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Effects of Tele-Exercise and Nutrition Tele-Counselling on Fitness Level of Obese Employee during COVID-19 Pandemic Time

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Abstract

The unhealthy lifestyle of office employees may affect cardiovascular disease risk and other chronic illnesses. In this ongoing COVID-19 pandemic, there's a decrease in physical activity and exercise intensity in-office employees, while increasing psychological stress may reduce physical fitness. One of the solutions to these problems is by implementing tele-counseling and tele-exercise technology. The purpose of this study is to test the effects of tele-exercise and tele-counseling intervention against obese employees' fitness levels. This study uses a pre-post-test quasi-experimental design on one group without a control group, with subjects consisting of males and females with BMI 25-30 kg/m2. Subjects received tele-exercise intervention for 30 minutes per session, three sessions per week for 12 weeks, while tele-counseling was done by Zoom and WhatsApp every day. Fitness tests include 1-minute push-up and sit-up count, sit-and-reach, and bleep test. Subjects experience significant improvement on all aspects of fitness level (strength, flexibility, and cardiorespiratory fitness), with the most significant improvement being flexibility. This study proves that tele-exercise and nutrition tele-counseling is an effective program to improve obese employees' wellness. Moreover, this method is a good alternative for substituting direct, face-to-face exercise and nutrition counseling in this pandemic time.

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INTRODUCTION

The prevalence of metabolic syndrome, especially among office employees in Indonesia, is still high. (Zahtamal et al., 2014). Metabolic syndrome correlated with overweight/obesity and percent body fat, poor fitness level, uncontrolled blood glucose, and dyslipidemia (Miculis et al., 2012). This abnormality is mainly caused by unhealthy lifestyles and behavior, such as poor diet,

alcohol intake, and sedentary lifestyles. A sedentary lifestyle correlates with bodily damage. Insufficient physical activity level contributes to 7% of Type-2 Diabetes Mellitus cases, 10% of breast cancer cases, and 10% of colon cancer cases. Suppose the physical activity level increases by 10 to 25%, about 0.53 to 1.30 death may be avoided every year (I.-M. Lee et al., 2012). Thus, a healthy lifestyle, including exercising regularly, may improve health substantially (I.-M. Lee et al., 2012).

For office employees, an unhealthy lifestyle can cause cardiovascular disease risk and other chronic illnesses, hence creating an adverse effect related to the workplace. Suppose physical activity level does not meet the recommendation from WHO (World Health Organization, 2020). In that case, there will be a negative effect correlated to physical work capacity and positively correlated with time spent on sick leave (Borak, 2011). This may happen since poor physical activity level causes overweight or obesity (Gray et al., 2018), while overweight and obesity cause poor fitness levels (Wedell-Neergaard et al., 2018). In turn, poor fitness level is a good predictor of low productivity (Goettler et al., 2017). Hence, those conditions are essential factors of indirect cost for employers. An integrated management approach is critical to prevent the consequences of a sedentary lifestyle efficiently, while at the same time, this approach is improving fitness levels. On the other hand, one of the most significant barriers from physical fitness programs is maintaining the compliance level on the said program, with the biggest reason for lousy compliance being time (Bauman et al., 2012).

The ongoing COVID-19 pandemic that is still happening in Indonesia since last year causes many employees to Work from Home (WFH), and this may potentially increase the prevalence of overweight and obesity. This pandemic also caused fitness centers, stadiums, swimming pools, physiotherapy centers, dance studios, parks, and playgrounds to be closed. As a result, many people cannot exercise individually and in groups outside of the home. In this condition, physical activity level and intensity are reduced, psychological stresses are increased, and both may reduce fitness levels (Almandoz et al., 2020). While at the same time, mobile device usage is increased, further contributing to sedentary time (Qin et al., 2020; Ten Velde et al., 2021; Wagner et al., 2021).

In this ongoing pandemic context, online exercise intervention on working hours, done in every employee's home, may become a solution to poor time management, causing lack of time to exercise and may reach people with poor motivation to do physical activity. One of the approaches to this problem is implementing nutrition counseling programs and exercise programs in the workplace. This program provides exercise activity and nutrition counseling done with Zoom application on office employees by professional coaches and nutritionists. Exercise program in this pandemic time aims to strengthen unused muscle for work and

maintain muscle power and flexibility while increasing knowledge of the importance of nutrition and physical activity and the effect of a sedentary lifestyle on health (Tiksnadi et al., 2020). It is to be noted that office employees' health is essential since it will decrease the healthcare cost of a company. This study aims to analyze the effect of online exercise program intervention and online nutrition counseling on obese office employees' fitness levels. Further in this paper will be referred to as tele-exercise and nutrition tele-counseling.

METHODS

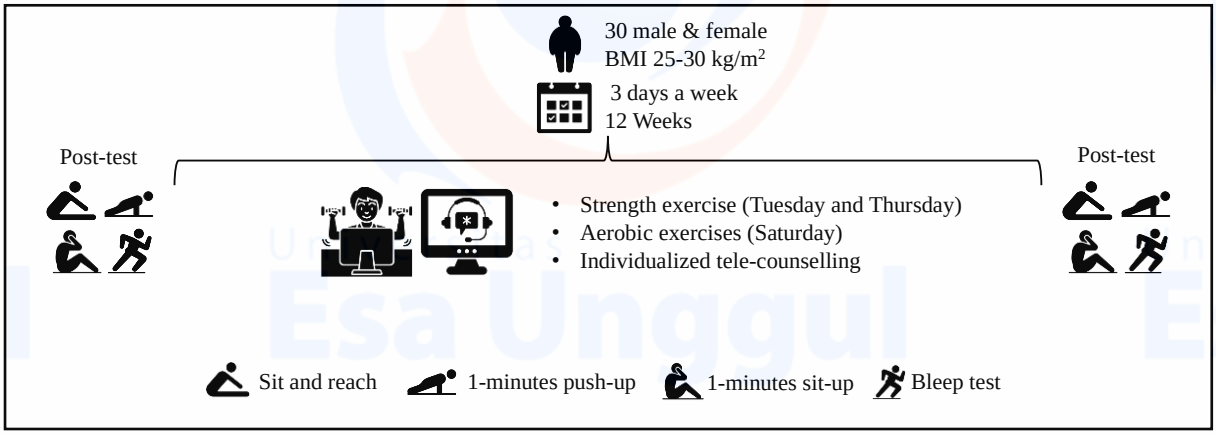
This research was done on Fast Moving Consumer Good's employees for 12 weeks. Tele-exercise program was done using the Zoom application where subjects may be located in an office or their own home according to WFH and WfO schedule. The design of this study is Pre-Post-Test Quasi-Experimental Design without a control group. The subjects were male and female with BMI of 25-30 kg/m^2. The tele-exercise program comprised 30-minute exercise sessions, three sessions per week, for 12 weeks. The exercise consisted of 2 kinds of activity: Strength exercise (circuit training and Tabata) and aerobic exercises (low-moderate intensity and Zumba). Nutrition tele-counseling was given daily with Zoom, and WhatsApp application consisted of healthy lifestyle education, balanced nutrition education, and the importance of the physical activity to increase physical fitness.

The population of this study is both male and female (age 18-45 years) office employees in Jakarta. Sampling was first done by screening BMI (eligible : >25 kg/m^2). The inclusion criteria were: age 18-45 years, working as an office employee, passed the medical check-up test, no coronary heart disease, no illnesses that exercises may worsen, no commuting by walking more than 2 km or using a bicycle, not doing the specific diet, not having trouble exercising with high intensity, not doing regular exercise session on another place, and able to comply until the end of the program without pressure from other people. Exclusion criteria were having a chronic disease(s), pregnancy, or having an injury. The total sample in this study was 11 males and 19 females.

The exercise interventions done in this study were low in risk of injury since samples were either overweight or obese. Exercises were done proportionally according to the abilities of each subject, with accompaniment from a professional fitness coach and trainer. Exercises protocol consisted of strength and cardio exercises using an online platform. Strength exercise consisted of circuit training and Tabata training, which is of 20 seconds of ultra-intense exercise (at an intensity of about 170% of VO2max) followed by 10 seconds of rest, repeated continuously for 4 minutes (8 cycles) (Tabata et al., 1996). Cardio training consisted of low-moderate aerobic exercises and Zumba. Exercises started by doing warm-up for 2-5 minutes, leading training for 20-25

minutes, and ended by cooling down for 2-5 minutes.

Figure 1 Study design



Exercises were done every Tuesday and Thursday for strength training and every Saturday for a cardio workout. To determine the output variable, fitness tests were done on the baseline, followed by a 12-weeks intervention, then fitness tests were done again at the end of the study. The intervention was monitored by using the heart rate reported by each subject to identify whether topics comply with the overall exercises regimen or not. Fitness tests were done in the office parking area, consisting of a 1-minute push-up count, a 1-minute sit-up count, sit-and-reach distance, and bleep test distance.

Data were processed by entry, coding, editing, and cleaning after obtaining it. Entry was done using Microsoft Excel 2018, using subjects' characteristics and fitness level data. Coding was done so subjects' characteristic data could be kept anonymous by changing the name, age, and sex using a specific code value. Cardiorespiratory fitness level (VO2Max) was obtained by processing bleep test distance using bleep test normative table.

Univariate analysis was done to analyze the scattering of data descriptively. All categories of fitness level in baseline, after 6 weeks, and after 12 weeks were then tested using paired sample t-test to prove the research hypothesis. If $p<0.05$, then the theory of this study is proven. All analysis was processed using IBM SPSS 26.0 for Windows. This study protocol is approved by Komite Etik Penelitian Kesehatan Fakultas Kedokteran Universitas Indonesia - RSUPN Dr. Cipto Mangunkusumo No. 20-10-1309.

FINDINGS AND DISCUSSION

Findings

Table 1 shows that before the intervention, most subjects were classified as "poor" in sit-up tests, sit-and-reach tests, and VO2Max, while most subjects were categorized as "good" at push-up tests. After the intervention, most subjects were classified as "excellent" at sit-up, push-up, and sit-and-reach test, while VO2Max level remained poor. However, subjects classified as "very

poor" on their VO2Max level decreased after the intervention.

Table 1 Classification of subjects according to fitness test before and after intervention (n=30)

Categories	*Sit-Up*		*Push-Up*		*Sit-and-Reach*		VO_2Max	
	Before	After	Before	After	Before	After	Before	After
Very Poor	10	1	2	0	4	0	14	9
Poor	12	3	5	0	8	0	15	20
Fair	6	6	9	1	6	1	1	1
Good	1	5	10	8	4	8	0	0
Excellent	1	15	4	21	8	21	0	0

Table 2 shows significant increases ($p<0.05$) on all fitness indicators assessed in this study of an obese employee after the intervention. This proves that a combination of tele-exercise and nutrition tele-counseling increases fitness levels (strength, flexibility, and cardiorespiratory fitness).

Figure 2 Average score of physical fitness test

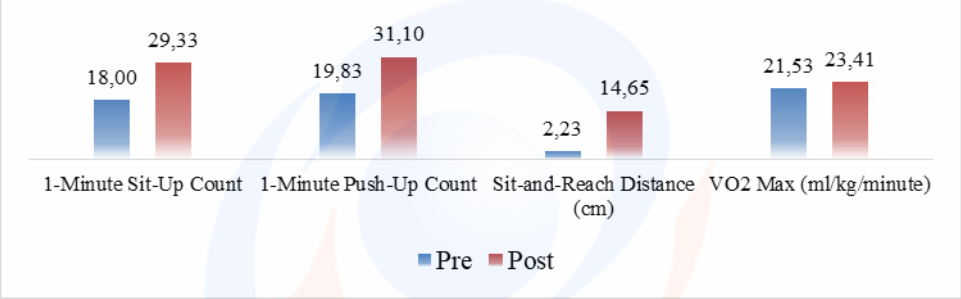


Table 2 Effects of tele-exercise and nutrition tele-counseling on fitness indicator of obese employee

	1-Minute Sit-Up Count	1-Minute Push-Up Count	Sit-and-Reach distance (cm)	VO_2 Max (ml/kg.minute)
Pre	18.00±5.65	19.83±6.89	2.23±11.34	21.53±2.34
Post	29.33±8.56	31.10±7.85	14.65±8.51	23.41±3.40
Δ	11.33±7.68	11.27±8.98	12.42±7.67	1.88±2.21
p-value	0.0001	0.0001	0.0001	0.0001

Discussion

To our knowledge, this is the first tele-exercise and nutrition tele-counseling targeted at obese office employees in Indonesia. This study shows that tele-exercise when combined with nutrition tele-counseling, increases obese employees' fitness levels. However, the positive findings of this study are based on a pilot study that involves a small sample, so its application to clinical practice needs proper interpretation. This program must be further analyzed in longitudinal, controlled research and using a more significant number of samples. However, this research is consistent with a previous study that examined the effect of telehealth technology for 12 months (Vandelanotte et al., 2019) that compares the impact of two different interventions

(Randomized Controlled Trial and Controlled Ecological Trial) on adults. In contrast, this research analyzes the combined effects of nutrition tele-counseling and tele-exercise on the obese employee. According to this current research and previous research, this could be a reference that a combination of tele-exercise and nutrition tele-counseling may be beneficial on overweight or obese subjects.

Poor physical activity levels may cause overweight (Gray et al., 2018), which in turn causes poor physical fitness (Wedell-Neergaard et al., 2018). On the contrary, poor physical fitness is a good indicator of overweight and obesity (Chen et al., 2021; P.-F. Lee et al., 2020; Lin et al., 2020). Meanwhile, the decline of physical fitness will cause poor work productivity (Goettler et al., 2017). Inferior skeletal muscle and cardiorespiratory fitness, combined with obesity, will further worsen cardiovascular diseases, such as heart failure, ischemic heart disease, and cerebrovascular disease, which in turn causes office employees to resign earlier (Henriksson et al., 2020). On the other hand, exercise programs, nutrition counseling, and education improved body composition, especially in decreasing the percent body fat related to obesity (Avissa et al., 2021; Gifari et al., 2021). However, even on obese population themselves, there are some individuals with good physical fitness. In this context, subjects with obesity but good physical fitness are more protected against many metabolic diseases than subjects with normal or lower BMI but having poor physical fitness. Still, in the same context, physical activity or exercise intervention does not have to decrease BMI or improve nutritional status. Rather, the intervention must improve physical fitness, especially cardiorespiratory fitness (Do et al., 2018).

Physical fitness programs must aim for cardiorespiratory fitness, skeletal muscle strength, endurance, resistance, and flexibility (Winnick & Porretta, 2016). The findings of this study show that most subjects had an improvement in their cardiorespiratory fitness, which is in line with meta-analysis done by (Flahr et al., 2018). The mentioned meta-analysis shows that randomized controlled trial design on healthy sedentary office employees causes an improvement in subjects' cardiorespiratory fitness level after the intervention. Cardiorespiratory fitness plays a significant role in decreasing the risk of coronary heart disease (Nichols et al., 2018), which is one of the four worst chronic diseases, causing more than 17.9 death worldwide in 2019 (World Health Organization, 2021). Therefore, the positive effects of cardiorespiratory fitness improvement in this study must be continued by other researchers with a significantly more significant number of samples, including control subjects.

Cardiorespiratory fitness is a good determinant for an individual's physical function and future physical disability. Cardiorespiratory fitness is also a strong predictor of cardiovascular disruption and early death (Saunders et al., 2020).

Improvement in cardiorespiratory fitness, which is determined by assessing VO_2Max, is not homogenous in previous research, for as little as 1% (Barene, Krustrup, Brekke, et al., 2014) to as large as 19% after a 12-week exercise program (Barene, Krustrup, Jackman, et al., 2014). The difference in those researches may be attributed to many factors, such as exercise intensity and good exercise progression during the intervention. The findings of this study are not in line with the research of (Miller et al., 2020) that study the improvement of morbidly obese female's cardiorespiratory fitness, but this research is in line with the research of (Schwingshackl et al., 2014), stating that combination of exercises and calorie restriction provides more significant effects than calorie restriction alone (Schwingshackl et al., 2014).

Assessment on mid-intervention, or follow-up assessment, especially in the more extended procedure, enables the researcher to modify aerobic intensity, resulting in more relevant cardiorespiratory fitness improvement. In this current study, exercises were guided by a professional fitness coach and trainer, with nutrition tele-counseling implemented by an experienced nutritionist, resulting in better control and monitoring on subjects, and the implementation of different exercises classes may be related to better improvement in cardiorespiratory fitness (Barranco-Ruiz & Villa-González, 2020). These results indicate that tele-exercise has positive effects on aerobic capacity. While this finding is promising, further analysis, including objective control on exercise intensity, is also recommended.

Besides skeletal muscle fitness, tele-exercise and nutrition tele-counseling intervention also significantly improved before and after the intervention. Both 1-minute sit-up count and 1-minute push-up count increased significantly. Strength exercises done twice a week provide high skeletal muscle overload, which increases lean muscle fitness. Also, researchers hypothesized that sedentary subjects tend to have a low level of skeletal muscle fitness, especially in abdominal strength seen in 1-minute sit-up count at baseline, and upper extremities strength is seen in 1-minute push-up count at baseline so that in only 12 weeks, skeletal muscle strength increases clearly and rapidly. Researchers also assumed that nutrition tele-counseling about calorie restriction affected the nutritional intake of subjects. The results of this research are in line with previous research, which states that a combination of calorie restriction and exercise increases skeletal muscle strength compared with calorie restriction alone (Miller et al., 2020). The results of this study are also consistent with a previous study showing that resistance training may increase the physical strength of skeletal muscle on a hypocaloric diet (Ardavani et al., 2020), which may help protect against future physical disabilities early death.

Significant improvements in abdominal muscle strength and resistance (represented by 1-minute sit-up count and 1-minute push-up count) are also consistent with previous

research (Tseng et al., 2013). The study above analyzes the effects of 12-weeks aerobic exercises intervention on physical fitness related to health in the workplace. In line with that study, one of the results of this study is that there are many positive changes in abdominal muscle strength and flexibility. Aerobic exercises have positive effects on improving capillary muscle density and muscle mitochondria number, resulting in higher body weight loss since increasing mitochondria means increasing energy expenditure (Karavirta et al., 2011).

Resistance training also can cause an improvement in skeletal muscle fitness, vice-versa, while the capacity of both can be increased indirectly, mainly in sedentary subjects (Eklund et al., 2016). Furthermore, 12-weeks intervention may directly affect physical variables other than cardiorespiratory fitness and strength since the exercises implemented are very global (aimed at many joints and have full-body workout characteristics). As body exercises with low-to-moderate intensity, including many moves such as jumps, core exercises, and other choreographies such as hand movement, muscle mass improvement is enabled from low level (Barranco-Ruiz & Villa-González, 2020)

After 12 weeks of intervention, subjects also gained significant flexibility, shown by an increasing sit-and-reach test distance. Since that test cover full-body movement, it is assumed that the validity of that test is affected by anthropometric factors and flexibility on the shoulder, back, and both upper and lower extremities (arms and legs) (Ayala et al., 2011). In this study, there are some factors reported to affect reproducibility and flexibility of the hamstring, including different pelvic muscle positions and its stability, and also the position of the ankle (Barene et al., 2016)

Other evidence also shows that muscle flexibility may be increased by stretching exercises, which causes an increase in stretching tolerance, not on visco-elastic accommodation on expanding the range of motion of many joints (Behm & Chaouachi, 2011). Therefore, aerobic exercises, strength exercises, and stretching during this 12-weeks intervention may increase flexibility and abdominal muscle strength in obese office employees.

Exercise in the workplace is beneficial to office employees to decrease health risk indicators, increase physical function, physical capacity, and perceived health. Specifically, tele-exercise is proven to reduce body weight (Kuswari et al., 2021). Moreover, employers are also benefited if they provide some free time for their employees to do physical activity, in the context of reducing absenteeism due to illnesses and improving and keeping up the productivity and working ability (Sjøgaard et al., 2016). Other than just potentially increasing productivity, the intervention given in this study is potentially reducing absenteeism. The workplace is an exciting environment to change behavior, with individualized counseling and less than ten intervention frequencies, which is the most

effective one in methodological design on reducing absenteeism of office employees (Tarro et al., 2020).

This research is in line with a previous systematic review, which concludes that nutrition intervention and physical exercise can affect work-related output, mainly absenteeism, positively by health promotion efforts that cover components aimed at physical workplace environment and organizational structure (Grimani et al., 2019). Exercising in the workplace also can reduce the level of psychological stress. Previous research shows that if most office employees' working days are categorized as passive, sedentary behavior, more than 3 hours are spent sitting a position per day, thus stimulating psychological stress (D\.edel\.e et al., 2019). Type of workplace may even affect office employees' physical activity essentially; open tables are the most active, followed by boxed office, and individualized rooms are the least busy (Lindberg et al., 2018). Evidence shows that more physically active employees have a lower stress level outside of works (Lindberg et al., 2018). Other research also shows that aerobic exercises 2 times a week decrease the need for rest during the creation of office employees (Lidegaard et al., 2018).

The main weakness of this study is the design, which did not use a randomized controlled trial or even a control group to compare the effect of the exercise and nutrition tele-counseling. Despite the weakness, this study is a pilot study, so the fault is insignificant. Another disadvantage is that this study did not include nutritional intake as a confounding factor since nutrition intake may also affect fitness (Kuswari et al., 2020). Nutritional intake was assumed not to be changed in this study, even though nutrition tele-counseling enabled subjects to change their dietary habit.

CONCLUSION

This study shows that tele-exercise and nutrition tele-counseling effectively improves obese office employees' fitness. Moreover, this type of exercise and counseling is an excellent alternative to substitute face-to-face exercise and nutrition counseling in this ongoing pandemic time. Further research should use a control group and differentiate the training used.

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