



Physical Activity And Intermittent Fasting Interventions To Improve The Physical Fitness Of Physical Education Teachers

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Abstrak

Penelitian ini bertujuan untuk menguji pengaruh intervensi aktivitas fisik dan puasa intermiten terhadap kebugaran tubuh guru. Metode yang digunakan adalah eksperimen dengan desain pretest-posttest, melibatkan 50 guru berusia 26-35 tahun sebagai sampel. Aktivitas fisik dan puasa intermiten diterapkan selama 6 minggu, dengan pengukuran kebugaran tubuh menggunakan Beep Test untuk mengukur VO2 Max dan pemantauan detak jantung menggunakan smartwatch. Hasil penelitian menunjukkan bahwa terdapat pengaruh yang signifikan antara intervensi aktivitas fisik dan puasa intermiten terhadap peningkatan kebugaran tubuh guru, yang tercermin dari peningkatan nilai VO2 Max dan stabilitas detak jantung. Penelitian ini memberikan kontribusi penting dalam memahami cara intervensi gaya hidup sehat dapat meningkatkan kebugaran fisik bagi tenaga pendidik, khususnya pada usia produktif.

Abstract

This study aims to examine the impact of physical activity and intermittent fasting interventions on the physical fitness of teachers. An experimental method with a pretest-posttest design was employed, involving 50 teachers aged 26-35 as the sample. The physical activity and intermittent fasting interventions were applied over 6 weeks, with physical fitness measured using the Beep Test to assess VO2 Max and heart rate monitoring via a smartwatch. The results indicate a significant effect of physical activity and intermittent fasting interventions on improving teachers' physical fitness, reflected in increased VO2 Max scores and heart rate stability. This study provides valuable insights into how healthy lifestyle interventions can enhance physical fitness for educators, particularly in the productive age group.

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Keywords:

physical activity, intermittent fasting, physical fitness, VO2 Max

Introduction

Teachers are among the professions with a significant responsibility in educating the nation's next generation. As educators, they are not only required to possess strong teaching skills but must also maintain physical fitness to perform their duties optimally. Amid busy schedules and demanding workloads, physical fitness often becomes an overlooked aspect.

Therefore, efforts to improve physical fitness through appropriate approaches are crucial, especially for teachers in their productive age range, such as those aged 26–35 years.

A structured physical activity intervention is one approach that can enhance physical fitness. Physical activity has been proven to offer numerous benefits, including increased aerobic capacity, enhanced muscle strength, and reduced risk of various degenerative diseases, (Gabel et al., 2022). Concurrently, intermittent fasting has gained attention as a method to improve both physical and mental well-being, (Basilio et al., 2020). It is claimed to provide positive impacts on health, such as boosting metabolism, aiding weight management, and improving overall fitness,(Erlangga et al., 2023).

However, while there is ample research discussing the benefits of physical activity and intermittent fasting separately, studies combining these two approaches in the context of teachers' physical fitness remain scarce,(Stöggel et al., 2023). Thus, this study aims to fill that gap by examining the effects of physical activity and intermittent fasting interventions on teachers' fitness levels, particularly among those aged 26–35 years.

Previous studies have demonstrated that regular physical activity can significantly improve physical fitness. A study by (Tian et al., 2024) indicated that a regular aerobic exercise program could enhance VO2 Max in individuals with low physical fitness. Meanwhile, research on intermittent fasting continues to expand. Some studies have shown that intermittent fasting offers significant health benefits, including body fat reduction and improved cardiovascular function, (Franklin et al., 2022).

Despite the individual scientific evidence supporting the benefits of these interventions, few studies have combined physical activity and intermittent fasting as an integrated intervention program, particularly for teachers who face high workloads and tight schedules,(El-Jaziz & Lotfi, 2023a), (Indra Kusuma et al., 2023). This research seeks to address that gap by testing the effectiveness of combining the two interventions to improve teachers' physical fitness.

The urgency of this research is also underscored by the fact that many teachers experience declining physical conditions due to age and high workloads. Optimal physical fitness is essential for teachers to carry out their duties effectively and healthily,(Utomo, Kusuma, Putra, et al., 2024), (Wang et al., 2024). Therefore, this study aims to contribute to designing appropriate health programs for educators.

Additionally, this research has strong rationalization, considering that physical fitness not only affects bodily health but can also influence teachers' productivity and teaching quality. Healthy and fit teachers are better able to transfer knowledge effectively to students,(El-Jaziz & Lotfi, 2023b), (Utomo, Kusuma, Utamayasa, et al., 2024). Conversely, poor physical conditions can lead to decreased energy, concentration, and even health problems, ultimately compromising the quality of education delivered.

This study also aims to deepen understanding of the combined effectiveness of physical activity and intermittent fasting in the context of physical fitness. If the findings reveal significant effects, this could serve as a basis for recommending similar intervention programs for teachers on a broader scale. Furthermore, the results could provide clearer insights into the benefits of a healthy lifestyle in professions requiring high physical and mental endurance,(Gabel et al., 2024).

The objective of this study is to examine the impact of combining physical activity and intermittent fasting interventions on enhancing teachers' physical fitness. Using a pretest-posttest experimental design, this study seeks to provide empirical evidence supporting efforts to improve educators' physical fitness. This approach is expected to yield findings applicable to developing health policies for teachers in Indonesia and contribute to research in sports science and public health.

Given the background and objectives outlined, this study is anticipated to provide valuable findings for the education sector, particularly in managing the health and fitness of educators. It also aims to offer practical recommendations for teachers to enhance their quality of life through healthy lifestyle practices.

Method

This study employed an experimental design with a pretest-posttest approach to examine the effects of physical activity and intermittent fasting interventions on teachers' physical fitness. The sample consisted of 50 teachers aged 26–35 years from a single school. The study was conducted over six weeks, incorporating structured aerobic exercise and intermittent fasting interventions alternately. Physical fitness was measured before and after the intervention using the Beep Test to assess VO₂ Max and heart rate monitoring via smartwatches to observe cardiovascular changes throughout the study period.

The collected data were analyzed using inferential statistical techniques, particularly the paired sample t-test, to evaluate differences between pretest and posttest physical fitness scores. This test was utilized to determine whether there were significant improvements in participants' physical fitness following the intervention. All data analyses were conducted using SPSS statistical software, and significant results were used as the basis for drawing conclusions regarding the impact of combining physical activity and intermittent fasting on teachers' physical fitness.

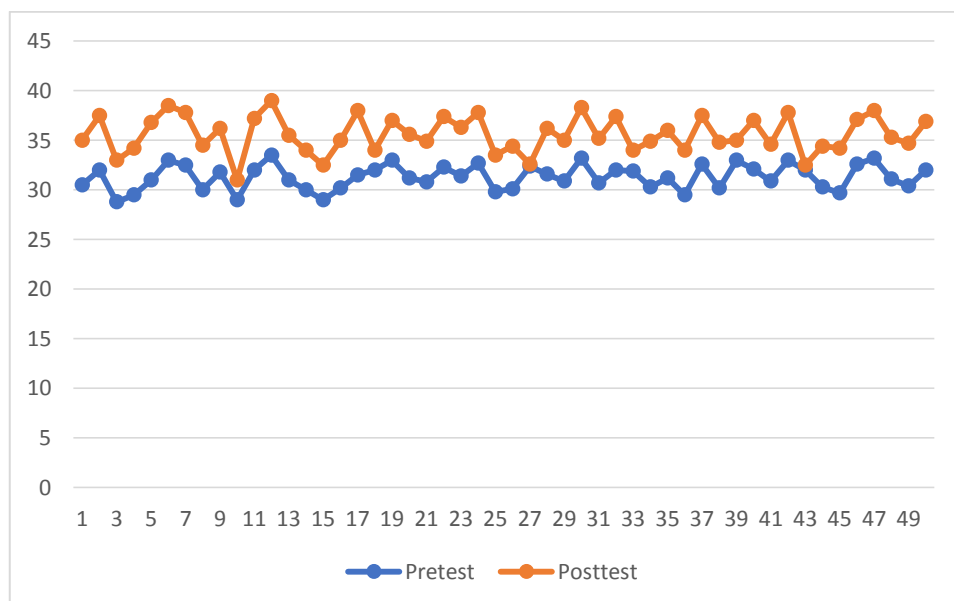
Result and Discussion

The results of the study indicate a significant improvement in teachers' physical fitness after participating in a six-week intervention combining physical activity and intermittent fasting. The participants' average VO2 Max scores during the pretest fell within the suboptimal fitness category. Following the intervention, there was a significant increase in VO2 Max scores, reflecting enhanced physical fitness.

For a clearer illustration, the differences between pretest and posttest VO2 Max scores for each participant are presented in the following line chart:

Picture 1

Result of Vo2 max pratest-posttest



In this chart, the lines connecting pretest and posttest data points reveal consistent improvements in fitness levels across all participants. Most participants experienced a VO2 Max increase ranging from 15% to 18%, underscoring the intervention's effectiveness in

enhancing their physical fitness. Statistical analysis using SPSS yielded a significance value of 0.000. As this result is < 0.05 , it indicates a significant effect of the combined physical activity and intermittent fasting intervention on teachers' fitness levels.

Overall, these findings support the hypothesis that a combination of structured physical activity and intermittent fasting has a significantly positive impact on physical fitness,(Mohr et al., 2021). Structured physical activities, such as those included in this intervention, enhance aerobic capacity, as evidenced by the increase in VO2 Max. Aerobic exercises improve cardiovascular efficiency, enabling the heart and lungs to function more effectively during physical activities, (Al Hammouri & Al-Oran, n.d.).

Additionally, intermittent fasting has demonstrated benefits in boosting metabolism and enhancing cardiovascular function,(Billingsley et al., 2023). In this study, teachers who adhered to intermittent fasting showed significant improvements in physical fitness, likely linked to enhanced metabolic processes during fasting periods, which positively affected heart and lung efficiency,(Yao et al., 2024), (Putra et al., 2024) .

These results suggest that combining both approaches—physical activity and intermittent fasting—produces more effective outcomes than using either method alone. Structured exercise improves aerobic capacity, while intermittent fasting enhances metabolic conditions, with both approaches synergistically contributing to optimal fitness improvements,(Rai Vaid & Verma, 2021).

Furthermore, the study highlights that this combined approach can be effectively implemented for individuals with demanding schedules, such as teachers, (Allen & Smith, 2020). Given the time constraints faced by educators, interventions that integrate physical activity with intermittent fasting provide greater flexibility compared to fitness programs solely reliant on physical activity,(Cavalcante et al., 2021), (Jospe et al., 2020).

The results of this study highlight the importance of combining multiple health strategies to maximize outcomes. Teachers who participated in the intervention demonstrated measurable improvements in their physical capabilities, showcasing that a well-rounded approach can yield substantial benefits. By incorporating both physical exercise and dietary modifications, participants were able to target different aspects of their health simultaneously, leading to comprehensive improvements in their overall fitness.

The structured nature of the program also ensured that participants adhered to the activities consistently over six weeks. This consistency was pivotal in driving the observed improvements, as regular engagement in physical activities is essential for building cardiovascular endurance and improving metabolic functions. Moreover, the inclusion of intermittent fasting added an innovative layer to the intervention, allowing participants to optimize their body's natural processes for enhanced energy utilization and recovery.

Another key takeaway from this study is the feasibility of implementing such interventions within the constraints of a busy work schedule. Teachers, often burdened with demanding workloads, managed to successfully follow the program, highlighting its practicality for real-world application. This demonstrates that fitness and health programs do not necessarily need to be overly complex or time-consuming to be effective.

Additionally, the positive reception of the program among participants suggests that such interventions can be scaled and adapted for other professional groups facing similar challenges. The dual-focus strategy—targeting both physical activity and dietary habits—provides a flexible yet impactful solution for improving health and well-being. Future programs can build upon this model, exploring variations in activity types or fasting protocols to further refine and personalize interventions.

In summary, this study demonstrates that integrating structured physical activity and intermittent fasting can significantly enhance physical fitness in a measurable and systematic manner,(Batitucci et al., 2022). Such programs can serve as a model for developing health initiatives for teachers in schools, offering widespread applicability to support better health and improved teaching performance.

Conclusion

Based on the research findings, it can be concluded that the intervention program combining physical activity and intermittent fasting significantly contributes to improving teachers' physical fitness (VO₂ Max). With an average increase in VO₂ Max of 14.99%, these results demonstrate the effectiveness of this combined approach in enhancing aerobic capacity and overall physical fitness among teachers. This finding provides substantial value to efforts aimed at improving the health and fitness of educators, ultimately supporting their performance in fulfilling daily responsibilities within the school environment. The results imply that implementing similar programs on a broader scale could enhance the well-being and productivity of teaching professionals.

Reference

- Al Hammouri, W., & Al-Oran, H. (n.d.). JEPonline The Effect of Intermittent Fasting on Some Physical Fitness Elements among. In *Sport Science Students Journal of Exercise Physiologyonline* (Vol. 26).
<https://www.researchgate.net/publication/372915354>
- Allen, C., & Smith, M. (2020). *Effects of Intermittent Fasting and Physical Activity on Salivary Expression of Reduced Glutathione and Interleukin-1 β* .
<http://www.intjexersci.com>
- Basilio, P. G., de Oliveira, A. P. C., de Castro, A. C. F., Carvalho, M. R. de, Zagatto, A. M., Martinez, P. F., Okoshi, M. P., Okoshi, K., Ota, G. E., Dos Reis, F. A., & de Oliveira-Junior, S. A. (2020). Intermittent fasting attenuates exercise training-induced cardiac remodeling. *Arquivos Brasileiros de Cardiologia*, 115(2), 184–193. <https://doi.org/10.36660/abc.20190349>
- Batitucci, G., Faria Junior, E. V., Nogueira, J. E., Brandão, C. F. C., Abud, G. F., Ortiz, G. U., Marchini, J. S., & Freitas, E. C. (2022). Impact of Intermittent Fasting Combined With High-Intensity Interval Training on Body Composition, Metabolic Biomarkers, and Physical Fitness in Women With Obesity. *Frontiers in Nutrition*, 9. <https://doi.org/10.3389/fnut.2022.884305>
- Billingsley, H. E., Toldo, S., & Abbate, A. (2023). Fast Today, Feast Tomorrow: Can Intermittent Fasting Improve Right Ventricular Function in Pulmonary Arterial Hypertension? In *JACC: Basic to Translational Science* (Vol. 8, Issue 3, pp. 255–257). Elsevier Inc. <https://doi.org/10.1016/j.jacbts.2023.01.002>
- Cavalcante, L. P., Lima, T. da R., de Almeida, P. C., Tolazzi, G. J., Ávila, E. T. P., Navalta, J. W., Vieira Junior, R. C., & Voltarelli, F. A. (2021). Intermittent fasting compromises the performance of eutrophic rats submitted to resistance training. *Nutrition*, 86. <https://doi.org/10.1016/j.nut.2021.111187>
- El-Jaziz, A., & Lotfi, S. (2023a). How do chronotype and sleep patterns impact young athletes' aerobic performance during Ramadan intermittent fasting? *Annali Di Igiene Medicina Preventiva e Di Comunita*, 35(6), 683–694.
<https://doi.org/10.7416/ai.2023.2574>
- El-Jaziz, A., & Lotfi, S. (2023b). How do chronotype and sleep patterns impact young athletes' aerobic performance during Ramadan intermittent fasting? *Annali Di Igiene Medicina Preventiva e Di Comunita*, 35(6), 683–694.
<https://doi.org/10.7416/ai.2023.2574>
- Erlangga, Z., Ghashang, S. K., Hamdan, I., Melk, A., Gutenbrunner, C., & Nugraha, B. (2023). The effect of prolonged intermittent fasting on autophagy, inflammasome and senescence genes expressions: An exploratory study in healthy young males. *Human Nutrition and Metabolism*, 32.
<https://doi.org/10.1016/j.hnm.2023.200189>

- Franklin, B. A., Eijsvogels, T. M. H., Pandey, A., Quindry, J., & Toth, P. P. (2022). Physical activity, cardiorespiratory fitness, and cardiovascular health: A clinical practice statement of the American Society for Preventive Cardiology Part II: Physical activity, cardiorespiratory fitness, minimum and goal intensities for exercise training, prescriptive methods, and special patient populations. In *American Journal of Preventive Cardiology* (Vol. 12). Elsevier B.V. <https://doi.org/10.1016/j.ajpc.2022.100425>
- Gabel, K., Cares, K., Varady, K., Gadi, V., & Tussing-Humphreys, L. (2022). Current Evidence and Directions for Intermittent Fasting during Cancer Chemotherapy. In *Advances in Nutrition* (Vol. 13, Issue 2, pp. 667–680). Oxford University Press. <https://doi.org/10.1093/advances/nmab132>
- Gabel, K., Hamm, A., Czyzewski, O., Sanchez Perez, J., Fought-Boudaia, A., Motl, R. W., & Hibbing, P. R. (2024). A Narrative Review of Intermittent Fasting With Exercise. *Journal of the Academy of Nutrition and Dietetics*. <https://doi.org/10.1016/j.jand.2024.05.015>
- Indra Kusuma, A., BP, I., Dharma Utamayasa, I. G., Ratna Sari, M., & Cahyati Anggraeni, D. (2023). Perbandingan notasi pertandingan bulutangkis nomor tunggal putra pada olimpiade Rio 2016 dan Beijing 2020. *Jurnal Porkes*, 6(2), 826–836. <https://doi.org/10.29408/porkes.v6i2.24228>
- Jospe, M. R., Roy, M., Brown, R. C., Haszard, J. J., Meredith-Jones, K., Fangupo, L. J., Osborne, H., Fleming, E. A., & Taylor, R. W. (2020). Intermittent fasting, Paleolithic, or Mediterranean diets in the real world: Exploratory secondary analyses of a weight-loss trial that included choice of diet and exercise. *American Journal of Clinical Nutrition*, 111(3), 503–514. <https://doi.org/10.1093/ajcn/nqz330>
- Mohr, A. E., McEvoy, C., Sears, D. D., Arciero, P. J., & Sweazea, K. L. (2021). Impact of intermittent fasting regimens on circulating markers of oxidative stress in overweight and obese humans: A systematic review of randomized controlled trials. In *Advances in Redox Research* (Vol. 3). Elsevier Inc. <https://doi.org/10.1016/j.arres.2021.100026>
- Putra, I. B., Indra Kusuma, A., & Utomo, G. M. (2024). Pengembangan Instrumen Tes Akurasi dan Heart Rate pada Pukulan Jarak Menengah dalam Olahraga Woodball. 7(2). <https://doi.org/10.29408/porkes.v7i2.28129>
- Rai Vaid, N., & Verma, R. (2021). INTERMITTENT FASTING FACTS AND MYTHS: METABOLIC BENEFITS OF INTERMITTENT FASTING. *International Journal of Advanced Research*, 9(10), 867–870. <https://doi.org/10.21474/IJAR01/13621>
- Stöggel, T. L., Strepp, T., Blumkaitis, J., Schmuttermair, A., Wahl, P., & Haller, N. (2023). Unraveling the mystery of isocaloric endurance training - Influence of exercise modality, biological sex, and physical fitness. *Metabolism: Clinical and Experimental*, 144. <https://doi.org/10.1016/j.metabol.2023.155582>
- Tian, Y., Zheng, D., Xu, H., Xu, Z., Zhou, T., & Huang, Y. (2024). Effects of intermittent fasting on growth, metabolism and stress resistance in freshwater

crayfish (*Procambarus clarkii*). *Aquaculture Reports*, 38.
<https://doi.org/10.1016/j.aqrep.2024.102275>

Utomo, G. M., Kusuma, A. I., Putra, I. B., Utamayasa, I. G. D., & Sari, M. R. (2024). Peran Jalan dan Senam Aerobic Low Impact terhadap Heart Rate dan IMT bagi Guru Perempuan. *Jurnal Pendidikan Kesehatan Rekreasi*, 10(2), 281–288.
<https://doi.org/10.59672/jpkr.v10i2.3625>

Utomo, G. M., Kusuma, A. I., Utamayasa, I. G. D., Putra, I. B., & Zen, M. Z. (2024). Efektivitas Latihan Vertimax jump dan Modern Depth jump terhadap Peningkatan Kecepatan dan Power. *Jurnal Pendidikan Kesehatan Rekreasi*, 10(1), 176–183. <https://doi.org/10.59672/jpkr.v10i1.3481>

Wang, T., Laher, I., & Li, S. (2024). Exercise snacks and physical fitness in sedentary populations. In *Sports Medicine and Health Science*. KeAi Communications Co. <https://doi.org/10.1016/j.smhs.2024.02.006>

Yao, K., Su, H., Cui, K., Gao, Y., Xu, D., Wang, Q., Ha, Z., Zhang, T., Chen, S., & Liu, T. (2024). Effectiveness of an intermittent fasting diet versus regular diet on fat loss in overweight and obese middle-aged and elderly people without metabolic disease: a systematic review and meta-analysis of randomized controlled trials. *Journal of Nutrition, Health and Aging*, 28(3).
<https://doi.org/10.1016/j.jnha.2024.100165>