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Clinical application of transcranial magnetic stimulation in the treatment of chronic pelvic pain syndrome

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 March 2024 and was last updated on 11 March 2024.

INTRODUCTION

Review question / Objective Chronic pelvic pain syndrome is a common condition with diverse causes, unclear underlying mechanisms, and few effective treatment options. Prior research has indicated that central nervous system regulation can have some therapeutic effects. The purpose of this review was therefore to evaluate the pain scores and safety of transcranial magnetic stimulation in relieving chronic pelvic pain syndrome.

Condition being studied Chronic Pelvic Pain Syndrome (CPPS) is a condition characterized by the presence of persistent or recurrent pain in the pelvic floor area lasting for more than three months without confirmed infection or other obvious local pathological causes. It is frequently linked to adverse cognitive, behavioral, sexual, and emotional outcomes, as well as manifestations of lower urinary tract (LUT), bowel, pelvic floor, or gynecological dysfunction. In males, the global prevalence of CPPS ranges from 2% to 16%, while

the prevalence in females can reach up to 24%. CPPS and other pelvic floor functional disorders can severely impact patients' social activities and quality of life, leading to feelings of inferiority and depression, thus increasing family and societal pressure. The projected yearly expenditure for managing chronic prostatitis/CPPS is estimated at 880 million dollars.

The exact causes and pathogenesis of CPPS remain unclear, possibly resulting from the interaction between immune, nervous, endocrine system dysfunctions, and psychological factors. Various studies have shown that CPPS patients often exhibit central and peripheral nervous system hypersensitivity and dysregulation of pain modulation, which can exacerbate pain. Presently, therapies for CPPS include physical therapy, pharmaceutical interventions, and nerve block procedures. For refractory cases, nerve modulation of the central and peripheral nervous systems can also be applied. Two comprehensive reviews have previously assessed the efficacy of nerve modulation methods for CPPS, with both reaching the consensus that nerve modulation could

potentially alleviate pain and enhance the overall quality of life for individuals suffering from this condition.

METHODS

Search strategy To identify studies, we conducted a comprehensive search of the PubMed, Embase, and Cochrane Library databases, utilizing the terms "transcranial magnetic stimulation (TMS)" as a medical MESH term, with no time restrictions applied to any search fields. This search encompassed all relevant studies available in these databases. The search was further narrowed by indicating that one of the following four keywords or MESH terms must appear in the title or abstract: Term A: "Neuralgia*", "Perineal", "Perineal Neuralgia*", "Pelvic Pain", "Pelvic Girdle Pain" (n=78); Term B: "Anorectal disease", "Rect* pain", "an* pain" (n=49); Term C: "Pelvic Inflammatory Disease", "Pelvic Infection" (n=29); Term D: "Prostatitis", "Chronic prostate pain" (n=23).

Participant or population Research involving human subjects, involving transcranial magnetic stimulation, chronic pelvic pain without pathological explanation.

Intervention Transcranial magnetic stimulation is a non-invasive and painless neuroregulation technique that uses depolarization or hyperpolarization of neuronal membranes to induce action potentials and regulate their excitability. Since the initial experiments, researchers have evaluated transcranial magnetic stimulation for the treatment of a range of symptoms related to pelvic pain.

Comparator Not applicable.

Study designs to be included We conducted a search for clinical trials on the treatment of chronic pelvic pain with transcranial magnetic stimulation using computer and manual retrieval methods from the PubMed, EMBASE, and Cochrane Library databases. The search spanned from the establishment of the databases to December 2023. The main outcome measures included pain intensity and safety. After removing duplicate publications using Endnote software, two researchers independently screened the studies according to the criteria. Any discrepancies were resolved through discussion, and non-English literature was excluded.

Eligibility criteria Inclusion criteria: (1) Original articles; (2) Studies involving human subjects; (3)

Articles in English; (4) Involving transcranial magnetic stimulation; (5) Chronic pelvic pain without pathology that can explain it. Exclusion criteria: (1) Book chapters, commentaries, meta-analyses, systematic reviews, letters to the editor, and comments; (2) Articles where transcranial magnetic stimulation is not used as a treatment option; (3) Articles lacking pain treatment outcomes, even if these subjects are included in the study, should be excluded; (4) Participants under 18 years old.

Information sources the PubMed, Embase, and Cochrane Library databases.

Main outcome(s) Changes in pain scores or alterations in pain thresholds Pain score or changes in pain threshold.

Quality assessment / Risk of bias analysis Prejudice assessment risk not applicable.

Strategy of data synthesis Based on previous literature searches, it was expected that the enrolled studies would not only be diverse in their therapeutic intervention parameters, but also heterogeneous in the dimensions of effect measurement. Therefore, it was decided in advance that these circumstances would not allow for a reasonable and convincing quantitative meta-analysis; instead, a narrative synthesis of the study results was conducted.

Subgroup analysis All studies were grouped and summarized based on the applied therapeutic parameter models, and the treatment effects were described.

Sensitivity analysis Sensitivity analysis is used to evaluate the robustness of results. In sensitivity analysis, the treatment effect is examined based on pain scores or pain thresholds as the outcome.

Country(ies) involved China.

Keywords Transcranial magnetic stimulation, pelvic pain, chronic prostatitis pain, perineal pain, anal and rectal pain, prostatitis.

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