



REVIEW

Effectiveness of Patient Education and Cognitive Behavioural Treatment as a Non-Pharmacological Intervention for Migraine in Adults – a Systematic Review

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Abstract

To evaluate the content of patient education and cognitive behavioural therapy and its effectiveness in the prevention of migraine for adults, a systematic search was conducted in the databases MEDLINE, EMBASE, PsycINFO and CINAHL. RCTs published in the past 10 years in German or English, reporting on any form of patient education or cognitive behavioural therapy for adult migraineurs, were included. Two reviewers independently searched and evaluated search results. The methodological quality of selected studies was assessed using the Cochrane risk of bias tool 2.0 independently by two reviewers. Data on content and effectiveness were extracted in a predesigned table. Across 1059 records, 14 studies were eligible, including 2266 participants (82,7% females). Contents of patient education included explanations on the link between thoughts and feelings, information on lifestyle influences on headaches, relaxation techniques and stress management, advice on diet and the benefit of physical activity. In addition, patient education focussed on the pathogenesis and diagnostic criteria of migraine, triggering factors and effective acute or prophylactic drug use. Outcome measures included headache frequency, medication intake, function and disability, as well as psychosocial status. Education reduced migraine frequency and improved quality of life. Effect sizes were small, and contents were heterogeneous. Educational and behavioural approaches can positively influence headache frequency. However, the content, duration and frequency and education formats varied widely. The level of evidence for education and cognitive behavioural therapy as a non-pharmacological intervention for migraine is still low. The protocol for the systematic review was registered in the database PROSPERO (PROSPERO 2019 CRD42019134463) prior to the data collection.

Keywords Migraine · Education · Behavioural Therapy · Headache Frequency · Quality of Life

Background

General recommendations for effective management of chronic pain conditions point towards a multimodal approach including self-management, behavioural treatment and education as the most effective interventions [1]. Patient education is not clearly defined and varies largely in descriptive terms and specific aims. Different professional groups attribute different contents to education. Therefore, different terms are used, such as therapeutic patient education, self-management interventions, cognitive behavioural interventions and biobehavioural training (biofeedback, relaxation training, stress management). The evidence for pain neuroscience education to manage chronic pain, in general, is well accepted by clinicians and researchers, and the intervention is successfully used in, e.g., chronic low back pain populations [2, 3] or fibromyalgia populations [4]. The German

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guideline for low back pain (CLBP) recommends education and cognitive behavioural therapy as the main approach for the management of CLBP [5].

For patients with chronic migraine, national and international guidelines recommend dominantly pharmacological management combining medication for acute symptom management such as triptans and non-steroidal anti-inflammatory drugs with prophylactic drugs. Relaxation exercises, psychological therapy including stress reduction, coping strategies and behavioural therapy, as well as aerobic exercise, are recommended complimentary for the prevention of attacks [6–8]. Behavioural therapies, designed to reduce migraine frequency and enhance the quality of life, encourage patients to participate actively in their treatment and to employ self-management strategies, but evidence for their effectiveness is conflicting [9, 10].

According to the World Health Organisation, patient education is provided by health care professionals trained in the education of patients to enhance knowledge about treatment options and to train patients in self-management skills, in adapting the treatment to their specific chronic disease and in coping abilities and processes [11]. For migraine, this includes, e.g., changing maladaptive behaviours and catastrophizing thoughts, which might contribute to headache impact and pain intensity [9].

Research on biobehavioural treatment shows beneficial effects on disability and migraine-specific quality of life, indicating that better migraine self-management will consequently result in reduced migraine frequency and decreased overall drug consumption [9]. Recently, two systematic reviews by Raggi et al. [12] and Probyn et al. [3] reported positive effects of therapeutic patient education (TPE) and other behavioural treatments on the pain and disability of headache patients. However, the inclusion and exclusion criteria of the two reviews focussed on all types of headaches. The overall evidence for patient education to specifically manage migraine symptoms is unclear, especially regarding the contents that should be provided and the format, e.g., duration and frequency of education sessions.

This review is therefore aiming to provide an overview of the current level of evidence for the content, duration, frequency and effectiveness of education and cognitive

behavioural therapy for the reduction of pain, disability and psychological outcomes of adults with migraine.

Methods

A systematic review was conducted following the recommendations from the Cochrane Handbook for Systematic Reviews of Interventions and reported according to the criteria of the PRISMA statement [13, 14]. Randomised controlled trials (RCTs) reporting on education or cognitive behavioural therapy (CBT) compared to a control intervention or to any other intervention were selected. Only studies published in English or German language were included.

Participants included in eligible trials had to be 18 years or older and diagnosed with migraine or chronic migraine according to the International Headache Society classification [15, 16]. Headache disorders other than migraine were excluded, but episodic tension-type headache and medication overuse headache were accepted as comorbidities. No restrictions were made for depression and/or anxiety.

RCTs had to focus on an educational or behavioural intervention for migraine. Single interventions, such as biofeedback, progressive muscle relaxation or other relaxation strategies, did not meet the eligibility criteria.

The main outcome measurement was headache frequency. Trials were included if they reported at least one of the following outcome measures: attack frequency per month, pain intensity or duration, drug use, disability, quality of life, depressive symptoms, anxiety, self-efficacy and locus of control. Furthermore, these outcomes had to be reported either for short term (< 3 months), intermediate (between 3 and 12 months), or long-term periods (> 12 months).

Searches in the scientific databases MEDLINE, EMBASE, PsycINFO and CINAHL were limited to publications from the last decade with 01.01.2010 being the first and 29.08.2021 being the final date for publication. An example of a combination of search terms used for Pubmed is presented in Table 1. The search strategy was adapted for each database as necessary. Additional studies were identified by hand searching the literature lists of reviews on the topic and by screening the contents of relevant journals in

Table 1 Exemplary presentation of the search strategy in Pubmed. In consideration of readability, only the American spelling of the terms is provided here

(Headache[Mesh] OR Headache Disorders[Mesh] OR Headache Disorders, Primary[MeSH] OR Migraine Disorders[MeSH] OR migraine OR migraines OR migrainous OR head pain OR head pains) AND (therapeutic OR physical therapy OR physiotherapy) AND (Behavior Therapy[Mesh] OR Desensitization, Psychologic[Mesh] OR Mind–Body Therapies[Mesh] OR Cognitive Therapy[Mesh] OR self care[MeSH] OR behavior therapy OR behavior therapies OR behavioral therapies OR behavioral treatment OR behavioral approach OR behavioral approaches OR neuro feedback OR cognitive therapy OR cognitive therapies OR cognitive behavioral therapy cognitive behavioral treatment OR cognitive behavioral therapies OR cognitive-behavioral interventions OR psychologic desensitization OR neuro feedback OR mind–body therapy OR behavioural training OR self-management OR psychological therapy OR psychological therapies OR psychosocial support OR neuroscience education OR explain pain OR neurobiology OR pain education OR pain science OR education)

the field of headache (Headache Journal, Cephalalgia, Journal of Headache and Pain).

Two researchers screened all studies independently at two stages: title and abstract and at full-text level for those studies passing the first stage. A third reviewer was approached if disagreements were not solved in the discussion. The inter-rater reliability for study selection was assessed using Cohen's kappa coefficient. Results were rated as follows: 0.01–0.20 interpreted as slight agreement, 0.41–0.60 as moderate agreement and 0.81–1.00 as almost perfect or perfect agreement [17]. Outcome data were collected in a predesigned data extraction table by one researcher and controlled for mistakes by the second researcher.

Risk of Bias Assessment

The risk of bias in included studies was evaluated by two researchers independently using the Cochrane risk of bias tool 2.0 [18]. The judgement involved assessing the overall risk of bias as 'low risk', 'high risk' or 'some concerns' with the last category indicating either lack of information or uncertainty about the potential risk of bias. The domains in the risk of bias table were sequence generation (selection bias), allocation sequence concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias) and other potential sources of bias.

Results

The database search resulted in 1059 records. Fourteen studies were included in the data analysis. These reported on 2266 participants, with the majority being female (82,7%). Figure 1 shows the PRISMA flow diagram of the review process. The Cohen's k for agreement at abstract level was 0.93, at full-text level 0.94, which was interpreted as almost perfect agreement.

Table 2 shows the results of the assessment of the risk of bias according to the Risk of Bias Tool 2.0 recommended in the Cochrane Handbook. Three studies were rated with 'low risk', seven were rated with 'some concerns' and four studies reached a high risk of bias. The inter-rater reliability of the methodological quality assessment was high (Cohen's k : 0.94, almost perfect agreement). All discrepancies were solved after discussion.

The characteristics of education are described in Table 3. The content of education interventions varied widely, including explanations about the link between thoughts and feelings, between symptoms and behaviours, thought monitoring and relaxation techniques or cognitive restructuring techniques. Behavioural interventions aimed at improving the lifestyle and stress coping, including pain management

strategies during an attack, stress relief, advice regarding body posture, diet, attitude, physical activity, handling of emotions or dealing with the pathophysiology of migraine, stress physiology, behavioural management skills, identifying prodromal migraine warning signs and triggers, strategies for managing migraine triggers, effective acute drug use and in one study neuroscience-based information was provided.

Professionals performing education were psychotherapists, health psychologists, psychologists or master-level psychology students under the supervision of a clinical psychologist or trained instructor. Only in one study did family doctors or neurologists provide the education.

The duration and frequency of the behavioural approaches varied and ranged from three sessions of 60 min to 5 weeks with up to 12 weekly 2-h classes plus one retreat day of 6 h with additional training at home for 45 min on 5 days per week. Details are listed in Table 3.

Different educational formats were used, varying from brief-guided self-help CBT, books or leaflets or audiotapes to face-to-face sessions in single or group sessions, as well as internet-based approaches including relaxation audios, videos of patient case studies, interactive exercises and homework. All approaches are detailed in Table 3. Education was often accompanied by adjunct treatment: multimodal therapy, aerobic exercise, prophylactic medical therapy, endurance training, meditation, yoga, relaxation techniques, mindfulness, additional techniques focused on body posture and a healthy lifestyle. The control groups included standard medical or clinical care, as well as prophylactic beta-blockers or waiting lists.

There was great variability in outcome measurements across the studies. Outcomes were related to pain, function and disability, to psychosocial status as well as to days lost due to migraine-related disability. Measurement periods ranged from immediate effects up to 16-month follow-up, but most of the studies reported intermediate effects between 3 and 12 months after the intervention.

Results of two newer studies support that online behavioural training (oBT), as well as a waiting list, resulted in improvements in attack frequency, but only oBT increased self-efficacy, internal and external control and reduced triptan use [25, 30]. The 20-month follow-up of one of the studies [31] showed a stronger improvement in attack frequency for participants with more (4–6) attacks per month at baseline. Wells et al. [32] showed no significant results for the reduction of attack frequency, but improved self-efficacy and mindfulness.

Seminowicz et al. [26] demonstrated a greater reduction in headache days from baseline to 20 weeks post-intervention for mindfulness-based stress reduction (MBSR) compared to stress management for headache (SMH). Fifty-two percent of the MBSR group showed a response to treatment



PRISMA 2019 Flow Diagram

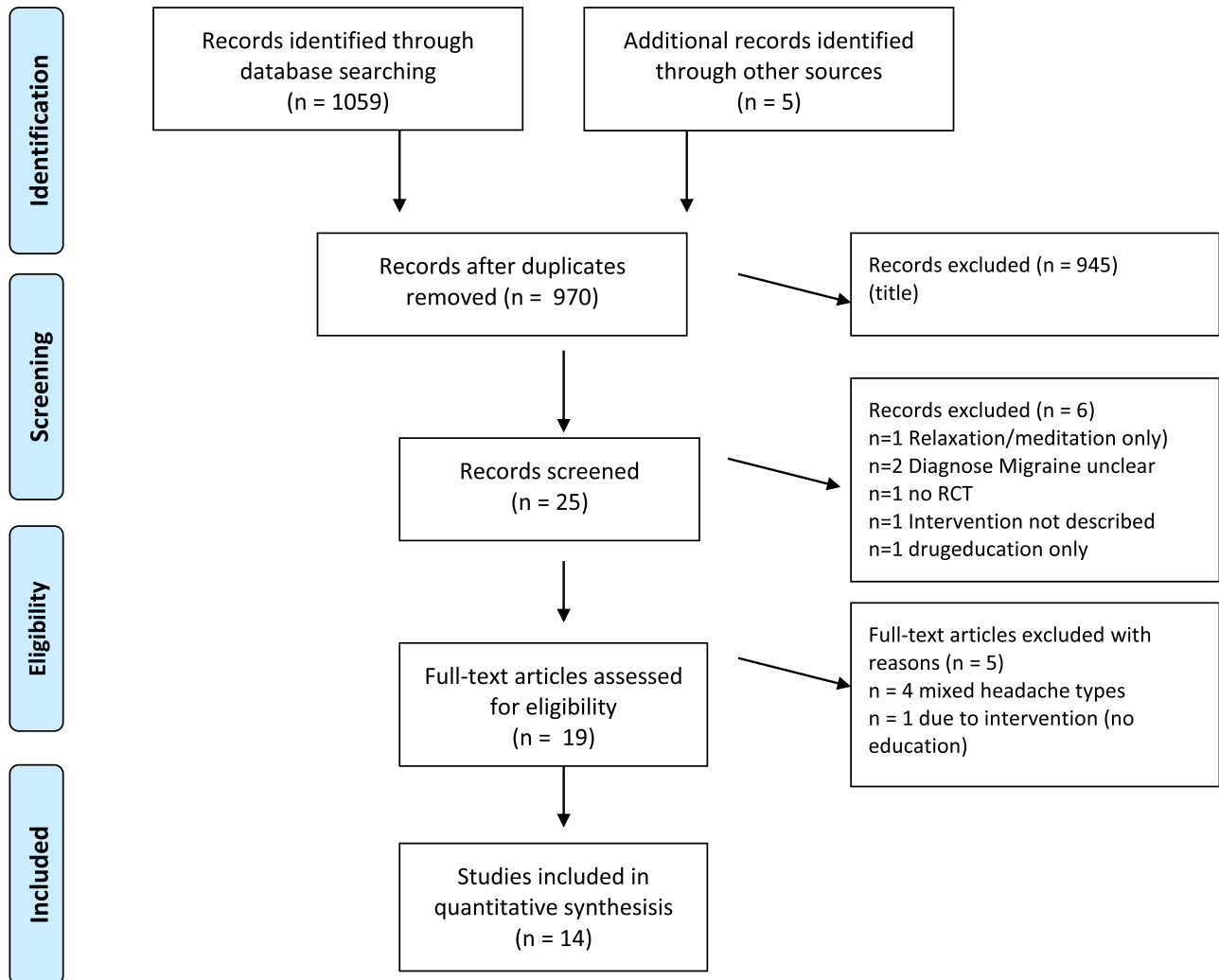


Fig. 1 Prisma flow diagram

(50% reduction in headache days) compared to 23% in the SMH group ($p=0.004$). There were no differences in clinical outcomes at 52 weeks.

In the study by Aguirrazabal et al. [19], 69% of patients ($n=37$) in the intervention group (pain neuroscience education) and 34.6% in the control group ($n=18$) reported reduced migraine-related work disability by at least 50%.

The results of Seng et al. [27] support that behavioural migraine management increases headache self-efficacy and internal locus of control. A secondary analysis of the data [28] found improvements in cognitive and behavioural responses to migraine (depression and catastrophisation),

supporting the results of a web-based intervention designed to increase patient self-efficacy [20]. Simshäuser et al. [29] found that the primary outcome ‘reduction of migraine frequency’ showed no significant group difference, but mindfulness-based stress reduction (MBSR) showed greater improvements in variables related to psychological symptoms, pain self-efficacy and sensory pain perception compared to an education/relaxation group.

Detailed information on the individual interventions can be found in Table 3. In summary, most of the included studies reported a slight positive effect of education and behavioural therapy approaches for the reduction of the migraine

Table 2 Results of the assessment of the risk of bias according to the Risk of Bias Tool 2.0

Author	Year	1.Risk of bias arising from the randomisation process	2.Risk of bias due to deviations from the intended intervention	3. Risk of bias due to missing outcome data	4.Risk of bias in measurement of the outcome	5.Risk of bias in selection of the reported result	Overall risk of bias
Aguirrezabal	2019	low	low	low	low	low	low
Bromberg	2012	some concerns	low	high	low	high	high
Cousins	2015	low	low	low	low	low	low
Hedborg	2012	low	low	low	low	some concerns	some concerns
Hedborg	2011	low	low	low	low	some concerns	some concerns
Holroyd	2010	low	low	low	low	some concerns	some concerns
Kleiboer	2014	low	low	low	low	some concerns	some concerns
Seminowicz	2020	low	low	low	low	some concerns	some concerns
Seng	2014	low	low	some concerns	some concerns	high	high
Seng	2010	low	some concerns	some concerns	some concerns	some concerns	high
Simshäuser	2019	low	low	high	low	low	high
Sorbi	2015	low	some concerns	low	low	some concerns	some concerns
Sorbi	2017	low	some concerns	low	low	some concerns	some concerns
Wells	2014	low	low	low	low	low	low

frequency and improved quality of life of migraine sufferers as well as a decreased overall drug consumption or reduced migraine-related work disability. Data was not pooled in a meta-analysis due to the heterogeneity of outcome measures and intervention types, duration and delivery methods across studies (see Table 3).

Discussion

This systematic review is providing a comprehensive overview of the current evidence for cognitive behavioural therapy and education for patients with migraine. Results confirm the conclusions of a review published seven years earlier by Kindelan-Calvo et al. [9] about therapeutic patient education for migraine. This current review added 9 studies not included by Kindelan-Calvo et al. [9].

Other systematic reviews by Sullivan et al. [33], Harris et al. [34] and Raggi et al. [12] confirmed this overall positive influence of therapeutic patient education and other behavioural treatments and concluded that the compiled evidence supports the efficacy of psychological interventions on migraine. These reviews – in contrast to the current review – did not restrict the inclusion of migraine but included mixed headache types, making it difficult to draw conclusions on the effectiveness and content of migraine-specific education. Furthermore, children and adolescents were also included in previous reviews. The review by Raggi et al. [12] presented no assessment of the methodological quality of included studies. The review by Probyn et al. [3] reported

no effect of education on headache frequency, but only four studies in their review were specifically targeting migraine. In their meta-analysis, Sharpe et al. [10] did not find any evidence that psychological interventions affected migraine frequency or medication usage, migraine-related disability or quality of life in the short term or long term. The authors focussed on psychological types of intervention. Neuroscience content, as in Aguirrazabal [19], was not included.

Two out of these other six reviews on education and behavioural therapy in migraine patients conducted a meta-analysis [9, 10]. All other authors decided against a meta-analysis due to the heterogeneity of content and extent of the interventions, different outcome measures and a low number of studies. Therefore the results of the two meta-analyses should be viewed with caution.

For other chronic pain diseases, such as CLBP, pain neuroscience education has been extensively studied and there is compelling evidence that education addressing the neurophysiology and neurobiology of pain has a positive effect on pain, disability, catastrophisation and physical performance [1, 2]. Previous research already showed some similarities of migraine and CLBP regarding, e.g., the functional connectivity of brain regions which in migraine are equally associated with the pain or salience network [35] as reported for CLBP [36], or behaviourally, altered elements of quantitative sensory testing [37] and reduced tactile acuity [38].

Despite these similarities and the view of migraine as a chronic pain disease, only one of the studies included in this review provided migraine patients with information on the neurophysiology of their pain in a structured or standardised

Table 3 Study approaches, main outcome measures and results

Studies	Format, extend and content of education	Main outcome measures	Results
Aguirrezabal et al. 2019[19]	Five sessions of group education, each lasting 1 h and 45 min including neuroscience-based information (neurophysiology of pain and migraine)	Reducing MIDAS score > 50%, pain intensity, pain duration and medication intake	Days lost due to migraine-related disability decreased by at least 50% in 68.9% ($n=37$) of patients in the intervention group and 34.6% of patients in the control group ($n=18$) ($P<0.001$). The provision of suitable information through a group educational intervention delivered in primary care appears to be effective in preventing migraine attacks
Bromberg et al. 2012[20]	Eight 20-min sessions over a four-week intervention period and five 20-min follow-up sessions during the follow-up period (completing self-assessments, taking lessons, using interactive tools, reading articles (e.g. caffeine and migraines) and using the pain tracker (daily tracking of migraine pain, triggers and medications))	Depression, anxiety, pain catastrophizing, self-Efficacy	Because of data management error, the primary outcomes are not available for analysis and all secondary outcomes are considered as primary. The intervention shows a greater effect on self-efficacy, relaxation, pain catastrophizing and stress symptoms at six months compared to control
Cousins et al. 2015[21]	Three one-hour face-to-face over five weeks including brief-guided self-help CBT (links between thoughts and feelings, symptoms and behaviours, thought monitoring and relaxation techniques)	Number of headache days (28 days)	Pilot study determined nonsignificant headache reduction, but this study was not powered sufficiently to comment on the effectiveness of the treatment
Hedberg et al. 2011[22]	Via internet 53-page multimodal behavioural training programme over six months aiming at improvements in lifestyle and stress coping (stress physiology, physical activity, diet, thought pattern, attitude, handling of emotion)	Migraine frequency, depression and quality of life	A 50% or greater reduction in migraine frequency was found in 42% of participants of the group receiving MBT who statistically were significantly more improved than participants of the control group
Hedberg et al. 2012[23]	Via internet 53-page multimodal behavioural training programme over six months aiming at improvements in lifestyle and stress coping (stress physiology, physical activity, diet, thought pattern, attitude, handling of emotion)	Migraine frequency, number of drug doses and drug efficacy	One major finding was decreased overall drug consumption because of the positive effect of the MBT programme leading to a decreased total number of migraine attacks. MBT also resulted in significantly increased overall drug efficacy
Holroyd et al. 2010[24]	Four clinic visits, three phone contacts during three-month treatment dealing with the pathophysiology of migraine, behavioural management skills, relaxation (stretching, deep breathing, progressive muscle relaxation), homework assignments strategy for managing migraine triggers and effective acute drug use	Decreases in migraines and migraine days	Statistically significant ($p<0.05$) differences in outcomes were shown among the four added treatments. The addition of combined beta-blocker plus behavioural migraine management, but not the addition of beta-blocker alone or behavioural migraine management alone, improved outcomes of optimised acute treatment
Kleitboer et al. 2014[25]	Eight one-hour online lessons of behavioural therapy aiming at migraine self-management (exercises to detect patterns of prodromal features, techniques for bodily self-relaxation, cognitive behavioural self-regulation, techniques focusing on a healthy lifestyle)	Migraine attack frequency	A decrease in migraine attack frequency was found in both conditions without a between-group difference ($p=0.71$), but improvements were not due to online BT; the waitlist control group improved accordingly. Attack frequency had improved significantly in oBT ($-23%$, $ES=0.66$) but also in WLC ($-19%$, $ES=0.52$)

Table 3 (continued)

Studies	Format, extend and content of education	Main outcome measures	Results
Seminowicz et al. 2020[26]	Eight weekly two-hour interventions, then biweekly for another eight weeks. Control: stress management for headache (including the role of stress, other triggers, coping with stress, sleep hygiene, pain education and medications) Intervention: mindfulness-based stress reduction, meditation	Headache frequency/28 days, HIT-6 (headache-related disability), severity	Reduction in headache days from baseline to 20 weeks was greater for MBSR (7.8 to 4.6) than for SMH (7.7 to 6.0) ($P=0.04$). 52% of the MBSR group showed a response to treatment (50% reduction in headache days) compared with 23% in the SMH group ($P=0.004$). Reduction in headache-related disability was greater for MBSR (59.6 to 54.6) than SMH (59.6 to 57.5) ($P=0.02$). There were no differences in clinical outcomes at 52 weeks
Seng et al. 2010[27]	12 modules (relaxation, warning signs and triggers, use of migraine medication, stress management and others) during four monthly clinic visits and applied between sessions through readings (workbook), audiotape lessons, guided home practice	Headache management self-efficacy scale, migraine-specific quality of life questionnaire (secondary analyses only)	Behavioural migraine management over a 12-month evaluation period shows a large and significant increase in headache self-efficacy and internal headache locus of control. In contrast, no clinically meaningful differences between beta-blocker and placebo were observed
Seng et al. 2014[28]	Four monthly visits to the clinic and three telephone contacts during three-month treatment dealing with the pathophysiology of migraine, behavioural management skills, relaxation (stretching, deep breathing, progressive muscle relaxation), homework assignments focus on effective relaxation, identifying prodromal migraine warning signs and triggers, strategy for managing migraine triggers and effective acute drug use	Pain catastrophizing scale, migraine-specific quality of life questionnaire (secondary analyses only)	No follow-up data presented
Simshäuser et al. 2019[29]	Eight weekly sessions of MBSR, education and relaxation programme. Or three sessions within eight weeks each 2,5 h educational elements (pathogenesis, diagnostic criteria, triggering factors, prodromal symptoms) and progressive muscle relaxation by Jacobsen	Attack frequency/30 days, pain-related impairment during a migraine attack (0–3), medication use/month, quality of life	Migraine frequency showed no significant group difference. Compared to the education/relaxation group, the MBSR group showed greater improvements in variables of psychological symptoms, pain self-efficacy and sensory pain perception. Within the MBSR condition, all variables showed significant improvements over the course span with effect sizes ranging from $d=0.37$ to $d=0.81$, apart from the primary outcome
Sorbi et al. 2015[30]	Eight voiceover lessons, four relaxation audios, 26 videos of exemplary patients (follow-up 11 months) including oBT (exercises to detect patterns of premonitory symptoms and triggers of the attack and techniques for physical relaxation and cognitive behavioural self-regulation, time management, reshaping of involuntary thoughts and behavioural habits). Additional techniques focus on body posture and a healthy lifestyle and on handling the pain during an attack	Migraine attack frequency, migraine self-efficacy, locus of control	At timepoint, two attack frequencies had improved significantly in oBT (-23% , $ES=0.66$) but also in WLC (-19% , $ES=0.52$). However, only oBT had sustained effects on migraine self-efficacy and perceived control, which indicates better migraine self-management

Table 3 (continued)

Studies	Format, extend and content of education	Main outcome measures	Results
Sorbi et al. 2017[31]	Eight voiceover lessons, four relaxation audios, 26 videos of exemplary patients, follow-up: 20 months. oBT (exercises to detect patterns of premonitory symptoms and triggers of the attack and techniques for physical relaxation and cognitive behavioural self-regulation, time management, reshaping of involuntary thoughts and behavioural habits). Additional techniques focus on body posture and a healthy lifestyle and on handling the pain during an attack	Migraine attack frequency, migraine self-efficacy, locus of control	The results lend support to the benefits of oBT in frequent episodic migraine. Delayed oBT induced stronger improvements compared to 'watchful waiting' by means of an online headache diary that carefully assessed migraine and medication use; these changes matched those in the group that had directly received oBT, and the effects were observed differentially in the training episodes of the respective groups. In addition, the effects of oBT were durable over 16 months of follow-up
Wells et al. 2014[32]	Eight weekly two-hour classes plus one retreat day of six hours plus guided audio recordings to practice at home for 45 min per day, based on systematic and intensive training in mindfulness meditation and mindful hatha yoga. Mindfulness was cultivated through mindful eating, mindful breathing with sitting and walking meditation, body scan and mindful movement (yoga). Additional information about stress and stress relief, the negative effects of stress reactivity and effective ways of responding positively and proactively in stressful situations and experiences	Change in migraine frequency	Although the small sample size of this pilot trial did not provide power to detect statistically significant changes in migraine frequency or severity, secondary outcomes demonstrated this intervention had a beneficial effect on headache duration, disability, self-efficacy and mindfulness

CBT, cognitive behavioural therapy; *oBT*, online behavioural therapy; *MBSR*, mindfulness-based stress reduction; *MBT*, multimodal behavioural training; *WLC*, waitlist control; *Hii-6*, headache impact test; *SMH*, stress management for headache; *d*, effect sizes (Cohens)

manner [19]. This study was rated as having a low risk of bias, and the group receiving information on the neurophysiology of migraine benefitted more regarding the reduction of migraine attacks compared to routine medical care, thereby indicating that knowledge from CLBP management might be transferable to chronic migraine populations.

Interestingly, in all studies included in this review, psychologists delivered the treatment, while for patients with CLBP, education is commonly provided by physiotherapists. Since the management of especially chronic pain disorders is usually interprofessional, all health professionals including neurologists, psychologists and physiotherapists should be trained to provide education for chronic migraine patients.

The wide range of durations and frequencies of the intervention, as well as of the delivery methods, does not allow for a conclusive recommendation of the most effective behavioural intervention. Moreover, many different terms and definitions were used for the treatment, such as biobehavioural treatments, therapeutic patient education, neuroscience education, cognitive behavioural therapy or mindfulness-based therapy, making it difficult for patients and researchers to recognise these as similar treatment approaches or to recommend such treatment in guidelines. Despite the different names, most approaches share the general focus on lifestyle modifications such as managing stress factors and implementing exercise or relaxation strategies.

For most of the included studies in this review, education was often provided as an adjunct treatment or part of multimodal therapy, and therefore, the explanatory power of the results is restricted. Evidence for a stand-alone treatment is not yet available for patients with migraine.

Within multimodal pain therapy in a hospital, psychological treatments are mandatory [7, 39], while access to psychological therapies or educational or cognitive behavioural treatment outside of a hospital or day-clinic setting is restricted [40]. Only patients with a specific psychiatric or psychological indication (such as anxiety or depression) are usually referred to such treatments. This is in contrast to the guidelines for CLBP, where educational and behavioural approaches are recommended to be included as soon as possible [2, 5].

Clinical Implications

This systematic review revealed, in line with previous reports, some evidence for a positive effect of educational or biobehavioural treatments to decrease headache frequency and disability and to improve self-efficacy and the quality of life in adults with migraine. Therefore, behavioural therapy approaches, especially offered by a multidisciplinary team of specialists in the field of chronic pain management, should be included in any treatment and be accessible to all migraine patients. Besides psychologists

providing behavioural treatment, neurologists and physical therapists specialised in the treatment of chronic pain and chronic migraine can provide education and are easier to access for the patients.

Implication for Research

Even though the effectiveness of behavioural approaches is scientifically proven, the content and extent of education are not defined and have to be investigated. Education should include approaches to help patients understand their symptoms from a neurophysiological point of view. It should be investigated whether the evidence of education from other chronic pain syndromes such as CLBP are applicable for chronic migraine. More randomised controlled trials investigating the efficacy of education alone without adjunct treatments are required to disentangle the effects of the various approaches.

Author Contribution RM and AS searched, excluded or included and rated the quality of the studies. All three authors interpreted the results and contributed to the writing process. All authors read and approved the final manuscript.

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Data Availability All data generated or analysed during this study are included in this published article and its supplementary information files.

Code Availability Not applicable.

Declarations

Ethics Approval Not applicable.

Consent to Participate As no patients were included in this present study, no informed consent was necessary. All studies included in this review stated that informed consent was obtained. Thus, the standards of good scientific practice were met.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests. There are no amendments between protocol and review (PROSPERO 2019 CRD42019134463) available from https://www.crd.york.ac.uk/prosp/ero/display_record.php?RecordID=134463.

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