

**PENGARUH *HIGH INTENSITY INTERVAL TRAINING* TERHADAP
PENINGKATAN *VO2MAX* ATLET BOLA BASKET**

TESIS

Diajukan untuk Memenuhi Sebagian dari Syarat Memperoleh Gelar Magister Pendidikan
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The Effect of High Intensity Interval Training on Increasing VO2Max in Basketball Athletes

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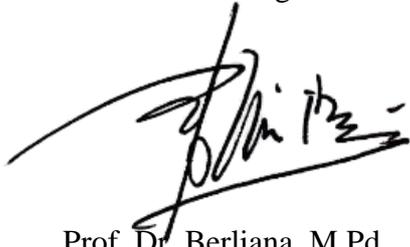
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ABSTRAK
PENGARUH *HIGH INTENSITY INTERVAL TRAINING*
TERHADAP PENINGKATAN *VO2MAX* ATLET BOLA
BASKET

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Tujuan dari penelitian ini adalah untuk mengetahui adanya perbedaan peningkatan VO2Max dengan metode latihan High Intensity Interval Training (HIIT) antara atlet bola basket laki-laki dan perempuan. Penelitian ini menggunakan metode eksperimen dan desain yang digunakan adalah The One-Group Pretest-Posttest Design partisipan dalam penelitian ini berjumlah 14 atlet laki - laki dan perempuan Selesksi PORPROV 2022 Kabupaten Cianjur. Salah satu teknik pengambilan sampel (sampling) adalah total sampling. Instrumen penelitian yang digunakan adalah dengan bleep test dengan Panjang lintasan 20 meter. Teknik analisis data menggunakan uji-t dan uji beda uji-f dengan taraf signifikansi 5%. Setelah melakukan latihan dan posttest maka diperoleh hasil untuk kelompok laki-laki ada peningkatan rata-rata sebesar 3,229 dan peningkatan rata – rata untuk kelompok perempuan sebesar 2,843. maka dari itu metode latihan High Intensity Interval Training berpengaruh terhadap peningkatan VO2max untuk atlet bola basket kelompok laki-laki dan kelompok perempuan. Implikasi penelitian ini adalah VO2max dapat ditingkatkan dengan metode latihan High Intensity Interval Training.

Kata Kunci : VO2Max, *High Intensity Interval Training*, Bola Basket.

ABSTRACT

THE EFFECT OF HIGH INTENSITY INTERVAL TRAINING ON VO2MAX IMPROVEMENT OF BASKETBALL ATHLETES.

Chandra Dwi Ardiansyah

The purpose of this study was to determine the difference in the increase in VO2Max with the High Intensity Interval Training (HIIT) training method between male and female basketball athletes. This study uses experimental methods and the design used is The One-Group Pretest-Posttest Design. The participants in this study amounted to 14 male and female athletes in the 2022 PORPROV Selection in Cianjur Regency. One of the sampling techniques (sampling) is total sampling. The research instrument used is the bleep test with a track length of 20 meters. The data analysis technique used t-test and f-test difference test with a significance level of 5%. After doing the exercises and posttest, the results for the male group were an average increase of 3.229 and an average increase for the female group was 2.843. Therefore, the High Intensity Interval Training method has an effect on increasing VO2max for basketball athletes in the male and female groups. The implication of this research is that VO2max can be increased by using the High Intensity Interval Training method.

Keywords : VO2Max, High Intensity Interval Training, Basketball

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DAFTAR PUSTAKA

- Allen, S. V., & Hopkins, W. G. (2015). Age of Peak Competitive Performance of Elite Athletes: A Systematic Review. *Sports Medicine*, 45(10), 1431–1441.
<https://doi.org/10.1007/s40279-015-0354-3>
- Armstrong, N. (2006). Aerobic fitness of children and adolescents. *Jornal de Pediatria*, 82(6), 406–408. <https://doi.org/10.2223/JPED.1571>
- Arslan, E., Kilit, B., Clemente, F. M., Murawska-Ciałowicz, E., Soyulu, Y., Sogut, M., Akca, F., Gokkaya, M., & Silva, A. F. (2022). Effects of Small-Sided Games Training versus High-Intensity Interval Training Approaches in Young Basketball Players. *International Journal of Environmental Research and Public Health*, 19(5).
<https://doi.org/10.3390/ijerph19052931>
- Aschendorf, P. F., Zinner, C., Delextrat, A., Engelmeyer, E., & Mester, J. (2018). Effects of basketball-specific high-intensity interval training on aerobic performance and physical capacities in youth female basketball players. *Physician and Sportsmedicine*, 47(1), 65–70. <https://doi.org/10.1080/00913847.2018.1520054>
- Aschendorf, P. F., Zinner, C., Delextrat, A., Engelmeyer, E., & Mester, J. (2019). Effects of basketball-specific high-intensity interval training on aerobic performance and physical capacities in youth female basketball players. *Physician and Sportsmedicine*, 47(1), 65–70. <https://doi.org/10.1080/00913847.2018.1520054>
- Astorino, T. A., Allen, R. P., Roberson, D. W., & Jurancich, M. (2012). Effect of high-intensity interval training on cardiovascular function, $\dot{V}O_{2\max}$, and muscular force. *Journal of Strength and Conditioning Research*, 26(1), 138–145.
<https://doi.org/10.1519/JSC.0b013e318218dd77>
- Astorino, T. A., Edmunds, R. M., Clark, A., King, L., Gallant, R. A., Namm, S., Fischer, A., & Wood, K. M. (2017). High-Intensity Interval Training Increases Cardiac Output and $\dot{V}O_{2\max}$. *Medicine and Science in Sports and Exercise*, 49(2), 265–273.
<https://doi.org/10.1249/MSS.0000000000001099>
- Barth, K., & Boesing, L. (2019). *training basketball* (P. Haynes (ed.)). B.O.S.S Druck und Medien GmbH.
- Batacan, R. B., Duncan, M. J., Dalbo, V. J., Tucker, P. S., & Fenning, A. S. (2017). Effects of high-intensity interval training on cardiometabolic health: A systematic review and meta-analysis of intervention studies. *British Journal of Sports Medicine*, 51(6), 494–503. <https://doi.org/10.1136/bjsports-2015-095841>

- Berliana, B. (2014). ANALISIS PERAN POLA ASUHAN DAN PROSES SOSIALISASI OLAHRAGA BELADIRI DITINJAU DARI PERSPEKTIF KESETARAAN GENDER. *Jurnal Cakrawala Pendidikan*, 3(3). <https://doi.org/10.21831/cp.v3i3.2389>
- Berliana, B., Hamzah, A., & Simbolon, M. (2021). Gender Issue in Masculine Sports in Indonesia: A Case Study. *Annals of Applied Sport Science*, 9(1). <https://doi.org/10.29252/aassjournal.941>
- Brown, K. A., Patel, D. R., & Darmawan, D. (2017). Participation in sports in relation to adolescent growth and development. *Translational Pediatrics*, 6(3), 150–159. <https://doi.org/10.21037/tp.2017.04.03>
- Bryantara, O. F. (2016). Faktor yang berhubungan dengan kebugaran jasmani (Vo2 Maks) Atlet Sepakbola. *Jurnal Berkala Epidemiologi*, Vol. 4 No.(December), 237–249. <https://doi.org/10.20473/jbe.v4i2.2016.237>
- Chaabene, H., Negra, Y., Bouguezzi, R., Mkaouer, B., Franchini, E., Julio, U., & Hachana, Y. (2016). Physical and physiological attributes of wrestlers: An update. In *Journal of Strength and Conditioning Research* (Vol. 31, Issue 5). <https://doi.org/10.1519/JSC.0000000000001738>
- Chatterjee, S., Chatterjee, P., & Bandyopadhyay, A. (2014). Cardiorespiratory fitness of obese boys. *Indian Journal of Physiology and Pharmacology*, 3(October), 353–357.
- Cregg, C. J., Kelly, D., O'Connor, P. L., Daly, P., & Moyna, N. M. (2013). Effects of High-Intensity Interval Training and High-Volume Endurance Training on Maximal Aerobic Capacity, Speed and Power in Club Level Gaelic Football Players. *Medicine and Science in Sports and Exercise*, 45(5, 1), 510–511.
- Daniels, J., & Scardina, N. (1984). Interval Training and Performance. *Sports Medicine: An International Journal of Applied Medicine and Science in Sport and Exercise*, 1(4), 327–334. <https://doi.org/10.2165/00007256-198401040-00006>
- Darwis, Z., Melati, S., & Riau, U. I. (2020). *J o p e*. 2, 79–86.
- Delextrat, A. (2015). Small-Sided Game Training Improves Aerobic Capacity and Technical Skills in Basketball Players Small-Sided Game Training Improves Aerobic Capacity and Technical Skills in Basketball Players. *International Journal of Sports Medicine*, 35, 385–391.
- Ellal, A. L. D., Eller, D. O. K., Arling, C. H. C., Haouachi, A. N. I. S. C., Ong, D. E. L. P. W., & Hamari, K. A. C. (2010). *P e d c i e s p*. 24(12), 3219–3226.
- Festiawan, R., Suharjana, S., Priyambada, G., & Febrianta, Y. (2020). High intensity interval training dan fartlek training: Pengaruhnya terhadap tingkat VO2 Max. *Jurnal*

- Keolahragaan*, 8(1), 8–20. <https://doi.org/10.21831/jk.v8i1.31076>
- Fink, H. H., & Alan E. Mikesky, L. A. B. (2015). *Practical applications in sports nutrition*. Jones & Bartlett Learning.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to Design And Evaluate Research In Education 8th edition* (8th ed.). McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc.
- Gastin, P. B. (2001). Energy system interaction and relative contribution during maximal exercise. *Sports Medicine*, 31(10), 725–741. <https://doi.org/10.2165/00007256-200131100-00003>
- Giriwijoyo, H. Y. S. S., & Sidik, D. Z. (2012). *Ilmu faal olahraga (fisiologi olahraga)*.
- Giriwijoyo, S., & Sidik, D. Z. (2012). *Ilmu kesehatan olahraga*. PT Remaja Rosdakarya.
- Jackson, A. S., Blair, S. N., Mahar, M. T., Wier, L. T., Ross, R. M., & Stuteville, J. E. (1990). Prediction of functional aerobic capacity without exercise testing. *Medicine and Science in Sports and Exercise*, 22(6), 863–870. <https://doi.org/10.1249/00005768-199012000-00021>
- Kavcic, I., Milic, R., Jourkesh, M., Ostojic, S. M., & Ozkol, M. Z. (2012). COMPARATIVE STUDY OF MEASURED AND PREDICTED VO₂max DURING A MULTI-STAGE. *Kinesiology*, 44(1), 18–23.
- Kilpatrick, M. W., Jung, M. E., & Little, J. P. (2014). High-intensity interval training: A review of physiological and psychological responses. *ACSM's Health and Fitness Journal*. <https://doi.org/10.1249/FIT.0000000000000067>
- Kim, C. H., Wheatley, C. M., Behnia, M., & Johnson, B. D. (2016). The effect of aging on relationships between lean body mass and VO₂max in rowers. *PLoS ONE*, 11(8), 1–11. <https://doi.org/10.1371/journal.pone.0160275>
- Kondapalli, A., Devpura, G., Manohar, S., & Perakam, S. (2019). Cardio Respiratory Fitness among Normal, Overweight and Obese Adolescent Girls of Hyderabad. *International Journal of Health Sciences & Research*, 9(3), 65–70.
- Koralsztein, V. L. B. L. H. J. P. (2008). *The Influence of Exercise Duration at V O 2 max on the Off- transient Pulmonary Oxygen Uptake Phase During High*. March 2016. <https://doi.org/10.1076/apab.110.5.383.8794>
- Lee, D. chul, Artero, E. G., Sui, X., & Blair, S. N. (2010). Mortality trends in the general population: the importance of cardiorespiratory fitness. *Journal of Psychopharmacology (Oxford, England)*, 24(4 Suppl), 27–35. <https://doi.org/10.1177/1359786810382057>
- Maciejczyk, M., Więcek, M., Szymura, J., Szyguła, Z., Wiecha, S., & Cempla, J. (2014). The

- influence of increased body fat or lean body mass on aerobic performance. *PLoS ONE*, 9(4), 0–5. <https://doi.org/10.1371/journal.pone.0095797>
- Malles, A., TN, S., & VPR, S. (2017). Effectiveness of Sports Specific Circuit Training and High Intensity Interval Training on Aerobic Capacity in Male Basketball Players. *International Journal of Clinical Skills*, 11(6), 177–184. <https://doi.org/10.4172/clinical-skills.1000130>
- McArdle, W., & K., K. F. (2010). *Exercise physiology : nutrition, energy, and human performance*. Lippincott Williams & Wilkins.
- Mishra, M. K., Pandey, A. K., & Chaubey, D. (2015). A Comparative Study of Vo2 Max among the Basketball, Football, Volleyball and Hockey Male Players. *International Journal of Applied Research*, 1(11), 245–247. <https://www.allresearchjournal.com/archives/?year=2015&vol=1&issue=11&part=D&ArticleId=903>
- Moxnes, J. F., & Hausken, K. (2012). Comparing VO2max improvement in five training methods. *Advanced Studies in Theoretical Physics*, 6(17–20), 931–957.
- Noakes, T. (2008). Testing for maximum oxygen consumption has produced a brainless model of human exercise performance. *British Journal of Sports Medicine*, 42(7), 551–555. <https://doi.org/10.1136/bjism.2008.046821>
- Nuryadi, Astuti, T. D., Utami, E. S., & Budiantara, M. (2017). *Dasar-Dasar Statistika Penelitian* (1st ed.). Sibuku Media.
- Okazaki, V. H. A., Rodacki, A. L. F., & Satern, M. N. (2015). A review on the basketball jump shot. *Sports Biomechanics*. <https://doi.org/10.1080/14763141.2015.1052541>
- Owen, A. L., Wong, D. P., Paul, D., & Dellal, A. (2014). Physical and technical comparisons between various-sided games within professional soccer. *International Journal of Sports Medicine*, 35(4), 286–292. <https://doi.org/10.1055/s-0033-1351333>
- Penggalih, M. H. S. T., Solichah, K. M., Dewinta, M. C. N., Niamilah, I., Nadia, A., Pratiwi, D., Hosianna, D., Darmastuti, A., Prihastin, A., Syarifah, N., Ningrum, R. K., Reswati, V. D. Y., & Bactiar, N. (2021). Comparison of somatotype profiles and dietary intake of football athletes in different playing levels in Indonesia. *Jurnal Gizi Klinik Indonesia*, 18(1), 18. <https://doi.org/10.22146/ijcn.64653>
- Rodrigues, A. N., Perez, A. J., Carletti, L., Bissoli, N. S., & Abreu, G. R. (2006). Maximum oxygen uptake in adolescents as measured by cardiopulmonary exercise testing: a classification proposal. *Jornal de Pediatria*, 82(6), 426–430. <https://doi.org/10.2223/JPED.1533>

- Rogers, J., & Andrea Revesz. (2005). Experimental and quasi-experimental designs. *Physical Review B*, *111*, 1–11.
- Samsudin, A. (2018). STATISTIKA NONPARAMETRIK. In *Jakarta: PT Gramedia* (pp. 25–31). PT Gramedia.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2005). Experimental and Quasi - Experimental Designs for Generalized Causal Inference. In *Experimental and quasi-experimental designs for generalized causal inference* (2nd ed.). HOUGHTON MIFFLIN COMPAN.
- Shete, A. N., Bute, S. S., & Deshmukh, P. R. (2014). A study of VO₂ max and body fat percentage in female athletes. *Journal of Clinical and Diagnostic Research*, *8*(12), BC01–BC03. <https://doi.org/10.7860/JCDR/2014/10896.5329>
- Sidik, D Zafar. (2008). Pembinaan Kondisi Fisik (Dasar dan Lanjutan). *Bandung: PT Remaja Rosdakarya*.
- Sidik, Dikdik Z. (2010). Pembinaan Kondisi Fisik. *Bandung: Jurusan Pendidikan Kepeleatihan FPOK UPI*.
- Smith, M. J. (2008). Sprint Interval Training - “ It ’ s a HIIT !”. *Training, March*.
- Stojanovic, M. D., Ostojic, S. M., Calleja-González, J., Milosevic, Z., & Mikic, M. (2012). Correlation between explosive strength, aerobic power and repeated sprint ability in elite basketball players. *Journal of Sports Medicine and Physical Fitness*.
- Sumpena, A., & Sidik, D. Z. (2017). The Impact of Tabata Protocol to Increase the Anaerobic and Aerobic Capacity. *IOP Conference Series: Materials Science and Engineering*. <https://doi.org/10.1088/1757-899X/180/1/012189>
- Warburton, D. E. R., McKenzie, D. C., Haykowsky, M. J., Taylor, A., Shoemaker, P., Ignaszewski, A. P., & Chan, S. Y. (2005). Effectiveness of high-intensity interval training for the rehabilitation of patients with coronary artery disease. *American Journal of Cardiology*. <https://doi.org/10.1016/j.amjcard.2004.12.063>
- Wen, D., Utesch, T., Wu, J., Robertson, S., Liu, J., Hu, G., & Chen, H. (2019). Effects of different protocols of high intensity interval training for VO₂max improvements in adults: A meta-analysis of randomised controlled trials. *Journal of Science and Medicine in Sport*, *22*(8), 941–947. <https://doi.org/10.1016/j.jsams.2019.01.013>
- Weston, M., Taylor, K. L., Batterham, A. M., & Hopkins, W. G. (2014). Effects of low-volume high-intensity interval training (HIT) on fitness in adults: A meta-analysis of controlled and non-controlled trials. *Sports Medicine*, *44*(7), 1005–1017. <https://doi.org/10.1007/s40279-014-0180-z>

