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Effectiveness of self-management support program for overweight employees: a quasi-experimental study

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ABSTRACT

This quasi-experimental research examined the effects of self-management support program on knowledge, exercise and eating behaviors, body mass index (BMI), and waist circumference among overweight employees in an industry in Samutprakarn Province, Thailand. Seventy overweight employees aged 20-59 years were equally randomly allocated into either the treatment or control group. Thirty-five overweight employees were in each group. In the 16 weeks, the treatment group was intervened through a self-management support program, while the control group received standard care. Research tools consisted of two parts: a self-management support program and questionnaires. The data were analyzed by using descriptive statistics, paired t-tests, and independent t-tests. The results after 16 weeks of the self-management program showed that its average scores of knowledges, exercise, and eating behavior were higher than the baseline and control group ($p<.05$) while scores of waist circumferences and BMI were lower than the baseline ($p<.05$). The findings of this study indicated that the self-management support program had outcomes that not only could improve knowledge, exercise and eating behavior, but also reduce BMI and waist circumference. It is suggested that the self-management support program should be applied in the organization to promote knowledge and modify the health behaviors of overweight employees in other industries.

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1. INTRODUCTION

Overweight is one of the global major health concerns because its prevalence has increased exponentially. Currently, in the year 2023, there are approximately 3.12 billion people who are obese, accounting for 39% of the total world population. This is a significant increase compared to 15 years ago in 2008 when there were 1.63 billion people who were obese, or 23.9% of the world's total population [1]. In Thailand, it was found that the prevalence of overweight in the population aged 19 years and over was likely to increase from 45.6% in 2020 to 46.6% in 2022. However, when considering the scale of the overweight problem, almost half of the Thai people are overweight; they are at risk of developing chronic non-communicable diseases including hypertension, diabetes mellitus, heart diseases, stroke, and metabolic syndrome [2]. Being overweight or obese is defined by measuring body mass index (BMI) [3]. BMI of obesity is over 30 kg/m^2 while BMI of overweight is in a range of 25-29.9 kg/m^2 [4]. However, criterial standards for obesity and overweight vary in different populations [5]. For example, the standard for Thai people is different from that of WHO. According to the recommended criteria for Thai people, the categories

are defined as follows: underweight (BMI<18.5 kg/m^2), normal weight (BMI 18.5–22.9 kg/m^2), overweight (BMI 23.0–24.9 kg/m^2), obesity class 1 (BMI≥25-29.9 kg/m^2), and obesity class 2 (BMI≥30 kg/m^2) [6].

The incidence of overweight and obesity in individuals is rooted in individual eating habits and working conditions. Most employees in different professions or workforces spend approximately one-third of their time at the workplace and have at least one meal at work; their dietary intake and eating habits in the workplace are considered as major factors leading to the incidence of overweight and obesity [7]. A previous study of overweight employees in Finland found that eating less healthy food habits was associated with weight gain among both male and female employees [8]. Similar findings are also revealed among workers in the metropolitan waterworks authority; it is found that workers with obesity would eat much more food while they are feeling stressed, watching television and video, or playing computer games for more than three hours continuously or having a sedentary lifestyle [9]. For the work conditions, it is found that shift work, especially in the night shifts, could influence the increase in BMI and obesity among industrial workers [10]. More than that, almost all working-age individuals have spent more than half of their lives at work, their workload and stress or pressure including shift work which has affected their eating behavior and physical exercise including their ways of life, resulting in obesity or being overweight.

Furthermore, the result of a rapid survey among 100 workers in the factory located in Samut Prakan Province found that approximately 54% of employees were overweight, 15% of them were obese, and 71% of them had total cholesterol levels exceeded the standard, while 32 of them had triglyceride levels exceeded the standard. The low density lipoprotein (LDL) cholesterol level exceeded the standard in 42% of the participants, and the high density lipoprotein (HDL) cholesterol level was 10% lower than the standard level.

Not only could overweight affect the metabolic system or alters the body's metabolic system, but it also could induce insulin resistance, cause of type 2 diabetes; it also could be a major risk factor leading to many other chronic non-communicable diseases including cardiovascular disease, hyperlipidemia, and high blood pressure. These all effects could lower people's quality of life. These chronic non-communicable diseases are ranked at the top of health problems worldwide, both in terms of the number of deaths and the overall burden of diseases [11]. However, overweight can be preventable by modifying health behaviors through various strategies. The strategies include choosing nutrition-valued food for consumption, controlling food intake, limiting fat and sugar intake, increasing fruit, vegetables, whole grains, and nuts intake, and increasing physical activities. Adults aged 18 years and over should have physical activities, at least 150 minutes of moderate-intensity aerobic exercise per week, or at least 75 minutes of vigorous aerobic exercise [12]. They should have stress control and management, self-management, self-direction, and goal setting in behavior modification [13] as well as self-management support [14].

According to result of a systematic review, self-management support has been proven to be a foundation for increasing skills and confidence in changing health behaviors and has benefits in improving the clinical outcomes in chronic disease patients [15]. The study was conducted by Glasgow *et al.* [16] stating that the 5A's self-management support could facilitate self-management and change the behaviors in patients with chronic illnesses, including obesity. This concept covers the patient's participation in the process of managing health problems. This includes providing support from healthcare providers during behavior change [17], which is widely used in modifying health behaviors [18]. The 5A's self-management consists of assessing, advising, agreeing, assisting, and arranging [16]. Although the previous studies regarding self-management support have been conducted in Thailand, most of them focused on behavior change in chronic illness patients in various settings and they did not specify the obese workers in the industry. Thus, the purpose of this study was to examine the effectiveness of the self-management support program on knowledge, exercise and eating behavior, BMI, and waist circumference among overweight employees in an industry in Samutprakarn Province, Thailand.

2. METHOD

This research have employed a quasi-experimental design with a two-group pretest and posttest design because this design is appropriate for this intervention in which participants were randomly drawn from employees of two similar industrial organizations into either the treatment or control groups. However, since the participants have been involved in the program for 16 weeks, they might have learned how to control their weight from other sources. This would become a confounding factor affecting the result of the study, which the researchers could not control, unlike in a randomized controlled trial (RCT) [19]. This study was conducted in two factories in Samut Prakan Province, Thailand. By conducting the treatment group and control group from different factory branches, the intervention was not contaminated, allowing the control group to benefit from the treatment group's insights and enhancing external validity as the findings could be more broadly applied to various settings and were not restricted to the same characteristics of a single branch [20]. The study samples were employees aged 20-59 years and working in an industrial factory in Samut Prakan Province. The eligible

samples must meet the following criteria: i) having a BMI≥23 kg/m^2; ii) not having any congenital disease which would be an obstacle to carrying out physical activities. The exclusion criteria were applied to exclude those who the physician recommended for refereeing from aerobic exercise during the whole program, those who were unable to participate in the program throughout the 16 weeks, or those who had severe complications or illness which prevented the performance of activities in the program, such as chest pain, shortness of breath, or irregular heartbeat, and severe injury or acute illness.

The sample size in this research was determined by using the method for calculating the power of the test (power analysis) to control type II error by setting the statistical confidence value at 0.05, setting the power of the test at the level of 0.80 and setting the medium influence size (effect size) at 0.10 by opening the table. Table estimate sample size requirements as a function of effect [21] had a sample size of 30 people per group, totaling 60 people, to prevent problems with withdrawing or terminating participation during the study. The researchers increased the sample size by another 15% or five people in each group, making a total of 35 people per group, totaling 70 people. In selecting the sample group, the researchers selected industrial factories affiliated with a company which had the potential to drive a research project based on a self-management support program for overweight employees in two locations. After that, the researchers randomly selected the areas for the study. By using a simple random method, factory branch 1 was an experimental group whereas factory branch 2 was the control group. Then, researchers announced the recruitment for those who met the criteria to participate in the research project as scheduled.

The research project was considered for ethical approval by the human research ethics committee, Burapha University, project code G-HS082/2021. The sample was given clarifying the research purpose and process, including the right to participate or withdraw from the research project at any time without affecting the rights of the eligible sample. When the sample gave informed consent for participation in the research project, the researchers had the sample signed the document requesting consent for research participation.

2.1. Intervention and control condition

The self-management support was developed based on the model 5A [17], including five phases: assess, advise, agree, assist, and arrange. The participants in the intervention group participated in six weeks. The process of activities for the implementation consisted of twelve sessions (twice per week on Monday and Wednesday) with approximately 60–75 min per session. The intervention involved providing knowledge and encouraging self-regulation skills and abilities to manage their health behaviors both exercise and diet. Homework guidelines were formulated for the participants to present activities for discussion in the following week. Weekly homework assignments were given for the researchers to assess the participants' understanding and problems. Lastly, the booklet on obesity consisted of information about knowledge of obesity, exercise, and diet management, and aerobic exercise was given to all participants at the end of the 6th week.

For weeks 7 to 16, the participants participated in aerobic exercise activities for 30 sessions (three times per week on Monday, Wednesday, and Friday) with approximately 60 min per session. The researchers implemented all the steps outlined in the function-based intervention plan and data collection at the 2-point times (baseline and after the 16th week). The participants in the control group received the routine care: advice for lifestyle modification including nutrition, exercise, and emotional management after being assessed health status. The routine care was delivered by the health care providers. In the meantime, the control-group participants were measured the outcomes variables at the first week as baseline and after the 16th week as the end of the study.

2.2. Measurements and measures

Data were collected using questionnaires. Questionnaires were administered at the baseline and immediately after the intervention program (16 weeks after the baseline). Participants in the control group also received a set of questionnaires 16 weeks after the baseline measurement.

2.3. Primary outcome measures

Knowledge assessment was measured by using a set of questionnaires consisting of 25 questions created by researchers from reviewing textbooks, documents, and related research to assess knowledge about being overweight. If a respondent answers the question correctly, the respondent gets 1 point, but if the answer is incorrect or “don't know”, gets 0 points. The knowledge assessment on overweight has 25 questions with the full score of 25 points. The participants who have the high total score means that they have good knowledge.

Exercise behavior assessment was measured by using a set of questionnaires consisting of 12 questions indicating the frequency of practice. The respondent answers were scored on the 5-point Likert scale where (0) represents “never practice” and (4) “regularly practice.” The participants who have the high total score means that they have good exercise behavior.

Eating behavior assessment was measured by using the set of questionnaires consisting of 12 questions indicating the level of frequency of practice. The responses were scored on a 5-point Likert scale where (0)

represents “never practice” and (4) “regularly practice.” The participants who have the high total score means that they have good eating behavior.

For measuring wrist circumference, participants were asked to hold their wrist anterior surface using a tape meter up to the nearest 0.1 cm. Without any pressure, the superior border of the tape measure was placed just distal to the prominence of radial and ulnar bones. For measuring BMI, participants were asked to measure their height and weight. The BMI can be calculated through dividing an adult’s weight in kilograms (kg) by their height in meters (m) squared. General data were analyzed by using descriptive statistics, comparing mean scores on knowledge about being overweight, exercise behavior, eating behavior, average BMI, and waist circumference between pre and post of the experimental group, using paired sample t-test statistics, and comparing between the experimental group and control group, by using independent samples t-test statistics.

3. RESULTS AND DISCUSSION

The participants in the experimental and control groups had a mean age of 44.25±7.39 years and 39.40±9.60 years, respectively. Most participants were male, married, had completed a bachelor's degree, worked in the production segment, had no underlying diseases, did not smoke, and drank alcohol as shown in Table 1. Effect on knowledge, exercise behavior, eating behavior, BMI, and waist circumference paired sample t-test analysis showed that, after the 16th week, the experimental group showed a significantly higher average score of knowledge, average score of exercise behavior, average score of eating behavior than at baseline ($p<0.05$). Effect on BMI and waist circumference paired sample t-test analysis showed that after the 16th week, the experimental group showed a significantly lower average score of BMI and waist circumference than at baseline ($p<0.05$) as shown in Table 2.

Effect on knowledge, exercise behavior, eating behavior, BMI, and waist circumference independent samples t-test analysis showed that, after the 16th week, the experimental group showed a significantly higher average score of knowledge, average score of exercise behavior, average score of eating behavior than the control group ($p<0.05$). Effect on BMI and waist circumference independent samples t-test analysis showed that after the 16th week, the experimental group showed a significantly lower average score of waist circumference than the control group ($p<0.05$) while non significantly lower average score of BMI than the control group ($p>0.05$) as shown in Table 3.

Table 1. Number, percentage, mean, and standard deviation of demographic characteristics of the experimental and the control groups (70)

General information	Experimental group (n=35)		Control group (n=35)		p-value
	Number	%	Number	%	
Gender					
Male	31	86.6	29	82.9	.495[c]
Female	4	11.4	6	17.1	
Age ($\overline{X}$± SD)	44.25 (7.39)		39.40 (9.60)		.021[t]
Education level					
High school/ High vocational education	13	37.1	12	34.3	.803[c]
Bachelor’s degree and above bachelor’s degree	22	62.9	23	65.7	
Marital status					
Single/Widow/Devoice/Separate	5	14.3	13	37.1	.029[c]
Married	30	85.7	22	62.9	
Type of work					
Production staff	26	74.3	19	54.3	.081[c]
Office staff	9	25.7	16	45.7	
Underlying disease					
None	25	71.4	28	80	.403[c]
Yes	10	28.6	7	20	
Smoking					
No-smoke	21	60	22	62.9	.806[c]
Smoked/used to smoke but quit	14	40	13	37.1	
Drinking alcohol					
No	4	11.4	3	8.6	.690[c]
Yes	31	88.6	32	91.4	

Note. [t]= t-test, [c]= Chi-square test

Table 2. Compared the average knowledge, exercise behavior, eating behavior, BMI, and waist circumference of the experimental group at baseline and after the 16th week (n=35)

Data	Mean	SD	d	SDd	t	df	p
Knowledge about being overweight							
Baseline	20.49	4.20	3.14	3.43	5.42	34	<.001**
16th week	23.63	1.21					
Exercise behavior							
Baseline	28.09	5.23	6.29	3.66	10.16	34	<.001**
16th week	34.37	3.66					
Eating behavior							
Baseline	29.71	2.65	3.86	2.32	9.86	34	<.001**
16th week	33.57	2.94					
Body Mass Index							
Baseline	27.97	3.41	-.91	.35	-15.46	34	<.001**
16th week	27.06	3.36					
Waist circumference							
Baseline	95.65	24.46	-1.30	.73	-10.56	34	<.001**
16th week	94.35	24.37					

Note. *p<.05. **p<.001.

Table 3. Compared the mean scores on knowledge, exercise behavior, eating behavior, BMI, and waist circumference of the experimental group and the control group at baseline and after the 16th week (n=70)

Variables	Experimental group (n=35)		Control group (n=35)		t	df	p
	Mean	(SD)	Mean	(SD)			
Knowledge about being overweight							
Baseline	20.49	4.20	19.77	3.28	0.79	68.00	.430
16th week	23.63	1.21	20.51	3.27	5.29	43.23	.000**
Exercise behavior							
Baseline	28.09	5.23	27.74	3.71	0.32	61.32	.753
16th week	34.37	3.66	28.20	4.98	5.91	62.49	.000**
Eating behavior							
Baseline	29.71	2.65	28.37	3.81	1.71	60.66	.092
16th week	33.57	2.94	29.63	3.45	5.15	68.00	.000**
BMI							
Baseline	27.97	3.41	27.06	3.07	1.18	68.00	.243
16th week	27.06	3.36	27.07	3.00	-0.01	68.00	.991
Waist circumference							
Baseline	95.65	24.46	84.24	5.11	2.70	68.00	.009**
16th week	94.35	24.37	84.29	5.22	2.39	68.00	.020*

Note. *p<.05. **p<.001.

3.1. Discussion of main results

From the results of the study, it was found that the experimental group had an average score of knowledge about overweight. The knowledge score at post-experiment period was higher than the pre-experiment period (t=5.42, p<.001) and higher than the control group (t=5.29, p<.001) from this study. That knowledge score of the experimental group increased resulted from the activities designed to enhance their understanding of overweight. These activities were created and conducted by the researchers during the self-management support process, utilizing the 5A's techniques. The process started with the problem assessment step (Assess); in this step, the experimental group would assess their current health problems and overweight status. This step provided an opportunity for self-reflection on health behavior, past obstacles related to self-care, and the analysis of factors influencing their current overweight condition. Following that, they shared their knowledge to facilitate self-management in problem-solving. They proceeded to the counseling session (Advise) in which the experimental group received support in terms of knowledge and skills to plan and establish goals, enabling them to set objectives for behavior change. They also determined the methods to be employed for behavior change, including exploring potential courses of action to achieve success in line with their established goals. Additionally, the researchers provided an overview of knowledge related to being overweight, including its causes, effects, and methods for controlling it. During the knowledge-sharing process, the experimental group engaged in active learning through questioning and interaction with the researchers. These methods enabled the experimental group to enhance their understanding of overweight and the strategies for its control. In addition, the experimental group also practiced self-management skills in eating and exercising including continuing to carry out activities as planned. Finally, the researchers also monitored and evaluated knowledge about overweight and provided feedback to the experimental group. From the support of knowledge and skills in self-management in various areas that the experimental group received, as a result, after the 16th week, knowledge about being overweight was increased and was higher

than the control group. The results of this study are consistent with the results of the previous studies. It was found that when the sample group received knowledge from participating in the self-management support program; as a result, the sample group had increased knowledge of self-care and self-management. This might result from that the sample group has learned both from the process of providing knowledge, which allows asking questions, exchanging experiences, and discussing together [22]. Similar results were found in a study examining the effects of self-management programs on knowledge, self-management behaviors, and HbA1c among diabetic patients with poor glycemic control. The experimental group in that study had a higher mean knowledge score than the baseline score and the control group [22], [23].

For exercise behavior: this study found that the experimental group had a higher mean exercise behavior score in the post-experiment than the pre-experiment ($t=10.16$, $p<.001$) and higher than the control group ($t=5.91$, $p<.001$). It demonstrated that the self-management support program resulted in an increase in exercise behavior in the experimental group. This may have been due to the researchers having applied the concept of supporting self-management systematically way. From evaluating the exercise behavior of the experimental group (Assess). It also included supporting and providing knowledge, and training skills which were important for solving problems and obstacles on their own (Advice), providing knowledge about ways to change behavior through exercise, benefits of exercise, the appropriate level of exercise intensity, duration, frequency of exercise, and exercise precautions for those who were overweight. It included the development of self-management skills regarding exercise both in terms of setting goals for changing behavior, planning for exercise operations according to the suitability of one's physical ability, solving problems that might occur both while exercising and when being unable to exercise according to the set goals. Monitoring their exercise behavior, from the activities in the program, the researcher allowed the experimental group an opportunity to participate in managing their health problems at every step, allowing the experimental group the opportunity to ask questions or offer opinions and design activities together ultimately resulting in increased confidence in doing exercise. In addition, the experimental group agreed and decided to change their health behaviors by themselves (Agree), resulting in the experimental group having increased exercise behavior. In conducting the research, the researchers encouraged the experimental group to choose exercise methods according to their abilities including setting goals for increasing exercise by themselves. It created more motivation and confidence to exercise. In addition, the researchers designed steps to prepare the bodies of the experimental group with aerobic Muay Thai exercise by allowing the experimental group to experience basic Muay Thai aerobic exercise. There was an exercise leader who had been trained and experienced to give advice; it was the step of helping (Assist) the experimental group to prepare the body ready to exercise according to the goal in the next phase. As a result, the experimental group had increased confidence in exercising. The continuous improvement in exercise behavior in the experimental group may be partly due to that the experimental group had self-regulated their exercise through recording. That is, keeping self-record is a crucial part of increasing awareness. It could help the experimental group to maintain their exercise behavior. To experiment, the experimental group received feedback on the benefits of exercise including the energy used while exercising each time according to the duration and frequency that the experimental group used to exercise. However, having the experimental group received the continuous feedback could help participants in the group check whether their exercise was adequate. When participants became aware that they had insufficient or too little exercise, they would change their behavior. Receiving feedback also allowed the experimental group to track their exercise progress. The experimental group's increased exercise behavior was partly due to the support and information on how to manage and control overweight including following up on solving problems (Arrange) through asking about problems and obstacles including solving problems together with the researchers during the experiment period. In addition, they had received support from the research center that provided a place to exercise, receiving encouragement from co-workers by exercising together. In addition, the participants in the experimental group were able to exercise as planned. As a result, they would be able to exercise more continuously. This study was consistent with prior studies which had found that after receiving the self-management support program, the experimental group had better self-management behavior scores than before the experiment and better than the control group [24]–[27].

For eating behavior: it was found that the experimental group had a higher mean eating behavior after the 16^{th} week than the baseline ($t=9.86$, $p<.001$) and higher than the control group ($t=5.15$, $p<.001$). It was showed that the self-management support program resulted in better eating behavior in the experimental group. This might have been due to the researchers having applied the concept of self-management support systematically. From evaluating the eating behavior of the experimental group (Assess) including supporting and providing knowledge, training in skills important to solving one's problems and obstacles (Advice) through providing knowledge about guidelines for changing healthy eating habits, kinds of healthful food, standard proportions of food, advice on proper diet, planning meals to fit one own body's needs including developing self-management skills regarding eating, both in terms of setting goals for changing behavior, planning one own diet according to one body's needs, solving problems that might arise in case of not being

able to eat according to the set goals, monitoring one's eating habits from the activities in the program, the researchers would allow the experimental group to participate in managing their health problems at every step, by allowing the experimental group to ask questions or offer opinions together ultimately led to increased confidence. In addition, the experimental group agreed and decided to change health behaviors on one's own (Agree), resulting in the experimental group having better eating habits. In conducting the research, the researchers had encouraged the experimental group to practice food selection, practice one's skills in setting food menus to get balanced and appropriate energy for oneself, and set eating goals to control one's weight. In doing so, it created more motivation and increased confidence among individual participants. In addition, the researchers had prepared a diet guideline for the overweighted people so that the experimental group had access to appropriate food options. There was an introduction to recording data and practice recording food intake data. According to the diet self-management record, it was a step for assisting the experimental group. As a result, the experimental group had increased confidence in eating appropriately. In addition, the experimental group had good eating behavior. This continuous increase might be partly because the experimental group self-regulated their exercise through recording. Because recording was part of increasing awareness. Thus, it helped the experimental group maintain their eating behavior. In experiments, the experimental group received feedback on the benefits of making appropriate food choices. The fact that the experimental group received continuous feedback could help the experimental group check that their diet was appropriate. When a person becomes aware that they have the behavior of eating inappropriately or excessively. People would change their behavior and receiving feedback also allowed the experimental group to track their progress. The improvement in eating behavior in the experimental group was partly due to receiving support and information on how to manage and control overweight including following up on solving problems (Arrange) through asking about problems and obstacles including solving problems together with the researchers during the experimental period. By this study, the results were consistent with previous studies which found that after receiving a support self-management support program, the experimental group had better scores of eating behavior than the baseline and better than the control group [28], [29].

For BMI and waist circumference: it was found that the experimental group had a lower mean BMI after the experiment than before the experiment ($t=-15.46$, $p<.001$) and lower than the control group ($t=-.011$, $p<.991$). The mean waist circumference of the experimental group had a lower mean waist circumference after the experiment than before the experiment ($t=-10.56$, $p<.001$) and lower than the control group ($t=2.39$, $p<.020$). It was demonstrated that the self-management support program resulted in improved health status in the experimental group. The researchers applied the concept of self-management support in a systematic way including self-management in exercise through aerobic Muay Thai exercises which were moderate exercises spending at least 60 minutes per session (10 minutes warm-up, 40 minutes exercise, 10 minutes relaxation) at least three times a week. For a continuous period of three months, aerobic exercise of moderate intensity or higher continuously for at least 150 minutes per week would help increase the burning of energy and excess fat in the body together with self-management behavior regarding eating. The experimental group chose food to suit their body's needs and had sufficient physical activity, by using the principle of eating right. The eating right principle includes eating food from all nutritional groups to fit their body's needs, eating a variety of foods, reducing sweetness, reducing fat, reducing salty food, and increasing the consumption of less sweet vegetables and fruits. To reduce the impact of being overweight during the study, the researchers had provided support, advice, and continuous monitoring and evaluation. As a result, the experimental group had better self-management behaviors regarding diet and exercise. After the experiment, the experimental group had a lower BMI and waist circumference. This was consistent with studies on the effectiveness of self-management support for weight control in overweight and obese adults. It was found that after receiving the program for a total of 24 weeks, the experimental group had decreased in their average BMI [30]. It was consistent with studies in groups with metabolic syndrome; the average BMI decreased [24].

3.2. Limitation

This research could not control how people received news or information from other sources. It would be due to that modern technology provided people access to knowledge resources related to overweight, exercise, and controlling food intake. In addition, the samples were able to have extra exercise in addition to what the research had planned which might affect the study results.

4. CONCLUSION

Industrial workplaces could apply this research results as a guideline for organizing a set of activities for modifying health behavior for personnel in the organization. This would result in the organizations having healthy human resources, and they could continue to work at full efficiency. It could have further study by bringing a self-management support program to compare with other programs or other

theories to compare their effectiveness in controlling overweight. In addition, further long-term studies would be conducted to determine whether overweight employees could maintain sustainable self-management. It would be able to control their overweight condition to a normal and stable level, which would be still necessary.

In conclusion, the study's findings show that the self-management support program could heighten knowledge about overweight, level of self-management in exercise behavior, and level of self-management in eating behavior, including reducing the BMI and waist circumference of employees. Therefore, healthcare providers in various settings could apply the program to promote the workers' health to improve their healthy lifestyle and their quality of life.

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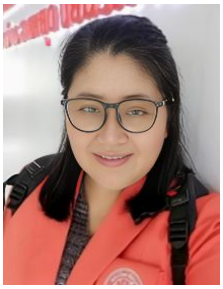

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