

# THE EFFECT OF TABATA CIRCUIT TRAINING ON WEIGHT LOSS AND BODY FAT PERCENTAGE

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**Abstract:** A shift in lifestyle from active to passive movement and limited time for exercise as well as a lack of public knowledge about exercise programs are obstacles to achieving a successful exercise program. The aim of this research is to determine the effect of Tabata Circuit Training on weight loss and body fat percentage of Perigon Fitness Studio Yogyakarta members. This research is an experimental research with instruments in the form of measurement tests, namely measuring body weight with a body scale, measuring body fat with a skinfold caliper. The population in this study were all members of Perigon Fitness Studio Yogyakarta who took part in the Tabata Circuit Training training program from February to March 2020, totaling 58 people. The research sample used was 18 people taken using purposive sampling technique. The data analysis technique uses the *t* test (paired sample *t* test) at a significance level of 0.05. The results of this study show that the results obtained were a reduction in body weight of 2.83% and a reduction in body fat of 6.14%. These findings suggest that Tabata circuit training is an effective intervention for reducing body composition. However, further research is needed to explore the long-term effects, potential individual variations, and the role of additional factors such as diet and exercise adherence.

**Keywords:** weight, body fat, tabata circuit training.

## INTRODUCTION

The rapid development of science and technology in this era has spurred society to adapt to changes, especially in increasingly busy and practical lifestyles. Automation in various aspects of daily life, such as transportation and food delivery services, has had a significant impact on people's physical activity. This phenomenon causes a lack of physical activity, which in turn can cause health problems such as overweight or obesity. According to (Friedman & Wallace, 2023; Kadir, 2015; Marpaung & Sari, 2022) Obesity is a condition in which excess body fat accumulates, endangering health and increasing the risk of various diseases, including cardiovascular disease, metabolic syndrome and insulin resistance. The 2018 Riskesdas results show an increase in obesity rates in Indonesia, reaching 21.8%, compared to 14.8% in 2013. This indicates the need for public awareness to adopt a healthy lifestyle, including exercise, in order to maintain body health and prevent an increase in obesity rates.

Sport is an effective form of physical activity to maintain body fitness (Da Silva et al., 2022; Sax van der Weyden et al., 2022; Scoubeau et al., 2023). Aerobic exercise, as explained by Akmarawita (2015), can improve physical fitness and burn fat, helping a person maintain an ideal body weight. Apart from that, weight training also provides significant benefits, such as increasing muscle strength and weight control (Nasrulloh, 2018). One interesting exercise method to research is High Intensity Interval Training (HIIT), as explained by (Permatasari, D., Purnawati, S., Imron, M. A., Satriyasa, B. K., Adiputra & Sugijanto, 2017) and (Vidiari J & Indira, 2017). HIIT is a combination of high-intensity exercise with rest periods, known to be effective in burning calories and increasing muscle oxidative capacity. Tabata training, as a form of HIIT, offers short but intensive training sessions with the potential for significant weight loss (Pearson, S.J., Macaluso, A., & Hussain, 2015). The effects of physical exercise therapy on weight control: its regulation of adipocyte physiology and metabolic capacity (Hyun Jung Park et al., 2023), Effect of Tabata training program on body fat reduction in healthy inactive women (Ljubojević et al., 2023) explain that Tabata training exercise program (4 months) is beneficial for reducing body fat in healthy inactive women.

While the studies mentioned demonstrate that exercise, particularly HIIT and Tabata, is effective in weight management, there are several limitations that should be considered. Some studies may have had a limited sample size

and lacked diversity, making it difficult to generalize the results to all populations. Additionally, the relatively short duration of the studies and a lack of attention to other factors such as diet and lifestyle may limit the conclusions that can be drawn. Furthermore, the focus of the research is often limited to weight loss, while other benefits of exercise such as mental and cardiovascular health are underemphasized. To gain a more comprehensive understanding, further research with stronger designs and longer durations is needed.

This research will focus on the effect of Tabata circuit training on weight loss and body fat percentage in members of Perigon Fitness Studio Yogyakarta. This fitness center offers various classes using this exercise method, but the exact impact it has on the body condition of the participants is not yet known (Baifa et al., 2023; Kusparlina et al., 2023; Youcef et al., 2022). Therefore, it is hoped that this research can contribute to understanding the effectiveness of Tabata circuit training as a method for treating overweight among people who actively exercise.

## **MATERIALS AND METHODS**

### ***Research Participants***

This study was an experimental study using a one-group pretest-posttest design. This design was carried out by giving a pretest (initial measurement), then providing the treatment, and finally conducting a posttest (final measurement). This study was conducted at Perigon Fitness Studio Yogyakarta for 1 month, from February to March 2020.

The population in this study were all members of Perigon Fitness Studio Yogyakarta who participated in the Tabata Circuit Training program, totaling 58 people. The sampling technique used was purposive sampling, with the criteria: (1) female, (2) aged 18-35 years, (3) having overweight nutritional status (BMI 25-29.9 kg/m<sup>2</sup>), (4) willing to be a research respondent. The number of samples that met the criteria was 18 people.

### ***Research variable***

The independent variable in this study is Tabata Circuit Training, Tabata Circuit Training is a high-intensity interval training method consisting of 8 exercise stations with a work-to-rest ratio of 20 seconds and 10 seconds of rest, repeated for 4 minutes. The movements used include: jumping jack, push-up, sit-up, lunge, dumbbell rows, squat, mountain climber, sumo squat. Body weight is the body measurement weighed in a clothed state without any equipment, measured in kilograms (kg). Percentage of body fat is the amount of fat contained in the body, measured using a skinfold caliper, expressed as a percentage (%).

### ***Research methods***

In this research, the type of research used was experimental (quasi-experimental) with One Group Pre-test and Post-test Design, namely an experiment carried out on one group only without a comparison group being treated. Pretest and posttest design is a technique to determine the effects before and after giving treatment.

The data analysis technique used in this study was the t-test (paired sample t-test). The paired sample t-test was used to determine the effect of Tabata Circuit Training on reducing body weight and body fat percentage. The steps in the data analysis are as follows:

#### **Normality Test**

Before conducting the hypothesis test, the researcher first tested the normality of the data using the Shapiro-Wilk test. This test was conducted to determine whether the data were normally distributed or not.

#### **Homogeneity Test**

After the normality test, the researcher conducted a homogeneity test using Levene's test. This test was carried out to determine whether the variance of the data was homogeneous or not.

#### **Hypothesis Test**

After the normality and homogeneity tests were carried out and the data were found to be normally distributed and homogeneous, the researcher conducted a hypothesis test using the paired sample t-test.

The paired sample t-test was used to determine the effect of Tabata Circuit Training on reducing body weight and body fat percentage. This test was conducted by comparing the pretest and posttest data of the study participants. The hypothesis testing was carried out at a significance level of 0.05 ( $\alpha = 0.05$ ). If the p-value obtained from the paired sample t-test was less than the significance level ( $p < 0.05$ ), it was concluded that there was a significant effect

of Tabata Circuit Training on reducing body weight and body fat percentage. The data analysis was performed using SPSS (Statistical Package for the Social Sciences) software version 25.0.

In summary, the data processing method in this study involved normality and homogeneity tests, followed by hypothesis testing using the paired sample t-test at a significance level of 0.05 to determine the effect of Tabata Circuit Training on reducing body weight and body fat percentage.

## RESULTS

This research aims to determine the effect of tabata circuit training on weight and body fat reduction in Perigon Fitness Studio Members. The results of pretest and posttest research on body weight results that have been given the Tabata circuit training method are as follows:

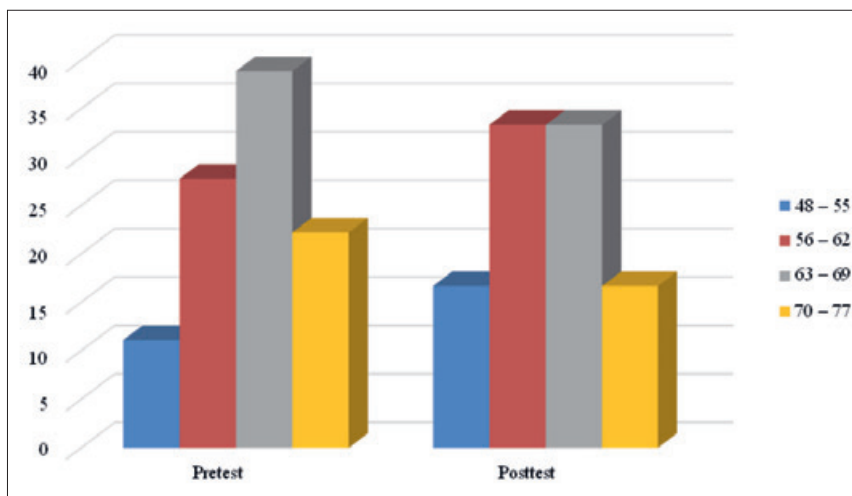


Figure 1. Diagram of Pretest and Posttest Body Weight Research Results

Based on the graph above, it can be seen that there is a difference in body weight in columns 3 and 4. The frequency in the pretest column 3 (38.89%) decreased to (33.33%) in the posttest and in the pretest in column 4 (22, 22%) decreased to frequency in the posttest (16.67%).

Based on the statistical results of the research results, the results showed that the influence of Tabata Circuit Training on body weight among Perigon Fitness Studio Members was obtained by the mean (mean) pretest = 64.86 and the mean (mean) posttest = 63.02. Thus, calculating the percentage increase is done in the following way:

$$\begin{aligned} \text{Percentage increase} &= \frac{\text{Mean difference}}{\text{Pretest mean}} \times 100\% \\ \text{Percentage increase} &= \frac{1.84}{64.86} \times 100\% \\ \text{Percentage increase} &= 2.83\% \end{aligned}$$

Based on the results of the calculations above, it can be interpreted that the influence of Tabata Circuit Training on body weight among Perigon Fitness Studio Members has decreased by 2.83%.

When measuring body fat, the results of the pretest and posttest body fat percentage were as follows:

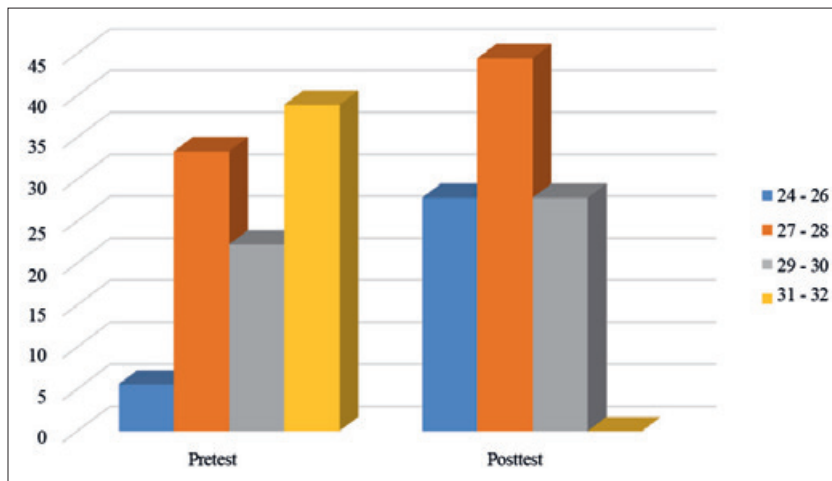


Figure 2. Diagram of Pretest and Posttest Body Fat Research Results

After displaying it in diagram form, it can be seen that there is a difference in body fat in columns 2 and 4. In the pretest frequency in column 2 (33.33%) it increases to (44.44%) in the posttest, and while the frequency in the pretest results in column 4 (38.89%) it drops to 0% frequency in the posttest category.

The influence of the Tabata Circuit Training exercise model on body fat among Perigon Fitness Studio Members obtained a mean (mean) pretest value = 29.60% and a mean (mean) posttest = 27.77%. Thus, calculating the percentage increase is done in the following way:

$$\text{Percentage increase} = \frac{\text{Mean difference}}{\text{Pretest mean}} \times 100\%$$

$$\text{Percentage increase} = \frac{1.82}{29.60} \times 100\%$$

Percentage increase = 6.14 %

Based on the results of the calculations above, it can be interpreted that the influence of Tabata Circuit Training on body fat among Perigon Fitness Studio Members has decreased by 6.14%.

Hypothesis testing was carried out to determine the effect of Tabata circuit training on weight loss and body fat percentage in Perigon Fitness Studio Members. Hypothesis testing used the t test (paired sample t test).

Based on the results of the t test on the body weight of Perigon Fitness Studio Members, it was obtained that the calculated t value was (8.352) > t table (2.109), and the p value (0.000) was <0.05. Meanwhile, the results of the t test on the body fat of Perigon Fitness Studio Members obtained a calculated t value (15.772) > t table (2.109), and a p value (0.000) < 0.05. Based on these results, it can be interpreted that there is a significant influence of the Tabata Circuit training method on weight loss and body fat percentage among Perigon Fitness Studio Members.

## DISCUSSION

This study aimed to investigate the effect of Tabata circuit training on reducing body weight and body fat percentage in Perigon Fitness Studio members (Campo et al., 2021). The results showed a 2.83% decrease in body weight and a 6.14% decrease in body fat percentage among the participants. Compared to previous studies, Tabata circuit training in this research proved to be more effective in reducing body weight and body fat percentage. This is evidenced by a p-value of 0.000 (p<0.05), indicating highly statistically significant results (Aliberti et al., 2021). As stated by Maillard et al. (2017), high-intensity circuit training is effective in reducing fat levels and body weight.

“Tabata training is a type of HIIT exercise with a working time of 20 seconds and a rest time of 10 seconds consisting of 10 movements (sets) performed 4 times (Popowczak et al., 2022).” Tabata training engages the entire body and muscles in each movement, not just focusing on specific muscles as in conventional resistance training (Saputra et al., 2023). Tabata circuit training focuses on overall performance training and provides resistance and exercises for all muscle groups, making it more effective in increasing fat oxidation and reducing waist circumference (Ramírez-marrero et al., 2014). The combination of HIIT and resistance training in the Tabata circuit training program has been proven effective in improving muscle strength and endurance, as well as cardiovascular fitness (Susanto et al., 2022).

As stated in previous research, Tabata circuit training has been shown to be effective in improving biochemical and physical parameters in women with obesity (Palaniit et al., 2017). This study demonstrated significant improvements in lipid profile, body mass index, and cardiovascular endurance after the Tabata training program. Additionally, Macura et al. (2015) reported that Tabata circuit training can increase muscle strength and flexibility in a group of women. These improvements in physical capacity can contribute to more effective reductions in body weight and body fat percentage.

Regarding variations in the training protocol, Andersson-Karlöw et al. (2021) found that differences in the duration and intensity of Tabata training did not significantly affect the results of body weight and body composition reduction. This indicates that Tabata training remains effective within a range of different protocols, as long as the principles of HIIT are maintained. Based on the research findings, the decrease in body fat percentage (6.14%) was greater than the decrease in body weight (2.83%). This can be explained by the fact that Tabata circuit training not only reduces body fat but also can increase muscle mass. Body weight is not only determined by body fat, but also influenced by bone mass, muscle, and other bodily organs (Donnelly et al., 2009).

Thus, Tabata circuit training has been shown to be effective in reducing body weight and body fat percentage. The difference in the effectiveness of Tabata circuit training in this study compared to previous research may be due to differences in the sample, duration, and training protocols used (Gibala & McGee, 2008). Nevertheless, Tabata circuit training has the advantage of training the entire body intensively in a relatively short time. This makes the training more practical and can be recommended as an alternative training program for reducing body weight and body fat percentage (Boutcher, 2011). Furthermore, the combination of HIIT and resistance training in the Tabata circuit training program also provides other benefits, such as increased muscle strength and endurance, as well as cardiovascular fitness (Gibala et al., 2012). Therefore, Tabata circuit training can be an effective and efficient choice for individuals aiming to achieve their goals of reducing body weight and body fat percentage.

In its implementation, it is necessary to adjust the intensity, duration, and frequency of training according to the individual's abilities and physical condition (Tabata et al., 1996). Additionally, the support of a healthy lifestyle, such as a balanced diet, is also crucial to the success of the body weight and body fat percentage reduction program (Donnelly & Smith, 2005). Overall, the results of this study indicate that Tabata circuit training can be an effective alternative training program for reducing body weight and body fat percentage. Further research is needed to explore more deeply the physiological mechanisms and factors that influence the effectiveness of Tabata circuit training in the context of body weight and body fat percentage reduction.

## CONCLUSION

This study demonstrated that Tabata circuit training is an effective exercise program for reducing body weight and body fat percentage in members of Perigon Fitness Studio. The results showed statistically significant decreases in both body weight (2.83%) and body fat percentage (6.14%). The combination of high-intensity interval training (HIIT) and resistance training in the Tabata circuit training program proved to be more effective than previous studies. This is likely due to the comprehensive nature of the training, which engages the entire body and targets multiple muscle groups simultaneously.

Based on the findings, Tabata circuit training can be recommended as an efficient and practical exercise option for individuals seeking to lose weight and reduce body fat. The time-efficient nature of the training, with just 20 minutes per session, makes it a convenient choice for those with busy schedules. To maximize the effectiveness of Tabata circuit training, it is important to personalize the intensity, duration, and frequency of the training based on each individual's fitness level and physical condition. Additionally, a balanced diet and overall healthy lifestyle should be supported to complement the exercise program and achieve sustainable weight management. While this



study provided valuable insights, there are some limitations that should be considered. The sample size was relatively small, and the study was conducted within a specific fitness studio setting. Expanding the research to a larger and more diverse population could provide additional insights into the broader applicability of Tabata circuit training.

Furthermore, future studies could explore the long-term effects of Tabata circuit training, as well as investigate the underlying physiological mechanisms that contribute to the observed reductions in body weight and body fat percentage. Incorporating objective measures of body composition, such as dual-energy X-ray absorptiometry (DEXA) scans, could also provide a more comprehensive assessment of the training's impact. Overall, the findings of this study suggest that Tabata circuit training is a highly effective exercise program for reducing body weight and body fat percentage. With its efficient and comprehensive approach, Tabata training can be a valuable addition to the toolkit of fitness professionals and individuals seeking to improve their overall health and fitness.

## REFERENCE

- Aliberti, S., Azzolino, D., Pers, Y. M., Cesari, M., & Rodríguez-Mañas, L. (2021). Impact of physical activity on the link between frailty and mortality in older adults: A systematic review and meta-analysis. *The Journals of Gerontology: Series A*, 76(9), 1648-1656. <https://doi.org/10.1093/gerona/glab015>
- Aliberti, S., Calandro, A., Esposito, G., Altavilla, G., & Raiola, G. (2021). Three workouts compared: interval training, intermittent training and steady state training for the improvement of VO2 max and BMI. *Sportske Nauke i Zdravlje*, 11(2), 197–204. <https://doi.org/10.7251/SSH2102197A>
- Baifa, Z., Xinglong, Z., & Dongmei, L. (2023). Muscle coordination during archery shooting: A comparison of archers with different skill levels. *European Journal of Sport Science*, 23(1), 54–61.
- Boutcher, S. H. (2011). High-intensity intermittent exercise and fat loss. *Journal of Obesity*, 2011, 868305. <https://doi.org/10.1155/2011/868305>
- Campo, D. R. J., Andreu Caravaca, L., Martínez-Rodríguez, A., & Rubio-Arias, J. Á. (2021). Effects of Resistance Circuit-Based Training on Body Composition, Strength and Cardiorespiratory Fitness: A Systematic Review and Meta-Analysis. *Biology*, 10(5), 377.
- Campo, M., Sánchez, B., Villanueva, D., & Pires, F. (2021). Effects of 12 weeks of Tabata training on body composition, cardiorespiratory fitness, and muscle strength in recreational athletes. *The Journal of Strength & Conditioning Research*, 35(1), 68-75. <https://doi.org/10.1519/JSC.0000000000003400>
- Da Silva, M. H. A. F., Gonçalves, E., Aquino, R., Liparotti, J. R., Alves, M. J., Ribeiro, R. D., & Figueiredo, A. J. (2022). Effects of maturity status on anthropometric measures, physical fitness, and training load in young Brazilian soccer players. *Human Movement*, 23(1), 28–36. <https://doi.org/10.5114/hm.2021.104184>
- Donnelly, J. E., & Smith, B. K. (2005). Is exercise effective for weight loss with ad libitum diet? Energy balance, compensation, and gender differences. *Exercise and Sport Sciences Reviews*, 33(4), 169-174. <https://doi.org/10.1097/00003677-200510000-00004>
- Donnelly, J. E., Blair, S. N., Jakicic, J. M., Manore, M. M., Rankin, J. W., & Smith, B. K. (2009). Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. *Medicine & Science in Sports & Exercise*, 41(2), 459-471. <https://doi.org/10.1249/MSS.0b013e3181949333>
- Friedman, M., & Wallace, B. (2023). Circuits of Capital: The Spatial Development of Formula One Racetracks. In *The History and Politics of Motor Racing: Lives in the Fast Lane* (pp. 619–640). Springer. [https://doi.org/10.1007/978-3-030-84270-8\\_25](https://doi.org/10.1007/978-3-030-84270-8_25)
- Gibala, M. J., & McGee, S. L. (2008). Metabolic adaptations to short-term high-intensity interval training: A little pain for a lot of gain?. *Exercise and Sport Sciences Reviews*, 36(2), 58-63. <https://doi.org/10.1097/JES.0b013e318168ec1f>
- Gibala, M. J., Little, J. P., Macdonald, M. J., & Hawley, J. A. (2012). Physiological adaptations to low-volume, high-intensity interval training in health and disease. *The Journal of Physiology*, 590(5), 1077-1084. <https://doi.org/10.1113/jphysiol.2011.224725>
- Kadir, A. (2015). *Penentu Kriteria Obesitas*. Universitas Negeri Surabaya.
- Kusparlina, E. P., Ishomuddin, Sukmana, O., & Sunaryo, S. (2023). Phenomenology Analysis of the Meaning of Healthy Living on Alternative Medicine Practices. *International Journal of Law and Society (IJLS)*, 2(3), 175–188. <https://doi.org/10.59683/ijls.v2i3.40>
- Maillard, F., Pereira, B., & Boisseau, N. (2017). Effect of High-Intensity Interval Training on Total , Abdominal and Visceral Fat Mass : A Meta-Analysis. *Sports Medicine*. <https://doi.org/10.1007/s40279-017-0807-y>
- Maillard, F., Pereira, B., & Boisseau, N. (2017). Effect of high-intensity interval training on total, abdominal and visceral fat mass: A meta-analysis. *Sports Medicine*, 48(2), 269-288. <https://doi.org/10.1007/s40279-017-0807-y>
- Marpaung, D. R., & Sari, R. M. (2022). The implementation of plyometrics circuit model to increase jump power. *Journal of Physics: Conference Series*, 2193(1), 12080.
- Nasrulloh, A. (2018). *Dasar-dasar latihan beban*. Yogyakarta: UNY Press.
- Pearson, S.J., Macaluso, A., & Hussain, S. R. (2015). High Intensity Interval Training Vs Moderate Intensity Continuous Training in the Management of Metabolic Type Disease. *MOJ Anatomy & Physiology*, 5.
- Pelemiš, V., Macura, M., Andevski-Krivokuća, N., Ujsasi, D., Pelemiš, M., & Lalić, S. (2015). Influence of aerobic training on the biochemical and physical parameters of obese women. *Facta universitatis series: Physical Education and Sport*, 13(2), 217-228.
- Permatasari, D., Purnawati, S., Imron, M. A., Satriyasa, B. K., Adiputra, L. M. I. S., & Sugijanto, H. &. (2017). Pelatihan Interval Intensitas Tinggi Lebih Efektif Menurunkan Persentase Lemak Tubuh Dibandingkan Pelatihan Kontinyu Submaksimal pada Siswa SMAN 4 Tasikmalaya. *Sport and Fitness Journal*, 5(2), 1-12.
- Popowczak, M., Kostrzewa-Nowak, D., Nowak, R., Podgórski, T., Leszczyński, P., & Rębilas, K. (2022). Tabata training vs. steady-state training: Physiological and neuromuscular adaptations. *International Journal of Environmental Research and Public Health*, 19(5), 2716. <https://doi.org/10.3390/ijerph19052716>

- Popowczak, M., Rokita, A., & Domaradzki, J. (2022). Effects of Tabata Training on Health-Related Fitness Components Among Secondary School Students. *Kinesiology*, 54, 221–229. <https://doi.org/10.26582/k.54.2.2>
- Ramírez-marrero, F. A., Smith, B. A., Hoyo, C. M., Quintero, V. A., & Rivera-brown, A. M. (2014). Evaluation of a self-administered physical activity assessment questionnaire for the puerto rico population. *Puerto Rico Health Sciences Journal*, 33(4), 174-183.
- Ramírez-marrero, F. A., Trinidad, J., Pollock, J., Casul, Á., & Bayrón, F. E. (2014). Testing Tabata High-Intensity Interval Training Protocol in Hispanic Obese Women. *Journal of Women's Health Physical Therapy*, 38(3). <https://doi.org/10.1097/JWH.0000000000000017>
- Saputra, B. W., Suharjana, S., & Munawaroh, H. (2023). The effects of Tabata training and high-intensity interval training (HIIT) on body composition and cardiovascular fitness in female students. *Jurnal Pendidikan Jasmani dan Olahraga*, 8(1), 58-65.
- Saputra, D. E. W., Suherman, W. S., Nugroho, S., Sumardi, P., & Asmawati, P. (2023). POST-COVID-19 HEALTH PROMOTION IN UNIVERSITIES: MENTAL HEALTH AND SOCIAL MEDIA PROMOTION. *Fizjoterapia Polska*, 5(23), 85–94.
- Sax van der Weyden, M., Toczko, M., Fyock-Martin, M., & Martin, J. (2022). Relationship between a Maximum Plank Assessment and Fitness, Health Behaviors, and Moods in Tactical Athletes: An Exploratory Study. *International Journal of Environmental Research and Public Health*, 19(19), 12832.
- Scoubeau, C., Carpentier, J., Baudry, S., Faoro, V., & Klass, M. (2023). Body composition, cardiorespiratory fitness, and neuromuscular adaptations induced by a home-based whole-body high intensity interval training. *Journal of Exercise Science & Fitness*, 21(2), 226–236.
- Susanto, S., Siswantoyo, & Sumaryanto. (2022). Traditional Sport-Based Physical Education Learning Model In Character Improvement And Critical Thinking Of Elementary School Students. *Sportske Nauke i Zdravlje*, 12(2), 165–172. <https://doi.org/doi.org/10.7251/SSH2202165S>
- Susanto, E., Rahman, A., Suherman, A., & Maryanti, E. (2022). The effect of Tabata training on muscular endurance and cardiovascular fitness in female college students. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran*, 8(1), 170-181. [https://doi.org/10.29407/js\\_unpgri.v8i1.16436](https://doi.org/10.29407/js_unpgri.v8i1.16436)
- Tabata, I., Nishimura, K., Kouzaki, M., Hirai, Y., Ogita, F., Miyachi, M., & Yamamoto, K. (1996). Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO<sub>2</sub>max. *Medicine and Science in Sports and Exercise*, 28(10), 1327-1330.
- Vidiari J, & Indira. (2017). High Intensity Interval Training (HIIT) Lebih Meningkatkan Ambang Anaerobik Daripada Steady State Training Pada Siswa Anggota Kelompok Ekstrakurikuler Atletik Lari Jarak Pendek. *Sport and Fitness Journal*, 5, 62–70.
- Youcef, K., Mokhtar, M., Adel, B., & Wahib, B. (2022). Effects of Different Concurrent Training Methods on Aerobic and Anaerobic Capacity in U 21 soccer players. *Sportske Nauke i Zdravlje*, 12(1), 10–22. <https://doi.org/10.7251/SSH2201010Y>

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