



Case report



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Transcranial Direct Current Stimulation combined with Physiotherapy in the control of Chronic Pelvic Pain: a case report

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ABSTRACT | INTRODUCTION: Chronic Pelvic Pain (CPP) is a non-menstrual pain condition of intense pain that can cause dysfunctions in some aspects such as quality of life, sexual function, among others. **OBJECTIVES:** To evaluate the effects of transcranial direct current stimulation (tDCS) on pain, as well as pelvic floor functionality, sexual dysfunction and quality of life in a patient with CPP. **METHODS AND MATERIALS:** This is a case report of patients with significant CPP who underwent tDCS for 5 consecutive days, targeting the dorsolateral prefrontal cortex (DLFPC) at 2mA for 20 minutes, in combination with physiotherapy. Pain scales, a sexual function questionnaire, pelvic floor muscle function and quality of life measures were used for evaluation. **RESULTS:** There was a 62.06% improvement in pain intensity and a 22.91% improvement in pain interference. The average pain score decreased from 10 at the start of the intervention (D0) to 3 in the first week (D1) and 6 in the second week (D2) of post-intervention menstruation. Regarding sexual function, the results were 31.2 at D0, 31.8 at D1 and 29.3 at D2. Improvement was observed in pelvic floor muscle strength, endurance, and repetitions at D1 and D2, although there was a decrease in strength compared to D2. The average scores for domains of quality of life were as follows: physical (55.95), psychological (59.72), social relationships (69.44) and environment (82.29). **CONCLUSION:** tDCS positively affected pain management and pelvic floor muscle function in the patient. However, there were no significant gains observed in other domains.

KEYWORDS: Pelvic Pain. Pelvic Floor Disorders. Physiotherapy. Transcranial Direct Current Stimulation. Neuromodulation.



1. Introduction

Chronic pelvic pain (CPP) can be understood as non-menstrual pain present, whether continuous or contingent, for a period equal to or greater than six months and strong enough to affect the woman's daily activities, requiring clinical and/or surgical interventions.¹ It can affect between 5.7% and 26.6% of women worldwide, and its cause is still unknown, although it is known to be the result of a complex interaction between several systems, including urinary, gynecological, musculoskeletal, neurological, psychological and endocrine systems. Additionally, sociocultural and environmental factors can also influence CPP.²

Pelvic pain can originate from an inflammatory, infectious, or anoxic process, and it can also be the consequence of some type of trauma that can be resolved with therapeutic interventions. This vicious cycle can lead to limitations and physical deconditioning, loss of functional capacity, as well as cause fear, anxiety and distress, which can lead the patient to social isolation and mood changes, impacting quality of life.³

Changes in the functionality of the limbic system and the hypothalamic-pituitary-adrenal axis may be related to the CPP condition. There is suspicion that central sensitization may be directly associated with CPP, as well as structural and functional dysfunctions of the brain, leading to maladaptive changes.⁴ Furthermore, pain causes plastic changes throughout the neural pathway, affecting the limbic system, spinal cord, somatosensory cortex and prefrontal cortex. In this regard, Transcranial Direct Current Stimulation (tDCS) appears to significantly alter this brain activity in Chronic Pelvic Pain.⁵

tDCS is a treatment method that involves the application of a low-intensity continuous electrical current to the head, directly beneath the scalp, targeting specific cortical areas of the brain. This stimulation modulates neural excitability, being able to both inhibit and excite cortical and subcortical regions, resulting in the stimulation and release of endogenous opioids that facilitate pain modulation.⁶ tDCS is an accessible, safe and easy-to-administer therapy that can be advantageous for chronic pain, with minimal side effects, which promotes patient adherence.⁴ Anodal current stimulation enhances cortical excitability, facilitating neuronal membrane

depolarization, while cathodal current stimulation has an inhibitory effect, inducing neuronal membrane hyperpolarization.⁷⁻⁹ Due to its low cost, ease of use and safety, tDCS is an alternative and adjunctive method in the treatment of pain in various diseases.¹⁰

This study is justified by the clinical and functional of this dysfunction in women's health and the scarcity of studies involving Chronic Pelvic Pain and tDCS as well as different treatment protocols and lack of follow-up.^{5,11}

The main objective of this study was to evaluate the effects of Transcranial Direct Current Stimulation combined with physiotherapy on pelvic floor pain in a patient with Chronic Pelvic Pain. The secondary objectives were to assess pelvic floor motor function, sexual function and quality of life.

2. Methods

This is a case report study, longitudinal, interventional.

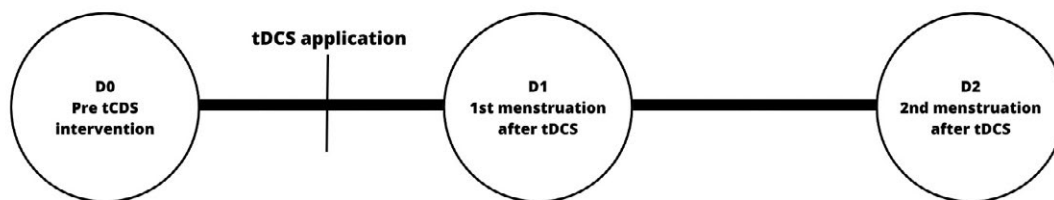
2.1 Ethical aspects

The case was selected at the Academic Practices Center of a private university center in the Federal District, for convenience, as it was the only patient with a report of important pelvic pain refractory to some types of medication treatment, during the proposed data collection period, which was in March 2023. This study is part of a big project that was approved by the Research Ethics Committee, CAEE: 40693020.8.0000.5058, opinion 4.526.720, following all the ethical principles of Brazilian Resolution nº 466/2012. The patient accepted and signed the Free and Informed Consent Form and the Image Use Agreement.

2.2 Procedures

Some instruments were used to assess pelvic pain and pelvic floor muscle function, as well as sexual dysfunction and quality of life. They were evaluated before the intervention, when the patient had completed her menstrual cycle (D0), in the first menstruation after the intervention (D1) and after the second menstruation after the intervention (D2) (Figure 1).

Figure 1. Schematization of the evaluations conducted (follow up)



Legend: tDCS (transcranial direct current electrostimulation).

Source: the authors (2023).

In all assessments, the patient was in the supine position, with the hips flexed at approximately 90° and feet supported on the surface. During these assessments, it was possible to diagnose weakness of the pelvic floor muscle, reduced proprioception and sensitivity, and increased muscle tone and pain.

2.3 Pain assessment

The Brief Pain Inventory is an instrument that assesses pain intensity (sensory dimension) and pain interference (reactive dimension) based on the past 24 hours. The intensity score was obtained through the four items of the sensory dimension and is rated on a scale from 0 to 10, where 0 corresponds to no pain and 10 represents the worst possible pain. The interference score through the item of the reactive dimension, which has seven sub-items: daily activity, mood, ability to walk, work, social activities, sleep and ability to enjoy life. The score is rated on a scale of 0 to 10, with 0 indicating no interference and 10 pain indicating complete interference due to pain.¹²

The Visual Analogue Scale (VAS) is also an instrument used to measure pain intensity in this study before and after each tDCS session. The patient was asked to rate the degree of pain at that moment, with 0 representing no pain and 10 representing the maximum pain the patient can tolerate. This instrument was used to assess levels during the weeks between menstruations.¹³

2.4 Assessment of the pelvic floor muscles

During vaginal or anal palpation, the evaluator should wear procedural gloves and lubricating gel. The palpation can be done using one or two fingers, up to the second phalanx, depending on the evaluator's experience and the size of the vaginal canal and the chosen evaluation scale. During palpation, in addition to assessing the functional status of the pelvic floor muscles, attention should be given to the muscle tone, whether there is an increase or decrease in muscle tone. Other functions, such as sensitivity, the ability to fully relax after contraction, coordination with abdominal muscles, symmetry between right and left sides during contraction, scars, adhesions, pain, speed, and sequence of elevator and recruitment with perineal muscles, and transverse and anteroposterior diameters of the urogenital hiatus are important for a comprehensive evaluation of the patient.¹⁴

The PERFECT scale assesses pelvic floor function. "P" stands for Power and is evaluated according to the modified Oxford scale, "E" stands for Endurance which corresponds to the duration in seconds of voluntary contraction, "R" stands for Repetitions, which represents the number of effective repetitions of sustained voluntary contractions, and "F" stands for fast contractions, referring to the number of times the patient can perform quick and effective contraction without compromising intensity.^{15,16}

2.5 Evaluation of female sexual dysfunction

The Female Sexual Function Index (FSFI) questionnaire is an instrument that assesses female sexual function. It consists of 19 questions divided into sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction, and pain, based on the past 4 weeks. The score is calculated by summing all the weighted scores, ranging from 2 to 36. High scores indicate better sexual function.¹⁷

2.6 Evaluation of quality of life

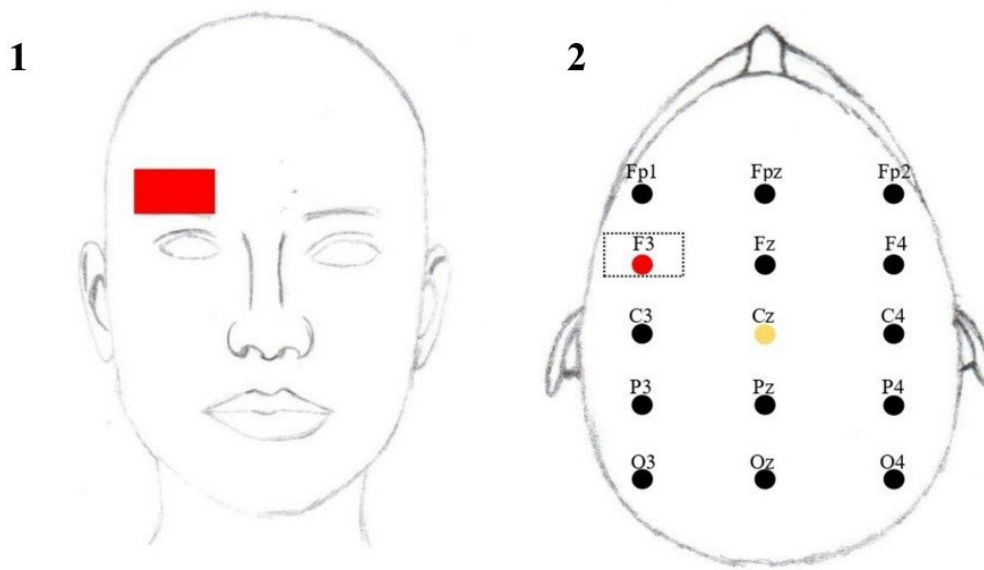
The WHOQOL-bref scale assesses the quality of life and consists of 26 questions. The first question pertains to overall quality of life, the second to satisfaction with one's health, and the remaining 24 questions are divided into the physical, psychological, social relationships and environment domains. The questions are formulated to obtain responses ranging from "nothing" to "extremely" for intensity, from "nothing" to "completely" for capacity, from "never" to "always" for frequency, and from "very bad" to "very good" and from "very dissatisfied" to "very satisfied" for evaluation. As stated in the WHOQOL-Bref instructions for use, the scores should be transformed to obtain values on a scale of 0 to 100.¹⁸ The transformation of the WHOQOL-bref questionnaire scores on a scale of 0 to 100 revealed the average assessment of the four respective domains: values between 0 and 40 are considered "failure"; values from 41 to 70 represent a state of "undefined"; and values above 71 represent "success".¹⁹

2.7 Intervention

The device used for the tDCS application was the MicroEstim model tES, intensity of 2mA, for 20 minutes. The electrodes were connected to sponges soaked in 0.9% sodium chloride saline solution.

The electrode placement followed the 10/20 system to determine the electrode points. The anodal electrode was positioned over the left dorsolateral prefrontal cortex (DLPC) and the cathodal electrode was positioned over the contralateral supraorbital region. This positioning was based on a meta-analysis of Chronic Pelvic Pain by Divandari et al.⁴ (Figure 2). The intervention was performed for 5 consecutive days, at the same time, by the same evaluators.

Figure 2. Positioning of the electrodes



Legend: (1) Cathodal electrode in the contralateral supraorbital region (Fp2) (2) Anodal electrode in the left dorsolateral prefrontal region (F3).

Source: the authors (2023).

2.8 Data analysis

Data collection, tabulation and graphics were performed using Microsoft Excel, including measures of central tendency such as mean, minimum and maximum values and percentages.

3. Case report

Female patient, 33 years old, in a stable relationship, one sexual partner. She had her menarche at the age of 12, with menstrual cycles of 27 days and a duration of 4 days, with intense flow. She never got pregnant. She sought pelvic physiotherapy service for the first time since the onset of symptoms, in February 2023, with complaints of pelvic pain during the menstrual period, with recurred despite other therapies.

The patient reported having unusual dysmenorrhea for the past 5 years. Initially, she did not seek help from specialists, but after experiencing several episodes of intense pain, she decided to seek physiotherapy treatment. The patient also has a diagnosis of endometriosis since 2018. She regularly takes analgesics once a day during the menstrual period, however, when the pain increases, she takes the medication more than once a day. Additionally, she has been taking an anxiolytic drug, since April 2022, but stopped taking it at the end of April 2023. It is important to note that during the entire pre-intervention, intervention and post-intervention assessment period, the use of analgesic medications had already been discontinued.

The patient also reported that she experienced exacerbated pelvic pain, especially during her menstrual period, which negatively impacted her daily activities and mood. She denied any history of sexual trauma or abuse, is a non-smoker and non-drinker, and has no food intolerances. She engages in physical activity at least 4 times a week and does not use hormone replacement therapy or pharmacological contraceptives. She thinks she has a normal sexual function and an active sex life, but occasionally experiences pelvic pain during sexual intercourse, particularly in the doggy-style position, although not consistently.

During the initial physiotherapy assessment, the patient exhibited normal sensitivity and absence of the clitoral, anocutaneous and contractile cough reflex. She was able to voluntarily contract her pelvic floor muscles. Her urinary and bowel functions were normal. Vaginal palpation, performed with two fingers, revealed increased muscle tonus, and altered proprioception in the lateral and posterior walls. There was a decrease in pelvic floor muscle strength (PFM), partial relaxation of the PFM and co-contraction of the abdominal, adductor and gluteal muscles.

The patient also reported a pain level of 5 on the VAS during the palpation of internal obturator muscle.

The patient was recruited for treatment based on her profile of intense dysmenorrhea and her willingness to undergo the proposed treatment.

4. Treatment protocol

The proposed protocol for the patient in this study consisted of tDCS application for 5 consecutive days for 20 minutes combined with pelvic floor exercises, including perineal massage (an increase in tonus important was found), breathing exercises, ventilation patterns aiming for relaxation, strengthening exercises aimed at contracting and relaxing the muscles in the region aiming at improving strength, repetitions and contraction support. The exercises consisted of 3 sets of at least 5 contractions, 3 sets of 10 quick repetitions and 3 sets of at least 5 contractions with a focus on muscle relation. Vaginal palpation was always performed using two fingers.

After 5 consecutive days of tDCS application, the patient continued with regular pelvic physiotherapy sessions, twice a week, each session lasting 50 minutes, for a period of 4 months, followed the same treatment protocol.

This combination aimed to enhance the effectiveness of the treatment and provide comprehensive care for the patient with Chronic Pelvic Pain.

5. Results and discussion

The patient underwent the 5 sessions of tDCS without any complaints related to the application of the technique. She presented mild hyperemia during the application, but it disappeared after a few minutes, on the same day of the session, with no reports of any other complaints.

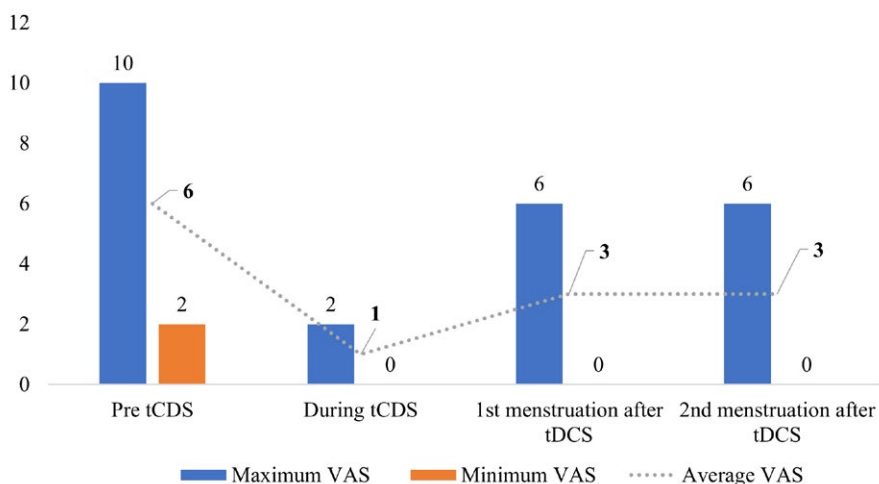
Among the adverse effects reported in the literature, the most common ones, also reported by the participant, were erythema and itching in the area where the electrodes are placed, as well as mild headache during and after the stimulation.

These effects were found regardless of electrode placement, both in healthy individuals and those with neurological disorders.²⁰

5.1 Pain

According to the Brief Pain Inventory, during the pre-intervention phase (D0), the intensity score was 7.25 and the interference was 6.85. After the application of tDCS (D1), the scores dropped to 2.75 and 5.28, respectively, indicating a 62.06% improvement in pain intensity and a 22.91% improvement in pain interference. On D3, both aspects were 0, indicating a significant improvement in pain. The VAS also showed a considerable decrease throughout the follow-up period (Figure 3).

Figure 3. VAS scale follow-up until the second menstruation after tDCS application



Legend: VAS (visual analogue scale); tDCS (transcranial direct current electrostimulation).
Source: the authors (2023).

In the figure, a slight increase in the average score can be observed in the first menstruation after the intervention, which the patient justified by the fact that her pain peak always occurs during the menstrual period.

Studies show that during the menstrual period, the incidence of pelvic pain is directly associated with the concentration of intrauterine prostaglandins. This high concentration of prostaglandins leads to more intense pain symptoms. This also explains why dysmenorrhea is more common in young adolescents than in young adults, as adolescents have a smaller uterine volume, and consequently, a higher concentration of prostaglandins. In a study involving 112 female students aged 17 to 28 years, their level of pelvic pain during the menstrual period was assessed. When evaluated using the VAS, 33.75% of the participants reported severe pain (7–10), 35% reported moderate pain (4–6) and 28.75% reported mild pain (0–3).²¹

These results demonstrate that tDCS had a positive effect on pain interference and intensity in the patient of the present study, as there was a significant and positive reduction in pain after the intervention period, promoting well-being and functionality for the patient. Zakka et al.²² showed in their case study with a 45-year-old patient with CPP that the intensity and characteristics of Chronic Pelvic Pain can vary according to internal and external factors and stimuli, such as the fertile period, menstruation, bowel movements, sexual intercourse, urination, climate, emotions, systemic disorders, among others.

A single application of tDCS in the same area as the current study and subsequently in the primary motor cortex region (M1), in the study by Divandari et al.⁴, with 16 women, showed positive effects compared to the placebo group regarding pain. A reduction in pain was also observed in the study by Pegado et al.²³, which included 20 women with primary dysmenorrhea. They also applied tDCS for 20 minutes, 5 sessions, in the primary motor cortex, although the area differed from the proposed one in the current study. However, the same number of sessions and duration were used since the stimulated areas for pain improvement can vary, with the most common being the primary motor cortex and left CPFDL.

In the study by Mechsner et al.²⁴, which involved 36 women with endometriosis and CPP, used anodal tDCS was applied to the primary motor cortex for 10 days. It was observed that the pain reduction in tDCS group was greater compared to the control group, and even 1 week after the end of stimulation, the pain reduction remained sustained, indicating a lasting effect. In the current study, using another stimulated region, the maintenance of pain reduction was observed for approximately 2 months after tDCS application.

The systematic review conducted by Souza, Maciel and Cerqueira⁶ demonstrates that the primary motor cortex is an important area for the release of neurotransmitters responsible for the release of endogenous opioids. When stimulated, the release of these neurotransmitters increases, resulting in pain reduction. In this same review, most studies stimulated the primary motor cortex, as did the study by Matias et al.²⁵ However, it is known that pain is also related to emotional factors, and therefore, the application of tDCS to the DLPFC can have positive effects. The use of tDCS in the DLPFC is justified by its modulation of cognitive function, emotional processing, and reaction to pain, which directly contributes to the treatment of chronic pain. Other factors, such as the duration and frequency of the sessions, also affect the durability of the post-intervention effect. Thus, despite the limited number of studies on chronic pelvic pain and considering the inherent emotional factors that occur with women, especially in the menstrual cycle, the placement of electrodes in DLPFC was chosen.¹⁰

5.2 Pelvic floor motor function

There was a maintenance of muscle strength compared to the first and last evaluations, with a slight increase in D1. In terms of the assessment of endurance time and repetitions of sustained contractions, there was a gradual increase. As for the assessment of the repetitions of rapid contractions, there was a maintenance comparing the first and last evaluation (Table 1).

Table 1. PERFECT scale evaluation

Variable	Pre tDCS (D0)	1st menstruation after tDCS (D1)	2nd menstruation after tDCS (D2)
P	2	3	2
E	0	3	10
R	0	6	10
F	10	10	10

Legend: tDCS (transcranial direct current electrostimulation); P (degree of strength), E (sustaining time), R (repetitions of sustained contractions), F (repetitions of rapid contractions), D0 (pre-intervention); D1 (1st menstruation after tDCS), D2 (2nd menstruation after tDCS).

Source: the authors (2023).

In a study conducted with 108 women with CPP and 48 healthy women, it was found that the tension of the pelvic floor muscles (PFM) was higher in women diagnosed with CPP and was associated with dyspareunia. They observed that 89% had increased tension in the levator ani muscle, 50.8% had tension in the piriformis muscle and 31.7% had tension in the obturator internus muscle, while only 2 out of 48 healthy women had tension in the levator ani muscle.²⁶ The same result was observed in the patient of the present study, as during the first and second physiotherapeutic evaluation, changes in tension and pain were identified in the obturator internus and levator ani muscles, and from the last one, the pain ceased, but a slight increase in muscle tonus could still be identified.

Increased muscle tone of the PFM affects approximately 50% of women with PFM dysfunctions and this increased tone may be related to urinary, bowel, and sexual dysfunctions and/or chronic pelvic pain.²⁷ Therefore, in addition to pain treatment, the combination of perineal massage, strengthening exercises, relaxation and proprioception were applied in conjunction with tDCS to promote relaxation of the PFM, as the patient in the present study presented not only pain but also increased tone in the lateral and posterior wall of the vaginal canal. Nogueira et al.²⁸ reports that in the diagnosis and treatment of CPP, the abdominal wall, pelvic floor muscles, pelvic viscera, nerves and ligaments should be evaluated, as painful conditions of the PFM can be the result of visceromuscular reflexes, which are common among women with this condition. This reflex causes the release of inflammatory mediators and neurotransmitters in both the periphery-spinal cord direction (orthodromic) and in the opposite direction (antidromic), leading to what is known as neurogenic inflammation, which can affect the musculature of the pelvic region, causing an increased muscle tone associated with functional impairment, the appearance of pain points, and myofascial pain becoming a new source of pain. Most patients with bladder pain syndrome and pelvic endometriosis present increased tone in the PFM.²⁸

It is important to note that in addition to the improvement in strength and function of PFM, in the

evaluation conducted after the second menstruation following the intervention, the patient in the present study also showed improvement in proprioception and sensitivity. Regarding the tone of the vaginal canal region, there was still a slight increase in tone, but not as pronounced as observed in the first evaluation. Therefore, during the treatment for pain relief using tDCS, the combination of exercises and training of the PFM was essential for improving the patient's pain condition, as the pelvic floor is a neuromuscular, fascial and ligamentous unit responsible for supporting pelvic organs and contributing to the proper functioning of the region.²⁹

5.3 Sexual function

In the current study, sexual function was not the main complaint of the patient, even during the menstrual cycle when there was a peak pain. However, during the evaluation, some relevant alterations were observed. The patient reported episodes where her sexual desire, lubrication or sexual satisfaction were reduced, not only due to the dysmenorrhea condition, but also due to marital issues she was facing with her partner. The patient mentioned a personality incompatibility with her partner, as their daily habits are different, and this affected her love and sexual life at times. The study by Hämmerli et al.³⁰ compared the sexual satisfaction of women with CPP associated with endometriosis to that of healthy women without a diagnosis of endometriosis and/or CPP. Only 47.2% of women diagnosed with CPP associated with endometriosis achieved orgasm in sexual intercourse with their partner, while 60.1% of healthy women were able to achieve orgasm in sexual intercourse with their partner.

In the current study, the patient had a total score of 31.2 in the initial evaluation, and after the intervention (second evaluation), this score increased to 31.8, indicating that the improvement was not relevant. However, as shown in Table 2, the greatest improvement variation was observed in the desire domain, with a variation of 1.2 points. In the third evaluation, which took place during the second menstruation after the application of tDCS, the score was 29.3, indicating a worsening of sexual function.

Table 2. Result of the FSFI scale evaluation

Variable	Pre tDCS	1st menstruation after tDCS	2nd menstruation after tDCS
Excitement	5.1	5.1	5.1
Lubrication	5.7	5.1	5.4
Orgasm	5.6	6	5.6
Sexual satisfaction	5.2	4.8	3.6
Pain	6	6	6
Sexual desire	3.6	4.8	3.6
Total	31.2	31.8	29.3

Legend: tDCS (transcranial direct current electrostimulation), FSFI (female sexual function index)
Source: the authors (2023).

These numbers indicate that in the second menstruation after the intervention, the effects of tDCS may have ceased, as there was a decrease in the domains of orgasm, sexual satisfaction, and sexual desire. Another relevant issue to be mentioned was a personal matter related to the partner, as previously reported, which may have affected the results of the final evaluation of her sexual function. The cycle of sexual response includes the phases of desire, excitement, and orgasm, which contribute to sexual satisfaction for women. In long-term relationships, the lack of spontaneous sexual desire can be common. Therefore, depending on the relationship with the partner, a woman may respond to sexual stimuli and achieve sexual satisfaction with or without orgasms.³¹

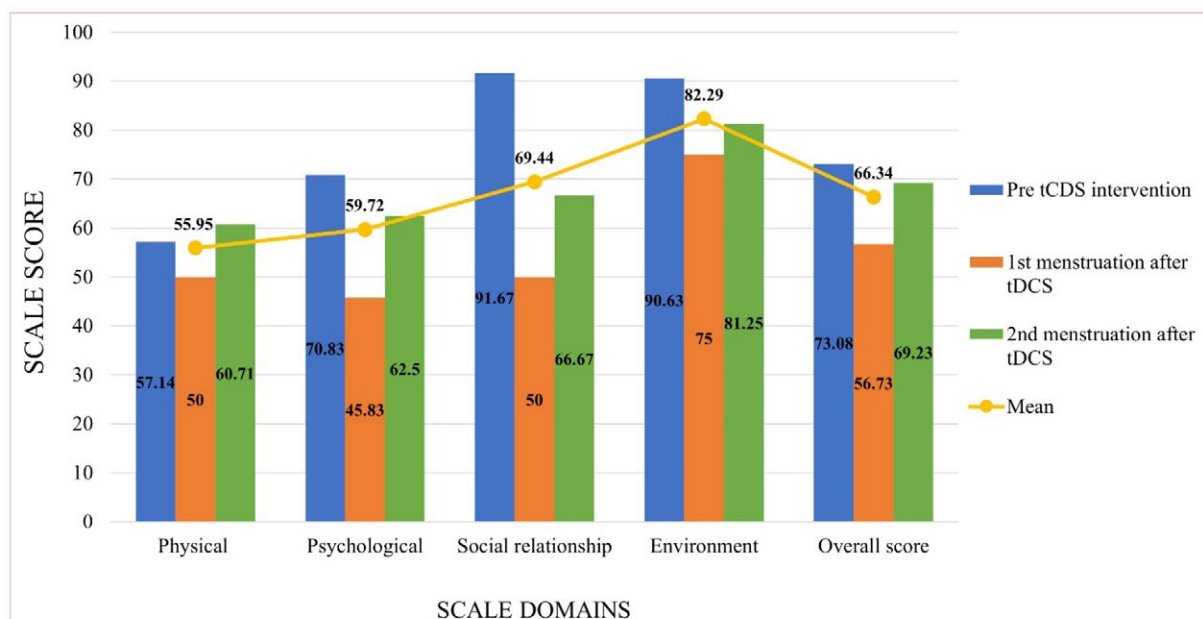
It is important to note that throughout the assessment moments, despite fluctuations in other sub-items, the level of pain during sexual intercourse remained the same (score of 6), even though the main focus was to evaluate pelvic pain. Dyspareunia is defined as genital pain present during sexual intercourse, which may be associated with physical and/or psychological factors. Deep dyspareunia is characterized by pain in the deep vaginal and hypogastric region and is often associated with pain occurring outside of sexual intercourse. It can also be conditional, meaning it may only be present in some positions, stimuli or with specific partners.³¹ The patient in the current study may fall within the group of deep dyspareunia, as her pain was not related to penetration, but rather to pelvic pain, occasionally occurring in specific sexual positions, and also related to marital issues, as previously reported.

No studies involving sexual dysfunction in women with chronic pelvic pain and tDCS were found.

5.4 Quality of life

The patient had an “undefined” result in the quality of life assessment, as her score was 73.08 at D0, 56.73 at D1 and 69.23 at D2. When comparing D0 with D1 there was a decrease in quality of life. Comparing D1 and D2 there was an improvement. Between D0 and D2 it was noticeable that there was an improvement in some domains of quality of life (Figure 4).

Figure 4. Analysis of the sample participant's quality of life, on D0, D1 and D2, through the domains of the WHOQOL-bref scale



Legend: QL (quality of life)
Source: the authors (2023).

The patient reported an improvement in her self-assessment of quality of life over the course of the study. In the first assessment, she rated overall quality of life as “poor”, while in the second assessment it was rated as “neither bad nor good”, and in the final assessment it was rated as “good”. Similarly, her satisfaction with her health improved from “neither satisfied nor dissatisfied” in the first two evaluations and “satisfied” in the last one.

Several aspects of quality of life were evaluated in the study. In the initial assessment, the patient had lower scores in questions 3 “To what extent do you think your (physical) pain prevents you from doing what you need to do?”, and 4 “How much do you need some medical treatment for lead your daily life?” In the second assessment, she had lower scores in questions 3 and 4, as well as questions 7 “how much can you concentrate?”, 21 “how satisfied are you with your sex life?” and 26 “how often do you have negative feelings such as bad mood, despair, anxiety and depression?”. In the final assessment, only question 3 had a low score. The question with the highest score in all three assessments was question 23 “how satisfied are you with the conditions of the place where you live?”.

Women living with chronic pain often experience psychological distress, which can lead to work impairment and loss or reduction of functional capacity for daily activities. According to the study by Xavier et al.³² conducted in a specialized clinic for chronic pelvic pain, over 50% of women had moderate to severe anxiety, and over 25% had moderate to severe depression. These women reported unsatisfactory results regarding the clinical treatments they underwent, including surgical procedures to alleviate dysmenorrhea symptoms. tDCS appears to be a non-invasive option for pain management in women who are unable to undergo surgical treatments, for example.³³

The study by Tripoli et al.³⁴ included 134 patients, divided into three groups, and the assessment of the quality of life showed that groups 1 and 2 (women with CPP due to endometriosis and other etiologies, respectively) had negative results in the physical and psychological domains compared to group 3 (healthy patients without gynecological pathologies). There were no significant changes in the social and environmental domains. The different stages of endometriosis and etiologies of chronic pelvic pain did not show significant differences in quality of life.

Women with mild to severe pain caused by dysmenorrhea experience a high number of works, leading to income loss and a decrease in overall well-being.³⁵ In the study by Durand, Monahan and McGuire³⁶ primary dysmenorrhea had a considerable impact on the participants' quality of life, affecting them physically, psychologically, socially and behaviorally. Karout et al.³⁷ reported that half of the participants with primary dysmenorrhea reported that pain negatively affected their ability to study and their academic performance. The patient in the study reported difficulties in concentration at work and daily activities, as well as disruptions in sleep and mood, especially during menstruation, affecting her personal relationships and psychological well-being, as she "couldn't think positively" and felt "great despair" due to the intensity of the pain.

6. Conclusion

Transcranial Direct Current Stimulation combined with exercises was positive in alleviating severe pelvic pain in this patient with chronic pelvic pain. It also had a positive impact on pelvic floor motor function. However, there were no significant improvements in sexual function and quality of life, which could be influenced by emotional and personal factors or even the discontinuation of tDCS. Randomized clinical trials are needed to provide further evidence of the effects of tDCS on chronic pelvic pain.

Authors' contributions

Gadelha BCCV and Maciel BGM participated in the construction and development of the article, literature review, data collection and processing, discussion of results and conclusion. Salata MC and Ribeiro TG contributed in the guidance, review, correction and development of the article, literature review, data collection and processing, discussion of results and conclusion. Lima MSN were responsible for the review, translation and correction of the article. OIher RR participated in the review and correction of the article.

Conflicts of interest

No financial, legal, or political conflicts involving third parties (government, private companies, and foundations, etc.) were declared for any aspect of the submitted work (including but not limited to grants and funding, advisory board participation, study design, manuscript preparation, statistical analysis, etc.).

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