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EDITORIAL

Oriented Magnetic Fields and Blood Pressure

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Editorial referring to the article: Possible Effects of Oriented Magnetic Fields on Human Blood Pressure

Hypertension is a combination of genetic, environmental, and social factors, defined by blood pressure levels in which the benefits of treatment outweigh the risks.[1] The global prevalence of hypertension is approximately 1.3 billion adults.[2] The blood pressure control rates in developing countries in 2019 were 23% in women and 18% in men.[2]

Treatments range from lifestyle modification, medication treatment, and use of medical devices.[3] The prevalence of resistant arterial hypertension is estimated between 12% to 15% among patients with hypertension.[1] Up to half of patients with resistant hypertension are partially or not adherent to pharmacological treatment.[1] The World Health Organization (WHO) has identified five dimensions for treatment adherence, shown in Table 1.[4]

Device-based therapies have emerged primarily with the aim of treating resistant hypertension, for example carotid baroreceptor stimulation or baroreflex amplification (externally or internally by implantable pulse generator). Increased tension in the carotid bulb can lower blood pressure.[3] Renal denervation by catheter using radiofrequency, ultrasound, or perivascular injection of neurotoxic agents such as alcohol have also been treatment options.[3] Confection of a central iliac arteriovenous fistula using a nitinol stent-type device (deviation from 0.8 to 1 L/min) has shown a reduction in blood pressure.[3] Devices for ultrasound-guided endovascular ablation of the carotid body are under investigation in studies.[3] These therapies, according to the guidelines, are not recommended, as they require further studies to demonstrate long-term benefit and safety.[1,3]

A systematic review carried out in studies with weak magnetic fields (< 1 mT) showed that the evidence available in the reviewed literature was not sufficient, as the studies did not have the scientific rigor to generate credibility in relation to the results presented.[5] Other studies related to magnetic fields are epidemiological, and most have focused on cancer risks in occupational exposure.[6,7]

The article published in this issue, *Possible Effects of Oriented Magnetic Fields on Human Blood Pressure*,[8] was a randomized controlled trial in which 70 patients underwent placement of magnetic plates versus placebo. The magnetic plates were placed superficially to the location of the brachial and femoral arteries, with the magnetic field parallel to each artery. The magnetic field of approximately 50mT for approximately 24 hours. Blood pressure measurements were taken by an automatic blood pressure monitor.

When evaluating the results of the study, no differences were found in blood pressure levels when comparing the groups (magnetic versus placebo). In the analysis of baseline blood pressure data from the two groups, it can be seen that both had blood pressure levels within the normal range, according to current guidelines, and this may have been one of the reasons for the non-reduction of blood pressure. Perhaps the choice of patients with resistant hypertension may demonstrate some results in future studies.

The limitations of the use of devices in resistant hypertension are mainly due to their invasiveness and high cost. The use of devices is not intended to replace non-drug and drug treatment of hypertension, but it is a rapidly evolving field. More controlled studies are needed so that device-based therapies can be recommended.

Keywords

Hypertension; Medical Devices; Magnetic Fields Therapy; Catalogs, Commercial as Topic; Electric Stimulation Therapy.

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Table 1 - Dimensions of adherence according to the World Health Organization (WHO)

Dimensions of adherence	
Social and economic factors	Age, race, sex, socioeconomic and educational status
Patient-related factors	Readiness to change, locus of control and self-efficacy, future discounting, health beliefs, health literacy, lack of knowledge, forgetfulness, and fear of dependence
Therapy-related factors	Complexity and cost of treatment, especially out-of-pocket costs, and adverse effects
Comorbid conditions	Drug and/or alcohol abuse, depression, psychosis, or impaired mental status; the number of coexisting chronic medical conditions; and severity of symptoms
Health care system factors	Patient-provider relationship, provider workload and burnout, misaligned and absent incentives, and absent or limited care coordination and care integration

Adapted from: Kisa A, Sabaté E, Nuno-Solinis R. Improving adherence rates: guidance for countries. In: WHO. Adherence to long-term therapies - evidence for action; 2003. (Section II).

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