A meta-analysis found that when reviewing only clinical trials using the energy dose recommended in the Bjordal et al review, joint pain relief was clinically important, as compared to placebo.[1,2] A systematic review/meta-analysis of LLLT for neck pain found that it decreased acute neck pain immediately and provided long term improvement for chronic neck pain.[3]

A 2014 review contends that "LLLT holds promise as a novel supportive tool in the treatment of wounds and chronic pain syndromes." [4]

Exercise performance

A 2013 systematic review states: "The most significant and consistent results were found with red or infrared wavelengths and phototherapy application before exercises, power outputs between 50 and 200 mW and doses of 5 and 6 J per point (spot)... phototherapy (with lasers and LEDs) improves muscular performance and accelerates recovery mainly when applied before exercise."[5]

Frozen shoulder/adhesive capsulitis

A 2013 systematic review states: "Low-level laser therapy is strongly suggested for pain relief and moderately suggested for improving function but not recommended for improving ROM."[6]

Neck pain

A 2013 systematic review found that, although the evidence was conflicting and not strong, LLL may be beneficial for chronic neck pain.[7] However, another 2013 systematic review states, "the benefit seen in the use of LLLT, although statistically significant, does not constitute the threshold of minimally important clinical difference."[8]

Low-Level Laser therapy (LLLT) – skeletal muscle repair

A 2014 systematic review states that evidence is available for short term benefits for acute muscle injuries. LLLT reported beneficial effects for "modulation of the inflammatory process, stimulation of new blood vessels, remodeling of the extra-cellular matrix and stimulation of the proliferation and differentiation of satellite cells." Biologic mechanisms of action are unclear – further investigation is necessary.[9]

LLLT and temporomandibular joint pain

2014 meta-analysis concludes that LLLT provides moderate analgesic effect to the masticatory muscle or joint capsule. However, optimal parameters have not been confirmed and more clinical studies of RCTs are required.[10]

Continued on next page.

LLLT continued

Low power light therapy and wound healing

A 2014 review reports that phototherapy, by LASER (Light Amplification by Stimulated Emission of Radiation) or LED (Light Emitting Diode), is effective in promoting skin wound healing. The biological effects, dependent on the irradiation parameters, notably wavelength and dose, include "decrease in inflammatory cells, increased fibroblast proliferation, angiogenesis stimulation, formation of granulation tissue and increased collagen synthesis."[11]

References

1. Bjordal JM, Couppe C, Chow RT, Tuner J, Ljunggren EA. A systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. *Aust J Physiother.* 2003;49(2):107-116. FREE FULL TEXT

2. Jang H, Lee H. Meta-analysis of pain relief effects by laser irradiation on joint areas. *Photomed Laser Surg.* Aug 2012;30(8):405-417. FREE FULL TEXT

3. Chow RT, Johnson MI, Lopes-Martins RA, Bjordal JM. Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomised placebo or active-treatment controlled trials. *Lancet.* Dec 5 2009;374(9705):1897-1908.

4. Rola P, Doroszko A, Derkacz A. The use of low-level energy laser radiation in basic and clinical research. *Adv Clin Exp Med.* September-October 2014;23(5):835-842. FREE FULL TEXT

5. Leal-Junior EC, Vanin AA, Miranda EF, de Carvalho PD, Dal Corso S, Bjordal JM. Effect of phototherapy (low-level laser therapy and light-emitting diode therapy) on exercise performance and markers of exercise recovery: a systematic review with meta-analysis. *Lasers Med Sci.* 2015 Feb;30(2):925-39.

6. Jain TK, Sharma NK. The effectiveness of physiotherapeutic interventions in treatment of frozen shoulder/ adhesive capsulitis: A systematic review. *J Back Musculoskelet Rehabil.* Nov 27 2013.

7. Gross AR, Dziengo S, Boers O, et al. Low level laser therapy (LLLT) for neck pain: A systematic review and meta-regression. *Open Orthop J.* 2013 Sep 20;7:396-419. FREE FULL TEXT

8. Kadhim-Saleh A, Maganti H, Ghert M, Singh S, Farrokhyar F. Is low-level laser therapy in relieving neck pain effective? Systematic review and meta-analysis. *Rheumatol Int.* Oct 2013;33(10):2493-2501.

9. Alves AN, Fernandes KP, Deana AM, Bussadori SK, Mesquita-Ferrari RA. Effects of low-level laser therapy on skeletal muscle repair: a systematic review. *Am J Phys Med Rehabil.* Dec 2014;93(12):1073-1085.

10. Chang WD, Lee CL, Lin HY, Hsu YC, Wang CJ, Lai PT. A meta-analysis of clinical effects of low-level laser therapy on temporomandibular joint pain. *J Phys Ther Sci.* Aug 2014;26(8):1297-1300. FREE FULL TEXT

11. Chaves ME, Araújo AR, Piancastelli AC, Pinotti M. Effects of low-power light therapy on wound healing: LASER x LED. *An Bras Dermatol*. 2014 Jul-Aug;89(4):616-23. FREE FULL TEXT