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Effectiveness of a 3-month weight-reduction programme for obese hospital employees in Malaysia

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ABSTRACT

Objective: To evaluate the effectiveness of a weight-reduction programme for obese employees in a public hospital in Malaysia.

Method: The programme introduced multicomponent interventions, ranging from supervised exercise training to one-to-one dietary counseling. Four 3-month sessions were conducted during 2015 and 2017, involving 131 participants with a body mass index (BMI) ≥30. The measurement was performed at the baseline and the end of each session.

Result: Most of the participants were nurses (59.5%) and in the age range of 30 to 39 years (53.4%). The post-intervention reduction in body weight, BMI, weight circumference and body fat percentage was, respectively, 4.57kg (5.4%; p<0.001), 1.71kg/m^2 (4.9%; p<0.001), 2.65cm (6.8%; p<0.001) and 4.48% (9.2%; p<0.001). Nearly half (46.2%) of them also achieved a weight reduction of at least 5%.

Conclusion: The results support the effectiveness of the programme. Nevertheless, further research is warranted to confirm the sustainability of health behaviors of the participants following the programme. As uncontrolled body weight of health employees has been a concern, this study suggests that a worksite intervention could be effective yet financially sustainable.

Keywords: Body mass index; exercise; health behavior; healthy diet; Malaysia; obesity.

1. Introduction

The Malaysian health standard has almost been on a par with those of developed countries, as the healthcare employees in both the public and private sectors continuously play an integral role in the delivery of health services (Thomas *et al.* 2011). Nevertheless, the welfare and health status of this workforce is often overlooked (Bourne *et al.* 2015; Wirth *et al.* 2016). Notwithstanding the fact that healthcare employees are always viewed as role models for health practices (Rush *et al.* 2005), overweight and obesity have been prevalent among them (Miller *et al.* 2008; Wynd *et al.* 2007). Complications resulting from uncontrolled body weight, both physical and mental, were also shown to reduce productivity of employees (Gifford, 2015). Besides, obese employees have recorded more occupational injuries and accidents as compared with those who had an ideal body weight (Kouvonen *et al.* 2013). Thus, there is a clear need for efforts geared specifically toward controlling the body weight of healthcare employees, and thereby improving their overall health status.

Within this context, the National Institute for Health and Care Excellence (2014) recommends an integrated approach for worksite weight-reduction programmes, which involves commissioners, healthcare professionals and the targeted population. Furthermore, special emphasis has been made

on the need for adopting multilevel strategies, ranging from increasing the awareness and programme uptake to the use of multicomponent interventions including both physical activity and dietary intake, in order to ensure the effectiveness of a weight management programme (Birnie *et al.* 2016; National Institute for Health and Clinical Excellence, 2014). However, the existing studies have been focusing mainly on revealing the unhealthy behaviors and uncontrolled body weight of healthcare employees (Abbate *et al.* 2006; Miller *et al.* 2008; Wynd *et al.* 2007; Zapka *et al.* 2009), while workplace-based weight management programmes documented were typically limited to developed countries (Christensen *et al.* 2012)

Since 2015, a 3-month weight-reduction programme has been introduced by the Health Education Unit of the Sultanah Bahiyah Hospital, a public tertiary care center in Malaysia. It combines evidence-based interventions, including a motivational workshop, one-to-one counseling on healthy diet, supervised exercise training, and behavioral self-monitoring, specifically targeting obese health employees in the hospital. The current study was designed to evaluate the effectiveness of the programme, particularly in reducing body weight, BMI, waist circumference and body fat percentage of the participants.

2. Materials and Method

2.1. **Study Design and Participants**

The current study employed a single-arm experimental design. The study protocol was registered with the National Medical Research Register, Malaysia, under the protocol number NMRR-17-418-34832, and was approved by the Medical Research Ethics Committee, Malaysia. The participants were obese staff in the Sultanah Bahiyah Hospital, who had a body mass index (BMI) of 30 or above and were nominated by the respective heads of departments. The employees, who had physical disabilities that potentially prohibited strenuous activities or self-reported chronic medical conditions, were excluded. All the eligible employees were invited to take part in one of the four sessions of the programme conducted between January 2015 and September 2017, each of which lasted for three months. They were required to confirm their willingness to manage their weight in a one-to-one interview, and to provide informed consent.

2.2. **Data Collection and Assessment**

A standardized data collection form was used to gather the information on the demographic characteristics and work history of the participants, including their gender, age, profession and work hours (normal or shift). The primary endpoints of the current study were the changes in body weight, BMI, waist circumference and body fat percentage following the intervention. The proportion of the participants who achieved the target set for weight reduction (10%) was also determined. Furthermore, in order to have a better understanding of the alleviation of the severity of obesity in the participants following the programme, the BMI distribution was also presented as class I (30.0-34.9), II (35.0-39.9) and III (≥40.0) obesity in line with the recommendations of international guidelines (Nuttall, 2015) and the changes in the proportions of each obesity class were assessed.

The measurement was performed once each at the baseline and the end of each three-month session. Both the body weight and fat percentage of the participants were measured by using the TBF-300A Total Body Composition Analyzer (Tanita Corporation of America, Illinois), while the height measured by using the Body Meter Model 208 (Seca, Hamburg) was used to compute their BMI. To increase the accuracy, the participants were weighed in their working clothes after removing shoes and all personal items. Besides, the waist circumference of each patient was measured by using the Girth Measuring Tape Model 203 (Seca, Hamburg).

2.3. **Data Collection and Assessment**

After the baseline measurement, the participants received immediate feedback on the results from the investigators. The programme began with a motivational workshop conducted by a team consisting of a certified health educator, a dietician and a physiologist. The participants were educated on healthy lifestyle and diet, and were informed of the content of the programme. A weight-loss target (10%) was also set for each participant. Besides, each participant received a log book, on which they were required to record their attendance at the activities under the programme and the food they took on a daily basis.

During the first month of the programme, all the participants were also scheduled for a one-to-one counseling session with a dietician, during which they were advised to avoid the intake of high-calorie diet, reduce portion sizes, and take more fruits and vegetables. Furthermore, they were enrolled in supervised exercise training sessions, in which one-hour training for high-intensity exercise, including Zumba and Tabata, were provided five days per week by a physiologist.

2.4. **Data Analysis**

All the data collected were managed and analysed by using the IBM SPSS Statistics for Windows version 21.0 (IBM Corp., New York). The categorical variables were described using frequencies and percentages, while the numerical variables were summarized using means and stand-

ard deviations (SDs). Paired t-tests were used to detect the differences between the baseline and post-intervention measurements. All the analyses were considered statistically significant if $P<0.05$.

3. Results

All the 131 selected employees had consented to be part of and completed the 3-month programme. They were predominantly female (95.4%) and in the age range of 30 to 39 years (53.4%). More than half of them were nurses (59.5%) and involved in rotating shift work (55.7%), and approximately 60% had a BMI within the range of class I obesity (Table 1).

Table 1: Baseline characteristics and classification of obesity of participants (n=131).

Gender, n (%)	
Male	6 (4.6)
Female	125 (95.4)
Age group (years), n (%)	
25-29	7 (5.3)
30-39	70 (53.4)
40-49	42 (32.1)
50-59	12 (9.2)
Profession, n (%)	
Nurse	78 (59.5)
Doctor	11 (8.4)
Allied health	42 (32.1)
Work hours, n (%)	
Normal	58 (44.3)
Shift	73 (55.7)
Obesity class, n (%)	75 (57.3)
I (BMI 30-34.9)	42 (32.1)
II (BMI 35-39.9)	14 (10.7)
III (BMI ≥40)	

BMI, body mass index; SD, standard deviation.

A significant reduction was shown in all the four targeted parameters following the programme. The post-intervention reduction in body weight, BMI, weight circumference, and body fat percentage was, respectively, 4.57kg (5.4%; $p<0.001$), 1.71kg/m^2 (4.9%; $p<0.001$), 2.65cm (6.8%; $p<0.001$) and 4.48% (9.2%; $p<0.001$) (Table 2). Twenty-three (18%) participants achieved the target set by reducing at least 10% of their body weight, while 37 (28.2%) managed to have a body weight reduction of 5 to 9.9%. Nevertheless, 50 (38.2%) participants only had a body weight reduction of less than 5%, and 21 (16.0%) conversely had an increased body weight following the programme. Intriguingly, forty (30.5%) participants were found to have a BMI in the non-obese range of 25.1 to 30 at the end of the programme. Apart from that, the proportions of the participants with class I, II and III obesity had declined to 40.5%, 24.4% and 4.6%, respectively.

Table 2: Changes in body weight, BMI, weight circumference, and body fat percentage of participants following the programme.

Parameter	Mean (SD)		Mean difference (SD)	p*
	Before	After		
Body weight (kg)	85.09 (11.85)	80.51 (12.25)	-4.57 (6.64)	<0.001
BMI (kg/m^2)	34.56 (4.23)	32.86 (4.18)	-1.71 (1.69)	<0.001
Weight circumference (cm)	39.02 (3.57)	36.37 (3.85)	-2.65 (1.47)	<0.001
Body fat percentage (%)	48.86 (7.76)	44.38 (7.21)	-4.48 (4.90)	<0.001

BMI, body mass index; SD, standard deviation.

* Paired t-test.

4. Discussion

To the knowledge of the investigators, the current study represents the first adaptation and assessment of a series of evidence-based health promotion strategies with a group of obese healthcare staff in Malaysia. The strength of the current study primarily lies in the high commitment of the participants, as all of them had consented to take part in and successfully completed the weight-reduction programme. Aside from that, the multifaceted interventions were designed to use the readily available resources in a public hospital, including the trainers, facilities and instruments, and are thus most likely to be financially sustainable. Such worksite interventions were also expected to benefit the employer economically (Kigozi *et al.* 2017; Thorndike, 2011), in particular by reducing the productivity loss and healthcare costs, even though a full evaluation of their economic impacts is yet to be conducted. Hence, the findings could be used to support the expansion of such a programme to other public health centers in Malaysia, which generally had challenges with both the limited resources and health issues among the employees.

Overall, the programme led to a considerable reduction in body weight, BMI, waist circumference and body fat percentage among the participants. This was largely attributable to their lifestyle changes, both assisted and self-motivated, during the programme, including increased physical exercise and diet control. Another point worth

highlight is that the magnitudes of reduction of all the four parameters targeted were both statistically and clinically significant, as each unit increment in BMI has been shown to elevate the risk of hypertension by 19%, and the risk is expected to increase up to 43% with long-term obesity (Matsuo *et al.* 2011; Williams, 2008). Moreover, the risk of diabetes in a healthy subject has been demonstrated to rise by 9% with each kg gained (Sikaris, 2004). Increased waist circumference and body fat percentage were also confirmed to be positively associated with a higher all-cause mortality rate despite the BMI (Cerhan *et al.* 2014; Padwal *et al.* 2016). Accordingly, while 1 in 2 adults in Malaysia was recently reported to be overweight or obese (Chan *et al.* 2017), the changes resulting from the programme indicated in the current study is a noteworthy achievement.

Interestingly, the magnitudes of reduction of both the body weight and BMI were also found to be higher than those shown in a meta-analysis (2.8 pounds and 0.5kg/m^2), which assessed the effectiveness of similar worksite interventions on overweight and obese employees (Anderson *et al.* 2009). This is most likely due to the generally higher health awareness and better health-related knowledge among the healthcare providers, particularly physicians and nurses in clinical settings (Burdick *et al.* 2015), even though the similar studies generally lacked information to determine the differential effects of weight reduction programmes across professions. However, it is also noted that a considerable proportion of the participants in the current study were still unable to achieve the targeted weight reduction, or even conversely ended up with an increased weight. Therefore, besides behavioral interventions, other evidence-based approaches, such as intensive counseling, worksite environmental changes and policy strategies, could be incorporated into the existing programme to optimize its effectiveness (Anderson *et al.* 2009).

Irrespective of the positive findings, the current study had several obvious limitations. First, the absence of a control group could affect its internal validity. However, the trend in the changes of all the four targeted parameters is similar to those shown in the previous studies (Anderson *et al.* 2009; Earnest & Church, 2015), suggesting that the existing weight-reduction programme is effective. Besides, the current study evaluated the interventions as a multifaceted package, and thus is not able to illustrate the roles of individual components. In addition, the current study focused merely on the immediate changes, particularly in the parameters directly related to the body weight change, and therefore does not provide specific information on the actual behavioral changes of the participants, as well as on the long-term effects of the programme.

5. Conclusion

The findings collectively support the effectiveness of a 3-month weight-reduction programme undertaken in a public tertiary care center in Malaysia. The use of readily available resources in the hospital ensures the sustainability and scalability of the programme. As obesity among healthcare employees is increasingly prevalent in Malaysia, further research is warranted to confirm the durability of health behaviors of the participants following the programme, thereby providing stronger evidence for its expansion to other public health centers. Additionally, besides behavioral interventions, efforts should be made to incorporate other evidence-based elements, especially of environment and policy, into the existing programme.

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