

# A Nutritional Wellness Program for Overweight Health Care Providers in Hospital Setting: A Randomized Controlled Trial Pilot Study

Kim H. K. Choy, Oliva H. K. Chu, W. Y. Keung, B. Lim, Winnie P. Y. Tang

**Abstract**—Background: The prevalence of workplace obesity is rising worldwide; therefore, the workplace is an ideal venue to implement weight control intervention. This pilot randomized controlled trial aimed to develop, implement, and evaluate a nutritional wellness program for obese health care providers working in a hospital. Methods: This hospital-based nutritional wellness program was an 8-week pilot randomized controlled trial for obese health care providers. The primary outcomes were body weight and body mass index (BMI). The secondary outcomes were serum fasting glucose, fasting cholesterol, triglyceride, high-density (HDL) and low-density (LDL) lipoprotein, body fat percentage, and body mass. Participants were randomly assigned to the intervention ( $n = 20$ ) or control ( $n = 22$ ) group. Participants in both groups received individual nutrition counselling and nutrition pamphlets, whereas only participants in the intervention group were given mobile phone text messages. Results: 42 participants completed the study. In comparison with the control group, the intervention group showed approximately 0.98 kg weight reduction after two months. Participants in intervention group also demonstrated clinically significant improvement in BMI, serum cholesterol level, and HDL level. There was no improvement of body fat percentage and body mass for both intervention and control groups. Conclusion: The nutritional wellness program for obese health care providers was feasible in hospital settings. Health care providers demonstrated short-term weight loss, decrease in serum fasting cholesterol level, and HDL level after completing the program.

**Keywords**—Health care provider, hospital, weight management, weight control.

## I. INTRODUCTION

OBESITY is a global problem. In 2014, 1.9 billion people were overweight, and 600 million of these were obese [1]. Overweight and obesity are characterized by a BMI greater than 25 and 30, respectively [2]. In the Asian population, the scale is adjusted as a BMI greater than 23 and 25 for overweight and obesity, respectively. In general, health care providers play a pivotal role in preventing obesity. However, recent researches showed that more than half of the hospital employees were overweight or obese [3], [4]. The increased prevalence of obesity among the health care providers [5], [6] indicated that

health care providers who take care of others are generally less likely to take care of themselves. Several studies also suggested that factors like primiparity [7], increasing age [8], and eating habits [9] were associated with high obesity prevalence in nurses.

Employment in the health care industry is associated with increased obesity prevalence [10]. Hostile work environment, shiftwork, job stress, and unhealthy eating habits are the contributing factors of obesity among health care providers in hospitals [11]–[13]. Obesity exerts health impacts at the personal and organizational levels. Recent research has indicated that obesity contributes to the development of cardiovascular disease, various malignancies, musculoskeletal disease, and sleep apnea [14]–[16]. At the organization level, obesity has been associated with substantially increased rates of absenteeism [17]–[19].

Healthy workplace and personal lifestyle behavior are crucial for obesity prevention. A workplace weight control program could create a culture of health and facilitate weight management among health care providers [20]–[23]. Nutritional knowledge alone shows no correlation with dietary practice [24], [25]. Thus, other strategies should be adopted to engage health care providers in lifestyle modification. Mobile phone text messages may help obese adults in weight management.

To date, limited research is available about the effect of mobile phone text messages on weight management for health care providers. Individually tailored mobile phone text messages may shed light in fostering self-weight management. In view of the high prevalence of overweight and obesity in health care providers, a multifaceted strategy should be considered for this vulnerable group. This study aims to develop, implement, and evaluate a hospital-based weight management program for obese health care providers by using information technology.

## II. METHODS

### A. Study Design

The 8-week workplace nutritional wellness program is a pilot randomized control trial. The intervention and control groups comprised 20 and 22 participants, respectively. The objective outcomes of the study included body weight, BMI, body fat percentage, blood pressure, LDL level, HDL level, and fasting glucose level.

Kim H. K. Choy, Professional Consultant, The Chinese University of Hong Kong (e-mail: choyhaukim@gmail.com).

Oliva H. K. Chu, Dietitian, Yan Chai Hospital Hong Kong (e-mail: chuhk01@ha.org.hk).

W. Y. Keung, Advanced Practice Nurse, Yan Chai Hospital Hong Kong (e-mail: keunwy@ha.org.hk).

Dr. B. Lim, Senior Medical Officer, Yan Chai Hospital Hong Kong (e-mail: limb@ha.org.hk).

Winnie P. Y. Tang, Professional Consultant, The Chinese University of Hong Kong (e-mail: winnie.tang@cuhk.edu.hk).

### 1. Participants

A total of 42 participants were recruited and completed the program. Probability sampling was adopted in this study. Full-time health care providers in a hospital with a BMI equal to or greater than 25, a smart phone, and a commitment to 2-month follow-up were included in the program. Pregnant women or individuals with medical conditions that might limit their ability to comply to nutritional interventions were excluded from the program.

#### B. Recruitment Strategy

Full-time obese health care providers were recruited from a regional hospital in Hong Kong. To prevent coercion in the recruitment process, general public recruitment tools such as posters and recruitment flyers were adopted to recruit eligible health care providers. Promotional posters and recruitment flyers were delivered to different departments using internal hospital mail. Electronic copies of the posters and recruitment flyers were sent to hospital employees in different departments using intranet email. Potential participants were invited to approach the coordinator in the dietetic department for initial screening.

Eligible participants were required to sign informed consent forms before participating in the program. This workplace nutritional wellness program was approved by the Institutional Review Boards of Hospital Authority Kowloon West Cluster, Hong Kong.

#### C. Intervention

Participants were randomly assigned into the intervention or control group. Both groups received a face-to-face education session for 45 min. The education session included nutritional knowledge on etiology, clinical manifestation, treatment modality of obesity, food selection, and food labeling. Participants in the intervention group received tailored weight management intervention, including individual nutrition counseling, nutrition pamphlets, telephone counseling, and smart phone text messages within eight weeks. Participants in the control group received individual nutrition counseling and nutrition pamphlets.

#### D. Statistical Analysis

One-way ANOVA was used to determine any differences in demographic features among the various respondents. The data retrieved from the demographic questionnaire were used to describe the population in the study. The descriptive measures of all participants, along with other study outcomes, were summarized by percentage, mean, and 95% CI, as well as compared for between-group differences. The paired t-test was used to test the sets of collected data at the baseline and 2-month follow-up. SPSS statistics software version 22 for Windows was used for data analysis.

### III. RESULT

A total of 47 participants were recruited for the study, of whom 42 completed the study. The retention rate of this study was 89.36%; five participants did not turn up in the follow-up

visit. Of the 42 participants, 8 (19%) were male and 34 (81%) were female. The mean age was 46, and the mean BMI was 28. No significant differences in baseline demographics were found between the two groups.

In comparison with the control group, the mean net weight loss in the intervention group increased at the end of the study. In the follow-up visit at week 8, the mean change in weight from baseline was  $-0.3$  kg (95% CI) in the control group and  $-0.98$  kg (95% CI) in the intervention group. The net difference of BMI mean in intervention groups was  $-0.4$  (95% CI).

Paired samples T-test analysis indicated an improved means in systolic blood pressure, diastolic blood pressure, serum cholesterol and HDL in the intervention group. No improvement in the mean body fat percentage and body mass were found in both intervention and control groups.

TABLE I  
OUTCOME DATA FROM INTERVENTION GROUP OF NUTRITIONAL WELLNESS PROGRAM

	Baseline data		Follow-up data	
	Mean $\pm$ SD	N	Mean $\pm$ SD	N
Weight (kg)	71.89 $\pm$ 11.57	20	70.91 $\pm$ 11.86	20
BMI (kg/m <sup>2</sup> )	28.59 $\pm$ 2.78	20	28.19 $\pm$ 3.01	20
Body fat (%)	36.29 $\pm$ 5.33	20	36.82 $\pm$ 5.37	20
Body mass (per kg)	26.19 $\pm$ 5.74	20	26.33 $\pm$ 5.68	20
Fasting glucose (mmol/L)	5.63 $\pm$ 1.76	20	5.65 $\pm$ 1.83	17
Fasting cholesterol (mg/dL)	5.11 $\pm$ 0.82	20	5.00 $\pm$ 0.97	17
HDL (mmol/L)	1.44 $\pm$ 0.39	20	1.33 $\pm$ 0.31	17
LDL (mmol/L)	3.18 $\pm$ 0.77	20	3.02 $\pm$ 0.92	17

### IV. DISCUSSION

Positive results of this study illustrated the value of workplace weight management program. The excellent retention rate (89%) of the study suggests that the participants were interested in self-weight management. The financial support of the employer on the weight management program encouraged the obese health care providers to participate in the program.

Anthropometric characteristics of the participants were measured at the baseline and in the 8-week follow up period. The body weight, body fat, and BMI were measured using a Tanita machine. The mean weight changed from baseline to  $-0.98$  and  $-0.31$  kg in the intervention and control groups after eight weeks, respectively. The participants in the intervention group who received mobile phone text messages lost significantly more weight than those in the control group. This result was consistent with the social cognitive theory, which stated that health behavior was regulated by reinforcement (mobile phone text messages). The recommended average weight loss is 1–2 lb per week [26]. The suboptimal weight loss (0.27 lb per week) for intervention group suggests that the participants had not cut an adequate amount of calories from their daily diet.

The cutoff point for body fat percentage defining obesity [27] greater and equal 25% in men and greater and equal 35% in women were adopted in the study. Participants in both intervention and control groups demonstrated no improvement

in body fat percentage and body mass. Participants who were classified as obese by BMI were also expected to be classified as obese by body fat percentage. However, one male participant obtained an obese BMI (26) with a normal body fat percentage (23%).

TABLE II  
OUTCOME DATA FROM CONTROL GROUP OF NUTRITIONAL WELLNESS PROGRAM

	Baseline data		Follow-up data	
	Mean $\pm$ SD	N	Mean $\pm$ SD	N
Weight (kg)	71.19 $\pm$ 11.31	22	70.88 $\pm$ 11.45	22
BMI (kg/m <sup>2</sup> )	28.95 $\pm$ 3.67	22	28.84 $\pm$ 3.84	22
Body fat (%)	40.37 $\pm$ 7.65	22	40.61 $\pm$ 8.05	22
Body mass (per kg)	29.21 $\pm$ 9.48	22	29.40 $\pm$ 9.47	22
Fasting glucose (mmol/L)	5.69 $\pm$ 0.77	22	5.48 $\pm$ 0.74	22
Fasting cholesterol (mg/dL)	5.59 $\pm$ 1.00	22	5.44 $\pm$ 1.06	22
HDL (mmol/L)	1.30 $\pm$ 0.27	22	1.29 $\pm$ 0.26	22
LDL (mmol/L)	3.65 $\pm$ 0.87	22	3.52 $\pm$ 0.80	22

Given that the Asian population was recruited in this study, the BMI scale for defining obesity was adjusted to 23 for overweight and 25 for obesity. Despite the same mean BMI (28) for both intervention and control groups, the intervention group demonstrated more improvement in BMI. By contrast, the control group showed less change in mean BMI.

Main biochemical markers, including serum levels of fasting glucose, fasting cholesterol, triglyceride, HDL, and LDL, were obtained and analyzed at the baseline and at the 8-week follow-up. At the baseline, no significant mean differences in biomarkers were found between the intervention and control groups. At the 8-week follow-up, the intervention group showed clinical improvement in cholesterol level and HDL only.

Overall, the participants were satisfied with the pilot nutrition wellness program. Over 90% of the participants reported that the workplace nutrition wellness program enhanced their knowledge and compliance to weight loss management. Around 40% of the participants reflected that the frequency of dietitian consultation should be increased.

Limitations of this study include a short study period (eight weeks), a small sample size (a total of 42 participants) and a single study venue.

## V. CONCLUSION

This study demonstrated that workplace weight management interventions are feasible and quantifiable for health care providers in hospital settings. It also reduced the body weight and cholesterol level of obese health care providers. In addition, the success of the program provides a stimulus for further development of healthy workplace programs in various work settings.

## ACKNOWLEDGEMENT

This study was approved by the Institutional Review Boards of Hospital Authority Kowloon West Cluster, Hong Kong and supported by the Hospital Donation Fund.

## REFERENCES

- [1] World health organization (2015). Obesity and overweight. Accessed on 04/11/2016 <http://www.who.int/mediacentre/factsheets/fs311/en/>.
- [2] National center for chronic disease prevention and health promotion (2015). Division of Nutrition, Physical Activity, and Obesity. Accessed on 04/11/2016 [http://www.cdc.gov/healthyweight/assessing/bmi/adult\\_bmi](http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi).
- [3] Mittal TK, Barr S, Grove T, Wood DA, Kotseva K. A cross-sectional survey of cardiovascular health and lifestyle habits of hospital staff in United Kingdom, do we look after ourselves? None. *European Journal of Preventive Cardiology*. 2016 Sep 1;23(1): S25.
- [4] Sharma SV, Upadhyaya M, Karhade M, Baun WB, Perkison WB, Pompeii LA, Brown HS, Hoelscher DM. Are Hospital Workers Healthy? A Study of Cardiometabolic, Behavioral, and Psychosocial Factors Associated With Obesity Among Hospital Workers. *Journal of Occupational and Environmental Medicine*. 2016 Dec 1;58(12):1231-8.
- [5] Skaal L, Pengpid S. Obesity and health problems among South African healthcare workers: do healthcare workers take care of themselves? *South African Family Practice*. 2011 Nov 1;53(6):563-7.
- [6] Chou CF, Johnson PJ. Health disparities among America's health care providers: evidence from the Integrated Health Interview Series, 1982 to 2004. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine*. 2008 Jun; 50(6):696.
- [7] Bogossian FE, Hepworth J, Leong GM, Flaws DF, Gibbons KS, Benefer CA, Turner CT. A cross-sectional analysis of patterns of obesity in a cohort of working nurses and midwives in Australia, New Zealand, and the United Kingdom. *International journal of nursing studies*. 2012 Jun 30;49(6):727-38.
- [8] Goon DT, Maputle MS, Olukoga A, Lebesse R, Khoza LB, Ayanwu FC. Overweight, obesity and underweight in nurses in Vhembe and Capricorn districts, Limpopo. *South African Journal of Clinical Nutrition*. 2013 Nov 14;26(3):147-9.
- [9] Ogunjimi LO, Ikorok MM, Olayinka O. Prevalence of obesity among Nigeria nurses: the Akwa Ibom State experience. *International NGO Journal*. 2010 Feb 28;5(2):045-9.
- [10] Luckhaupt SE, Cohen MA, Li J, Calvert GM. Prevalence of obesity among US workers and associations with occupational factors. *American journal of preventive medicine*. 2014 Mar 31;46(3):237-48.
- [11] Han K, Trinkoff AM, Storr CL, Geiger-Brown J, Johnson KL, Park S. Comparison of job stress and obesity in nurses with favorable and unfavorable work schedules. *Journal of Occupational and Environmental Medicine*. 2012 Aug 1;54(8):928-32.
- [12] Kim MJ, Son KH, Park HY, Choi DJ, Yoon CH, Lee HY, Cho EY, Cho MC. Association between shift work and obesity among female nurses: Korean Nurses' Survey. *BMC Public Health*. 2013 Dec 20;13(1):1.
- [13] Amani R, Gill T. Shiftworking, nutrition and obesity: implications for workforce health-a systematic review. *Asia Pacific journal of clinical nutrition*. 2013;22(4):698.
- [14] Yusuf S, Hawken S, Ounpuu S, Bautista L, Franzosi MG, Commerford P, Lang CC, Rumboldt Z, Onen CL, Lisheng L, Tanomsup S. Obesity and the risk of myocardial infarction in 27 000 participants from 52 countries: a case-control study. *The Lancet*. 2005 Nov 11;366(9497):1640-9.
- [15] Calle EE, Rodriguez C, Walker-Thurmond K, Thun MJ. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of US adults. *New England Journal of Medicine*. 2003 Apr 24;348(17):1625-38.
- [16] Bray GA. Medical consequences of obesity. *The Journal of Clinical Endocrinology & Metabolism*. 2004 Jun 1;89(6):2583-9.
- [17] Moreau M, Valente F, Mak R, Pelfrene E, De Smet P, De Backer G, Kornitzer M. Obesity, body fat distribution and incidence of sick leave in the Belgian workforce: the Belstress study. *International journal of obesity*. 2004 Apr 1;28(4):574-82.
- [18] Gates DM, Succop P, Brehm BJ, Gillespie GL, Sommers BD. Obesity and presenteeism: the impact of body mass index on workplace productivity. *Journal of Occupational and Environmental Medicine*. 2008 Jan 1;50(1):39-45.
- [19] Finkelstein EA, daCosta DiBonaventura M, Burgess SM, Hale BC. The costs of obesity in the workplace. *Journal of Occupational and Environmental Medicine*. 2010 Oct 1;52(10):971-6.
- [20] Katz DL, O'Connell M, Yeh MC, Nawaz H, Njike V, Anderson LM, Cory S, Dietz W, Task Force on Community Preventive Services. Public health strategies for preventing and controlling overweight and obesity in school and worksite settings. *MMWR Recomm Rep*. 2005 Oct 7;54(2).
- [21] Lemon SC, Zapka J, Li W, Estabrook B, Rosal M, Magner R, Andersen V,

- Borg A, Hale J. Step ahead: a worksite obesity prevention trial among hospital employees. *American journal of preventive medicine*. 2010 Jan 31;38(1):27-38.
- [22] Kigaru DM, Loechl C, Moleah T, Macharia-Mutie CW, Ndungu ZW. Nutrition knowledge, attitude and practices among urban primary school children in Nairobi City, Kenya: a KAP study. *BMC Nutrition*. 2015 Dec 29;1(1):1.
- [23] Kaufer-Horwitz M, Villa M, Pedraza J, Domínguez-García J, Vázquez-Velázquez V, Méndez JP, García-García E. Knowledge of appropriate foods and beverages needed for weight loss and diet of patients in an Obesity Clinic. *European journal of clinical nutrition*. 2015 Jan 1;69(1):68-72.
- [24] Kerr DA, Harray AJ, Pollard CM, Dhaliwal SS, Delp EJ, Howat PA, Pickering MR, Ahmad Z, Meng X, Pratt IS, Wright JL. The connecting health and technology study: a 6-month randomized controlled trial to improve nutrition behaviours using a mobile food record and text messaging support in young adults. *International Journal of Behavioral Nutrition and Physical Activity*. 2016 Apr 21;13(1):1.
- [25] Spring B, Duncan JM, Janke EA, Kozak AT, McFadden HG, DeMott A, Pictor A, Epstein LH, Siddique J, Pellegrini CA, Buscemi J. Integrating technology into standard weight loss treatment: a randomized controlled trial. *JAMA internal medicine*. 2013 Jan 28;173(2):105-11.
- [26] Guth E. Healthy Weight Loss. *Jama*. 2014 Sep 3;312(9):974-.
- [27] Bosy-Westphal A, Geisler C, Onur S, Korth O, Selberg O, Schrezenmeir J, Müller MJ. Value of body fat mass vs anthropometric obesity indices in the assessment of metabolic risk factors. *International Journal of Obesity*. 2006 Mar 1;30(3):475-83.