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Medical hypnosis for migraine management: A systematic review

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ABSTRACT

Background: Migraine, a highly prevalent and disabling condition affecting over one billion people worldwide, poses significant socio-economic challenges, including reduced quality of life, impaired mental health, and decreased productivity. While pharmacological treatments exist, their limitations drive interest in complementary approaches such as medical hypnosis, proven effective in chronic pain management. This systematic review, registered on PROSPERO (ID: CRD42024509302), evaluates the scientific evidence supporting hypnosis for migraine treatment.

Methods: Following PRISMA guidelines, a comprehensive search was conducted in PubMed, MEDLINE, EMBASE, Cochrane Reviews, and PsycINFO. Inclusion criteria encompassed randomized controlled or quasi-experimental studies on adult migraine sufferers using hypnosis as a standalone intervention.

Results: Nine studies involving 406 participants were analyzed, though a meta-analysis was precluded by the heterogeneity of study designs, populations, and outcome measures. Control conditions varied, including standard care and medication, while outcomes assessed ranged from migraine frequency and severity to psychological factors and medication use. The included studies employed two primary hypnosis techniques: to enhance internal resources and mental imagery, with some combining both. Results consistently demonstrated hypnosis's effectiveness in reducing migraine symptoms, often outperforming other non-pharmacological interventions with fewer resources required. However, significant methodological limitations were noted, including inadequate sample descriptions and lack of statistical power calculations.

Discussion: This review underscores the potential of hypnosis in migraine management but highlights the need for rigorous research to address methodological gaps and refine intervention strategies. Recommendations for future studies are proposed, as further studies are needed to fill methodological gaps and deepen understanding of its role in migraine management.

1. Introduction

1.1. Migraine

Migraine is a chronic, paroxysmal neurovascular condition[1] that can be categorized into two conditions with aura (temporary and reversible neurological symptoms before or during a migraine) and without aura; both episodic with migraine attacks.[2] Migraine is considered a neurological disorder involving abnormal hyperexcitability of the central nervous system.[3] Migraine is one of the world's most common and

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disabling conditions[1] and affects women three times more than men.[4] The burden of migraine is exacerbated by its frequent comorbidity with other disorders (e.g., depression, asthma, obesity, stroke, chronic pain, epilepsy, endometriosis).[5–9] The consequences are multiple for quality of life, with impacts in the physical, psychological, social, and economic domains.[10,11]

1.2. Treatment and management

Migraine management is complex with both pharmacological and non-pharmacological approaches being designed to prevent migraine attacks and/or relieve its symptoms.[2,12]

Pharmacological treatments, whether acute or preventive, are the most common.[13] The development of several pharmacological treatments targeting neuropathological processes has been increasing but several challenges remain to be addressed.[14] Indeed, these treatments should be taken with caution considering their limited efficacy,[13] failure to meet patients' needs, numerous side effects (e.g., medication overuse headache)[2,13,15] and limited results with poor tolerance.[16,17]

Examples of complementary treatments for migraines are neuromodulation and bio-behavioral therapies (i.e., cognitive-behavioral therapies, biofeedback, and relaxation).[18] Other methods such as acupuncture, dietary approaches, and physiotherapy have shown mixed results regarding their efficacy in migraines.[2,5,19] Some migraine sufferers choose those treatments because they do not benefit from conventional medication, have contraindications, or simply prefer complementary treatments more in line with their values and beliefs.[20] These treatments are generally considered safe with few side effects, though potential adverse effects may be underreported or not fully understood.[19]

1.3. Medical hypnosis

Medical hypnosis is a psychological technique defined as "*a state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion*".[21] It has shown efficacy in reducing acute and chronic pain,[22–28] and has been reported as a preventive treatment for migraines.[29] It enables patients to regain control of their symptoms.[30]

Several studies have explored the efficacy of hypnosis as a treatment for headaches and migraines, with positive results on symptom and pain reduction.[31–34] Four identified literature reviews suggested that hypnosis would be a well-established, effective, and specific treatment for headaches,[22] more specifically for the treatment of migraines.[30] It appears to be more effective than no treatment[35] and may relieve migraine symptoms in the short and long term.[36]

Although hypnosis has shown promising effects in treating migraines and headaches, few literature reviews or meta-analyses have been conducted.[22,30,35,36] This systematic review aimed to report the effects of medical hypnosis interventions on different characteristics of migraines (e.g., duration, frequency) in an adult population, in comparison with other interventions (e.g., pharmacology, non-pharmacology interventions). This review discusses its effectiveness and limitations and make recommendations for future studies.

2. Methods

2.1. Protocol and registration

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to report the results of this systematic review.[37] Detailed PRISMA checklists are presented in the Supplementary Material. The study was registered on PROSPERO (CRD42024509302). As this review was carried out using previously published literature, no patient consent and/or ethical approval was required for its completion. Each stage of analysis (study selection, study screening, and data extraction) was carried out separately and independently by two reviewers (EC, AC). Where conflicts and/or conceptual issues arose, discussions were held with two other co-authors and supervisors (DO, ML). Studies included in this systematic review had to meet inclusion criteria relating to participants, interventions, study designs, and variables examined (see Table 1). Due to the limited number of included studies and the heterogeneity in study population, hypnotic interventions, and outcome measures, no meta-analysis was performed.

2.2. Study selection and criteria for study inclusion

Two librarians were consulted to develop a strategy for searching scientific literature. The search was carried out on February 1, 2024, using major electronic databases including PubMed, MEDLINE, EMBASE, EBM Reviews - Cochrane Database of Systematic Reviews, PsycINFO. The specific search terms were related to hypnosis and headaches and an example of keywords researched is presented in Table 2.

Case studies and articles not written in French or English were excluded. The data extraction process followed the steps described below. The two librarians independently searched the various databases selected. Detailed information about the research strategy is presented in Supplementary Material. The results were then extracted into EndNote software.[38] The reference file was then download into covidence,[39] a software package for selecting articles for systematic reviews. Two authors (EC, AC) independently selected article titles and abstracts using the Covidence platform. The articles were then read in full and included according to the selection criteria. Following the final selection of studies, the four literature reviews on the topic of hypnosis as a treatment for headaches were consulted to ensure that no relevant studies on the treatment of migraines with hypnosis had been omitted from the literature search.[22,30,35,36] The article was translated from French to English using ChatGPT[40] and subsequently reviewed by the authors (DO, ML, EC) for accuracy. Included studies' results were summarized in tables to visually display results. Given that no meta-analysis could be performed, a narrative synthesis of results from included studies was performed, distinguishing statistical significance and effect sizes (reported in the studies or computed using an online tool[41] by a co-author (VF). The results were then divided into two main sections: Hypnosis treatments for migraines; and Effects of hypnosis interventions on migraines, to allow a clear and structured presentation that distinguishes between how hypnosis is used as a treatment method for migraines, and the observed outcomes of these interventions. Additional information about study selection is available in Supplementary Material (e.g., full text of included studies).

2.3. Risk of bias assessment

Risk of bias assessment was evaluated differently for randomized controlled trials and non-randomized controlled trials. For RCTs, the

Table 1
Eligibility criteria for studies included in the systematic review.

	Criteria
Participants	18 years of age or older and suffer from migraines
Interventions	Involved the use of hypnosis. Studies combining hypnosis with other interventions (e.g., autogenetic training, biofeedback) in the same intervention were excluded.
Study design	Randomized controlled trial (RCT) design comparing a group receiving the hypnosis intervention with one or more other control groups or groups receiving other migraine treatments; or a quasi-experimental design of pre-post (PP) types.
Outcomes	Inclusive and non-restrictive. Examples of outcomes that could be included: pain, anxiety, migraine frequency, intensity and/or duration, and level of migraine-related disability.

Table 2
Example of keywords searched in the databases for the systematic review (e.g. PubMed).

Targets	Keywords
Hypnosis	« Hypnosis» [Mesh] OU Hypnosis[TIAB] OU Hypnotism[TIAB] OU Hypnotherap*[TIAB] OU Hypnoanal*[TIAB] OU Hypnotizability [TIAB] OU Hypnotisability[TIAB] OU Self-hypnosis[TIAB] OU Autohypnosis[TIAB] OU auto-hypnosis[TIAB])
(AND)	
Headache	« Headache » [Mesh] OU «Headache Disorders» [Mesh] OU headache* [TIAB] OU migraine*[TIAB] OU cephal*[TIAB]

Cochrane Risk-of-bias, version 2 (RoB 2) was used.[49] Five domains of bias are identified: 1) bias arising from the randomization process, 2) bias due to deviation from intended interventions, 3) bias due to missing outcome data, 4) bias in measurement of the outcome, and 5) bias in selection of the reported result. In each study, principal and secondary outcomes can be evaluated in every domain as "low risk of bias," "some concerns," or "high risk of bias."

For non-RCTs, the Risk of Bias In Non-randomized Studies of Interventions, version 2, was used (ROBINS-I V2 is an update of ROBINS-I that wasn't referenced yet[50]). Seven domains of bias are assessed in this tool: 1) bias due to confounding, 2) bias in classification of interventions, 3) bias in selection of participants into the study, 4) bias due to deviations from intended interventions, 5) bias due to missing data, 6) bias in measurement of outcomes, and 7) bias in selection of the reported results. For each study, a general analysis of risk of bias can be evaluated in every domain as "low risk of bias," "some concerns," "high risk of bias" or "critical risk of bias." Guidelines for the RoB 2 and ROBINS-I V2 can be found in Supplementary Material.

Two researchers (EC and VF) assessed independently the risk of bias of each study. In cases of disagreement, the evaluation was discussed among the two evaluators and a co-author (DO) to reach consensus. A general evaluation of risk of bias was computed by following the algorithms suggested by the tool guidelines. The effect of interest is that of assignment to the intervention(s), irrespective of the degree to which participants actually received the intervention during follow-up.

3. Results

3.1. Selection process

From the 1082 studies selected in the databases and from the inclusion criteria, 9 studies published between 1974 and 2023 were included in this review.[12,17,42–48] Three studies did not report enough information to know the characteristics of their post-attrition samples,[42,45,48] so only their pre-attrition data were used in this review. A total of 406 participants were included in this review (studies with pre-attrition data: n = 159; studies with post-attrition data: n = 247) (see Fig. 1).

3.2. Risk of bias in studies

The outcomes for the risk of bias assessment were selected following article screening, given the limited number of included studies and the variability in outcome reporting across trials. Severity, intensity, and frequency of migraines were retained as the primary outcome, as they were assessed in all six RCTs. Medication intake was retained as secondary outcomes, reported in three of the six RCT.[42,45,48] For the primary outcome, this assessment led to the identification of two studies at low risk of bias,[17,42] one with some concerns regarding this risk,[45] and three with a high risk of bias.[46–48] Missing outcome data was the most common source of bias. For the secondary outcome, the analysis identified one study at low risk of bias,[42] one with some concerns regarding this risk,[45] and one with a high risk of bias.[48]

Unlike RoB2, which evaluates bias at the outcome level, ROBINS-I V2 assesses methodological quality at the study level. Accordingly, findings from non-randomized studies should be interpreted in light of

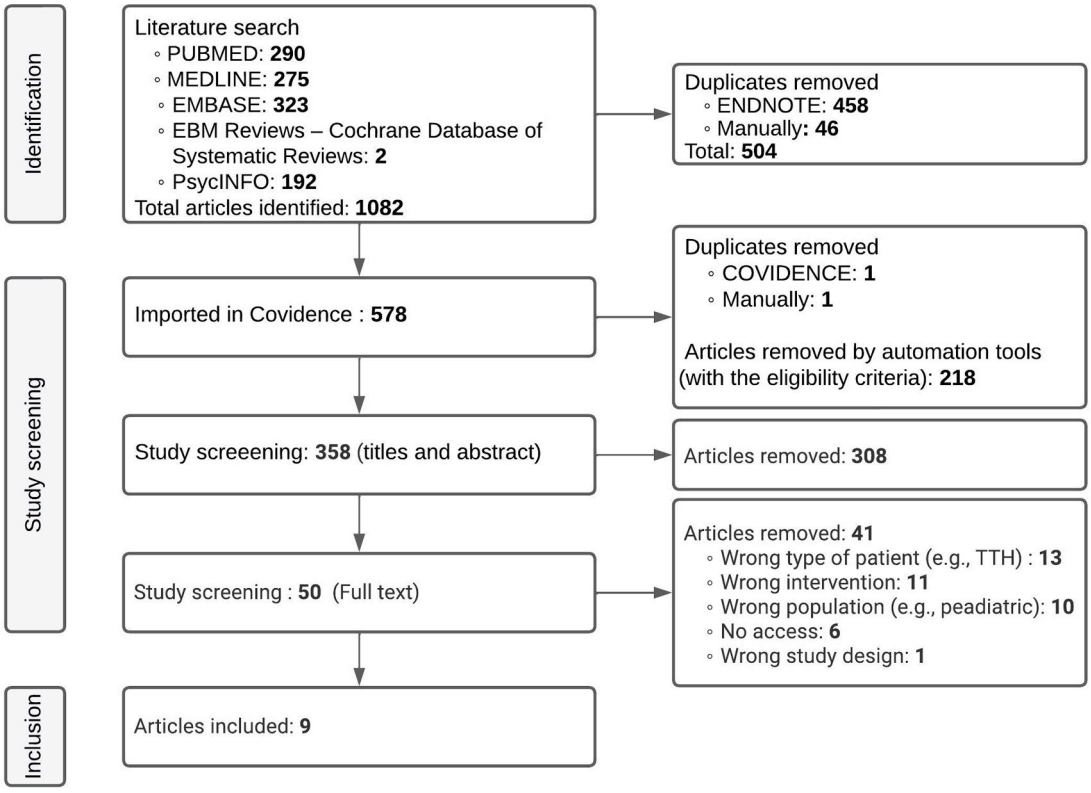

Fig. 1. Flowchart of systematic literature review.

their overall methodological quality, as detailed below, rather than on an outcome-specific basis. One non-RCT study was evaluated at high risk of bias[12] and two studies at critical risk of bias.[43,44]

The comprehensive assessment of the risk of bias is presented in Table 3. An inter-rater agreement of 92% was achieved. Detailed information regarding the evaluation of all domains and subdomains is presented in Supplementary Material.

To comprehensively document the effects of medical hypnosis on migraine characteristics across a range of comparators, consistent with the overarching aim of this review, four additional outcomes, Duration of migraines and/or their symptoms, Migraine-related disability, Pain and Remission, were synthesized narratively. Given the limited number of studies reporting these outcomes, findings should be interpreted with caution, as formal methodological appraisal was not feasible.

3.3. Samples description

Sample sizes ranged from 23 to 90 participants. Studies used various control groups (specific or usual medication, acupuncture, biofeedback, biofeedback training for alpha enhancement, autogenic training, thermal imagery, relaxation, no treatment). Two studies did not mention the age of their participants.[46,47] In the other studies, the mean age of participants was 40.17 (SD 7.63), and ranged from 33 to 59 years old. One study did not mention the gender of its participants (n = 47).[47] The other studies included a majority of females (studies with pre-attrition data: n = 163; studies with post-attrition data n = 134) and a minority of males (studies with pre-attrition data: n = 37; studies with post-attrition data n = 25). Further details on study characteristics can be found in Table 4.

3.4. Hypnosis treatments for migraines

3.4.1. Migraine measurements

All studies used several questionnaires and measurement tools as primary and secondary outcomes. Severity, intensity and/or frequency are the migraine characteristics measured in the largest number of

Table 3
Appraisal of the quality of studies using RoB 2, using two main outcomes for the analysis of risk of bias, and ROBINS-I v2 tools (colors needed), using overall analysis of risk of bias.

A. *Severity, intensity and frequency of migraines.*

Tools	Studies	Domains					
RoB2	**RCTs**	**D1**	**D2**	**D3**	**D4**	**D5**	**Overall**
	Anderson et al., 1975						
	Khazraee et al., 2023						
	Andreychuck et al., 1975						
	Flynn, 2019						
	Friedman et Taub, 1984						
	Graham, 1974						

B. *Medication intake.*

Tools	Studies	Domains					
RoB2	**RCTs**	**D1**	**D2**	**D3**	**D4**	**D5**	**Overall**
	Flynn, 2019						
	Friedman et Taub, 1984						
	Graham, 1974						

C. *Overall analysis of risk of bias.*

ROBINS	NRSI	D1	D2	D3	D4	D5	D6	D7	Overall
	Matthews et Flatt, 1999								
	Emmerson et Trexler., 1999								
	Tastan, 2018								

Legend Table 3.
Level of risk Low risk of bias, Moderate risk of bias, Serious risk of bias, Critical risk of bias.

Abbreviations RCTs, randomized controlled trials; NRSI, non-randomized studies of interventions.

Table 4
Principal characteristics of articles included in the systematic review (n = 9).

Authors, Year	Study Design	Sample Size † n post-attrition; n pre-attrition (¥)	Groups	Average Age Years	Sex	Measures	Principal Outcomes Hypnosis vs other conditions
Khazraee et al.[17]	RCT	34	1) Hypnosis + usual medication (n = 18); 2) Usual medication (n = 16).	35.1 (SD 11.06)	34 W.	1) Psychological Inflexibility (PIPS); 2) Chronic Pain Acceptance (CPAQ-R); 3) Headache Disability (HDI); 4) Frequence and intensity of migraine; 5) Pain level (SF-MPQ-2).	1) Hypnosis < Usual medication (d=0.487, p < 0.001*); 2) Hypnosis > Usual medication (d=0.663, p < 0.001*); 3) Hypnosis < Usual medication (d=0.676, p < 0.001*); 4) Hypnosis < Usual medication (Frequency: d= 0.670, p < 0.001*; Intensity: d=0.609, p < 0.001*); 5) Hypnosis < Usual medication (d=0.626, p < 0.001*).
Tastan et al.[12]	Non-randomized controlled trial	90	1) Acupuncture (n = 30); 2) Hypnosis (n = 30); 3) Medication (acetaminophen) (n = 30).	33.0 (SD 6.9)	64 W; 26 M.	1) Pain level (VAS); 2) Migraine Disability (MIDAS).	1) 3rd month: Hypnosis < Medication (p < 0.001*); 2) 1st month: No * difference between groups (p = 0.256); 3rd month: Hypnosis < Medication (p = 0.002*).
Flynn[42] ¥	Pre-pilot study (n = 15); Pilot study (n = 5); RCT (n = 40)	¥ 40	1) Hypnosis + usual medication (n = 22); 2) Waiting list + usual medication (n = 18).	¥ 40–59	¥ 35 W; 5 M.	1) Headache Disability (HDI); 2) Pain Catastrophizing (PCS); 3) Frequence, duration severity of migraine; 4) Medication intake (MIS).	1) Hypnosis < Waiting list (1 month 1/2: p = 0.012*; 3rd month: p < 0.001*); 2) Hypnosis < Waiting list (1 month 1/2: p = 0.013*; 3rd month: p < 0.001*); 3) *Frequency*. No * difference between groups (p = 0.343) but large and small effect sizes at 1 month ½ (d=0.79) and 3 month (d=0.19); *Duration*. Hypnosis < Waiting list (p = 0.016*) with a large effect size at 1 month ½ (d=0.92) and 3 month (d=0.54); *Severity*. No * difference between groups, No size effect (qualitative measure); 4) No * difference between groups, but small effect sizes at 1month ½ (d=0.22) and 3 month (d=0.11).
Matthews et Flatt[43]	PP	23	Hypnosis (n = 23)	52.04 (SD 9.58)	22 W; 1 M.	Headache journal including: Amount of hours/day with migraines, with vomiting, with nausea; with tingling; with post-headache fatigue; with any other symptoms determined by the participant. Total score = Severity of migraine	Amount of hours/day with migraines post treatment < Pretreatment (p = 0.0257*), Amount of hours/day with vomiting post treatment < Pretreatment (p = 0.5877), Amount of hours/day with nausea post treatment < Pretreatment (p = 0.0656), Amount of hours/day with tingling post treatment < Pretreatment (p = 0.1329), Amount of hours/day with post-headache fatigue post treatment < Pretreatment (p = 0.1245), Amount of hours/day with any other symptoms post treatment < Pretreatment (p = 0.007*); Severity post treatment < Pretreatment (p = 0.00498*).
Emmerson et Trexler[44]	PP	25	Hypnosis (n = 25)	51	19 W; 6 M.	1) Duration of migraine; 2) Frequency of migraine; 3) Severity of migraine; 4) Medication intake.	1) Duration post treatment < Pretreatment (t(24) = 5.74, p < 0.0005*); 2) Frequency post treatment < Pretreatment (t(24) = 3.86, p < 0.001*); 3) Severity post treatment < Pretreatment (t(24) = 5.71, p < 0.0005*); 4) Medication intake post treatment < Pretreatment (t(12) = 9.43, p < 0.0005*).
Friedman et Taub[45] ¥	Semi RCT	¥ 76	¥ 1) High hypnotic susceptibility without	¥ 38.2	¥ 63 W; 13 M.	1) Intensity of migraine (HHI); 2) Frequency of migraine (HQ); 3) Medication intake (RMU).	1) Intensity post treatment < Pretreatment (p < 0.001*), No * difference between groups at first 6 and

(*continued on next page*)

Table 4 (*continued*)

Authors, Year	Study Design	Sample Size † n post-attrition; n pre-attrition (¥)	Groups	Average Age Years	Sex	Measures	Principal Outcomes Hypnosis vs other conditions
			thermal imaging (n = 11); 2) Low hypnotic susceptibility without thermal imaging (n = 10); 3) High hypnotic susceptibility with thermal imaging (n = 12); 4) Low hypnotic susceptibility with thermal imaging (n = 10); 5) Biofeedback + Autogenetic training (n = 12); 6) Relaxation (n = 11); 7) Waiting list (n = 10).				last 6 months: Highly hypnotisable groups < low hypnotisable groups ($p < 0.01$*); 2) Frequency post treatment < Pretreatment ($p < 0.01$*), No * difference between groups; at first 6 and last 6 months: Highly hypnotisable groups < low hypnotisable groups ($p < 0.0$*); 3) Medication intake post treatment < Pretreatment ($p < 0.001$*), * difference between groups ($p = 0.05$*), No * difference between Highly hypnotisable groups and low hypnotisable groups.
Andreychuk et Skiver[46]	RCT	28	1) Hypnosis (n = 10); 2) Biofeedback (n = 9); 3) Biofeedback training for alpha enhancement (n = 9).	UN	24 W; 4 M.	1) Headache journal (including duration and intensity of migraine) to calculate severity (HI); 2) Personality (MMPI).	1) No * difference between groups, Intensity post treatment < Pretreatment ($t = 2.87$; $p = 0.025$*), Highly hypotisable < low hypnotisable people ($p < 0.05$*); 2) No correlation between intensity of migraine and personality.
Anderson et al.[47]	RCT	47	1) Hypnosis (n = 23); 2) Medication (prochlorperarine) (n = 24).	UN	UN	1) Frequency (Number of migraine attacks/month); 2) Intensity (Number of Grade 4 attacks); 3) Remission (Number of patients without migraine attacks).	1) Frequency post treatment < Pretreatment ($p < 0.0005$*); Hypnosis < Medication ($p = 0.005$*); 2) Hypnosis < Medication ($p = 0.0226$*); 3) Hypnosis < Medication ($p = 0.039$*).
Graham[48] ¥	RCT	¥ 40	¥ 1. Hypnosis (n = 10); 2. Hypnosis + biofeedback (n = 10); 3. Biofeedback (n = 10); 4. No treatment (n = 10).	¥ 41.15	¥ 34 W; 6 M.	1) Duration of migraine; 2) Frequency of migraine; 3) Medication intake.	1) No * difference between groups, Duration post treatment < Pretreatment ($t = 4.118$, df=58, $p < 0.002$*); 2) No * difference between groups, Frequency post treatment < Pretreatment ($t = 2.979$, df=58, $p < 0.01$*); 3) For pretreatment medication intake only: No * difference between groups, Medication post treatment < Pretreatment ($t = 3.097$, df=58, $p < 0.01$*); 52% reduction in average medication intake for Hypnosis group (after follow-up); Group biofeedback +hypnosis doesn't have better results than Hypnosis or Biofeedback groups.

Legend
RCT: Randomized Control Trials; Semi RCT: Study that mentioned the randomization of its control groups, but not for the distribution of its different hypnosis groups; PP: pre-post; ¥: pre-attrition data (due to lack of specific post-attrition data); UN: unavailable; SD: standard deviation; W: Women, M: Men; *: significant results. PIPS: Psychological Inflexibility Pain Scale; CPAQ-R: Chronic Pain Acceptance Questionnaire Revised; HDI: Headache Disability Inventory; SF-MPQ-2: Short-Form McGill Pain Questionnaire; PCS: Pain Catastrophizing Scale; MIS: Medication Index Score; VAS: The Visual Analog Scale; MIDAS: Migraine Disability Assessment; HHI: Peak Headache Intensity; HQ: Number of headaches per quarter; RMU: Relief Medication Units (a value of 3 RMU to each ergotamine pill, 2 to narcotic pills, and 1 to common analgesics); HI: Headache Index; MMPI: Minnesota Multiphasic Personality Inventory; Grade 4 attacks: blinding, totally incapacitating migraine attacks.
†See Supplementary Material for all inclusion and exclusion criteria.

studies (n = 8). Other measures include migraine duration and/or their symptoms, medication intake, psychological aspects, migraine-related disability, pain and remission (see Table 5).

3.4.2. *Hypnosis interventions*

There is considerable heterogeneity of intervention using hypnosis and/or self-hypnosis across studies (see Table 6). All studies have baseline migraine symptom measurement periods ranging from 2 to 24 weeks pre-intervention. Two studies did not mention the length of their baseline period.[12,17] Interventions ranged from 3 to 21 sessions in total, with 1–7 sessions per week, and 1–12 days between each session. Two studies gave no information on the number of hypnosis sessions.[44,48] The duration of hypnosis sessions, reported only in 4 studies, ranged from 3 to 60 min, with a median of 45 min. Treatments lasted between 3 and 12 weeks. One study reported no information on the subject.[48] Six studies had a follow-up period (ranging from 4 to 52 weeks post-intervention) to

Table 5
Migraine measures and questionnaires used in the studies.

Types of measures	Questionnaires	Study	n
Severity, intensity, frequency of migraines	Highest Headache Intensity (HHI) Number of Headache Quarter/ week (HQ) In-house questionnaires (e.g., headache diaries)	Anderson et al.[47] Andreychuk et Skriver[46] Emmerson et Trexler[44] Flynn[42] Friedman et Taub[45] Graham[48] Matthews et Flatt[43] Khazraee et al.[17]	8
Duration of migraines and/or their symptoms	In-house questionnaires on migraine duration (e.g., headache diaries) and/or migraine-related symptoms (e.g., nausea, vomiting)	Emmerson et Trexler[44] Flynn[42] Graham[48] Matthews et Flatt[43]	4
Medication intake	Medication Index Score (MIS); Relief Medication Units (RMU)	Emmerson et Trexler[44] Flynn[42] Friedman et Taub[45] Graham[48]	4
Migraine-related disability	Headache Disability Inventory (HDI) Migraine Disability Assessment (MIDAS)	Flynn[42] Khazraee et al.[17] Tastan et al.[12]	3
Psychological Factors	Psychological Inflexibility Pain Scale (PIPS) Chronic Pain Acceptance Questionnaire Revised (CPAQ-R) Pain Catastrophizing Scale (PCS)	Flynn[42] Khazraee et al.[17]	2
Pain	Short-Form McGill Pain Questionnaire (SF-MPQ-2) The Visual Analog Scale (VAS)	Khazraee et al.[17] Tastan et al.[12]	2
Remission	Number of remissions (migraine-free patients/month)	Anderson et al.[47]	1

investigate potential long-term effects of the interventions. After the hypnosis intervention, 8 out of 9 studies encouraged self-hypnosis, with 3 studies mentioning the use of self-hypnosis recordings as a tool at home.[42–44] All studies used interventions containing phases of induction, hypnotic suggestion and return to consciousness. The intervention techniques used can be grouped into two broad categories: 1) Enhancement of internal resources; and 2) Mental imagery. Tastan et al.,[12] Flynn[42] and Anderson et al.[47] combine techniques in these two categories. The hypnosis techniques used are detailed in Table 7.

3.5. Effects of hypnosis interventions on migraines

Studies reported the main results of hypnosis interventions on different components of migraines; frequency, intensity, severity (main outcome), medication intake (secondary outcome), psychological factors, migraine-related disability, migraine duration and/or their symptoms, pain, and remission. Given the heterogeneity in study designs, results from RCTs and non-randomized studies are presented separately within each outcome to allow for appropriate interpretation of certainty of evidence. To enhance clarity in the absence of a meta-analysis, results are organized around core migraine outcomes, with consistent reporting of comparators and direction of effects (between-group vs within-group differences). Additional outcomes with insufficient data for formal appraisal are synthesized narratively thereafter.

3.5.1. Primary outcome: frequency, intensity and severity of migraines

In terms of migraine frequency, three studies reported no significant differences between hypnosis and control group.[42,45,48] In contrast, 4 studies reported significant reductions between the H group and the control group. Khazraee et al.[17] reported a strong significant reduction in mean frequency ($p < 0.001$; reported size effect (η^2): 0.67) in the H group versus the control group. Two other studies reported the same reduction in mean frequency: Anderson and al., 1975 ($p < 0.0005$; no size effect computed because lack of sufficient data);[48] ($p < 0.01$; computed size effect (Hedge's g): $g = 1.18$). One additional non-RCT study reported similar findings[44] ($p = 0.001$; computed size effect (Hedge's g): $g = 0.24$). Although no significant difference between groups was found in their study, Friedman and Taub[45] highlighted a significant intra-subject reduction in the frequency of migraine following the H intervention ($p < 0.01$), and a significantly lower frequency of migraine ($p < 0.01$; no size effect computed because lack of sufficient data) in the high hypnosis-susceptible groups compared with the low hypnosis-susceptible groups between the first 6 months and the last 6 months of the intervention. According to this study, the low-hypnosis groups experienced a slight increase in migraine frequency between months 9 and 12.

Overall, results regarding migraine frequency were mixed across trials. While several studies reported significant between-group reductions favoring hypnosis, others found no superiority over comparator interventions, and some effects were limited to Within-group

Table 6
Characteristics of medical hypnosis interventions included in the systematic review (n = 9).

Authors, Year	Baseline Period Weeks	Number of sessions; Number of sessions / weeks; Number of days between sessions	Duration of Sessions Minutes	Duration of Treatment Weeks	Follow-up Weeks post-intervention
Khazraee et al.[17]	Yes, but unspecified	9; 1; 7	60	9	None
Tastan et al.[12]	Yes, but unspecified	20; 2; Δ	45	10	None
Flynn[42]	2	12; 3; Δ	UN	4	6
Matthews et Flatt [43]	16	21; 7; 1	UN	3	During 15
Emmerson et Trexler[44]	12	UN	UN	12	12
Friedman et Taub[45]	3	3; 1; 7	3–5	3	3 follow-ups: 25–27 (6 months), 36–40 (9 months) and 50–52 (1 year)
Andreychuk et Skiver[46]	6	10; 1; 7	45	10	None
Anderson et al.[47]	24	6; Δ; 10–12	UN	10	1 follow-up: Δ
Graham[48]	4	UN	UN	UN	4

Legend
UN: unavailable; Δ: variable.

Table 7
Hypnosis techniques for migraine management.

Types of techniques	Study	Description
Reinforced self-esteem	Andreychuk et Skriver[46]	Relaxation-oriented hypnotic suggestions to help cope with pain.
	Khazraee et al.[17]	A mindfulness-based hypnotic therapy technique in which suggestions focus on non-judgmental awareness of the present moment, acceptance of pain, difficult thoughts and emotions, compassion for self and others, and resilience in the face of stressful situations.
	Matthews et Flatt[43]	Technique to help manage inner conflict and reduce pain.
Mental imagery	Emmerson et al.[44]	Relaxation mental imagery technique to take the patient to a pleasant place and imagine using a cooling helmet.
	Graham[48]	Thermal imagery in which patients are asked to visualize their hands warming up. According to this study, given the reported causality between the expansion of the arteries in the head and the onset of migraines, redirecting the flow of blood from the head to the hands (by increasing their temperature and widening their arteries) and narrowing the arteries in the head could prove beneficial to migraine management.
	Friedman et al.[45]	A thermal visual imagery technique in which the patient is asked to imagine his or her hand in boiling water and feel the intense heat that emerges.
Combination of self-esteem and mental imagery techniques	Anderson et al.[47]	A first ego-strengthening technique focusing on hypnotic suggestions on reducing tension, anxiety and apprehension. It also seeks to improve alertness, determination and persistent behaviors, less dependent and affected by migraine. The second technique involves suggestions focused on visualizing the narrowing of the arteries to restore normal size and comfort. Its rationale focuses on the causation and aggravation of migraines by the tension and enlargement of the head's arteries.
	Flynn[42]	From one hypnosis session to the next, relaxation and self-esteem building techniques alternate with mental imagery: 1*) Living Life to the Fullest* aims to reduce stress, boost self-confidence and increase motivation to engage in more activities; 2) *Reducing Stress and Eliminating Foods Which Trigger Migraine* aims to bring relaxation and identify migraine triggers and their possible substitutes; 3) *Analgesia for Migraine* uses the analogy of a faucet attached to a container of colored liquid that corresponds to discomfort, and that we should seek to empty by opening the faucet; and 4) *Connecting Mind and Body Hypnosis* uses the metaphor of restoring a broken object to inspire hope for a return to health.
	Tastan et al.[12]	Six main self-esteem and visualization techniques alternate throughout the sessions. These techniques use: 1) visualization of a pleasant, relaxing place; 2) visualization of positive energy where healthy cells replace diseased ones; 3) suggestions for regaining control over migraine symptoms of pain and anxiety, peace and comfort; 4) learning self-hypnosis to control migraines when they arrive (i.e., closing the fist by inhaling and exhaling); 5) learning how to restore a broken object to inspire hope for a return to health. 5) post-hypnotic suggestions where patients emerge from sessions more relaxed and able to relax with the help of their breath and; 6) self-esteem building with an emphasis on the notion of ability, mental competence and tenacity to overcome migraines.

improvements.

About migraine intensity, two studies reported a strong significant reduction between the H group and the control group ($p = 0.0226$; no size effect computed because lack of sufficient data,[47] $p < 0.001$; reported size effect (η^2): 0.61[17]). Although Friedman and Taub[45] found no significant difference between their groups in migraine intensity, they reported a significant intra-subject reduction following H intervention ($p < 0.001$). Moreover, the reported intensity is significantly lower ($p < 0.01$) in the high hypnosis-susceptible groups than in the low hypnosis-susceptible groups between the first and last 6 months of the intervention. The low-hypnosis groups reached a steady level in migraine intensity between months 9 and 12.

Taken together, findings suggest potential reductions in migraine intensity associated with hypnosis, although consistent superiority over control interventions was not observed across all trials.

As for migraine severity, Flynn[42] didn't compare the scores of severities statistically as his measurement scale was qualitative. Although Andreychuk and Skriver[46] reported no significant between-group differences, they reported a significant intra-subject improvement in migraine severity following the H intervention, ranging from 33.4% to 38.8% ($p = 0.025$; no size effect computed because lack of sufficient data), with a significantly greater reduction in those highly susceptible to hypnosis compared to those lowly susceptible ($p < 0.05$; no size effect computed because lack of sufficient data). Similarly, in their non-RCT studies, Matthews and Flatt,[43] and Emmerson and Trexler[44] reported a significant intra-subject reduction following H intervention ($p = 0.00498$; $p < 0.0005$; no size effect computed because lack of sufficient data).

Overall, evidence regarding migraine severity remains limited and is largely based on within-group improvements or findings from non-randomized studies.

3.5.2. Secondary outcome: medication intake

Regarding medication intake, Friedman and Taub[45] reported a significantly different reduction between the H group and the control group ($p = 0.05$; no size effect computed because lack of sufficient data). They found no significant difference between their high-hypnotic and low-hypnotic groups in terms of reduction in medication intake over time. In contrast, Flynn[42] found no significant difference between groups. However, a small and non-significant intra-subject reduction in medication use was reported in this study, at 1.5 months (reported size effect (Cohen's d): $d = 0.22$) and 3 months (reported size effect (Cohen's

d): d= 0.11). Graham,[48] while not reporting a significant between-group difference, observed a significant within-group reduction in medication use following the H intervention ($p < 0.01$), with an average reduction of 52%. Similarly, Friedman and Taub[45] reported a significant intra-subject reduction in medication intake following the H intervention ($p < 0.001$). Effect sizes could not be computed for either of these two studies due to insufficient reported data. Finally, in their non-RCT study, Emmerson and Trexler[44] reported comparable findings ($p < 0.0005$), with a large, computed effect size (Hedge's $g = 2.54$).

Overall, evidence regarding medication intake remains heterogeneous, with within-group reduction over time, but limited consistent between-group superiority of hypnosis across randomized trials.

3.5.3. Additional outcomes

3.5.3.1. Psychological factors. Khazraee et al.[17] reported a significantly different mean reduction ($p < 0.001$) in pain avoidance, pain fusion and psychological inflexibility (PIPS) in the hypnosis (H) group versus the control group. This study also reported a significantly different ($p < 0.001$) large increase in pain acceptance, pain willingness and engagement in daily activities (CPAQ-R) in the H group versus the control group (respective reported size effect (η^2): 0.53, 0.33, 0.48). Flynn[42] reported a significantly different reduction in pain catastrophizing (PCS) at 1.5 and 3 months ($p = 0.013$; $p < 0.0001$; respective computed size effect (Hedge's *g*): $g^{1.5}$= 1.03, g^{3}= 1.35) in the H versus the waiting list group. It also observed a significant intra-subject reduction in catastrophization following the hypnosis intervention (computed size effect (Hedge's *g*): $g = 0.38$).

These findings suggest potential beneficial effects of hypnosis on psychological processes related to pain; however, evidence remains limited to a small number of trials.

3.5.3.2. Migraine-related disability. Khazraee et al.[17] reported a large and significantly different reduction ($p < 0.001$) in headache disability (HD) in the H group versus the control group (reported size effect (η^2): 0.68). Flynn[42] similarly reported a significantly different reduction at 1.5 and 3 months ($p = 0.012$; $p < 0.001$; respective computed size effect (Hedge's *g*): $g^{1.5}$= 1.02, g^{3}= 1.61) between the H group and the waiting list ($p < 0.0001$). Tastan et al.[12] reported in their non-RCT study a significantly different reduction in the Migraine Disability Scale (MIDAS) after the 3rd month in the H versus medication group ($p = 0.002$; computed size effect (Hedge's *g*): $g = 0.96$), but no significant difference between the H group and the acupuncture group (computed size effect (Hedge's *g*): $g = 0.11$). This study also reported a significant intra-subject reduction following H's intervention ($p < 0.001$; computed size effect (Hedge's *g*): $g = 1.34$).

Overall, reductions in migraine-related disability appear relatively consistent across studies, although the number of trials remains limited.

3.5.3.3. Migraine duration and/or their symptoms. Flynn[42] reported a significantly different reduction in migraine duration between it's the H group and the control group ($p = 0.016$). This difference tends to diminish over time, with the large effect observable after 1.5 months (reported size effect (Cohen's d): d= 0.92; computed size effect (Cohen's d): d= 0.71) decreasing by 41% 1.5 months later (reported size effect (Cohen's d): d= 0.54). In contrast, Graham[48] reported no significant differences between groups, but a significant intra-subject decrease following H intervention ($p < 0.01$; computed size effect (Cohen's d): d= 1.17). In their non-RCT study, Emmerson and Trexler[44] also agree, reporting a significant intra-subject decrease following H intervention ($p < 0.0005$; computed size effect (Hedge's *g*): *g*= 0.50). Similarly, Matthews and Flatt[43] reported a significant overall reduction in headache duration and associated symptoms ($p = 0.005$; computed size effect (Cohen's d): d= 0.50). However, when analyzed separately, these findings require nuanced interpretation. The study found a significant reduction in headache duration ($p = 0.0257$; computed size effect (Cohen's d): d= 0.65) and unspecified 'other symptoms' ($p = 0.007$; computed size effect (Cohen's d): d= 0.62). Although, when individual symptoms were examined, no significant pre-post differences were detected for vomiting, nausea, tingling, or post-headache tiredness ($p = 0.588$, $p = 0.066$, $p = 0.133$, $p = 0.125$, respectively).

Taken together, evidence for reductions in migraine duration is mixed, with both between-group and within-group improvements reported across studies.

3.5.3.4. Pain. In terms of pain perception, Khazraee et al.[17] reported a significantly different decrease in pain in the H group versus the control group ($p < 0.001$; reported size effect (η^2): 0.63). Similarly, in their non-RCT study, Tastan et al.[12] reported a significantly different decrease ($p < 0.001$; computed size effect (Hedge's *g*): $g = 2.23$) in the H group versus the medication group from 3 months post-intervention. This study also reported a significant intra-subject reduction in pain following the H intervention ($p < 0.001$; computed size effect (Hedge's *g*): $g = 4.22$).

Although based on a limited number of trials, findings suggest potentially meaningful reductions in pain associated with hypnosis.

3.5.3.5. Remission. Finally, Anderson et al.[47] conducted the only study to examine migraine remission following H intervention. They reported significantly greater remission in H intervention than in the control group ($p = 0.039$), with a remission rate of 43.5% versus 12.5% (no size effect computed because of insufficient data).

Given that remission was assessed in only one study, conclusions regarding this outcome remain preliminary.

To facilitate comparison across trials and enhance clarity in the absence of a meta-analysis, Table 8 summarizes the direction of effects across core migraine outcomes.

4. Discussion

This systematic review is the first to our knowledge to examine the effect of hypnosis on migraine in an adult population. The objective of this review was to synthesize the current state of scientific knowledge regarding the different types of possible interventions, evaluate their effectiveness, and the limitations of the studies to provide

Table 8
Direction of effects of hypnosis across core migraine outcomes.

Outcome	RCTs Favoring Hypnosis (Between-Group)	RCTs Showing No Significant Between-Group Difference	Non-RCTs Showing Within-Group Improvement	Overall Consistency
Frequency	3	3	1	Mixed
Intensity	2	1	0	Mixed
Severity	0	2	2	Limited / Mainly within-group
Medication intake	1	3	1	Mixed, mainly within-group
Psychological factors	2	0	0	Promising (few trials)
Migraine-related Disability	2	0	1	Relatively consistent (limited trials)
Duration	1	1	2	Mixed
Pain	1	1	0	Promising (few trials)
Remission	1	0	0	Very limited evidence

recommendations for future research. Nine studies on the subject were selected. The results highlight the great heterogeneity of hypnosis methods and interventions for migraine, the positive effects of hypnosis on many migraine characteristics, and the limitations of studies on the subject. A meta-analysis could not be conducted for various reasons, including insufficient information in the manuscripts, excessive variability in modalities (e.g., type of hypnotic suggestions, outcome measures), inadequate number of studies representing specific modalities, and/or heterogeneity of study samples. As a result, the empirical exploration of positive effects of hypnosis in relation to migraines remains to be further explored, with many aspects still requiring investigation. Recommendations for future studies on the treatment of migraines with hypnosis are proposed.

4.1. Hypnosis techniques used in migraine treatment

The hypnosis techniques used in the various studies can be grouped into two categories. 1) Enhancement of internal resources, including suggestions for: relaxation, mindfulness (i.e., awareness, non-judgment, acceptance of thoughts and pain, compassion and resilience), internal conflict management, ego-reinforcement, reduction of anxiety, stress, apprehension, increased alertness, motivation, determination, engagement in daily activities, mental competence, migraine management capacity and tenacity, migraine symptom control, and comfort. 2) Mental imagery includes suggestions for thermal imagery (i.e., cooling helmet, narrowing of arteries, warming of the hand, having the hand immersed in boiling water), visualization of a tap of discomfort, restoration of a broken object, positive energy replacing diseased cells with healthy ones, and a pleasant place. Suggestions related to hand-warming recurred in 3 studies, however, the impact of incorporating or not this type of suggestion on headaches is still unclear.[51]

Three studies utilized techniques to enhance internal resources,[17,43,46] three studies used mental imagery techniques[44,45,48] and the last three combined both types of techniques.[12,42,47] A difference in effect may be observable according to the type of hypnotic suggestion,[52] however, the specific link between types of suggestion and their effects is not yet very clear.[51] Thus, studies would benefit from including a wide variety of them, for example non-analgesic suggestions (e.g., ego-strengthening, relaxation) paired with several types of analgesic and/or comfort suggestions, as well as post-hypnotic suggestions of persistence and increasing treatment effect over time.[51,53] Future studies of hypnosis for migraine would benefit from following this recommendation and including a wide variety of hypnosis techniques.

4.2. Evaluating the effects of hypnosis on migraines

The measures for migraine reported in the included studies assess psychological aspects related to pain and migraines, disability, severity, frequency, intensity, duration, pain, medication use and remission. Generally, studies suggest potential beneficial effects of hypnosis interventions on reported measures. Hypnosis may be associated with greater improvements in some outcomes compared to certain conditions (usual or specific medication, i.e., prochlorperazine, acetaminophen), in improving migraine-related psychological factors, pain, remission, and migraine-related disability. However, it does not appear to be superior in terms of medication use or migraine severity. There is also no consensus on the additional benefits of hypnosis interventions over other interventions in terms of migraine frequency, intensity and duration.

Results show that hypnosis interventions are more effective than control interventions in reducing psychological inflexibility and pain catastrophizing and increasing pain acceptance. According to a review of neuroimaging studies on the effect of hypnosis on pain perception, this improvement could be due to functional changes in the prefrontal and insular cortices, as well as the thalamus, striatum and other regions of the midbrain.[54] The anterior cingulate cortex is particularly involved in this reshaping of the affective and cognitive aspects of pain by hypnosis.[54]

In addition to its effect on pain perception, hypnosis was associated with significant reductions in experienced pain in some studies, sometimes in comparison with other interventions.[12,17] These results are in line with a recent systematic review and meta-analysis on hypnosis as a treatment for neuropathic and chronic pain, which reports a moderate effect of hypnosis on chronic pain compared with active control groups, with a reduction in pain of up to more than 50%.[25] This effect is reported for both highly hypnosis-susceptible and moderately hypnosis-susceptible subjects in another systematic review on the effect of hypnosis on pain[27] and could last up to a year in some patients.[53]

This review also highlighted the improvement of migraine severity by hypnosis (up to 39% improvement), especially in those highly susceptible to hypnosis, although no difference was observed compared to another intervention. Severity is a measure that can encompass migraine intensity, frequency, and duration,[46,55] three measures also improved by the hypnosis intervention. Migraine intensity and frequency are helped by hypnosis, especially in people who are highly susceptible to hypnosis, although studies disagree on differences from other interventions.[17,45,47,48] The duration of migraine headaches is also improved by hypnosis, with no distinction between people who are highly or lowly susceptible to hypnosis. Once again, studies do not appear to be unanimous as to the superiority of hypnosis over other interventions in reducing migraine duration.[42,48] Moreover, the discrepancy between the reported and computed effect sizes in Flynn study[42] further underscores the need for caution when interpreting its findings.

Other factors were also improved by hypnosis, according to the studies identified. The use of migraine medication was reduced by hypnosis (by up to 52%), but no more than other interventions, and with no distinction between people with high and low susceptibility to hypnosis.[48] These results are consistent with the reduction in pain and migraine severity observed in the studies, with patients requiring less medication. In addition, one study reported higher remission rates in the hypnosis group compared to control conditions, with remission rates of up to 43%.[47]

Finally, this review highlighted a promising finding: some studies reported larger reductions in migraine disability in hypnosis groups compared with certain control conditions (waiting list, usual medication, medication). These results stem from the reduction in the social, domestic, professional and family impacts of migraines in patients' lives, and have a significant impact on the person's quality of life. This aligns with the previously noted improvements in migraine-related issues, including better psychological outcomes, reduced pain and severity, decreased medication use, and higher remission rates.

4.3. Recommendations to advance hypnosis and migraine research

In 2020, the ICHD issued its most recent methodological guidelines for controlled trials investigating preventive treatment for migraine attacks in adult with episodic migraine (e.g., selection of subjects, duration of baseline, sex, randomization). Future studies in this field should adhere to these recommendations to enhance the standardization, comparability and general quality of research.[56]

Additionally, based on the findings of this review, eight methodological recommendations are proposed to improve the understanding, interpretation, comparability, transferability and acceptability of results in studies evaluating hypnosis as a treatment for migraine. Recommendations are included in two sub sections: Hypnosis interventions and standardization efforts; and Limitations of studies on hypnosis and migraines. They are summarized in Box 1.

4.3.1. Hypnosis interventions and standardization efforts

Hypnosis interventions varied widely in terms of measures used, therapeutic targets, duration of treatment, baseline and follow-up periods, duration and number of sessions and time intervals between

Box 1
Recommendations for future interventional studies on the effect of hypnosis.

1. **Systematically report the elements necessary for comparison of studies.** E.g., baseline period, session duration, number of sessions, number of weeks of intervention. (See section "Hypnosis interventions and standardization efforts" for additional details).
2. **Report Sample Characteristics Thoroughly.** Comprehensive details about participant characteristics (e.g., age, gender, ethnicity, education, employment) to improve the generalizability of results. Avoid excluding key groups, such as women with menstrual-related migraines, to maintain an ecologically valid sample. (See section "Limitations and recommendations of studies on hypnosis and migraines" for additional details).
3. **Ensure Randomization and Use of Control Groups.** Include at least one control group (e.g., waiting lists, usual care, attention control) and ensure the randomization of participant groups to better assess the effect of interventions. (See section "Limitations and recommendations of studies on hypnosis and migraines" for additional details).
4. **Measure Hypnotic Susceptibility.** Measure participants' susceptibility to hypnosis using standardized tools such as the Stanford Hypnotic Susceptibility Scale. (See section "Limitations and recommendations of studies on hypnosis and migraines" for additional details).
5. **Power Calculations for Sample Size.** Calculate the required sample size to ensure sufficient statistical power for detecting significant effects. (See section "Limitations and recommendations of studies on hypnosis and migraines" for additional details).
6. **Include Self-Hypnosis in the Intervention.** Incorporate self-hypnosis components as regular practice between clinical sessions, to maximize outcomes. (See section "Limitations and recommendations of studies on hypnosis and migraines" for additional details).
7. **Implement a detailed intervention manual.** Implementing a detailed manual or protocol of intervention, including a hypnosis script, would enhance understanding, interpretation, comparison and replicability of results. (See section of "Hypnosis interventions and standardization efforts for additional details).
8. **Report on the Timing of Self-Hypnosis Administration.** Report the timing of self-hypnosis administration to better help understanding the optimal timing during different migraine phases, particularly the prodromal phase, to assess its potential in preventing the progression of migraines. (See section of "Limitations and recommendations of studies on hypnosis and migraines" for additional details).

sessions. Some studies reported no information at all on these subjects. All these variables may have an important impact on the results of the intervention and partly explain the incongruence between the results of certain studies.

A review of hypnotic interventions for chronic pain proposes recommendations for standardizing hypnotic interventions.[51] By following these recommendations, we can find that despite their methodological heterogeneity, all the included studies meet the initial recommendations of Jensen and Patterson's[51] by including an induction period and suggestions aimed at altering the subjective experience of pain.

Still relying on the recommendations of Jensen and Patterson,[51] several studies lack rigor in the method described. Five studies do not mention the duration of hypnosis sessions, and Friedman and Taub[45] study reports a duration varying from 3 to 5 min, which does not meet the recommendation of Jensen and Patterson[51] of a minimum 20-minute intervention. Jensen and Patterson[51] also recommend standardizing the hypnosis interventions by mentioning the number of hypnosis sessions. Again, this varies widely from study to study: Friedman and Taub[45] reported a "very brief hypnosis treatment" (3 sessions or less); Anderson et al.[47] a "brief hypnosis treatment" (4–7 sessions); and five other studies a "hypnosis treatment[*s*]" (8 sessions or more). Two studies[44,48] did not meet Jensen and Patterson[51] recommendation, as they omitted to report the number of sessions administered. According to a recent review and meta-analysis on the efficacy of hypnosis as a treatment for chronic pain, a minimum of 8 hypnosis sessions would be required to observe a significant medium to high effect.[25] Thus, future research protocols should consider incorporating this minimum of 8 hypnosis sessions and ensure that all elements necessary for cross-study comparisons are systematically reported.

To address this lack of standardization of hypnosis interventions for migraines, implementing a manual or an equivalent protocol could be a prudent approach. The use of such a standardized guide is advisable, as it supports identifying an intervention as empirically grounded.[35] Only two studies reported following a standardized manual.[12,17] Moreover, few studies described their hypnosis script, which significantly limits understanding, interpretation, comparison and replicability of results. Future studies should focus on standardization, by using an intervention manual or, at minimum, providing a detailed report of their hypnosis script to enhance comparability across studies.[25,51,57]

4.3.2. Limitations of studies on hypnosis and migraines

The risk of bias assessment across the nine included studies revealed substantial variability in methodological quality. While three studies (primary outcome, n = 2; secondary outcome, n = 1) were rated as having a low risk of bias, the remaining studies showed moderate to critical concerns, highlighting an overall lack of methodological rigor. Looking at the way research has been conducted to date, we were able to identify five main limitations of studies on hypnosis for migraines that encompass methodological issues generally encountered in interventional research (i.e., problems in randomization and constitution of experimental groups, statistical power of studies, reporting of intervention details enabling its replication) and issues specific to hypnosis paradigms (i.e., measure, use of self-hypnosis, timing of hypnosis sessions).

First, three studies did not specify their group allocation methods, whether groups were randomized, and/or whether a control group was included. This omission makes it challenging to determine if the intervention effects are due to the treatment itself or simply to the passage of time. Future studies should ensure they include at least one control group and use randomization for group allocation to enhance the reliability of their findings. For chronic pain studies, several control groups are recommended, such as waiting list, usual care, or attention control.[58] These types of control groups could also be valuable for future studies of hypnosis and migraines. Usual care for migraine interventions typically involves allowing participants to continue their regular migraine medications as prescribed by their neurologist throughout the study period.

Second, only a few studies assessed participants' susceptibility to hypnosis to explore its impact on treatment outcomes. Only three out of nine included this factor in their research protocol. By failing to account for inter-individual variability in hypnotizability, and by "averaging" effect across individuals with varying levels of susceptibility to hypnosis, the studies risk either overestimating or underestimating the true effect of hypnosis on migraines. This could also partly explain why hypnosis was no different than other interventions in relation to certain measures.[35] Therefore, future studies on hypnosis for migraines should ensure they measure participants' hypnotic susceptibility using standardized tools (e.g., Stanford Hypnotic Susceptibility Scale[59]).

A third limitation affecting the results is the lack of a power calculation to determine appropriate sample sizes. Only two of the most

recent studies ensured they had sufficiently large samples for adequate statistical power.[17,42] Future studies should incorporate power calculations to validate the significance of their findings. Added to the systematic preregistration of interventions, publication of detailed intervention specifications, and data sharing, this would contribute to enhancing transparency and replicability of studies, promoting open science practices.[60,61]

The fourth limitation is the inconsistent use of self-hypnosis in the treatment protocols. While eight out of nine studies included hypnosis sessions combined with self-hypnosis, Graham's[48] study did not mention it. In settings where daily access to hypnotherapists is not feasible, empowering patients with self-hypnosis techniques is a key component of effective long-term care. Regular practice can lead to better outcomes;[62] and omitting self-hypnosis components may reduce the effectiveness of the hypnosis intervention.[35] Jensen and Patterson[53] recommend that hypnotic interventions for chronic pain should include suggestions that facilitate self-hypnosis practice. Thus, future research on hypnosis for migraine may consider adopting a similar approach. An important consideration in the context of self-hypnosis is the timing of the intervention's self-administration. In this systematic review, no studies that included self-hypnosis specified the time of day for its use. Given the significant variability of symptoms across the 4 phases of migraine progression (prodromal, aura, migraine, postdromal),[63] it might be interesting to examine the effect of self-hypnosis in each of these phases and/or in the prodromal phase to prevent migraine progression in subsequent phases.[35]

Finally, the fifth limitation relates to the generalizability of results. Only four out of nine studies reported detailed characteristics of their samples (e.g., level of education, employment, number of years suffering from migraines), aside from age and gender. Moreover, these two covariates were not systematically reported across studies. Comprehensive reporting of sample characteristics (e.g., age, gender, ethnicity and education) is particularly important for understanding the population to which the results are generalizable. Furthermore, the exclusion of individuals with menstrual cycle in one study[42] limits the ecological validity of the interventions, particularly given that migraine is a condition that predominantly affects women.[4] Future studies need to be careful to describe their sample characteristics and exclusion criteria in greater depth to maintain an ecological sample.

Future research should aim to describe group allocation processes, include measures of participants' susceptibility to hypnosis, conduct calculation for sample size, recommend self-hypnosis, and ensure the use of a generalizable sample with thorough descriptions. By addressing these limitations, future research can improve the quality and applicability of findings related to hypnosis as a treatment for migraines.

5. Conclusion

Migraine is one of the most prevalent and disabling conditions worldwide. This systematic review suggests that hypnosis may be associated with improvements in migraine-related outcomes, including severity, frequency, intensity and duration of migraines, psychological factors, medication intake, pain, remission and migraine-related disability. However, the current evidence base remains limited and characterized by methodological heterogeneity, variability in intervention protocols, inconsistent outcome reporting, and multiple sources of potential bias. Therefore, hypnosis cannot currently be considered a stand-alone evidence-based treatment for migraine and may instead represent a potentially promising adjunctive intervention, but more rigorous research is needed before drawing firm conclusions. To address the pressing need for effective non-pharmacological interventions for migraine sufferers and to overcome the methodological limitations of existing studies, further high-quality research on the effects of hypnosis in this context is essential, particularly adequately powered randomized controlled trials using standardized migraine outcomes and transparent reporting practices.

CRediT authorship contribution statement

Ogez David: Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition. **Pierre Rainville:** Writing – review & editing, Supervision, Methodology. **Marie Désilets:** Writing – review & editing, Methodology, Investigation. **Alexandra Chevestrier:** Writing – review & editing, Investigation, Formal analysis. **Floriane Rousseaux:** Writing – review & editing, Validation. **Valentyn Fournier:** Writing – review & editing, Formal analysis. **Mathieu Landry:** Writing – review & editing, Methodology, Formal analysis. **Éloïse Cardinal:** Writing – original draft, review & editing, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ctim.2026.103374.

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