however these efforts are still minimal, not well-sustained or comprehensive and can be further improved. There is also a lack of published Malaysian studies that combine both physical activity and dietary interventions. The Healthy Worker Programme was a 6-month, multi-component programme, based on the socio-ecological model for behavioural change, which included environmental modification, intra- and interpersonal physical activity and dietary interventions for weight management among overweight and obese workers. The study also carried out process evaluation, evaluation for sustainable changes, dietary analysis to determine macro- and micronutrient dietary intake changes, which are lacking in many workplace obesity intervention studies published. The study assessed QOWL with a scale that observed more than job satisfaction, general well-being and stress at work which has been reported previously. The scale also included other factors such as Employee Engagement and Home-Work Interface. The scale has not been used for any workplace health interventions before with multiple data collections. This study aimed to evaluate the Healthy Worker Programme physical activity and dietary intake workplace interventions for weight management and improvement of QOWL.

MATERIALS AND METHODS

Design and hypothesis

The general objective of this study was to evaluate the Healthy Worker Programme, targeting overweight and obese workers. Specific objectives were to determine the effectiveness of the Healthy Worker Programme in reducing weight and improving physical activity, dietary intake and QOWL. The research question was “Will the Healthy Worker Programme be effective in reducing weight and improving physical activity, dietary intake and QOWL among overweight and obese workers?” The hypothesis was that participants in the Healthy Worker Programme would have more weight reduction and improved physical activity, dietary intake and QOWL compared to a control group. A quasi-experimental design was used to evaluate the Healthy Worker Programme which was held at one worksite, while another worksite was the control. In this 9-month quasi-experimental study, the intervention worksite participants followed a 6-month Healthy Worker Programme which promoted improvement in diets and physical activity. The programme was conducted for six months utilising the Socio-Ecological Model as an overarching framework of this multi-component intervention (10). The Healthy Worker Programme’s interventions were targeted at the organisational, inter- and intrapersonal levels. Figure 1 shows the logic model of the Healthy Worker Programme.

Study setting

A government worksite in the Federal Territory of Kuala Lumpur, was the intervention site while another government worksite in the Federal Territory of Putrajaya was the control. Both worksites were located in urban areas about an hour apart, which reduces the risk of contamination bias. There were approximately 500 staff

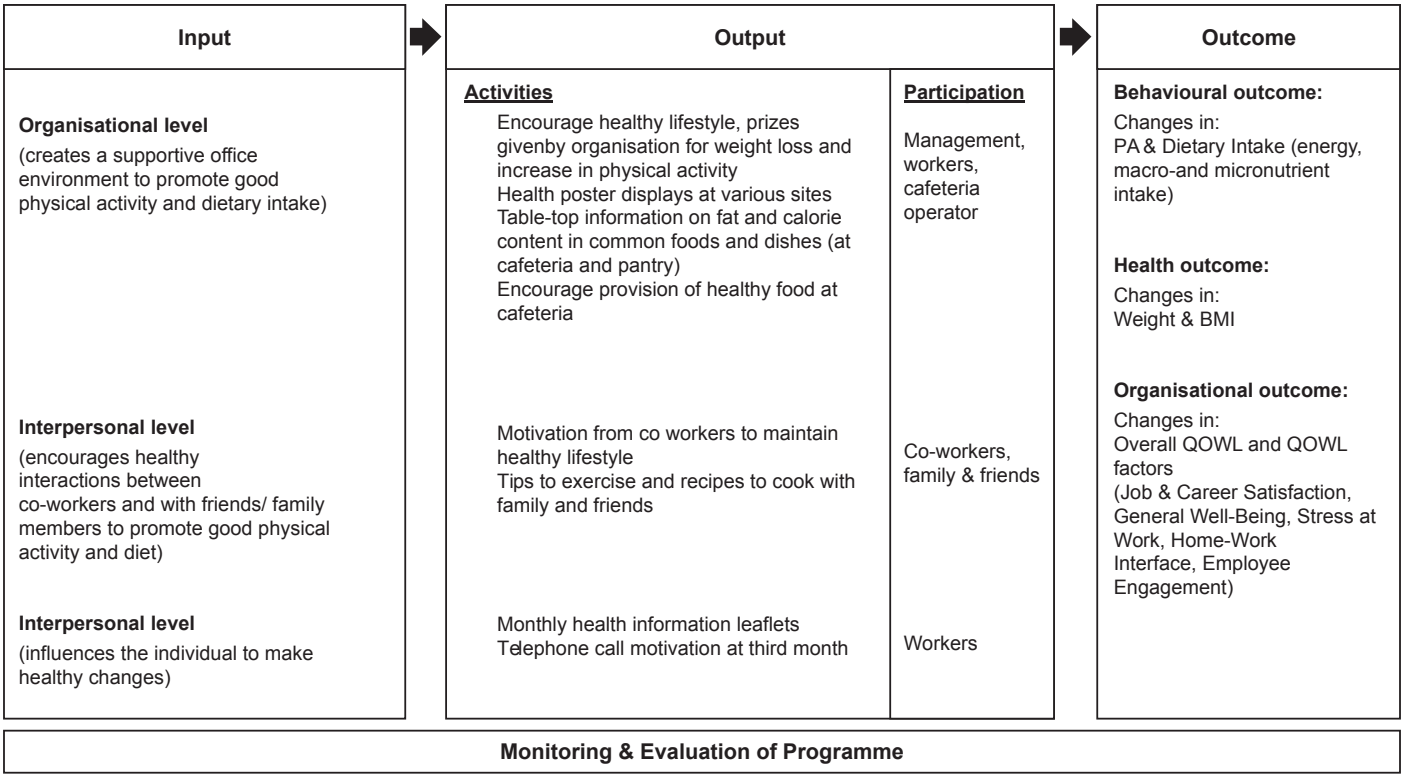

Figure 1. 'Healthy Worker Programme' Logic Model

at the intervention site and 1000 staff at the control site. At both sites, the main nature of work was office-based, however several support staff also did general work. There were no health programmes at both sites and each had a cafeteria, an on-site gym, staircases, parks and paths surrounding the office buildings which allowed opportunities for staff to exercise.

Sample size calculation

Sample size was calculated using the "PS–Power and Size Calculation" software based on the primary objective of reducing body mass index (BMI) as an effect of physical activity and dietary intervention. The outcome of an Asian similar workplace intervention, where there was a reduction of 0.5 kg/m^2 in BMI was used to calculate sample size (11). The significant level and power of the study was set at 0.05 and 80% (12). The ratio of intervention respondents to controls was 1:1. The sample size was calculated to be 64 respondents for the intervention group and 64 for controls. The sample size was further inflated in the case of a drop-out rate of 50%, giving rise to a calculated sample size of 128 intervention respondents and 128 controls.

Ethical considerations

The study was explained to respondents and an information sheet regarding the study was given to all respondents with contact details of the researcher if they had further queries. Respondents signed informed consent before participation and questionnaires were labelled with identification numbers to protect confidentiality. Respondents could exit the study at any time.

Study participants

A health screening was conducted and employees were invited to participate in the Healthy Worker Programme. The WHO Expert Consultation (2004) recommended for public health action among Asians, where a BMI of less than 18.5 kg/m^2 was classified as underweight, 18.5 to 23 kg/m^2 as an increasing but acceptable health risk, 23 to 27.5 kg/m^2 as an increased risk and 27.5 kg/m^2 or higher as high risk (13). The Ministry of Health of Malaysia has adopted this recommendation in its Clinical Practice Guidelines for Obesity (2004) and Malaysians with a BMI of 23 kg/m^2 to 27.5 kg/m^2 are considered overweight and those above 27.5 kg/m^2 are obese (14). Therefore, for the inclusion factor, employees who were overweight or obese, with a body mass index of 23.0 kg/m^2 or more, were invited to participate in the study. Exclusion factors were pregnancy, medical conditions which precluded moderate exercise and affected walking (eg: severe osteoarthritis of the knee, unstable angina, uncontrolled very high blood pressure and acute injury

to lower limbs), ceasing to work at the study site and unwillingness to participate.

Respondents were screened for any illnesses. Blood pressure was recorded using the Omron automatic blood pressure monitor (Sem-1 Model, Omron Healthcare Co., Ltd., Kyoto, Japan). For fasting blood glucose and cholesterol levels, patients were informed to fast from midnight and blood samples were taken in the fasting state in the morning by finger prick (Polymer Technology Systems, Inc, Indianapolis, U.S.). Blood pressure, fasting glucose and cholesterol levels were assessed by trained, registered nurses. A fasting cholesterol level of 5.2 mmol/L and above was classified as abnormally high (15). Respondents with a fasting glucose level of 5.6 mmol/L and above were referred to a physician at a government clinic/hospital for a diagnostic test for diabetes (16). Any abnormalities found on the health screening were referred to a physician for follow-up management. The Physical Activity Readiness (PAR-Q) questionnaire from the Canadian Society of Exercise Physiology was used to screen whether respondents could take part in physical activity (PA) interventions such as walking (17). A physician screened respondents for any illnesses and assessed if they could be included in the study.

Intervention

Intrapersonal Level

A health promotional information pack was sent to respondents every month through the office mail despatch. Information given included how to improve physical activity at work, home, alone or with family members. Healthy recipes were provided from the Ministry of Health and Nutrition Society of Malaysia healthy recipes book (18). Information on stress management was given to respondents to improve their general well-being and reduce stress. Information packs included pre-tested printed materials by the Ministry of Health which were freely available to the public. Table 1 shows the contents of monthly health motivational pamphlets.

After the 3rd month (mid-programme) assessments of outcomes, a nutritionist called respondents in the intervention group to inform them of any improvements in physical activity levels or changes in their weight. During the call of about 15 minutes duration, respondents were given the motivation to continue to improve or maintain their PA levels for health. The nutritionist reminded workers of types of foods to reduce in their diets such as fried foods, coconut milk and foods high in sugar, fat and salt. Workers were reminded to increase their consumption of fruits and vegetables. They were encouraged to consume foods prepared in a healthy manner.

Interpersonal Level

Monthly motivational packs included newsletters with congratulatory messages to those who achieved weight loss or increased their PA. Those who recorded good progress were invited to write words of encouragement in the newsletter to colleagues and share tips on how they succeeded to lose weight through a healthy diet and exercise. Healthy recipes were included so that respondents could try cooking healthily at home (18). This was to create a supportive atmosphere in social circles within and outside of the workplace.

Organisational Level

The organisation showed support for the Healthy Worker Programme to improve workers' health by giving out prizes (incentives) to participants who succeeded in reducing their weight and increasing their PA. Top management was encouraged to continue and promote any existing or planned activities to improve workers' health, such as exercise classes and sporting activities. The cafeteria operator was given information on how to provide healthy foods and encouraged to make healthy foods available. The cafeteria operator was also invited to listen to the Healthy Eating talk which was conducted once during the study for both groups. A corner of the cafeteria was designated as a health information centre, where posters on how to care for one's health through a good diet and PA were exhibited throughout the programme. Posters were changed every month to stimulate interest. A standing, table-top booklet display of calories and fat content in common foods was placed on cafeteria tables and office pantries. Health posters which have been pre-tested and printed by the Ministry of Health of Malaysia were used. Topics included healthy dietary intake, maintaining optimal physical activity and its benefits, exercising safely and prevention of disease through a healthy lifestyle. Posters were also placed in other common areas such as at notice boards, near staircases and outside the gym to encourage stair-climbing and exercise.

For ethical purposes, the control group was also given some health education. Both sites were given three similar health talks throughout the study period. The talks were approximately an hour in duration each

Table 1. Contents of monthly motivation given to participants of the Healthy Worker Programme

Month	Topics of Newsletters
1st month	**Welcome newsletter to participants** **General healthy lifestyle advice:** Pamphlets on 'Healthy Weight', 'Diabetes Prevention', 'Love Your Heart' & 'Motivation to Quit Smoking'
2nd month	**Motivation for a healthy lifestyle:** Pamphlets on 'Reduce Sugar Intake', 'Eat More Fruits & Vegetables' & 'Reduce Fat Intake'
3rd month	**Motivation to improve physical activity and dietary intake:** Pamphlets on: 'Stretching at Work', 'Healthy Lifestyle, Prevent Diabetes' & 'First Aid for Sports Injury' information
4th month	**Advice for increasing physical activity and reducing weight with involvement of family members:** Pamphlets and bookmark: 'Tips for meeting 10,000 Steps Guideline' & 'Reducing Weight Safely through Physical Activity and a Healthy Diet'. 'Tips to Reduce Sugar in Diet' (health pamphlets for housewives) & 'Exercise for the Elderly' Bookmarks with information for healthy physical activity and diet. **Results from 3rd month assessment:** Congratulatory messages to respondents who managed to lose weight and had good physical activity levels
5th month	**Advice and tips to reduce risk of non-communicable diseases:** 'Healthy Recipes', 'Guide to Increase Physical Activity' booklet, 'Stress Management' & 'Relaxation Technique' pamphlets
6th month	**Final newsletter:** Encouragement for all to continue with efforts to maintain healthy lifestyle and achieve ideal body weight Co-worker motivation: Sharing of information and encouragement from workers who successfully lost weight or achieved an active lifestyle. Congratulatory messages: -Certificates of Appreciation for all participants -For respondents who reduced at least 5% of body weight and had good physical activity levels

and the topics were healthy eating, active lifestyle and obesity. These talks were not part of the programme. Also, health pamphlets printed by the Ministry of Health which are freely available to the public, were made accessible during data collections.

Data collection

The intervention was carried out for six months. Primary outcomes were weight and BMI, while secondary outcomes were PA, dietary intake and QOWL. Assessments for weight, BMI, PA levels and QOWL were carried out at baseline, mid-programme (3rd month) and programme end (6th month). Dietary outcomes were assessed at baseline and programme end. All outcomes were assessed again in three months after the programme ended (9th month) for the sustainability of health changes. Self-administered questionnaires were used to collect demographic details such as age, gender, race, job designation, marital status and income level. Weight and height were measured using a digital scale and stadiometer (Seca brand, Model 7802321008, Hamburg, Germany) following the WHO STEPS Manual for chronic disease risk factor surveillance (19). BMI was calculated by dividing weight (in kilogrammes) by height in squared metres. Weight and BMI were assessed by a research assistant blinded to the intervention to reduce bias.

To determine any changes in PA levels, two types of measurement were taken, that is an objective measurement of average steps taken per day using a pedometer and a subjective overall PA assessment using the Malay, validated, short version of the International Physical Activity Questionnaire (IPAQ) (20). The Digi-walker CW-700 pedometer, manufactured by Yamax International, was used to record respondents' steps per day (21,22). The model resets itself to zero steps at midnight and has a memory recall for daily steps taken in the last seven days (21). Respondents were instructed to use the pedometer for seven consecutive days, from the moment they awoke and to take off the device before

they slept at night. The pedometer was worn at the hip, on a belt or at the waist of skirts or trousers. Respondents were allowed to remove their pedometers at bath time, when sleeping, swimming or when there was excessive shaking, such as when they rode on motorbikes. The number of steps taken was recorded by the respondent before going to bed at night (before midnight when the pedometer re-sets to '0 steps'). It was found that at least three days of records were needed to estimate a person's PA (with a correlation of 80%) (23). Records for at least three days were included in the analysis. The average number of daily steps were calculated.

For dietary assessment, the diet record method was used. Respondents were asked to record what they ate or drank for three days, that is two working days and one day at the weekend (24). Respondents were given a booklet with pictures of examples of portions of common Malaysian food and drinks and were taught how to record the amount and type of food consumed (25). Diet records were analysed for average energy, macro- and micronutrients daily intake by a nutritionist blinded to the intervention and trained in using the Nutritionist Pro dietary analysis software (Version 3.0, Axxya Systems, USA, 2007). For any processed or packaged foods, information from their nutrition labels were entered into the software directly (26). For local dishes that were not available on the database, the recipes were obtained from local recipe books and energy and nutrient content were analysed using the Malaysian Food Composition Tables (27). Only completed three-day record were analysed. The results were keyed in by the nutritionist and checked by the researcher.

The Work-related Quality of Life Scale-2 was used to assess the QOWL (9,28,29). The scale was translated and validated in the Malay language by the researcher and used for the study. The validation for the scale was described in another publication (30). Factors for QOWL in the Malaysian model include Job and Career Satisfaction, Stress at Work, General Well-Being, Employee Engagement and Home-Work Interface (30). The scores for overall QOWL and QOWL factors were assessed for any change as an organisational impact of the programme. Data was keyed in by a research assistant blinded to the study and respondent code numbers were used during data entry to reduce detection bias. The data entered was checked by the researcher.

Evaluation of the Programme

The programme was evaluated on its process, behavioural and health impacts and organisational outcome (31). In the process evaluation, its fidelity was assessed to determine if the intervention was carried out as planned. Other process outcomes which were assessed were participation rates for different activities of the programme (eg. reading of monthly motivation materials, phone calls for motivation, involvement of family members, use of healthy recipes), response rates and feedback on how useful an intervention was for respondents. Respondent feedback forms were distributed at the end of the programme. The cafeteria was evaluated for healthy cafeteria changes during the intervention. A surprise check on the cafeteria was carried out every three months. A Healthy Cafeteria Evaluation Checklist from the Malaysian Ministry of Health Obesity Workplace Intervention Module was used for this evaluation (32).

In-depth interviews were held at the end of the programme (after the 6th month) at the intervention site to understand barriers to improving PA and dietary intake among respondents. In-depth interviews were held instead of focus-group discussions (FGD) because of the possible different work schedules of workers. Interviews with respondents were repeated until a saturation point was reached, meaning no new information was collected in the interviews. Subjects interviewed were selected purposively, with varied demographics, that is from both genders and different ethnic backgrounds, categories of staff, marital status, age groups and levels of achievement in the programme. Recorded interviews were transcribed verbatim (33). Figure 2 shows the flowchart of the study.

Data Analyses

Reporting of the results from the intervention followed the CONSORT (Consolidated Standards of Reporting Trials) statement 2010, which recommends a standardised method for parallel interventions (34). Data analysis was carried out using the IBM-SPSS statistical software version 16.0 (SPSS Inc., 2007). The database was checked for errors, missing data and outliers by the researcher. Four assessments were undertaken, namely baseline, mid-programme (third-month), programme end (sixth-month) and post-programme (ninth-month). 'Modified intention to treat' was used for missing data (35). Respondents with baseline data and at least two out of three follow-up data for weight, BMI, PA and QOWL outcomes were included in the analyses. For dietary intake, where there was no mid-programme assessment, respondents with baseline and at least one more follow-up data were included. Missing data

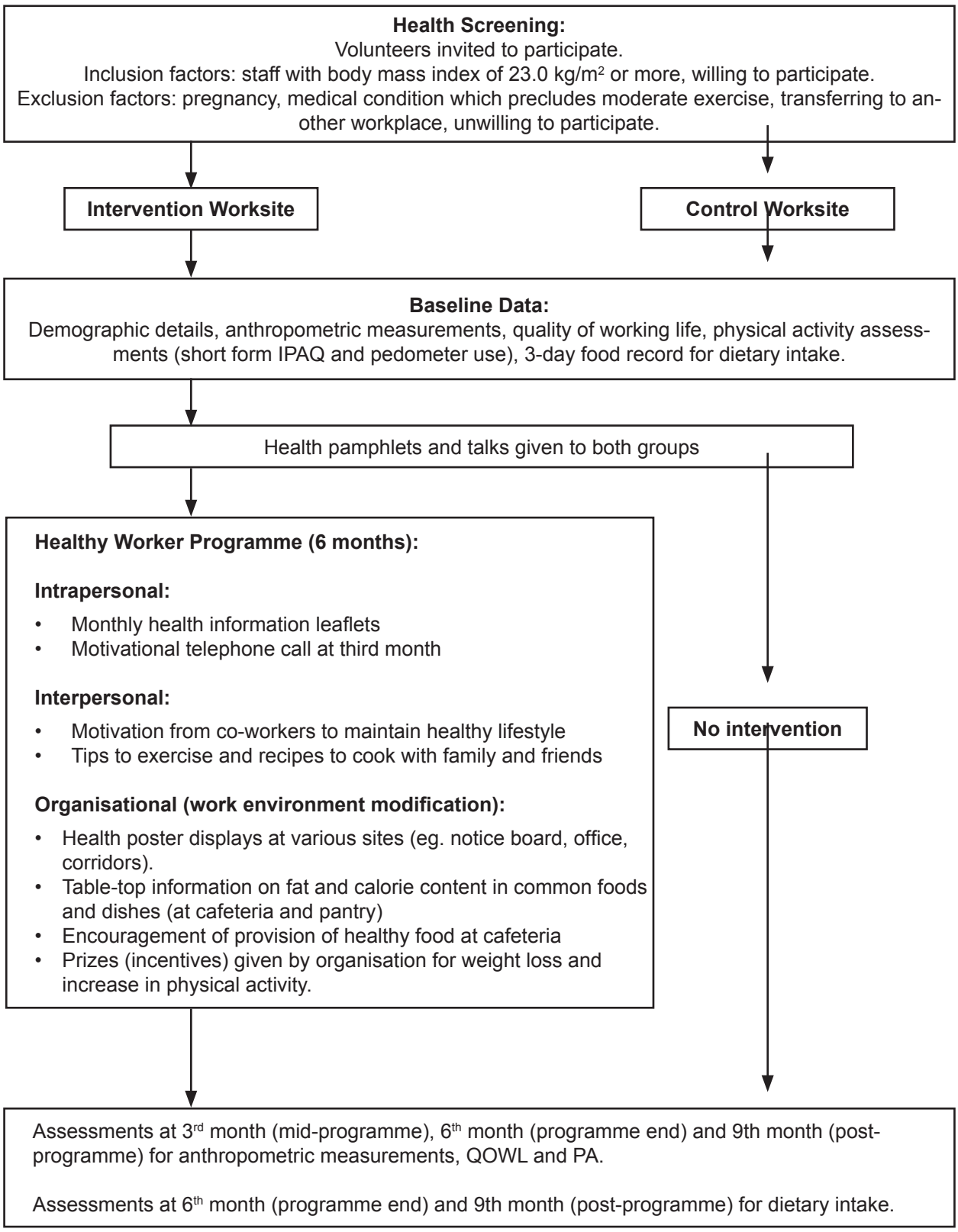

Figure 2. Flowchart of the study

was managed with 'Last Observation Carried Forward' (LOCF), with the assumption that there was no change since the last observation (36).

Data were analysed for frequencies and demographic details. For continuous variables, data were tested for normal distribution. Categorical variables were analysed using the Chi-square test. Outcomes were compared to the baseline for any change in both groups (37,38). Repeated measures analysis of covariates (ANCOVA) was used to determine differences in outcomes within and between groups while controlling for characteristics between worksites which differed significantly at baseline (39). Results were presented using 0.05 as the level of significance and 95% confidence intervals. To estimate effect size, relative risk (RR) ratios were used to determine the magnitude, direction and relevance of effects (39). 'As per protocol' analysis was carried out after analysis by 'modified intention to treat'. This was planned a priori to determine if the significance of results occurred with a different approach to analysis. Data from the qualitative interview was coded using the cutting and sorting method. Thematic analysis was conducted to determine barriers for workers to improve their PA and dietary intake (33).

RESULT AND DISCUSSION

Due to the rise in obesity in the global population, which increases the risks of the early development of non-communicable diseases (NCDs) (1,4), there is a need for more health promotions, including for workers who are contributing towards the economy. Efforts to promote health at the workplace are one of the strategies promoted in the National Strategic Plan for Non-Communicable Disease 2016-2025 (40). In Malaysia, there has been some initiative to promote health at the worksite, however these efforts are minimal and can be further improved. There is a dearth of published Malaysian worksite intervention studies that combine both physical activity and dietary intake components. The study also addressed the lack of information on changes in energy intake, macro- and micronutrient intake, QOWL and sustainability of changes in workplace obesity interventions. The strength of the study was repeated measurements of health and work-related outcomes at baseline, mid-programme, programme end and post-programme.

The study has its limitations. There is no randomisation involved due to its quasi-experimental design. However, the quasi-experimental design has been used in other workplace health interventions where one worksite is designated as the intervention site and another as a control to reduce contamination bias. A "Hawthorne effect" where participants may behave differently when they know they are being observed could occur. However, these effects could happen in both groups. There could be recall bias in assessing PA in IPAQ forms. Environmental influences could also affect both groups' health behaviour or QOWL and changes in medication consumed could affect weight gain or loss. The generalisability of the study is limited to urban office workers and sustainable health changes were assessed in the short term due to time constraints. In the future, a similar study could be conducted in other geographical areas and different work environments to measure sustainable changes over a longer period.

The programme aspired to empower the organisation and its workers to make practical changes to facilitate healthy choices for workers. The organisation stands to gain the employment of healthier staff who may be able to serve longer, and this may reduce health care costs and improve productivity. Outcomes from the study could be used to improve public health campaigns at workplaces in the future. This will contribute towards reducing obesity issues among adults in the population.

CONCLUSION

A sedentary lifestyle and unhealthy diet at work and at home contribute to increasing obesity levels among workers and the early development of non-communicable diseases. The Healthy Worker Programme included multiple intervention components to support a healthier lifestyle among workers. If this programme is found to be useful for weight management and the improvement of dietary intake, physical activity and QOWL, it would be beneficial for workers. The organisation also gain by reducing productivity loss and health care costs. This would also have an impact on tackling obesity-related health problems in society. The study will also contribute to the lack of information on workplace physical activity and dietary intake interventions in Malaysia and the sustainability of health changes from such an intervention.

ETHICAL DECLARATIONS

Ethical approval was granted by the Medical Ethics Committee of University Malaya Medical Centre, Kuala Lumpur. The trial was registered at the Iranian Registry of Clinical Trials (Registration reference

IRCT2015010620591N1).

ACKNOWLEDGEMENTS

We would like to thank the Director General of Health Malaysia for permission to publish this study protocol. The study was funded by the University of Malaya Postgraduate Research Fund (PV095-2011A). Ethical approval was granted by the Medical Ethics Committee of University Malaya Medical Centre, Kuala Lumpur (Reference Number 860.4). The study was registered in the Iranian Registry of Clinical Trials (IRCT2015010620591N1) and has been completed.

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