

## A SYSTEMATIC REVIEW ON BEHAVIORAL AND PHYSICAL TREATMENT APPROACHES FOR MANAGEMENT OF MIGRAINE

### RECENZIE PRIVIND ABORDĂRILE TERAPEUTICE COMPORTAMENTALE ȘI PSIHICE PENTRU MANAGEMENTUL MIGRENEI

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**Keywords:** migraine, behavioral therapy, physiotherapy, biofeedback, manual therapy, transcranial direct current stimulation.

**Cuvinte cheie:** migrenă, terapie comportamentală, psihoterapie, biofeedback, terapie manuală, stimulare cu current transcranial direct

#### Abstract

**Introduction.** Migraine is a common episodic headache syndrome with an estimated prevalence of 11% in adult population worldwide. Migraine is usually managed by medications although some patients have contradiction or suffer from side effects associated with certain medications. Therefore establishing non pharmacological neuromodulatory approach as an alternative treatment option shall be highly solicited.

**Objective.** The objective of this study is to systematically review experimental studies, preferably randomized controlled trials on Non Pharmacological management of migraine.

**Methods.** Comprehensive Computerized search was done. Review was performed according to the Preferred Reporting items for systematic review and Meta Analysis (PRISMA).

**Results.** Results suggest that treatments like Behavioral therapy, Biofeedback, Transcranial Direct Current Stimulation (TDCS) as well as exercises and diet restriction are effective tools in the management of migraine and other associated symptoms.

**Conclusion.** Non Pharmacological Techniques can be a safer alternative in Management of migraine and related symptoms

**Abbreviations** - TDCS - Transcranial Direct Current Stimulation, CSD-Cortical Spreading Depression, PRISMA-Preferred Reporting items for systematic review and Meta Analysis, ICHD-International Classification of Headache Disorders, MIDAS-Migraine Disability Assessment, MADR S-Montgomery Asberg Depression Scale, EEG-Electroencephalogram

#### Rezumat

**Introducere.** Migrena este un sindrom comun de durere de cap cu o prevalență estimată de 11% în populația lumii. Migrena se tratează de obicei cu medicație, cu toate că unii pacienți au contraindicații sau suferă de efecte secundare asociate cu unele medicamente. De aceea, stabilirea unei abordări nemedicamentoase, neuromodulatorii, ca tratament alternativ, este foarte binevenită.

**Obiective.** Obiectivul acestui studiu este de a recenza sistematic studii experimentale, de preferat randomizate, privind managementul nonfarmacologic al migrenei.

**Metode.** S-a efectuat o cercetare comprehensive computerizată. Recenzia s-a realizat în conform itemilor de Raportare Preferențială pentru studii de recenzie și Meta-analiză (PRISMA).

**Rezultate.** Rezultatele indică faptul că tratamente precum terapia comoprntamentală, biofeedback, stimulare cu curent direct transcranial, precum și exercițiile și dieta restrictivă sunt eficiente în managementul migrenei și simptomelor asociate.

**Concluzie.** Tehnicile nonfarmacologice pot fi o alternative sigură în managementul migrenei și simptomelor asociate.

**Abrevieri** - TDCS - Transcranial Direct Current Stimulation, CSD-Cortical Spreading Depression, PRISMA - Preferred Reporting items for systematic review and Meta Analysis, ICHD - International Classification of Headache Disorders, MIDAS-Migraine Disability Assessment, MADR S-Montgomery Asberg Depression Scale, EEG-Electroencephalogram

#### Introduction

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Migraine is a common episodic headache syndrome significantly affecting quality of life with estimated prevalence in 11% adult population across the globe.[1] Migraine interferes in many facets of people's daily life including employment commitment and their ability to look after their families resulting in reduced quality of life.[2] Migraine is very common, highly disabling and extremely costly. The World Health Organization ranks migraine among the top twenty causes of disability worldwide. [3] In the global burden of disease survey 2010, it was ranked as the third most prevalent disorder and 7th highest specific cause of disability worldwide.[22] The symptoms of migraine arise from a combination of vascular and neurological events occurring in the cranial meninges and therefore, this disorder is often described as being of neurovascular origin. During attacks of classic migraine, regional cerebral blood flow shows a mild cortical hypo-perfusion that begins in the visual cortex and spreads forward at a rate of 2 to 3 mm per min.[4] Cortical spreading depression (CSD) is an intense wave that propagates across the cerebral cortex at a rate of 2-5 mm per minute and lasting for 15 to 30 minutes which causes disruption of ionic gradients followed by a period of suppressed neural activity.[5,6] Both the migraine aura and CSD propagate along the cortical surface. CSD is one of the most significant mechanism underlying migraine owing to the characteristic spread and sequence of each symptom as reported by migraine patients. [7] CSD triggers the trigeminal vascular system, which in turn releases nitric oxide and calcitonin gene related peptide thus inducing vasodilatation and perivascular nerve activity.[8]The pain of migraine is invariably accompanied by features like nausea, vomiting, photophobia, phonophobia etc. This may be associated with localized edema of the scalp or face, scalp tenderness prominence of a vein or artery of the temple, or stiffness and tenderness of neck.[9]Migraine is a complex combination of biological, behavioral and emotional components, the most effective treatment programs include a combination of pharmacological and non-pharmacological approaches. [10] Moreover, patients with migraine are often refractory to medical management and there are a number of adverse effects of pharmacological management of Migraine. Therefore they might need other strategies to modulate their pain and other symptoms. The present review is an effort to document available literature regarding behavioral and physical treatment for management of Migraine

### **Purpose**

Purpose of this review is to provide a brief and succinct summary of scientific evidence regarding the non pharmacological management of migraine.

### **Methodology**

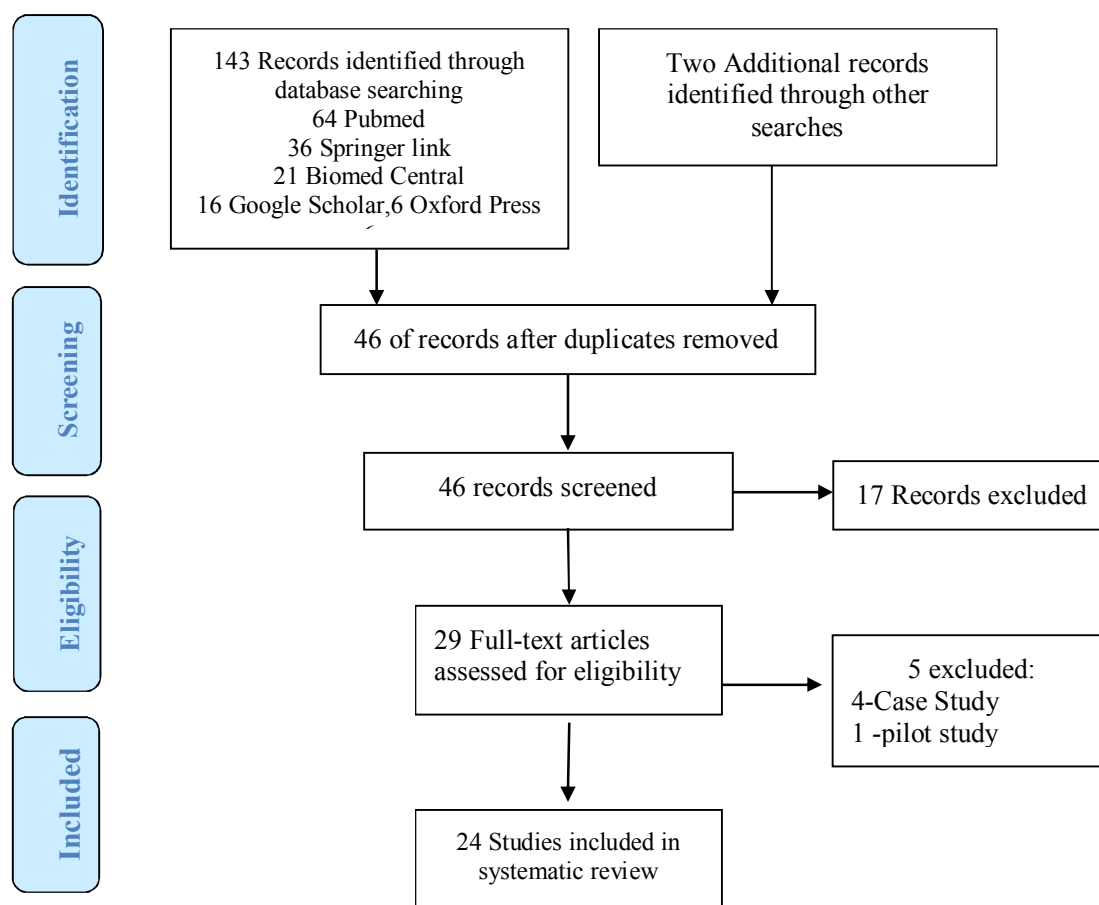
Initially, Literature search was done by comprehensive computerized search on Pubmed, Biomed central, Google Scholar, Springer link and Oxford Press. Review was performed according to PRISMA.PRISMA statement was published in 2009 in order to set standards in the reporting of systematic reviews and meta-analyses. Step Wise flow diagram of PRISMA is shown in figure 1. Search words were 'Migraine and Manual therapy' 'Migraine and Physical therapy', 'Migraine and Biofeedback', 'Migraine and Behavioral therapy', 'Behavioral Management of Migraine', 'Migraine and Acupuncture', and 'Non Pharmacological management of Migraine'. We also examined references of these studies and of earlier reviews. Only Randomized controlled trials and comparative studies preferably following International Classification of Headache Disorder criteria for migraine specified by International Headache Society as inclusion criteria for participants were included in the review. Although observational studies and case reports can yield relevant evidence, primary purpose of this review was to summarize the results of studies designed to evaluate efficacy and relative efficiency, therefore review was restricted to comparative studies preferably Randomized Controlled Trials.

## Diagnosis

A number of criterion have been utilized for diagnosis of Migraine. Migraine was diagnosed in twenty one studies by ICHD Criteria specified by International Headache Society. In one study inclusion criteria specified by Diamond and Delassio was used for diagnosis of Migraine. One study included subjects diagnosed by the Project Neurologist using diagnostic criteria of intermittent paroxysmal headaches with any two of four symptoms of throbbing pain or related neurological phenomena, nausea and/or vomiting and positive family history and one study included patients with self-reported diagnosis.

## Outcome measures

Most commonly used outcome measures were migraine pain intensity (17 Studies), frequency (14 studies) and duration (8 studies) .Visual Analog Scale was most common assessment tool (used in 5 studies) for evaluating headache intensity. Headache diary was used to record headache frequency and duration of attacks. Medications used were taken as an outcome measure in six studies. Two studies used Migraine Disability Assessment (MIDAS) questionnaire as an outcome measure while one study used Pediatric MIDAS as an outcome measure. Scales like Patient global assessment (one study), Clinical global Impression (one study) PQ23 Quality of life scale (one study) were also used as outcome measures. Anxiety and depression were also used as an indicator of treatment outcome with studies using Anxiety and depression rating scales like Hamilton rating scale for anxiety and depression, Speilberger state anxiety inventory and MADR S Depression inventory as Outcome measures. Visual evoked potential and LASER evoked potentials were used as outcome measures in one study each.



**Figure 1: PRISMA Flow Diagram**

## Treatment interventions

TDCS was used in three studies. Biofeedback including thermal Biofeedback, Electroencephalogram (EEG) Biofeedback, Passive Infrared Hemoencephalography Biofeedback, Hand warming Biofeedback, EEG Biofeedback and Biofeedback assisted relaxation training was given in five studies. Alvin lake et al used Biofeedback combined with rational emotive therapy in one of the three groups. RCT done by Peter J Tuchin et al applied Chiropractic spinal Manipulative therapy in migraine patients. Effect of Exercises (one study) and Diet restriction based on IgG Food elimination (two studies) on Migraine patient is also reported. Behavioral Migraine management was done in six studies and included Internet Based Multimodal Behavioral treatment (one study), Behavioral Migraine management, Web based behavioral interventions, Cognitive behavioral self management strategy, Relaxation Training and Written Emotional Disclosure and progressive deep muscle relaxation and Cognitive restructuring. Efficacy of High frequency transcranial Magnetic stimulation in Migraine Management was done in one study. Other studies which were included used Neck Cooling, Yoga, Acupressure, massage therapy and massage combined with cervical and upper thoracic manipulations.

## Results

Transcranial Direct Current stimulation-Results of studies included in present review indicate that TDCS may be safe and useful in migraine prophylaxis and in reducing migraine frequency and medication intake.

Biofeedback-Biofeedback may be effective in decreasing migraine frequency, improvement in headaches and altering mood states in Migraine. However type of biofeedback and combination with other therapies significantly alters treatment outcomes.

Spinal Manipulative therapy –Spinal manipulative therapy may result in improvement in migraine frequency, duration, disability and medication use in migraine patients. Cervical spine manipulation may significantly reduce headache pain intensity. Massage to trapezius significantly decreases pain and frequency of Headaches.

Diet and exercises-Exercise may be an option for prophylaxis of Migraine. Studies done on food elimination based on IgG antibodies have conflicting results. It may be an effective strategy in reducing migraine frequency.

Behavioral management of Migraine-Behavioral management is effective in treatment of Migraine. It also improves self efficacy in management of migraine. Internet based or CD ROM based behavioral techniques are easy to administer and are effective in improving Migraine related symptoms. Relaxation training and cognitive restructuring helps in reducing headache frequency. Relaxation training is also effective in improving pain severity in Migraine patients.

Transcranial Magnetic Stimulation-Results suggest that High frequency transcranial Magnetic Stimulation and sham procedure can both modulate pain in Migraine patients.

Other treatment Methods like neck cooling, yoga, massage therapy, acupressure and Anthroposphic therapy may be effective.

Summary of included studies is shown in Table 1.

S. No	Author	Design	n	Treatment applied	Outcome Measures	No. of Sessions/Study Duration	Follow up	Results	Diagnostic Criteria
1	Alexandre F Dasilva et al[11],2012	Randomized, single blinded with external blinded rater, placebo controlled clinical trial	13	Anodal TDCS Sham TDCS	Primary Outcome measure VAS Secondary Outcome Measure-Length of Migraine Episodes, patient global assessment(PGA) and Clinical Global Impression(CGI)	10 Sessions over a four week Duration	60 and 120 days after end of treatment	Patients with Chronic Migraine have a positive but delayed response to anodal TDCS of primary motor cortex	ICHD Criteria specified by IHS
2	Alessandro Vigano et al[12] 2013	Randomized Controlled Trial	10	Anodal TDCS	Pattern Reversal-VEP, First Block Amplitude and Migraine Frequency, Average Cumulative attack Duration, Average acute treatment intake and duration of each attack	16 sessions ,twice a week for 8 weeks	Prospective follow up 2 months	15 minutes Session of Anodal TDCS over the visual cortex is able to transiently increase habituation in healthy Volunteers Significant reduction in Migraine frequency, days, pain killer intake and attack Duration	ICHD Criteria specified by IHS
3	Paradee Auvichayapat et al[1] 2012	Randomized Placebo Controlled trial	37	Anodal TDCS	Headache Diary, attack Frequency, Pain intensity, Dosage of Abortive medications	20 days Double blind Treatment sessions	Pre treatment 4 week baseline evaluation ,post treatment 12 week period of observation	Anodal M1 TDCS may be safe and useful clinical tool in Migraine Prophylaxis	ICHD Criteria specified by IHS
4	J Michael Lacorix et al[13]1983	Comparative Study	27	Thermal Biofeedback,Frontalis EMG Biofeedback and Relaxation Training	Structured interview for headache Characteristics and global 5 point self rating scale of improvement	18 Training and six test sessions	Six months after training	Improvement in headaches was observed in all groups. Best improvement took place in thermal Biofeedback group	Criteria specified by Diamond and Delassio
5	Eun Ho Kang et al[14]2009	Randomized Controlled Trial	32	Biofeedback Assisted Relaxation	Primary Outcome measure was Headache severity on a 6 point scale for 7 consecutive days as headache	8 sessions of biofeedback assisted	Outcome measure recorded at	Biofeedback assisted Autogenic training is effective in	ICHD Criteria specified

				Training	indices,	Autogenic Training	Baseline, after 2 weeks and after 4 weeks of treatment	Management of Female Migraine Patients in Korean Population.	by IHS
6	Deborah A Stokes[15] 2010	Single group outcome open label study	37	EEG Biofeedback,PIR HEG Biofeedback,Hand warming Biofeedback	Headache frequency,severity,duration and medications used	Average total of 40 sessions	3 months to 2 years	Combined Neuro and Biofeedback interventions were effective in reducing the frequency of Migraine.	ICHD Criteria specified by IHS
7	Alvin Lake[16] 1979	Randomized Controlled Trial	24	Frontalis EMG Biofeedback, Digit Temperature Biofeedback(DBT ) and DBT Combined with Rational Emotive Therapy	Headache Intensity and medication Consumption for the duration of study using grid and Rating scale developed by Budzynski et al	8 to 10 sessions of Biofeedback, 3 sessions of Rationale Emotive therapy	3 months follow up	Digit Temperature Biofeedback alone or in Combination with RET did not prove to be more effective in the management of migraine than EMG Biofeedback Training or self Monitoring of headache activity	Positive indicators for vascular headache of the migraine type
8	Keith D Allen ,Mark D Shriver[17] 1998	Randomized controlled Group Outcome Design	27	Biofeedback	Headache Frequency ,Pain Impact on Child Adaptive Functioning	Six Treatment sessions	One and three months follow up	Significant Reduction in Headache activity in Both Groups(Biofeedback and Biofeedback + Pain Behavior Management(OP) ) in Children	ICHD Criteria specified by IHS
9	Peter J tuchin[18] 2000	Randomized Controlled Study	12 7	Chiropractic Spinal Manipulative Therapy	Headache Frequency, Intensity(VAS),Duration,Disability,As associated Symptoms, Use of Medications	2 months of treatment with maximum of 16 treatments	2 months	Statistically Significant Improvement in Migraine Frequeny,Duration,disability and Medication use .	ICHD Criteria specified by IHS
10	Emma Varkley [19] 2011	Randomized Controlled Study	91	Exercises	Migraine frequency, pain intensity	12 week treatment period	3 and 6 months after	Exercise may be an option for the prophylactic treatment	ICHD Criteria

							treatment	of migraine	specified by IHS
11	Kadriye alpay et al[20]2010	Double blind Randomized cross over trial	30	Diet restriction based on IgG against food	No of headache days, migraine attack count, migraine attack duration, median attack severity in VAS From 0-100	14 weeks protocol	No Follow up	Diet restriction based on IgG antibodies might be an effective strategy in reducing the frequency of migraine attacks	ICHD Criteria specified by IHS
12	Natasha mitchel et al[21] 2011	Single blind Randomized Controlled Study	167	Food elimination diet based on IgG antibodies	Number of Headache days, MIDAS questionnaire for Disability, Impact of Daily life by HIT 6	12 weeks diet program	4 and 12 weeks follow up.	Diet elimination advise didn't reduce the disability or impact on daily life in migraine and no. of headaches at 12 weeks but it did significantly reduce no. of migraine like headaches at 4 week.	Self reported diagnosis
13	Kerstin Hedorg, Carin Muhr[22] 2011	Randomized Controlled trial	83	Multimodal Behavioral Treatment(Internet based)	Migraine Frequency,MADR-S Depression Inventory,PQ23 Quality of Life Scale	11 months	No Follow up	Multimodal Behavioral therapy administered over the internet appears feasible and effective in the treatment of Migraine but no effect of hand massage was found	ICHD Criteria specified by IHS
14	Jonas Bromberg et al[23] 2012	Randomized Controlled trial	185	Web Based Intervention	Migraine disability assessment questionnaire, Chronic pain Coping Inventory 42,Headache management self efficacy scale,Pain Catastrophizing ,Patient global Impression of Change	Eight sessions(2 sessions per week)and a minimum of five sessions(one session per month)during follow up	5 months	Experimental group reported significantly increased headache self efficacy, increased use of relaxation, increasing use of social support, decreased pain catastrophizing, decreased depression and decreased stress	ICHD Criteria specified by IHS
15	Kenneth A Holroyd et al [24]	Randomized Controlled trial	232	Behavioral Migraine Management(BM)	Primary Outcome measure- Change in Migraines/30 days, Secondary Outcome measure-Change in Migraine	Five weeks run in period, Three	12 months follow up	Behavioral Migraine Management with BETA Blocker	ICHD Criteria specified

	2010			T),BMT with Beta Blockers, Beta Blockers	days/30 days an	months(1-4) Treatment protocol		Treatment may improve outcome in the treatment of frequent migraine	by IHS
16	Michael A Rapoff et al [25]2014	Randomized controlled Clinical Trial	35	Cognitive behavioral Self Management Strategy	Headache frequency, Duration, severity, Migraine related disability(using Pediatric MIDAS)Quality of life	4 weeks period	3 months follow up	Headstrong (Cognitive Behavioral self guided CD ROM program) resulted in lower pain severity and less migraine related disability as compared to control group.	ICHD Criteria specified by IHS
17	Pamela J Dsouza et al [26]2008	Randomized Controlled trial	90	Relaxation Training and written emotional Disclosure	Headache frequency, severity ,disability and general physical symptoms	4 sessions over a two week period	Follow up after one and three months	Relaxation training improved pain severity in Migraine patients as compared to control group	ICHD Criteria specified by IHS
18	Iris L Richter et al [27]1985	Randomized Controlled trial	42	Progressive deep muscle relaxation and Cognitive restructuring	Headache frequency, duration, pain Intensity, medications used	6 weeks of treatment	4 weeks of follow up from 12 <sup>th</sup> to 16 <sup>th</sup> week	Relaxation and Cognitive coping groups had significantly fewer headaches and less overall headache activity as compared to placebo group.	Diagnosis by Project Neurologist
19	Marina de Tomamaso et al[28] 2010	Randomized controlled trial	23	High frequency transcranial magnetic stimulation	Laser Evoked Potential latency	Repetitive TMS over the hand motor cortex of the left hemishpere	No follow up	Results suggests that High frequency TMS of motor cortex and sham procedure can both modulate pain and evoked responses in Migraine patients	ICHD Criteria specified by IHS
20	Adam S Sprouce et al[29] 2013	Randomized controlled crossover study	55	Neck cooling using cold packs	VAS	2 months trial with crossover of subjects after one month.	No follow up	The application of frozen neck wrap significantly reduced recorded pain in participants with migraine headaches	ICHD Criteria specified by IHS



21	Younes Jahangiri Noudeh et al[30]2012	Pre post comparative study	10	Massage to trapezius, suraspinatus, posterior and lateral neck muscles and manipulation of cervical and upper thoracic spine	Verbal analog score, percent pain score reduction	One session during migraine attack	1 Hour after manipulation	Cervical spine massage and manipulation could significantly reduce headache pain intensity in migraine attacks	ICHD Criteria specified by IHS
22	Sheleigh P Lawler et al [31]2006	Randomized controlled trial	48	Massage therapy	Migraine frequency, intensity, medications used, sleep behavior, heart rate, state anxiety and salivary Cortisol	Six massage sessions	1 day and three weeks after the final massage sessions	Massage group showed significant decrease in migraine frequency and increase in sleep quality. heart rate and state anxiety decreased from pre to post massage.	ICHD Criteria specified by IHS
23	Giani Allais et al[32] 2012	Pre post experimental Study	40	Acupressure	Nausea Score	Six Migraine attacks	No follow up	Nausea is significantly reduced in acupressure	ICHD Criteria specified by IHS
24	Harald j Hamre et al [33]2010	Prospective 2 years cohort study	45	Anthroposophic therapy	Average migraine severity on numeric rating scale, symptoms score and quality of life, Therapy outcome rating	105 Days	3,6,12,18 and 24 months after follow up	Patients with migraine under anthroposophic treatment had long term improvement of symptom and quality of life	ICHD Criteria specified by IHS

CGI –Clinical Global Impression, HRS-Hamilton Rating Scale, DASS-Depression, Anxiety and Stress Scale, ICHD-International Classification of headache disorder, IHS-International Headache Disorder, MADRS –Montgomery Asberg Depression Rating Scale, MIDAS-Migraine Disability Assessment Questionnaire, PGA-Patient Global Assessment, SSAI-Speilberger State Anxiety Inventory, TDCS-Transcranial Direct Current Stimulation, HIT6-Headache Impact Test, VAS-Visual Analog Score, VEP-Visual Evoked Potential

Research investigating the therapeutic effects of massage therapy for migraine headaches is very rare. Effects of massage therapy on headache frequency may be at least partially due to its impact on stress arousal.[31]

### Conclusion

Based on Comprehensive literature review through PRISMA it can be concluded that non pharmacological treatment approaches like TDCS,behavioural therapies etc appear to be an effective treatment method for migraine , associated pain and migraine related symptoms.

Therefore, these approaches can be used as an adjunct therapy.

**Acknowledgement.** Authors are thankful to Dr Arun Mozhi and Dr Jaspreet kaur for their help and support.

**Source of funding.** No source of funding is used for this systematic review.

**Conflict of Interest.** There is no conflict of interest.

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