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Revised guidelines of the French headache society for the diagnosis and management of migraine in adults. Part 3: Non-pharmacological treatment

G. Demarquay [a,*], J. Mawet [b], E. Guégan-Massardier [c], S. de Gaalon [d], A. Donnet [e], P. Giraud [f], M. Lantéri-Minet [g], C. Lucas [h], X. Moisset [i], C. Roos [b], D. Valade [j], A. Ducros [k]

[a] Inserm U1028, CNRS UMR5292, Neuroscience Research Center (CRNL), Neurological hospital, Lyon, France
[b] Department of Neurology, Emergency Headache Center (Centre d'urgences céphalées), Lariboisière Hospital, AP–HP, Paris, France
[c] Department of Neurology, Rouen University Hospital, Rouen, France
[d] Department of Neurology, Laënnec Hospital, CHU de Nantes, Nantes, France
[e] FHU INOVPAIN, centre d'évaluation et de traitement de la douleur, hôpital de La Timone, Marseille, France
[f] Department of Neurology, Annecy-Genevois Hospital, Annecy, France
[g] Pain Department and FHU InovPain, CHU de Nice, Côte Azur Université, Nice, France
[h] Service de neurochirurgie, centre d'évaluation et de traitement de la douleur, CHRU de Lille, hôpital Salengro, Lille, France
[i] Inserm, Neuro-Dol, Université Clermont Auvergne, CHU de Clermont-Ferrand, Clermont-Ferrand, France
[j] Department of Neurosurgery, Hopital Pitié-Sapêtrière, Paris, France
[k] Department of Neurology, Gui-de-Chauliac Hospital, CHU de Montpellier, University of Montpellier, 34000 Montpellier, France

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ABSTRACT

The French Headache Society proposes updated French guidelines for the management of migraine. This article presents the third part of the guidelines, which is focused on the non-pharmacological treatment of migraine, including physical exercise, dietary supplements and plants, diets, neuromodulation therapies, acupuncture, behavioral interventions and mindfulness therapy, patent foramen ovale closure and surgical nerve decompression.

* *Corresponding author.*
E-mail address: genevieve.demarquay@chu-lyon.fr (G. Demarquay).

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1. Introduction

Migraine is the second most common neurological disease after tension type headache, but many affected patients remain undiagnosed and undertreated. Besides medications, non-pharmacological approaches can be proposed both for the acute and prophylactic treatment of migraine. Non-pharmacological approaches include heterogeneous techniques with various qualities of evidence.

The French Headache Society has prepared revised guidelines to provide healthcare professionals with practical and up-to-date recommendations to optimize diagnosis and treatment of migraine, with the aim of improving the quality of life of affected patients and their relatives. The guidelines have been divided into three parts. The first part presents guidelines about the diagnosis and assessment of migraine [1]. The second part proposes guidelines for the pharmacological treatment of migraine [2]. The third part, presented herein, is focused on the non-pharmacological treatment of migraine, including physical exercise, dietary supplements and plants, diets, neuromodulation therapies, acupuncture, behavioral interventions and mindfulness therapy, patent foramen ovale closure and surgical nerve decompression.

2. Methods

Methods are described in the first part of the updated guidelines [1] (Online material).

3. Is physical exercise effective for migraine prophylaxis?

Recent systematic reviews and meta-analyses provide moderate-quality evidence that aerobic exercise therapy can decrease the number of migraine days in patients with migraine (level of evidence medium) [3–5]. Although the type of physical activities varied according to the studies, multi-weekly aerobic exercise (endurance) has a clear benefit [3,4,6]. Exercise therapy can be efficient when used as the sole preventative option and might also potentiate pharmacological prophylaxis [7,8].

The benefit of yoga for migraine prevention remains uncertain: a recent meta-analysis including six low-quality randomized-controlled trials (RCT) in migraine and tension-type headache patients revealed a global benefit but which related to tension-type headache [9]. However, a more recent, not included, large RCT showed a benefit of yoga as add-on therapy for migraine prevention, with positive outcomes on headache days, disability and quality of life [10]. Up to now, evidence remains too scarce to make any recommendation for this activity.

4. What is the evidence concerning dietary supplements and plants?

Studies show that co-enzyme Q10 supplementation (mostly 300 mg/day) (level of evidence fair) [11,12], high-dose riboflavin (vitamin B2, 400 mg/day) (level of evidence fair) [13–15], oral magnesium (600 mg/day) (level of evidence fair) [16,17], and oral melatonin (mostly immediate-release 3 mg) (level of evidence fair) [18] may be of potential benefit for migraine prophylaxis. Some data suggest that feverfew may have a small positive effect on migraine prophylaxis, but other studies are negative (level of evidence for efficacy unknown) [19]. Studies show that butterbur is effective in the prophylaxis of migraine (level of evidence moderate) [20,21] but preparations are heterogeneous with a risk of hepatotoxicity in those containing pyrrolizidine alkaloids.

5. What is the evidence concerning diets?

Specific diets (gluten-free, lactose free…) should not be recommended as data are too scarce to make any recommendation for a specific diet for migraineurs [22]. Further studies are needed to confirm the encouraging results of ketogenic diets in overweight migraine patients [22,23].

6. What neuromodulation therapies are effective in migraine?

Neuromodulation therapies were evaluated in a 2020 systematic review and meta-analysis [24] (Table 1). For the acute treatment of migraine, the number of well-conducted studies is limited. Conditioned pain modulation by non-painful remote electrical neuromodulation (REN) is effective (level of evidence medium). This neuromodulation technique relates on the principle that pain inhibits pain. Single pulse transcranial magnetic stimulation (TMS), with a portable self-administered device, is effective for migraine with aura [25] (level of evidence fair). One open-label study suggested that it might be of interest even in migraine without aura [26]. Supra-orbital transcutaneous electrical nerve stimulation (TENS) is possibly effective (level of evidence fair) [27,28]. Non-invasive vagus nerve stimulation (VNS) is ineffective [29] (level of evidence fair for inefficacy).

Concerning migraine prevention, everyday self-administered supra-orbital TENS is effective (level of evidence medium) [30–32]. Data concerning occipital TENS are inconclusive [33,34]. High frequency repetitive TMS on the primary motor cortex (M1) is effective (level of evidence fair) [35–37]. Percutaneous electrical nerve stimulation (PENS) or electroacupuncture is possibly effective [38–40] (level of evidence fair). Data concerning transcranial direct current stimulation (tDCS) are heterogeneous and inconclusive overall [24]. Self-administered non-invasive percutaneous VNS is ineffective [41–44] (medium level of evidence for inefficacy). Invasive occipital nerve stimulation is probably effective for chronic migraine prevention [45–47] (level of evidence medium), but no implantable device is currently FDA approved or CE marked in this indication.

7. What is the efficacy of acupuncture for migraine prophylaxis?

Acupuncture can be effective over sham in the short-term prophylaxis of episodic migraine (level of evidence medium),

Table 1 – Neuromodulation devices with proven efficacy and available in France.

Stimulation method Device™ (FDA cleared, CE marked)	Level of evidence for efficacy	Strength of recommendation by the French Headache Society	Availability	Practical use
Remote electrical neuromodulation (REN) (Yes)	Medium in acute migraine treatment	Moderate in acute treatment	Available online but not yet in France, price to be determined	Self-administered by the patients on his forearm for migraine attack treatment for 30–45 min, controlled by smartphone app
Single pulse transcranial magnetic stimulation (Yes)	Fair in acute aura treatment	Moderate in acute aura treatment	Available online but not in France, no data on a French availability or price	Self-administered by the patients for migraine with aura attack treatment: single-pulse on the occiput, repeated once 30 sec later, to be performed as soon as possible after the aura starts
Supra-orbital transcutaneous electrical nerve stimulation (TENS) (Yes)	Fair in acute migraine treatment Medium in migraine prevention	Weak in acute treatment Moderate in migraine prevention	Available online, for devices with acute and prophylactic settings	Self-administered by the patients on his forehead, 20 min every day for preventive treatment, punctual use for 60 min for migraine attack treatment
High frequency repetitive TMS on the primary motor cortex (Yes)	Fair in migraine prevention	Weak in migraine prevention	Classical rTMS device in the neurologist's office	Up to 3 sessions/week performed by a neurologist on the primary motor cortex for up to 4 consecutive weeks. $\geq$ 600 pulses per session, 10 Hz, 70 to 80% of the resting motor threshold. Further studies are needed to specify conditions and settings, especially to define sessions' rate for long-term use This technique should be restricted to tertiary centers until further studies are available (expert opinion)

TMS: transcranial magnetic stimulation.

and has similar efficacy and fewer side effects than many of the standard pharmaceutical agents [48–50]. Long-term studies of acupuncture in episodic migraine, and studies in chronic migraine are lacking.

8. What is the efficacy of behavioral interventions and mindfulness therapy for migraine prophylaxis?

Studies evaluating behavioral therapies and mindfulness meditation are highly heterogeneous regarding settings (size, comparator arms, and endpoints), risk of bias and results. One major limitation relates to the endpoint used for prophylactic treatment: some studies have negative results on headache days, but the awaited effect of these techniques is more related to improvement of disability, quality of life and ability to function with migraine than on the classical headache day reduction endpoint [51].

Behavioral therapies include relaxation, biofeedback and cognitive behavioral therapy. Depending on endpoints, inclusion criteria and analyses, divergent results have been reported in meta-analyses. A meta-analysis concluded that most of the 21 studies conducted up to 2018 to assess the efficacy of behavioral or cognitive-behavioral therapies such as coping strategies, biofeedback, relaxation, and eye movement sensitization for migraine prophylaxis are of very low quality [52]. This Cochrane meta-analysis concluded that there is an absence of high-quality evidence to determine whether psychological interventions are effective for migraine prophylaxis in adults and that it remains uncertain whether there is any difference between psychological therapies and controls on the reduction of migraine days. Another meta-analysis, including all types of headache disorders, concluded that psychological treatments were promising to reduce headache frequency even though the diversity of treatment modalities and the heterogeneity of protocols limited interpretation of data [53]. A previous review focused on cognitive behavioral therapy acknowledged the methodology inadequacy but suggested a potential benefit [54]. Behavioral therapy can be used as add-on to classical pharmacological treatment [55].

Wide heterogeneity also exists regarding mindfulness-based stress reduction benefit for migraine prophylaxis. Likewise, meta-analyses showed conflicting results [56,57], but a more recent narrative review [51], and two new large randomized studies [58,59] suggest that mindfulness-based stress reduction may have beneficial effects, not always on headache days but on disability and quality of life.

Because of their safety and acceptability, behavioral therapies and mindfulness-based stress reduction should be considered in patients with episodic or chronic migraine with significant stress, anxiety or migraine induced-disability, as add-on therapy to pharmacological treatments (level of evidence fair).

The evidence regarding the efficacy of hypnosis is too scarce to make any recommendation [60–62].

9. What is the efficacy of patent foramen ovale closure?

Patent foramen ovale (PFO) is more frequent in migraineurs than in non-migraineurs but randomized controlled trials on PFO closure in migraine failed to demonstrate a significant benefit of PFO closure on the primary endpoints [63–66]. To date, screening for a PFO and PFO closure is not recommended for migraine prophylaxis (level of evidence strong).

10. What is the efficacy of surgical nerve decompression?

Data supporting surgical nerve decompression are very scarce and mostly based on retrospective and unblinded studies [67,68]. Up to now, we do not recommend such procedures.

11. Recommendations for non-pharmacological treatment of migraine

The recommendations are summarized in the Table 2.

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The author DV declares that he has no competing interest.

Table 2 – Recommendations for non-pharmacological treatment of migraine.

	For non-pharmacological treatment of migraine, our recommendations are	Strength of recommendation
Rnpt1	Encourage any patient with migraine to practice weekly aerobic exercise as an alternative or a supplement to pharmacological prophylaxis	Strong
Rnpt2	In patients with episodic migraine asking for a prophylactic treatment with limited side-effects, propose co-enzyme Q10, high-dose riboflavin or melatonin	Moderate
Rnpt3	Do not prescribe plants for the prophylaxis of migraine because feverfew has no demonstrated efficacy and butterbur has a heterogeneous composition carrying a risk of hepatotoxicity	Strong
Rnpt4	In patients with episodic migraine asking for non-pharmacological treatments or achieving insufficient efficacy with pharmacological treatments, propose neuromodulation therapies, favoring remote electrical neuromodulation for the acute migraine treatment and supra-orbital transcutaneous electrical nerve stimulation for migraine prevention	Strong
Rnpt5	In patients with episodic migraine asking for non-pharmacological treatments or achieving insufficient efficacy with pharmacological treatments, propose acupuncture as an alternative or a supplement to pharmacological prophylaxis	Strong
Rnpt6	In patients with episodic or chronic migraine with significant stress, anxiety, or migraine-induced disability, propose behavioral therapies (relaxation, biofeedback and cognitive behavioral therapies) or mindfulness-based stress reduction as add-on therapy to pharmacological treatments	Strong
Rnpt7	Do not recommend PFO closure for migraine prophylaxis	Strong

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.neurol.2021.07.009.

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