

## Effects of Pulsed Electromagnetic and Static Magnetic Fields on Musculoskeletal Low Back Pain: A Systematic Review Approach

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**Abstract :** Objective: This systematic review study was conducted to evaluate the effects of Pulsed Electromagnetic (PEMF) and Static Magnetic Fields (SMG) on pain relief and functional improvement in patients with musculoskeletal Low Back Pain (LBP). Methods: Seven electronic databases were searched by two researchers independently to identify the published Randomized Controlled Trials (RCTs) on the efficacy of pulsed electromagnetic, static magnetic, and therapeutic nuclear magnetic fields. The identified databases for systematic search were Ovid Medline®, Ovid Cochrane RCTs and Reviews, PubMed, Web of Science, Cochrane Library, CINAHL, and EMBASE from 1968 to February 2016. The relevant keywords were selected by Mesh. After initial search and finding relevant manuscripts, all references in selected studies were searched to identify second hand possible manuscripts. The published RCTs in English would be included to the study if they reported changes on pain and/or functional disability following application of magnetic fields on chronic musculoskeletal low back pain. All studies with surgical patients, patients with pelvic pain, and combination of other treatment techniques such as acupuncture or diathermy were excluded. The identified studies were critically appraised and the data were extracted independently by two raters (M.J and S.B.T). Probable disagreements were resolved through discussion between raters. Results: In total, 1505 abstracts were found following the initial electronic search. The abstracts were reviewed to identify potentially relevant manuscripts. Seventeen possibly appropriate studies were retrieved in full-text of which 48 were excluded after reviewing their full-texts. Ten selected articles were categorized into three subgroups: PEMF (6 articles), SMF (3 articles), and therapeutic nuclear magnetic fields (tNMF) (1 article). Since one study evaluated tNMF, we had to exclude it. In the PEMF group, one study of acute LBP did not show significant positive results and the majority of the other five studies on Chronic Low Back Pain (CLBP) indicated its efficacy on pain relief and functional improvement, but one study with the lowest sessions (6 sessions during 2 weeks) did not report a significant difference between treatment and control groups. In the SMF subgroup, two articles reported near significant pain reduction without any functional improvement although more studies are needed. Conclusion: The PEMFs with a strength of 5 to 150 G or 0.1 to 0.3 G and a frequency of 5 to 64 Hz or sweep 7 to 7KHz can be considered as an effective modality in pain relief and functional improvement in patients with chronic low back pain, but there is not enough evidence to confirm their effectiveness in acute low back pain. To achieve the appropriate effectiveness, it is suggested to perform this treatment modality 20 minutes per day for at least 9 sessions. SMFs have not been reported to be substantially effective in decreasing pain or improving the function in chronic low back pain. More studies are necessary to achieve more reliable results.

**Keywords :** pulsed electromagnetic field, static magnetic field, magnetotherapy, low back pain

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