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The visceral pain: from piezo2 receptors to bowel permeability. The role of diamagnetic therapy

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Abstract

Introduction: Irritable Bowel Syndrome (IBS) is a high-prevalence clinical manifestation (10-15%) in industrialised countries. To date, its treatment is symptomatic, because its aetiology has not well clarify. However, it has been documented that the Piezo2 channels expressed by bowel TRPV1 nociceptors could play a role in the development of visceral pain. Diamagnetic Therapy is a pulsed magnetic fields treatment at high intensity and low frequency which has anti-inflammatory and regenerative, neo -angiogenesis and neuromodulator effects. This study aims to evaluate the efficacy of Diamagnetic Therapy in the modulation of visceral pain in patients with IBS.

Methods. A randomized, controlled and open-label prospective observational pilot study was conducted in patients with visceral pain and with a clinical diagnosis of IBS, referred to the Pain Medicine Room of the University of Catanzaro between February 2023 and March 2024. Patients with a clinical diagnosis of IBS were enclosed in this study, signed the informed consent and were randomized into two groups. Group 1 were treated with probiotics + Diamagnetic therapy, using the Diamagnetic pump CTU-mega 20 device for 15 minutes twice a week for 8 weeks. Group 2 (control group) were treated with probiotics. Exclusion criteria: presence of pacemakers or other electronic devices; presence of prostheses not compatible with MRI exam. At the enrolment (T0), after 4 (T1) and 8 weeks (T2), patients were subjected to pain assessment (VAS and DN4 scale), questionnaires of: quality of life (SF36), anxiety and depression, functional skills (ADL and IADL), quality of sleep. Moreover, blood samples to evaluate inflammatory cytokines and chemokines and urinary samples to evaluate indole and skatole, were also collected.

Results: we enrolled 25 patients in group 1 (average age 45.09± 8.46 years) and 24 patients in group 2 (average age 43.5±9.32 years). Women were 16 in group 1 (64%) and 14 in group 2 (58.3%). Fibromyalgia hypertension and mild cardiovascular pathologies, dyshyroidism, osteoporosis/osteopenia and hyperlipidaemia were the main comorbidities, without difference between the groups. All patients received paracetamol and/or antispasmodics for pain management. At T0: all enrolled patients showed intense pain (VAS 6 2, DN4 2 1) with a decrease of both quality of life and sleep and with the presence of anxiety and depression, without alteration of the parameters of ADL and IADL. In addition, an increase in proinflammatory cytokines and chemokines, as well as of indole and skatole were recorded, without a significant difference between the two groups (P>0.05).

The clinical evaluation and laboratory findings carried out at T1 and T2 documented a statistically significant and time-dependent improvement of pain (VAS T1: 4±1; T2: 2±1; P<0.01) of quality of life, sleep and mood in Group 1 VS Group 2. At T2 the number of patients taking drug treatment for pain control decreased from 81.8% to 34.5% in Group 1 vs Group 2 (P<0.01).

CONCLUSIONS: Our data shows that diamagnetic therapy reduced pain and associated symptoms through neuromodulation of the inflammatory pathways involved in Piezo2-mediated visceral mechanical hypersensitivity in the context of bowel inflammation, without the development of adverse events or drug interactions.