

The impact of pulsed electromagnetic field therapy on blood pressure and circulating nitric oxide levels: a double blind, randomized study in subjects with metabolic syndrome.

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Abstract

PURPOSE: Regulation of blood pressure (BP) is important in reducing the risk for cardiovascular disease. There is growing interest in non-pharmacological methods to treat BP including a novel approach using pulsed electromagnetic field therapy (PEMF). PEMF therapy has been proposed to impact physiological function at the cellular and tissue level and one possible mechanism is through an impact on endothelial function and nitric oxide (NO) related pathways. The focus of the present study was to evaluate the effect of PEMF on BP and NO in subjects with mild to moderate metabolic syndrome.

MATERIALS AND METHODS: For 12 weeks, 23 subjects underwent PEMF therapy and 21 subjects underwent sham therapy. BP was measured at rest and near the end of submaximal exercise pre- and 12 week post-therapy. Additionally, plasma NO was measured at similar time points.

RESULTS: The PEMF demonstrated an increase in NO after therapy ($p = .04$) but SHAM did not ($p = .37$). For resting BP, there were no differences in systolic BP (SBP), diastolic BP (DBP) or mean arterial pressure (MAP) between groups ($p > .05$). During exercise, PEMF had a reduction in peak SBP ($p = .04$), but not SHAM ($p = .57$). PEMF demonstrated significant relationships between baseline SBP and change in SBP following therapy ($r = -0.71$, $p < .01$) and between MAP and change in MAP following therapy ($r = -0.60$, $p < .01$), but no such relationships were found in SHAM. Subjects with resting hypertension (SBP ≥ 140 mmHg) in PEMF ($n = 11$) had significant reductions in SBP, DBP and MAP when compared to SHAM with hypertension ($n = 9$) ($p < .05$). In this sub-group analysis, PEMF demonstrated lowered peak SBP ($p = .04$) at a given exercise load ($p = .40$) but SHAM did not ($p > .05$).

CONCLUSION: PEMF may increase plasma NO availability and improve BP at rest and during exercise. However, this beneficial effect appears to be more pronounced in subjects with existing hypertension.