Compliance level difference of tele-exercising obese office employee on body weight and body fat

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Compliance level difference of tele-exercising obese office employee on body weight and body fat

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ABSTRACT

The problem of overnutrition and obesity tends to increase year by. Office employee is susceptible to physical inactivity and obesity. In context of current pandemic, exercising via online media, termed 'tele-exercise' may be an effective alternative intervention. However, the effect of compliance and timing of exercise on overall health-related output is still not often discussed. The purpose of the study is to compare the effect of tele-exercise done during working hours vs. after working hours on obese office employee's weight loss and improvement of body fat percentage, as well as their relation to compliance level. The design of this study is quasi-experimental design, with obese office employee as participants, which then grouped into after work exercise (AW, n = 36, 1-hour duration) and mid-work exercise (DW, n = 21, 30-minute duration). Total sampling is used since the target population is under 100 people. Exercises are done 3 times/week for 12 weeks. Data collected are sample characteristics, bodyweight, and percentage of body fat. Both timing of intervention is effective on reducing body weight significantly ($p<0.05$). Significant reduction ($p<0.05$) on percentage of body fat is only occurring in DW group. Compliance level for AW and DW group is 63.75% and 61.23%, respectively, and being insignificant to each other ($p>0.05$). The contribution of compliance in shorter exercise/DW on body fat loss and weight loss is 23.1% and 20.9%, respectively; while the contribution of compliance in longer exercise/AW is 11.3% on body weight loss. In short, mid-working exercise has the similar or even better effect than 1-hour after-work exercise session on weight loss and body fat loss. We recommend tele-exercising during working hours for at least 30 minutes to achieve significant body weight and body fat loss.

Keywords: Tele-exercise; obesity; office employee

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INTRODUCTION

Overnutrition or obesity problem in the world is increasing by 39% for men and 40% for women above 18 years old (World Health Organization, 2016). According to Riskesdas (Indonesian Basic Health Research) in Indonesia, the problem of overnutrition and obesity tends to increase year by year from 10.5% in 2007, 14.8%

in 2013, and 21.8% in 2018. According to the same research, Province of DKI Jakarta and North Sulawesi have the highest prevalence of adult obesity problem in Indonesia (29.8% and 30.2%, respectively) (RISKESDAS, 2018)

Overnutrition or obesity increase the risk of many non-communicable diseases, such as type-2 diabetes mellitus, stroke, coronary heart disease, hypertension, and many other metabolic diseases (Kopelman, 2007). According to some review of many researches, this overweight and obesity problem is affecting the decline on productivity of office employee, therefore affecting economy as well (Goettler et al., 2017; Kudel et al., 2018). The declining rate of physical activity on public level in Indonesia correlates negatively with economical loss related to higher healthcare cost due to overweight and obesity. In that sense, physical activity is an important thing to do for Indonesian people (Ding et al., 2016). Obesity problem alone in Indonesia may potentially inflict a financial loss as high as Rp. 78.478 billion per year (Wulansari et al., 2016). This overnutrition problem is affected by many factors, so the solution to decrease the occurrence of this problem must be done in a correct and fit way. One of the solutions to overcome this problem is by combination of exercise, diet and many other factors such as intrapersonal factor, environmental factor, and government intervention (Raynor & Champagne, 2016).

Obesity in office employee is affected by many factors such as dietary intake, physical activity, and sleep duration (Kurniawati et al., 2016). It is evident that for employee, physical activity and percentage of body fat have a significant relationship with nutritional status (Sukianto et al., 2020). The controlling of physical activity by intervening subjects with moderate-intensity aerobic exercise done four times per week significantly improved body composition, by reducing subcutaneous body fat in triceps, abdominal area, and quadriceps (Kuswari et al., 2015). Exercising during working hours may have some beneficial effect regarding this, as shown in the study by Sjøgaard et al. (2016), such as reduced neck pain; improvement of cardiorespiratory fitness, muscle strength and balance control; and also decreasing of body mass index; and at the same time improves productivity. While in other research, Burn et al. (2017) shows that exercise outside working hours is more efficacious than during working hours at increasing cardiorespiratory fitness.

Workplace provides an beneficial environment for exercise intervention due to the opportunity to take advantage of social support structures, the potential for a large number of participants, pre-existing organizational structure, and the fact that individuals spend much of their day at work. Such intervention provides employees with flexible time to exercise during the workday, although there is limited evidence on the impact of this policy on increasing PA. Many workplace interventions using flexible time have low adherence over the course of the intervention (Bale et al., 2015). About 35% of subjects in the aforementioned study prefer to exercise outside of working hours for various reasons. The shorter duration nature of exercise during working hours, due to the limited free time compared to exercising after working hours, do not have a reduced efficacy on body weight loss, according to (Rosenkilde et al., 2012).

Covid-19 pandemic currently affects all countries in the world including Indonesia since 2020 causes many office employees to work from home, that might potentially increase the prevalence of overweight and obesity. This may be happening since fitness centres, swimming pool, dancing studio, physiotherapy centre, park, and playground are closed by the PPKM restriction policy. Due to this, many people can't exercise outside of their home. These conditions might increase the physical inactivity level as well as a decline in exercise intensity (Almandoz et al., 2020), while at the same time, screentime might be increased as well (Qin et al., 2020; Ten Velde et al., 2021).

In response to the aforementioned problem, Tiksnadi et al. (2020) recommends that exercise should be done at home without decreasing the intensity. Furtherly, they suggested that home exercise should be done by using online methods, which was termed "tele-exercise" (Lai et al., 2016), defined as a type of interventions offering physical training remotely. Tele-exercise method can be used by both office employee who works from home and office employee who works from office (WFH and WFO) simultaneously, by utilizing currently popular virtual video messaging application such as ZOOM and Google Meet. It is known widely that tele-exercise is a good substitute for live, face-to-face exercise session to reduce body weight (Kuswari et al., 2021) and improving fitness level (Kuswari et al., 2022). However, studies on timing of the tele-exercise (i.e: during vs. after working hours) and the duration (shorter vs. longer duration) are still limited, while

compliance level of tele-exercise is often not discussed in available study. The duration of the exercise is also not often discussed, even though for office employee, their time is limited. Therefore, the aim of this study is to compare the effect of tele-exercise done during working hours vs. after working hours, also with regards on their duration, on obese office employee's weight loss and improvement of body fat percentage, as well as their relation to compliance level. This study will provide beneficial information regarding the perfect timing of tele-exercise for company's policymaker on reducing their employee's body weight and body fat level to improve their overall productivity by preventing noncommunicable disease thus reducing healthcare cost.

METHOD

Time, Place, and Participants

This research was carried out on obese office employee working in Jakarta, Indonesia from June to August, 2020. Inclusion criteria were as follows: aged 18-45 years old, working as an officer, doesn't have a heart disease or other serious diseases that can be worsened by exercising, not walking more than 2 km on their way to office or using bicycle, not having constraint on doing high-intensity workout. While the exclusion criteria were as follows: having a chronic disease(s), currently pregnant, or having an injury.

The design of this study is quasi-experimental pre-post-test design. Total sampling method was utilized in this research, since the population of this research is under 100 people. This research was done on two group: tele-exercise during working hour group (DW, n = 22), and tele-exercise after working group (AW, n = 36). The subjects of this study are overweight and obese male and female office employees, with BMI 25-30 kg/m2. All subjects followed this research completely/until the end of this study. Tele-exercise intervention was given for 30 minutes per session, three sessions per week, for 12 weeks. Tele-exercises intervention was given online, done in every subject's laptop/computer.

Procedures

Exercises were done proportionally to each subjects' ability, guided by a professional fitness coach and trainer. The tele-exercises intervention was done using Zoom application and was consisted of strength training (circuit exercise and Tabata exercise, three sessions a week) and aerobic exercises (low-to-moderate aerobic exercises and Zumba, once a week). Every session of exercises was started by 2-5 minutes of warm-up, followed by main exercises for 20-25 minutes, and ended by 2-5 minutes cooling down session. The length of exercise intervention was 12 weeks, with bodyweight and body fat assessment was done before and after completing the intervention. Overall duration time was doubled for AW group, accounting to as much as one-hour exercise in total, since after working, subjects have more free time.

Data collected were sample characteristics, bodyweight, and percentage of body fat. The data were collected by interview methods and BIA (Bioelectrical Impedance Analyzer) in office. All data collection procedures follow Covid-19 prevention protocol: All subjects and enumerators are using a face mask, keeping a distance of 2 meters minimum, and using hand sanitizer each time data was collected from a single subject. Measurement of bodyweight was done by trained nutritionists, utilizing Omron HBF 375 Karada Scan scale as a weighing tool. The accuracy of this scale was up to one decimal. Measurement was taken twice per measurement session, for two sessions of measurement: baseline (0 weeks) and final (12 weeks). Compliance data were inputted as percentage of attendance during programs.

Data Analysis

The data then were entered, edited, and cleaned in Microsoft Excel 2013. Analysis of data was done using SPSS 26.0 for Mac. Kolmogorov-Smirnov test was utilized to see the data distribution. Paired sample t-tests were used to compare the data before and after the intervention, while an ANOVA test with Duncan post-hoc test was used to compare the mean difference between each intervention group, as well as group x time interaction. Spearman rank correlation test was used to determine the correlation of variables as well as their magnitude and direction. This research was ethically approved with protocol number 20-10-1309 by Komite Etik Penelitian Kesehatan, Fakultas Kedokteran Universitas Indonesia.

RESULTS AND DISCUSSION

Table 1 shows the effect of the change in body weight and percentage of body fat before and after intervention. It is shown that both timing of intervention is effective on reducing body weight significantly ($p<0.05$). However, the biggest change in body weight is occurring in AW group. Significant reduction ($p<0.05$) on percentage of body fat is only occurring in DW group, while DW group also showed reduction on percentage of body fat, even though it was not significant. These findings indicate that there is a loss of lean mass in AW group. There was a significant difference on weight loss between AW and DW group ($p<0.05$). However, the same cannot be stated for PBF loss, since there is no significant difference PBF loss between two group.

Table 1 also provides time x group interaction. Sphericity was assumed since there are only two points of data extraction time. Interaction was statistically significant for bodyweight ($p<0.05$) but not for percentage of body fat. This indicates that the changes in body fat percentage over time are not equivalent between two groups.

Table 1. Time X Group Interaction

Variable	Group	Pre	Post	Δ	P (G)	P (G X T)	P (T)	Partial eta squared
Bodyweight	AW	77.35±11.68	73.92±11.44	-3.43	0.009**	0.009*	0.0001*	0.113
	DW	69.52±10.39	68.37±10.28	-1.16				
PBF	AW	32.83±5.43	32.36±5.57	-0.47	0.067	0.056	0.002*	0.061
	DW	34.35±8.34	32.28±8.45	-2.07				

*Denotes significant value ($p<0.05$)
** Denote significant differences between groups based on the ANOVA test.

Table 2 shows the compliance level of each group. It is shown that the compliance level for each group was around 60% of attendance. There was no significant difference between compliance level of AW and DW group ($p>0.05$)

Table 2. Compliance Level For Each Group

Group	Compliance Level (%)
AW	63.75±30.65
DW	61.23±28.63
p-value	0.802

Table 3 shows that compliance level of AW group was correlated ($p<0.05$) with body weight, but not for percentage of body fat. It is also shown that compliance level of DW was correlated ($p<0.05$) with body weight and percentage of body fat.

Table 3. Correlation Test (Spearman Rank)

Group	p-value for Bodyweight	p-value for PBF	Magnitude and Direction
AW	0.037*	0.053	-0.480
DW	0.027*	0.037*	-0.457

*Denotes significant value ($p<0.05$)

During this ongoing Covid-19 pandemic, providing alternative exercise interventions for those who has higher risk of obesity-related noncommunicable diseases is needed since traditional methods are deemed too dangerous due to virus transmission. However, modern innovations allow professionals to provide healthcare services remotely through technologies of communication, such as video call via computers or smartphone with available internet access, which was termed "telehealth" (Lai et al., 2016; Smith et al., 2020). Tele-exercise is a subdivision of telehealth, defined as interventions that offer physical training and are provided remotely (Lai et al., 2016). It is known widely that tele-exercise is a good substitute for live, face-to-face exercise session to reduce body weight (Kuswari et al., 2021), and improving fitness level (Kuswari et al., 2022).

This study shows that tele-exercise done 3 times/week, which only take smaller time to do since both intervention group is focusing on strength rather than cardio exercise, is quite effective at improving body weight and body fat of office employee who has nutritional status of overweight and obese. The strength training intervention used in this study is comprised of basic strength training movement like hinge, squat, and core work.

The results show a significant effect of exercise on reducing bodyweight for AW and DW group, while only on the DW group a significant percentage of body fat reduction is observed. This is in accordance to the research by Mury (2013) which discuss the effect of moderate-intensity exercise (which are also intervened in this study on obese subject) on body weight. The aforementioned study shows that exercise intervention reduce bodyweight and improve nutritional status of the subjects. This is further amplified by research of (Gifari et al., 2021), stating that exercise and nutritional counselling improve BMI of obese subjects. However, the inconsistency of body fat percentage measured in this study may be attributed to many other factors. It is also well-known that exercises in any type of form improve body composition and waist-hip ratio (Avissa et al., 2021), while HIIT (High-Intensity Interval Training) as a form of strength exercise improve lipid profile on overweight and obese students (Gifari, Martianto, et al., 2021).

The inconsistency of body composition in AW group may also be attributed to the inaccuracy of body composition assessment method, which is assessed using BIA (Bioelectrical Impedance Analyser). The timing of measurement of body composition by BIA affects the result. Body fat measurements are lower when measurements are taken shortly after consumption of a meal up to 4.2% of body fat (Slinde & Rossander-Hulthén, 2001). The subject also must not do moderate exercise 90-120 minutes before measurement. Moderate exercise before BIA measurements leads to an overestimation of fat-free mass and an underestimation of body fat percentage due to reduced impedance (Kushner et al., 1996).

This study shows that compliance level is higher in AW group than in DW group. This may happen due to longer duration of free, non-working time available in AW group. The indifference between timing of the exercise proves that 30-minutes, mid-working exercise have the similar or even better effect on weight loss and body fat loss. Even though the difference is not significant, compliance level contributes more to bodyweight loss and body fat percentage loss in AW group than DW group. The reduction on body fat and body weight were affected by factors outside the scope of this study, such as diet. This may be attributable to dominance of strength training that was done in this study. White et al. (2008) stated that after strength exercise, skeletal muscle mass is broken down, marked by creatine kinase. Udani et al. (2009) and Cooke et al. (2010) also stated the same; there is an increase of muscle mass breakdown after strength training. However, in its recovery process, protein plays an important role by pushing z-line disorder on skeletal muscle (Helman et al., 2003). Therefore, it can be assumed that inadequate protein consumption, which was not monitored in this study, may affect body composition, especially in AW group.

CONCLUSION

Exercise session on obese office employee succeed in reducing body fat and induce weight loss, except fat loss on AW group. Compliance level are not different between short, mid-working session exercise and longer, 1-hour after work exercise session. A short, mid-working exercise have the similar or even better effect than 1-hour after-work exercise session on weight loss and body fat loss. There are correlations between compliance level with weight loss and fat loss on DW group, and compliance level with weight loss on AW group. The contribution of shorter exercise on body fat loss and weight loss is 23.1% and 20.9%, respectively; while the contribution of longer exercise is 11.3% on body weight loss. The limitation of this study is that it does not have a control group to be compared to, so the results should be taken cautiously to interpret. Future research should monitor diet as well to reduce bias. We recommend tele-exercising during working hours for at least 30 minutes to achieve significant body weight and body fat loss.

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CONFLICT OF INTEREST

There is no conflict of interest regarding this research

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