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Effects of the corporate wellness program on nutritional status parameters in employees with obesity

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ABSTRACT

Background: The Corporate Wellness Program (CWP) is a new physical exercise initiative designed to address the rising prevalence of obesity among PERTAMINA employees. Obesity negatively affects work performance. Body mass index (BMI) alone is not a sufficient indicator of obesity; therefore, additional measures such as visceral fat assessment are needed. Although nutritional interventions and physical activity are effective in reducing obesity, the effectiveness of structured workplace exercise programs requires further investigation using comprehensive parameters.

Objective: the purpose of the study was to investigate effects of the CWP on body weight, BMI, and visceral fat in obese employees.

Materials and Methods: A quasi-experimental one-group pre-test and post-test design was used. Ethical approval was obtained from the Institutional Ethics Committee. Twenty-six participants were selected from 150 employees using purposive sampling. The CWP was developed based on the FITT (Frequency, Intensity, Time, and Type) principle, with progressive overload applied throughout the intervention. Participants completed 24 exercise sessions (60 minutes per session, three times per week) equal to 2 months of intervention. Body weight, height, and visceral fat were measured using the Tanita BC-545N segmental body composition scale and the Tanita HR-200 wall-mounted height rod, following standardized procedures. A paired-sample t-test was used to compare pre- and post-intervention outcomes.

Results: Participants showed a meaningful decrease in body weight, females dropping from 85.73 kg to 78.63 kg (−7.10 kg), males from 97.75 kg to 91.27 kg (−6.48 kg). BMI followed the same downward trend, females falling from 33.05 kg/m² to 30.55 kg/m² (−2.51 kg/m²), and males from 34.15 kg/m² to 31.92 kg/m² (−2.23 kg/m²) as $p < 0.05$. Visceral fat levels were also significantly reduced, females from 11.07 % to 10.00 % (−1.07 %), and males from 16.97 % to 15.11 % (−1.87 %) as $p < 0.05$).

Conclusion: The CWP effectively contributed to reductions in obesity indicators among PERTAMINA employees.

***Keywords** : Body mass index; body weight; fitness and health; physical exercise; visceral fat*

BACKGROUND

Workplace obesity is a growing global health issue, with recent open-access studies showing that a substantial proportion of employees often 20% up to 55% overweight or obese in working populations, and higher in some occupational groups are affected, particularly in sedentary and shift-based jobs.[1] Prolonged sitting, low physical activity, job stress, irregular shift work, poor dietary environments (high-calorie snacks and sugary drinks), and inadequate workplace wellness structures, all of which interact with socioeconomic and behavioral factors.[2] These factors collectively promote weight gain and metabolic risk over time, making workplaces both a major contributor to obesity and a critical setting for prevention interventions such as movement-friendly work design, nutrition policy, and structured physical activity programs.[3]

Obesity is characterized by excessive body fat accumulation and primarily results from a chronic positive energy balance, where energy intake exceeds energy expenditure over time.[4] Obesity is a multifactorial condition influenced by high-calorie diets, physical inactivity, sedentary behavior (people who work in the office), unhealthy lifestyle patterns, and genetic susceptibility.[5] Obesity has become a global public

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health challenge affecting both developed and developing countries, with prevalence increasing worldwide over recent decades.[6]

Traditionally, obesity is assessed by using body mass index (BMI), but it cannot distinguish between fat mass and lean mass. However, relying solely on BMI may misclassify adiposity and health risk, in other words, nutritional status assessment in obesity requires multi-parameter evaluation.[7] Nowadays, visceral fat along with fat mass and muscle mass have become the keys nutritional status parameters to determine the obesity. Visceral fat that is also known as central adiposity is considered more metabolically harmful than total fat which is linked to type 2 diabetes, cardiovascular disease, and metabolic syndrome. Fat mass or body fat percentage represents total body adiposity, and lean mass often reduced in obese individuals (sarcopenic obesity) that lower muscle mass is strongly associated with worse metabolic outcomes.[8]

There are several strategies that have been confirmed effectively able to lower obesity degree whether single and/or the combination such as diet program, physical exercise program, behavioral therapy, as well as sleep optimization. Many diet programs start from calorie restriction until intermittent fasting has been elucidated as a major prediction of weight loss success and cardiovascular risk reduction when it is maintained long-term.[9] Another effective strategy is physical exercise that has been confirmed can reduces obesity, lowers risk of metabolic diseases (28% - 59% reduction in type 2 diabetes incidence), improves body weight, fat mass, blood pressure, and lipid profile.[10]

The Corporate Wellness Program (CWP), also known as an employee or workplace wellness program, is a structured physical exercise initiative designed to maintain employees' health at optimal levels. This program has been proposed by PERTAMINA in collaboration with Klinik Utama Eminence for PERTAMINA employees with obesity. The CWP is tailored based on the FITT formula, which is widely recognized as a fundamental guideline for developing effective physical exercise programs. FITT is stand for frequency, intensity, time, and type or model of exercise. However, scientific evidence demonstrating how the CWP effectively reduces obesity levels is still not available.

Obesity has been consistently associated with reduced work performance, primarily through its impact on physical capacity, health status, and productivity outcomes such as absenteeism and presenteeism. A systematic review of workplace health studies found that higher body weight is linked to decreased productivity and increased work impairment due to both health-related limitations and chronic disease burden.[11] Individuals with obesity tend to experience greater functional limitations in physically demanding tasks at work compared with those with normal body weight, particularly in roles requiring high physical activity.[12] In addition, obesity is associated with higher rates of absenteeism and presenteeism, contributing to measurable productivity losses in the workforce.[13]

Employees with obesity are suspected to have lower work performance compared to employees with an ideal body weight. Nevertheless, the CWP is a newly implemented physical exercise program aimed at addressing obesity, but scientific evidence supporting its effectiveness is still limited. Therefore, this study aims to investigate the effects of the CWP on nutritional status parameters, such as body weight, body mass index, and visceral fat, among PERTAMINA employees with obesity.

MATERIALS AND METHODS

This is a quantitative study using a quasi-experimental approach with a one-group pre-test and post-test design. All procedures in this study were approved by the Institutional Ethics Committee of the Faculty of Medicine, Universitas Negeri Semarang (Number: 287/KEPK/FK/KLE/2024). The study commenced with pre-test data collection, which included assessments of body weight, body mass index (BMI) calculation, and visceral fat measurement for obesity status screening among PERTAMINA employees. The second stage involved the implementation of the CWP physical exercise program, delivered by instructors from Klinik Utama Eminence. The third stage consisted of post-test data collection, followed by the fourth stage, which involved data analysis for publication.

The study employed purposive sampling with criterion-based selection, whereby only employees identified as obese during the screening process were included as participants. From a total of 150 employees who actively participated in the obesity screening, 26 employees (17.33%) were identified as having obesity. These individuals were subsequently included as participants and received the CWP program.

The CWP physical exercise program is structured according to the FITT formula, which stand for Frequency, Intensity, Time, and Type of exercise. The total duration of intervention was two months. The CWP is conducted three times per week, with an intensity ranging between 65% and 85% of maximum heart rate, and each session lasts up to 60 minutes. The program incorporates a combination of exercise types, including stretching, core movements, and compound movements, all of which are tailored to meet the specific objectives of each session. Each session begins with a warm-up lasting approximately 15 minutes, followed by 10 minutes of core exercise. This is then followed by approximately 30 minutes of compound movements, and the session concludes with a 5-minute cool-down. For detailed information about the list of the CWP physical exercise program, please refer to Table 1. Light physical activities, such as walking or swimming, are encouraged as a form of active recovery rather than passive recovery.

Table 1. The Structure of the CWP Physical Exercise Program

Warm-up (15 minutes)	Jogging on treadmill, Air bike, Elliptical-walk, Dynamic stretching, Assisted static stretching
Core exercise (10 minutes)	Bridge, Bicycle crunch, Dead-bug, Bird and dog, Cat camel, Plank, Crunches, Russian twist
Compound movement exercise (30 minutes)	Upper-body : Dumbbell lateral raise, Pull down, Shoulder press, Chest press, Low row, and Pectoral machine Lower-body : Leg press, Leg extension, Leg curl, Adduction, Abduction, and Rear kick Full-body : Jumping jack, Mountain climber, and Walkout
Cool-down (5 minutes)	Full-body static stretching routine

The CWP was scheduled on Tuesdays, Thursdays, and Saturdays, for a total of 24 training sessions (two months intervention). The program followed an alternating pattern of one day of physical exercise followed by one day of rest or recovery, allowing for sufficient physiological recovery time of less than 48 hours. This approach ensures that recovery is achieved while maintaining the body's readiness to adapt to subsequent stimuli or challenges. The principle of progressive overload was also applied to promote significant adaptation by gradually increasing exercise intensity and/or movement complexity.[14]

Nutritional status parameters measurement. Body weight and visceral fat levels were measured using the Tanita mode BC-545N segmental body composition scale. The Tanita HR-200 Wall-Mounted Height Rod was used to measure body height. All the measurement procedures were followed. Data collections were performed two times, pre-intervention and post-intervention. Obesity status was determined using body mass index (BMI), calculated as body weight in kilograms divided by height in meters squared (kg/m²). A BMI ≥ 25 kg/m² was classified as obesity according to Asian BMI classification.[15] Visceral fat levels were considered within the normal range when values were between 0.5% and 9.5% (device-dependent).

Data analysis begin with data normality which was assessed using the Shapiro–Wilk test, which indicated that the data were normally distributed. Although the number of participants was fewer than 30, the Shapiro–Wilk test confirmed normal distribution of the variables. Therefore, the Paired Sample t-test was used to compare pre-test and post-test outcomes within the same participants. All statistical analyses were performed using SPSS version 26.

RESULTS

The baseline characteristics of the participants prior to the CWP intervention showed a relatively broad distribution in age, anthropometric measures, and BMI. Total twenty-six employees of PERTAMINA with elevated body mass index (BMI) participated in this study, comprising 19 males (73.10%) and 7 females (26.92%). Participants' ages ranged from 27 to 53 years, with a mean age of 39.53 ± 7.82 years. Male participants were generally heavier and taller than females, with a mean body weight of 97.75 ± 14.62 kg compared to 85.73 ± 11.41 kg in females, and a mean height of 168.97 ± 5.98 cm versus 160.36 ± 4.40 cm, respectively. Body mass index (BMI) values in both groups fell within obese category, with females having a mean BMI of 33.05 ± 3.55 kg/m² and males slightly higher at 34.15 ± 4.49 kg/m². Visceral fat percentages were notably higher in males (16.97 ± 2.77%) compared to females (11.07 ± 1.54%). Overall, these findings demonstrate that the study sample was predominantly characterized by elevated body weight, high BMI, and increased visceral fat levels prior to the intervention, with males exhibiting slightly higher risk profiles than females. See Table 2.

Table 2. The Characteristics of Subject Prior the CWP Interventions

Variable	Min	Max	Mean ± SD
Body weight (kg)			
Female (n=7)	75.30	106.80	85.73 ± 11.41
Male (n=19)	76.00	129.80	97.75 ± 14.62
Height (cm)			
Female (n=7)	154	166	160.36 ± 4.40
Male (n=19)	162	185	168.97 ± 5.98
BMI (kg/m^2)			
Female (n=7)	28.28	38.10	33.05 ± 3.55
Male (n=19)	28.20	43.77	34.15 ± 4.49
Visceral fat (%)			
Female (n=7)	9.00	13.00	11.07 ± 1.54
Male (n=19)	13.50	21.50	16.97 ± 2.77

Based on the data showed in the Table 3, twenty-four sessions of CWP physical exercise significantly reduced both body weight (kg) and BMI (kg/m²) in both body for female and male subjects. Among female subjects (n=7), the mean body weight decreased from 85.73 ± 11.41 kg at pre-test to 78.63 ± 8.72 kg at post-test, reflecting an average reduction of 7.10 kg. Similarly, BMI decreased from 33.05 ± 3.55 kg/m² to 30.55 ± 2.65 kg/m², with a mean reduction of 2.51 kg/m². The *p*-value (< 0.05) indicates that these changes are statistically significant. In male subjects (n=19), body weight also declined significantly from 97.75 ± 14.48 kg to 91.27 ± 14.62 kg, with an average reduction of 6.48 kg. BMI decreased from 34.15 ± 4.49 kg/m² to 31.92 ± 4.68 kg/m², corresponding to a mean reduction of 2.23 kg/m². These changes were likewise statistically significant ($p < 0.05$).

Table 3. The Changes on Body Weight and BMI due to CWP Interventions

Variable (s)		N	Min	Max	Mean ± SD	Δ	*P*
Female subjects							
Body weight (kg)	Pre-test	7	75.30	106.80	85.73 ± 11.41	-7.10	< 0.05
	Post-test	7	68.40	92.70	78.63 ± 8.72		
BMI (kg/m2)	Pre-test	7	28.28	38.10	33.05 ± 3.55	-2.51	< 0.05
	Post-test	7	27.06	33.64	30.55 ± 2.65		
Male subjects							
Body weight (kg)	Pre-test	19	76.00	129.80	97.75 ± 14.48	-6.48	< 0.05
	Post-test	19	64.60	117.80	91.27 ± 14.62		
BMI (kg/m2)	Pre-test	19	28.20	43.77	34.15 ± 4.49	-2.23	< 0.05
	Post-test	19	24.31	40.29	31.92 ± 4.68		

The change in visceral fat (%) before and after the CWP program was also notable. The data in the Figure 1 indicate that the CWP intervention is an adequate physical exercise to reduce central obesity. Among female subjects (n=7), the mean visceral fat decreased from 11.07 ± 1.54% at pre-test to 10.00 ± 1.63% at post-test, representing an average reduction of 1.07%. The *p*-value (< 0.05) confirms that this decrease is statistically significant. In male subjects (n=19), a larger reduction was observed. The mean visceral fat decreased from 16.97 ± 2.77% to 15.11 ± 3.14%, with an average reduction of 1.87%. This change was also statistically significant ($p < 0.05$).

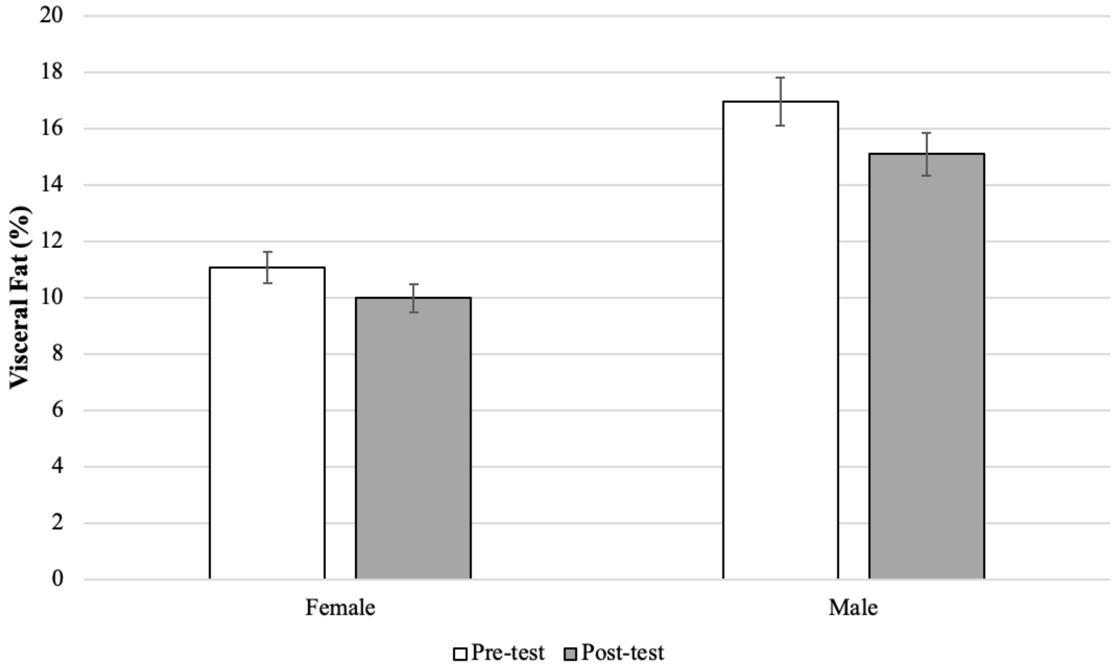

Figure 1. The Changes on Visceral Fat (%) due to CWP Interventions

DISCUSSION

In this study, we found that after 24 sessions of CWP exercise, participants showed a meaningful decrease in body weight. This is consistent with current evidence showing that structured exercise interventions significantly reduce body mass in individuals with overweight and obesity. Previous study stated that resistance training alone can significantly reduce body weight and fat mass compared with non-exercise controls, even without strict dietary intervention, supporting the effectiveness of exercise-based workplace programs in promoting weight loss.[16] Body weight reduction is typically explained by increased energy expenditure and improved metabolic efficiency induced by repeated exercise sessions over time.

Another previous study stated that an aerobic and combined exercise interventions have been shown to produce clinically meaningful reductions in body weight and overall adiposity. A dose-response meta-analysis of aerobic exercise found that regular training leads to significant reductions in body weight, with greater effects observed when exercise volume is increased over time.[17] This supports the progressive overload principle used in the CWP, where structured and repeated training sessions likely enhanced cumulative energy deficit and fat oxidation. Physiological adaptations contribute to sustained reductions in body mass in overweight populations.

The body weight reduction observed in this study is also supported by evidence indicating that exercise-induced weight reduction is closely associated with improvements in metabolic health, including reductions in visceral adiposity. Visceral fat reduction is particularly important because it is more strongly linked to cardiometabolic risk than overall body weight alone. Recent meta-analytic evidence confirms that exercise interventions significantly reduce visceral fat independent of weight loss magnitude, suggesting that the improvements observed in this study likely reflect both fat mass reduction and metabolic adaptation.[18] Importantly, in this study we also found that visceral fat levels were also significantly reduced, suggesting that the CWP program effectively helps reduce central obesity.

Using globally well-known variable (BMI), we found similar pattern for BMI like the body weight reduction as well as the visceral fat post the CWP interventions. This is consistent with strong evidence that structured exercise interventions effectively reduce BMI in overweight and obese populations. A meta-analysis of randomized controlled trials reported that exercise alone can significantly reduce BMI, with mean reductions of approximately −0.5 to −2.0 kg/m² depending on duration and intensity of training programs.[19] These findings confirm that regular physical activity is sufficient to induce measurable improvements in adiposity-related indicators, even in the absence of strict dietary control, particularly when interventions are sustained over several weeks. The FITT-based and progressive overload structure used in the Corporate Wellness

Program likely contributed to sustained physiological adaptations, including enhanced fat oxidation and perhaps improved insulin sensitivity, which collectively drive reductions in BMI over time.

Recent evidence also suggests that reductions in BMI are often accompanied by improvements in cardiometabolic health markers, reinforcing the clinical relevance of the observed changes. A large meta-analysis of exercise-based interventions demonstrated that BMI reduction is closely associated with decreases in overall adiposity and visceral fat, which are stronger predictors of metabolic risk than BMI alone.[20] This supports the interpretation that the observed BMI decline in this study reflects not only weight loss but also meaningful improvements in body composition and metabolic health, highlighting the effectiveness of structured workplace exercise programs in obesity management.

The understanding of how the CWP exercise program affects nutritional status parameters will be more completed and coherent if it also includes an investigation of biomolecular markers such as lipid profiles, blood glucose profiles, and other metabolic indicators. This would allow for a clearer and more comprehensive interpretation based on biomarker changes throughout the process. To better identify additional determinants of nutritional status beyond the physical activity program, future research should incorporate assessments of dietary intake and other lifestyle factors. A study design such as a time series, which evaluates changes not only before and after treatment but also at multiple time points, would further enhance the ability to capture responses over time. Lastly, evaluating psychological domains is crucial, as obesity has a bidirectional relationship with depression. Therefore, future studies could build on these limitations and take these directions into account.

CONCLUSIONS

In conclusion, the findings of this study demonstrate that the CWP physical exercise program exerts a positive effect on body weight, BMI, and visceral fat. These improvements may contribute to reducing obesity-related issues in the workplace among employees with obesity.

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CONFLICT OF INTEREST

Authors declare no conflict of interest to disclose.

DECLARATION USE AI

The authors declare that no artificial intelligence (AI) or AI-assisted technologies were used in the conception, design, data collection, data analysis, interpretation of results, writing, editing, or preparation of this manuscript. All work presented in this manuscript was conducted solely by the authors.

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