

Photobiomodulation used in the treatment and / or prevention of muscle fatigue in humans: Direction for clinical employability

David Ribeiro Costa
Centro de pesquisa Avançada em Fototerapia
https://orcid.org/0000-0002-4188-1321

Carolina Alves Delpasso
Centro de pesquisa Avançada em Fototerapia
https://orcid.org/0000-0002-4700-5883

Luana Aparecida Pilato Ribeiro
Centro de pesquisa Avançada em Fototerapia
https://orcid.org/0000-0002-2317-8835

Thiago dos Santos Maciel
Universidade Federal do Amazonas
https://orcid.org/0000-0002-7022-2309

Davidson Ribeiro Costa
Centro de pesquisa Avançada em Fototerapia
https://orcid.org/0000-0002-9750-5675

DOI: https://doi.org/10.33448/rsd-v10i4.14126

Keywords: Laser Therapy; Muscle Fatigue; Low-level light therapy.

ABSTRACT

The objective of the present work was to survey the main application parameters of photobiomodulation from Low-Level Light Therapy (LLLT) and / or diode therapy. light emitters (LEDT) used on FM, in addition to proposing their clinical employability through protocols that present scientific evidence. A bibliographic survey was carried out in the PUBMED databases, using the keywords available in the DESCs: "Photobiomodulation Therapy", "PBTM", "Low-Level Light Therapy", "LLLT", "Light-Emitting Diode Therapy", "LEDT", "Phototherapy", "Exercise", "Fatigue", "Performance", "sport" in different combinations and associated with Boolean descriptors. The following inclusion criteria were considered: controlled and randomized clinical trials, published in English, publication period between the years 2017 to 2020 After this procedure, all abstracts were read, in which fifteen articles were selected. In the last stage, the articles were read in depth and, by applying the inclusion and exclusion criteria, only ten published articles remained. Photobiomodulation therapy performed using TLBI and LEDT is able to delay the FM process and consequently increase



PDF (PORTUGUÊS (BRASIL))

PUBLISHED

09/04/2021

ISSUE

Vol. 10 No. 4

SECTION

Review Article

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JOURNAL METRICS

Índice H5 (Google Metrics): 38 (2024)

LANGUAGE

English
Español (España)
Português (Brasil)

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performance. However, the ideal application parameters of this tool still show many variables. Except for the wavelength, which is the only application parameter that shows a trend.

REFERENCES

- Albuquerque-Pontes, G. M., Vieira, R. P., Tomazoni, S. S., Caires, C. O., Nemeth, V., Vanin, A. A., Santos, L. A., Pinto, H. D., Marcos, R. L., Bjordal, J. M., de Carvalho, P., & Leal-Junior, E. C. (2015). Effect of pre-irradiation with different doses, wavelengths, and application intervals of low-level laser therapy on cytochrome c oxidase activity in intact skeletal muscle of rats. *Lasers in medical science*, 30(1), 59–66. <https://doi.org/10.1007/s10103-014-1616-2>
- Anders, J. J., Arany, P. R., Baxter, G. D., & Lanzafame, R. J. (2019). Light-Emitting Diode Therapy and Low-Level Light Therapy Are Photobiomodulation Therapy. *Photobiomodulation, photomedicine, and laser surgery*, 37(2), 63–65. <https://doi.org/10.1089/photob.2018.4600>
- Boccia, G., Dardanello, D., Zoppirolli, C., Bortolan, L., Cescon, C., Schneebeil, A., Vernillo, G., Schena, F., Rainoldi, A., & Pellegrini, B. (2017). Central and peripheral fatigue in knee and elbow extensor muscles after a long-distance cross-country ski race. *Scandinavian journal of medicine & science in sports*, 27(9), 945–955. <https://doi.org/10.1111/sms.12718>
- Costa, D. R., Costa, D.R., Pessoa, D.R., Masulo, L.J., Arisawa, E. A. L.S., & Nicolau, R.A. (2017) Effect of LED therapy on temporomandibular disorder: a case study. *Sci. Med.*;27: 258-272.
- Costa, D. R., Delpasso, C. A., Costa, D. R., & Nicolau, R. A. (2015) Efeito da fototerapia de baixa intensidade na fadiga muscular em humanos - revisão de literatura. XV Encontro Latino-americano de Pós- Graduação – Universidade do Vale do Paraíba. http://www.inicepg.univap.br/cd/INIC_2015/anais/arquivos/RE_0676_1358_01.pdf
- Costa, D. R., Pessoa, D. R., Seefeldt, V. B., Costa, D. R., Maia, D., Dos Santos Maciel, T., Mota, B., Delpasso, C. A., Ribeiro, C., & Nicolau, R. A. (2021). Orofacial evaluation of individuals with temporomandibular disorder after LED therapy associated or not of occlusal splint: a randomized double-blind controlled clinical study. *Lasers in medical science*. <https://doi.org/10.1007/s10103-021-03269-2>
- da Cunha, R. A., Pinfildi, C. E., de Castro Pochini, A., & Cohen, M. (2020). Photobiomodulation therapy and NMES improve muscle strength and jumping performance in young volleyball athletes: a randomized controlled trial study in Brazil. *Lasers in medical science*, 35(3), 621–631. <https://doi.org/10.1007/s10103-019-02858-6>
- de Oliveira, A. R., Vanin, A. A., Tomazoni, S. S., Miranda, E. F., Albuquerque-Pontes, G. M., De Marchi, T., Dos Santos Grandinetti, V., de Paiva, P., Imperatori, T., de Carvalho, P., Bjordal, J. M., & Leal-Junior, E. (2017). Pre-Exercise Infrared Photobiomodulation Therapy (810 nm) in Skeletal Muscle Performance and Postexercise Recovery in Humans: What Is the Optimal Power Output?. *Photomedicine and laser surgery*, 35(11), 595–603. <https://doi.org/10.1089/pho.2017.4343>
- Dellagrana, R. A., Rossato, M., Sakugawa, R. L., Baroni, B. M., &

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Diefenthaler, F. (2018). Photobiomodulation Therapy on Physiological and Performance Parameters During Running Tests: Dose-Response Effects. *Journal of strength and conditioning research*, 32(10), 2807–2815.

<https://doi.org/10.1519/JSC.0000000000002488>

Dornelles, M. P., Fritsch, C. G., Sonda, F. C., Johnson, D. S., Leal-Junior, E., Vaz, M. A., & Baroni, B. M. (2019). Photobiomodulation therapy as a tool to prevent hamstring strain injuries by reducing soccer-induced fatigue on hamstring muscles. *Lasers in medical science*, 34(6), 1177–1184.

<https://doi.org/10.1007/s10103-018-02709-w>

Ferraresi, C., Bertucci, D., Schiavinato, J., Reiff, R., Araújo, A., Panepucci, R., Matheucci, E., Jr, Cunha, A. F., Arakelian, V. M., Hamblin, M. R., Parizotto, N., & Bagnato, V. (2016). Effects of Light-Emitting Diode Therapy on Muscle Hypertrophy, Gene Expression, Performance, Damage, and Delayed-Onset Muscle Soreness: Case-control Study with a Pair of Identical Twins. *American journal of physical medicine & rehabilitation*, 95(10), 746–757.

<https://doi.org/10.1097/PHM.0000000000000490>

Ferraresi, C., de Sousa, M. V., Huang, Y. Y., Bagnato, V. S., Parizotto, N. A., & Hamblin, M. R. (2015). Time response of increases in ATP and muscle resistance to fatigue after low-level laser (light) therapy (LLLT) in mice. *Lasers in medical science*, 30(4), 1259–1267. <https://doi.org/10.1007/s10103-015-1723-8>

<https://doi.org/10.1007/s10103-015-1723-8>

Hemmings, T. J., Kendall, K. L., & Dobson, J. L. (2017). Identifying Dosage Effect of Light-Emitting Diode Therapy on Muscular Fatigue in Quadriceps. *Journal of strength and conditioning research*, 31(2), 395–402.

<https://doi.org/10.1519/JSC.0000000000001523>

Lanferdini, F. J., Krüger, R. L., Baroni, B. M., Lazzari, C., Figueiredo, P., Reischak-Oliveira, A., & Vaz, M. A. (2018). Low-level laser therapy improves the VO2 kinetics in competitive cyclists. *Lasers in medical science*, 33(3), 453–460. <https://doi.org/10.1007/s10103-017-2347-y>

Leal Junior, E., Bjordal, J., & Lopes-Martins, R. (2010) A laserterapia de baixa potência melhora o desempenho muscular mensurado por dinamometria isocinética em humanos. *Fisioterapia e Pesquisa*. 17(4), 317-321.

Miranda, E. F., Tomazoni, S. S., de Paiva, P., Pinto, H. D., Smith, D., Santos, L. A., de Tarso Camillo de Carvalho, P., & Leal-Junior, E. (2018). When is the best moment to apply photobiomodulation therapy (PBMT) when associated to a treadmill endurance-training program? A randomized, triple-blinded, placebo-controlled clinical trial. *Lasers in medical science*, 33(4), 719–727. <https://doi.org/10.1007/s10103-017-2396-2>

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*, 6(7), e1000097.

<https://doi.org/10.1371/journal.pmed.1000097>

Orssatto, L., Detanico, D., Kons, R. L., Sakugawa, R. L., da Silva, J. N., Jr, & Diefenthaler, F. (2019). Photobiomodulation Therapy Does Not Attenuate Fatigue and Muscle Damage in Judo Athletes: A Randomized, Triple-Blind, Placebo-Controlled Trial. *Frontiers in physiology*, 10, 811.

<https://doi.org/10.3389/fphys.2019.00811>

Pessoa, D. R., Costa, D. R., Prianti, B. M., Costa, D. R., Delpasso, C. A., Arisawa, E., & Nicolau, R. A. (2018). Association of facial massage, dry

needling, and laser therapy in Temporomandibular Disorder: case report. CoDAS, 30(6), e20170265. <https://doi.org/10.1590/2317-1782/20182017265>

Rossato, M., Dellagrana, R. A., Sakugawa, R. L., Lazzari, C. D., Baroni, B. M., & Diefenthaler, F. (2018). Time Response of Photobiomodulation Therapy on Muscular Fatigue in Humans. Journal of strength and conditioning research, 32(11), 3285–3293. <https://doi.org/10.1519/JSC.0000000000002339>

Tomazoni, S. S., Machado, C., De Marchi, T., Casalechi, H. L., Bjordal, J. M., de Carvalho, P., & Leal-Junior, E. (2019). Infrared Low-Level Laser Therapy (Photobiomodulation Therapy) before Intense Progressive Running Test of High-Level Soccer Players: Effects on Functional, Muscle Damage, Inflammatory, and Oxidative Stress Markers-A Randomized Controlled Trial. Oxidative medicine and cellular longevity, 2019, 6239058. <https://doi.org/10.1155/2019/6239058>

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Research, Society and Development - ISSN 2525-3409



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E-mail: rsd.articles@gmail.com |