



Comparative study of the efficacy of pulsed electromagnetic field and low level laser therapy on mitogen-activated protein kinases



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ABSTRACT

Mitogen-Activated Protein Kinases (MAPKs) consist of three major signaling members: extracellular signal-regulated kinase (ERK), p38 and C-JUN N-terminal kinase (JNK). We investigated physiological effects of Pulsed Electromagnetic Field Therapy (PEMFT) and Low Level Laser Therapy (LLLT) on human body, adopting the expression level of mitogen-activated protein kinases as an indicator via assessment of the activation levels of three major families of MAPKS, ERK, p38 and JNK in the peripheral lymphocytes of patients before and after the therapies. Assessment for the expression levels of MAPKs families' were done, in the peripheral lymphocytes of patients recently have appendectomy, using flow cytometric analysis of multiple signaling pathways, pre and post LLLT and PEMFT application (twice daily for 6 successive days) on the appendectomy wound. There were non-significant differences in the expression levels of MAPKs families' pre-therapies application. But there were significant increase in the ERK expression levels post application of LLLT compared to its pre application ($p < 0.01$). Also, there was significant increase in the ERK, p38 and C-Jun N terminal expression level values post application of PEMFT compared to its pre application expression levels ($p < 0.01$ for each). The present study demonstrates that PEMFT has a powerful healing effect more than LLLT as it increase the activation of ERK, P38 and C-Jun-N Terminal while LLLT only increase the activation of ERK. LLLT has more potent pain decreasing effect than PEMFT as it does not activate P38 pathway like PEMFT.

Abbreviations: MAPKs, Mitogen-Activated Protein Kinases; ERK, Extracellular signal-Regulated Kinase; JNK, C-JUN N-terminal Kinase; PEMFT, Pulsed Electromagnetic Field Therapy; LLLT, Low Level Laser Therapy; DMEM, Dulbecco's Modified Eagle Medium

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