Consensus among musculoskeletal experts for the management by physiotherapists in patients with headache? A Delphi study

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Consensus among musculoskeletal experts for the management by physiotherapists in patients with headache? A Delphi Study.

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DISCLOSURE

None

ETHICS APPROVAL

Ethical approval to conduct this study was granted by the Ethics Committee of the Ghent University Hospital under registration number B670201837528. Experts' consent to participate was inferred from their voluntary participation.

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ABSTRACT

Background

Though a large amount of research on the management of headache has been conducted, the clinical effectiveness of these treatments remains questionable.

Objectives

To reach consensus among international musculoskeletal experts on what the most useful management and clinical indicators are in patients that suffer from headache.

Design

Expert group and Delphi-study.

Methods

A total of 11 experts participated in the expert panel groups, where the role of physiotherapy in the management of headache was discussed. Afterwards, 14 of the initial 25 participants in the field of headache completed the whole Delphi study, which was conducted over 4 rounds. The first round aimed to identify clinical indicators and treatments that are useful in patients with headache. These questions were then categorized and ranked during the second, third, and fourth rounds. Consensual agreement was set at ≥ 80%.

Results

After the final round, 9 interventions were rated as useful by the participants. In the final extra round, 14 clinical indicators were retrieved as important to decide whether or not to start one of the consensual treatments. The top 3 management strategies were (1) upper cervical spine mobilisations in cervivogenic headache, (2) active mobilisation exercises of the cervical spine in cervivogenic headache, and (3) lifestyle advice in tension-type headache and migraine.

Conclusion

International experts agreed that most scientifically established effective treatments are useful in cervicogenic headache. Consensual agreement on treatments for migraine and tension-type headache were only reached for specific treatments. Their recommendations provide a framework for further research and the clinical management of headache.

KEY WORDS

Headache, management, clinical indicators, assessment, evidence

MANUSCRIPT

INTRODUCTION

Headaches are the second most common disorders in terms of all-age cases with a year by year increasing prevalence (Vos et al., 2017). Currently, the third edition of the International Classification of Headache Disorders (ICHD-3) (Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition., 2018) is the reference classification system used in research and clinical practice to subdivide headache into distinct clinical subtypes. The majority of primary headaches are classified as tension-type headache (TTH) with an estimated global prevalence of 38.0%, and migraine with an estimated global prevalence of 10.0% (Stovner et al., 2007). In contrast, the prevalence of cervicogenic headache (CeH), a secondary headache, is less common with prevalence estimates ranging from < 1.0% to 2.5% (Knackstedt et al., 2010; Nilsson, 1995). Together, these types of headache comprise most of the headaches in patients seen by physiotherapists.

Numerous treatment options have emerged for patients with headache, with each treatment option specifically matched to the specific headache type. Non-pharmacological approaches such as physiotherapy are considered effective by international studies (Falsiroli Maistrello et al., 2018; Luedtke et al., 2016a), but these studies also criticize individual randomized controlled trials for their low level of evidence. Although it has become clear that different types of headache are driven by distinct underlying mechanisms (Castien and De Hertogh, 2019), an overlap in signs and symptoms among these types of headache is to be expected (D'Amico et al., 1994; Nicholson and Gaston, 2001). Treatment optimization might be achieved by a thorough physical examination, which enables the clinician to identify subgroups of patients that could benefit from specific physiotherapeutical treatments (Fernández-de-las-Peñas and Courtney, 2014), within or even unrelated to the patient's specific headache(s). Musculoskeletal physiotherapists do have many useful clinical tests at their disposal to thoroughly examine patients with headache (Luedtke et al., 2016c; Rubio-Ochoa et al.,

2016), and the optimal treatment selection process might necessitate a combined thorough subjective and physical examination, embedded within the established ICHD-3 classification. The clinician would benefit from a clear set of criteria to enable a reasoned decision about the optimal treatment matched to the specific type of headache as included in the ICHD-3 classification. To date, there is no existing record of a survey that aimed to establish consensus for such clinical reasoning model among musculoskeletal physiotherapists. Once a consensus is reached among these experts, this reasoning model could be integrated into randomized clinical trials to evaluate its effectiveness.

To this end, the current study aimed to organize an expert group and a Delphi-survey in order to (1) identify treatments that are considered as useful by physiotherapists who treat regularly headache patients, and (2) identify the clinical criteria, derived from the subjective and physical examination, on which pysiotherapists base their decision to start a particular treatment in a patient with a certain headache.

METHODS

STUDY DESIGN

A 2-phase sequential design of an expert group and Delphi-study was conducted to obtain a consensus on physiotherapeutic treatments in TTH, CeH, and migraine. The Delphi-technique is a structured process that uses a series of questionnaires or 'rounds' to gather information which are repeated until 'group' consensus is reached (Beretta, 1996; Hasson et al., 2000; Powell, 2003). Preceding the actual Delphi-survey, 2 expert group panels were established, in which the construct and methodology of the Delphi-survey was discussed (Gibbs, 1997; McMillan et al., 2016). The Delphi-study was conducted in accordance with the COREQ recommendations.

PARTICIPANTS

The first expert panel, which focused on the diagnostic criteria from a medical viewpoint and the role of the physiotherapist in this process, consisted of 5 academic and clinical experts within the field of headache with an average of 16.0 years of clinical and/or teaching experience. The second expert panel, which focused on the design of the Delphi-study, consisted of 6 academic and/or clinical experts within the field of headache with an average of 9.8 years of clinical experience. The expert panels were moderated by the first author. Expert panels' demographics are presented in **Table 1**. All participants were recruited via a purposive sampling strategy from the academic teaching boards of different programs in physiotherapy in Belgium, and selected upon their expertise related to the topic.

The participants in the Delphi-survey consisted of academical researchers, and physiotherapists of a Belgian and English association of manual therapy (i.e. MATHERA and MACP, respectively). A list of topic-related academic researchers was retrieved by conducting the search query 'headache AND physiotherapy OR manual therapy' on PubMed (search date: May 2018). Researchers that obtained first-authorship of 2 or more headache-related publications were contacted for participation. Inclusion criteria for the physical therapists were (1) at least 3 years of clinical experience and (2) a headache-related patient population of at least 10%.

Prior to the first round, a 6-week period was considered during which the therapists were informed as to the purpose of the study and invited to participate. An invitation to participate was sent to 132 eligible academic researchers, of which 9 expressed their interest in participating, and an unknown number of therapists that have received communication from the English and Belgian association, of which 15 expressed their interest in participation. Twenty-four were interested in participating, of which 19 were included based on the aforementioned in- and exclusion-criteria. Delphi-participants demographics are presented in **Table 2**.

PROCEDURE

Prior to the expert group, the academic experts were invited via a face-to-face conversation and informed about the study design, and intentions of the meeting. The focus group discussion was moderated by the principal author. The starting point of the discussion was the integrated reasoning models on when to apply physiotherapy in patients with headache. During the discussion, the viewpoint from a medical perspective and physiotherapy perspective where discussed. During this 4-h meeting field notes were made on a flip chart and the conclusions were recorded in a written report. Afterwards, participants had the opportunity to check the report for accuracy, and remarks were fed back to all members in a final document.

The qualitative data collected through the expert groups was used to inform the first round of the Delphi-survey (Hasson et al., 2000). The survey consisted of 4 rounds. All 19 participants were e-mailed a personal internet link to an online survey (developed in LimeSurvey 3.0+), which enabled them to respond to the questions. Participants had 8 weeks to complete each round. Follow-up reminder e-mails were sent to non-respondents to maximize response rates (Hsu and Sandford, 2007).

At Round 1, the participants were provided with a brief definition of the intentions of the Delphi-study (**Figure 1**), in order to assure that all questions were answered with the same background. Secondly, a list of the in-practice applied classification criteria besides ICHD-3, was enquired. Thirdly, the participants were asked to (1) list subjective and physical examination criteria that they found to be

indicative to commence a certain treatment, and (2) suggest treatments that they found useful to apply in patients that were diagnosed with TTH, CeH, and migraine. The data from Round 1 were qualitatively analyzed (see "Data analysis") with the intention to create a summary of proposed treatment options and clinical indicators with respect to the diversity of answers provided in Round 1 for inclusion into Round 2.

Based on the responses gathered in round 1, the Delphi-study was divided into two parts to reduce the burden on the respondents, with both parts having specific aims. The first aim constituted the second and third round to evaluate consensus among participants for the treatments used by physiotherapists in patients that suffer from headache. The second aim (round 4) was conducted to evaluate consensus among participants for clinical criteria used to start a given treatment. In Round 2, participants were asked to rate the level to which they considered the suggested treatments useful by means of a 5-point Likert-scale, ranging from 0: definitely not useful to 4: definitely useful for each treatment option within the different included headache types. Based on the descriptive analysis of the responses from Round 2, the level of agreement and consensus for each treatment option was determined. A predefined consensus level of 80.00% agreement was set as a cut-off point to determine and establish consensus for a particular treatment option, which means that 80.00% or more of the participants had to rate the treatment option as either definitely useful (4) or useful (3). In the third round, participants were able to rerate their judgement after viewing their own responses from Round 2 and the group response from Round 2 per treatment option. Afterwards, response data were re-analyzed for levels of agreement and consensus. All participants remained anonymous towards each other. The researchers however could link the data to the respective participants, in order to provide each of them with his/her personal results in Round 3, which enabled them to reconsider their judgement in view of the group responses. An additional 4th round was organized, in which the participants were enquired to tick the clinical indicators they believed were useful to consider in a subjective and physical examination in order to start a given (consensual) treatment.

DATA ANALYSIS

The data from Round 1 were qualitatively analyzed via content analysis (Patton, 1999) by 2 researchers (R.D.P. and B.C.) with validation by a third researcher (V.D.): grouped related topics with variable wording were identified in order to reduce the amount of treatment strategies and subdivided into 3 topics: hands-off treatments, hands-on treatments, and education. Whenever possible, repetition of the wording used by the majority of the participants was aspired. The results of the 2 researchers were compared and differences were analyzed by a third researcher. Upon shared agreement, a final list of specified treatments and clinical indicators was created and included into Round 2, and Round 3 respectively. All responses from Round 2, 3 and the fourth round were analyzed with descriptive statistics.

RESULTS

EXPERT GROUP RESULTS

The first expert group, which consisted of a neurologist, a general practitioner, and 3 physiotherapists, concluded that the most suitable classification system that broadly covers the evaluation of patients with headache is the ICHD-3 classification. They also agreed that physiotherapy is certainly an asset in the treatment of patients with TTH, CeH, and migraine. They suggested to leave out other specific forms of headache, such as cluster headache for the purpose of the Delphi study. The second expert group, which consisted of 6 physiotherapists agreed upon the usefulness of the ICHD-3 classification. They proposed to subdivide available treatments into hands-on techniques, hands-off techniques, and education to provide some structure to the participants of the Delphi-study.

DELPHI-SURVEY RESULTS

In total, 19 participants were included in the Delphi-survey. An overview of participation rate in the respective rounds is depicted in the flowchart of **Figure 2**.

ROUND 1

The qualitative analysis of Round 1 generated a listing with 17 hands-on treatments, 14 hands-off treatments, and 3 educational strategies, which were presented to the participants in Round 2. In addition, a list of 26 clinical subjective and physical indicators were retrieved, which were presented to the participants in the Round 3. The importance of the Sjaastad criteria (Sjaastad et al., 1998, 1990; Sjaastad and Bakketeig, 2008) in the clinical reasoning process was brought up by 5 (26.3%) of the 19 participants, and one expert (5.3%) indicated the use of IASP-criteria in their clinical reasoning process.

ROUND 2, 3 and extra 4th round

After Round 2, consensus (≥ 80% agreement) was reached for 3 treatments in TTH, 6 treatments in CeH, and 1 treatment in migraine. After Round 3, no additional treatments reached the predefined level of consensus. **Table 3** lists the results of Round 2 and 3 of the Delphi-survey. The final list of

consensual treatments can be consulted in **Table 4**. Lastly, consensus was reached for a total of 11 clinical criteria, of which 9 in CeH, 1 in TTH, and 1 in migraine. A visual representation of the results from Round 3 is depicted in **Figure 3**.

DISCUSSION

The aim of this Delphi-study was to investigate on which treatment techniques, and which clinical indicators consensus was reached among professional physiotherapists when facing patients with CeH, TTH, and migraine, since there is inconsistent evidence for the management of these headache types. Nineteen participants initiated the study, of which 14 completed the third and extra round. Consensual agreement on the usefulness was set at a cut-off of at least 80% of the participants that needed to rate these interventions with a score of 3 or 4. After the final round, 9 interventions were rated as useful by the participants. In the final extra round, 14 clinical indicators were retrieved as important to decide whether or not to start one of the consensual treatments.

TREATMENTS TO CONSIDER FOR HEADACHE

Overall, the participants agreed to the available evidence (Luedtke et al., 2016a), which shows that (1) manual therapy can be useful in CeH, (2) trigger point therapy and manual therapy (combined with exercises) can be useful in TTH, and, lastly, (3) psychological interventions can be useful in migraine. Surprisingly, the participants did not agree on the usefulness of aerobic exercises in migraine and trigger point therapy in CeH (Luedtke et al., 2016b). Additionally, work-related ergonomic training in CeH and TTH, and lifestyle advice in TTH and migraine were recognized as useful treatments by the participants. In general, more participants graded active hands-off treatments and education more useful compared to hands-on treatments.

The working hypothesis behind CeH considers the cervical spine as a “source” for the headache symptoms (Bogduk and Govind, 2009a). Anaesthetic blocks in the upper cervical spine seem to be efficient in the reduction of pain intensity in CeH (Aprill et al., 2002). Consequently, (upper) cervical spine (active and passive) mobilisations were graded as useful by the participants in the treatment of patients with CeH. Although evidence exists for the use of active approaches and neuromotor control training in CeH (Racicki et al., 2013), there are only a limited number of high-quality papers available.

206 This could explain the finding that 30% of experts included in this study were unsure about the
207 usefulness of exercise therapy, as more research is needed on this topic.

208 Myofascial pain has been attributed as a mechanisms that might be associated with TTH, because
209 myofascial trigger points are often present and can lead to referred pain (Fernández-de-las-Peñas et
210 al., 2006). This referred pain reproduces the familiar pain complaints and mimics the headache pain
211 pattern (Couppé et al., 2007; Palacios-Ceña et al., 2017). This assumes a direct link between the
212 myofascial tissue and the headache (Moraska et al., 2017). Recent studies indicated that trigger point
213 dry needling might be useful in the management of TTH, because there is a reduction in headache
214 frequency and headache intensity (Gildir et al., 2019; Kamali et al., 2019).

215 Aerobic exercises for migraine patients did not reach consensus by the participants, with a percentage
216 of only 60%. However, previous studies revealed that aerobic exercises with a moderate-intensity level
217 could improve the patients migraine status, with a reduction in pain intensity and beneficial effects on
218 frequency and duration of migraine attacks (Amin et al., 2018; Lemmens et al., 2019; Santiago et al.,
219 2014; Varkey et al., 2009). Interestingly, none of the experts rated it as not useful, but a rather large
220 proportion (40%) of participants were unsure about the usefulness of aerobic training. Evidence
221 regarding aerobic training seems not to reach a large proportion of participating physiotherapists.

222 The importance of work-related ergonomic training in CeH and TTH might be linked to the increased
223 tenderness of pericranial myofascial tissues in TTH (Bendtsen and Fernández-de-la-Peñas, 2011), and
224 cervical spine biomechanics in CeH (Bogduk and Govind, 2009b). Functional active training exercises
225 involving posture, lifting, and muscle-relaxation exercises might target these specific factors (Van
226 Ettekoven and Lucas, 2006; Liang et al., 2019; Park et al., 2017; Yang and Da, 2017). Although exercise
227 did not achieve expert's consensus in CeH, consideration should be given to adding exercise, such as
228 specific neuromotor control exercises, given they have been shown to be efficacious in the short and
229 long term in those with CeH (Jull et al., 2002) and the current evidence for combined use of manual
230 therapy and exercise in those with disorders of cervical musculoskeletal function (Hidalgo et al., 2017).

231 There are some risk factors for chronic daily headache that can be targeted with an educational
232 program, i.e. obesity, caffeine overuse, medication overuse, and sleep-related disorders (Cho and Chu,
233 2015). Lifestyle advice covers a large part of the non-pharmacological treatment of migraine, as it can
234 help patients avoid triggering situations (Goadsby, 2003). Migraine patients reported an improved
235 quality of life, less headache-related disability, greater satisfaction, and less anxiety and concern about
236 their headache after an educational program (Smith et al., 2010). Another possibility to offer lifestyle
237 advice is through brochures. Reading an educational good-quality brochure about migraine can
238 enhance migraine control and improve the overall knowledge of the illness, which can lessen the
239 burden of the disease (Martìnez et al., 2015; Smith et al., 2010). These findings are supported by the
240 results of this Delphi-study.

241 CLINICAL INDICATORS TO CONSIDER FOR HEADACHE

242 Useful assessment tools at the disposal of physiotherapists in patients with CeH, TTH, and migraine
243 have already been discussed in reviews (Luedtke et al., 2016c; Rubio-Ochoa et al., 2016; Szikszay et al.,
244 2019; Zito et al., 2006). Clinical indicators concerning the potential usefulness of active and passive
245 mobilizations in CeH were “Experiencing headache symptoms at the same time as cervical spine
246 related symptoms”, “Limited ROM (upper cervical spine, mid cervical spine, thoracic spine)”,
247 “Unilateral pain on movement”, “Positive passive joint provocation test”, and “Positive cervical flexion
248 rotation test”. These indicators concur with some of the ICHD-3 and Sjaastad criteria for CeH
249 (Headache Classification Committee of the International Headache Society (IHS) The International
250 Classification of Headache Disorders, 3rd edition., 2018; Sjaastad and Bakketeig, 2008), and 2
251 important clinical tests to identify cervical spine , namely involvement, i.e. the cervical flexion rotation
252 test and passive joint provocation, which have moderate to good levels of reliability (Rubio-Ochoa et
253 al., 2016). Consensus on clinical indicators for ergonomic training in CeH and TTH was reached for
254 “Posture-related complaints (i.e. antalgic posture, complaints modified by changes in posture,
255 changed posture such as forward head posture, chin tuck, etc.)”, which corresponds with the

literature (Fernandez-De-Las-Penas et al., 2007; Szikszay et al., 2019; Zito et al., 2006). Consensual agreement was reached for "Impaired muscle length/muscle stiffness (muscle tightness, sensation of tension)" as a clinical indicator of trigger point therapy in TTH. Lastly, "Unhealthy lifestyle (staying awake for long periods, limited physical activity, poor diet, sleep disturbances, stress and stress-related symptoms, etc.)" was identified as a clinical indicator for lifestyle advice.

CLINICAL IMPLICATIONS AND FUTURE RESEARCH

Physiotherapists seem to agree in large extent with existing literature. However, they seem less familiar with the efficacy of aerobic exercises in patients with migraine, although its efficacy has been scientifically proven. Moreover, the participating physiotherapists seem to rather focus on a patient-level and act upon clinical indicators instead of working on a disorder-level and act upon the headache-label of their patients. Future clinical research evaluating the efficacy of musculoskeletal physiotherapy should not only focus on the diagnosed headache-labels of included patients, but should include and consider the clinical indicators that might drive the underlying complaints.

LIMITATIONS AND STRENGTHS

An important limitation to note is the restricted number of participants who took part in this Delphi-study. Only 14 participants completed the third round, while 19 participants filled in the questionnaire after the first round. However, the included participants in this study were responsible for 51/215 (23.7%) of the recently published articles on PubMed regarding musculoskeletal physiotherapy and headache, when considering academic experts that have published at least 4 A1 articles. Because of the online communication, physiotherapists from all over the world could contribute to this study. Hence, physiotherapists from Asia, Europe, and Oceania answered the first questionnaire. However, only 1 participant from Asia and none from Africa and America were willing to participate. In the final round, 3 participants were Australian, 1 British, 1 Asian, and 9 European. This obviously limits the cross-cultural validity of our findings.

In Round 3, every participant was able to see his/her own previous score and the level of consensus at that point, which could have influenced their new score. However, the participants were not in the possibility to discuss results among themselves. If they were, other results might have come out of this Delphi-survey. However, the Delphi-design allows for an equal weight on the opinion of each participant, whereas the opinion of each individual might be influenced by more dominant/experienced experts in an organized group-discussion.

All participants were musculoskeletal physiotherapists, which can be considered as a positive fact. On the other hand, it may be useful to implement other health care professionals, since they might address the problem from other perspectives. Additionally, migraine and non-musculoskeletal interventions might be less known among musculoskeletal physiotherapists.

Although limited participation in this Delphi-study, the questionnaire was scored by physiotherapists who have knowledge of headache. Certain participants are active as researcher and are therefore aware of the current literature concerning headache. Moreover, the first Delphi-round constituted a multidisciplinary group of healthcare practitioners, allowing for a multi-perspective view on the investigated topic.

Lastly, patients often suffer from concurrent headache forms, which was neglected in this Delphi-study to avoid unnecessary complicated questions but attenuates the clinical inference. Similarly, we did not distinguish chronic from episodic types of headache, although this might impact the decision of a clinician. Further studies should certainly take these limitations into account.

CONCLUSION

This Delphi-survey of 14 experts in physiotherapy demonstrated that there is consensus among experts concerning the treatment of migraine, CeH and TTH. However, only one treatment gained consensus for migraine, namely lifestyle advice. Most consensus was reached for CeH. According to

303 the Delphi participants, active mobilisation exercises, upper cervical spine mobilisations, passive
304 MWM, work-related ergonomic training, and active MWM can all be considered as useful in the
305 treatment of CeH. Tension-type headache on the other hand, can best be treated with lifestyle advice,
306 manual trigger point techniques, and work-related ergonomic training. This study could not indicate
307 techniques as non-efficient, as no consensus was reached among the experts.

308 The findings are consistent with the available evidence concerning the management of CeH and TTH.
309 However, more techniques for migraine are mentioned in literature as being useful. Further research
310 involving more experts with various backgrounds from around the world and comparing different
311 treatment strategies, is needed to compile a more tailored treatment-based classification.

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TABLES AND FIGURES

TABLE 1: Demographics of participants at the expert group (n = 11).

	Expert group I (n = 5)	**Expert group II** (n = 6)
Gender	Male = 3 (60.0%) Female = 2 (40.0%)	Male = 5 (83.3%) Female = 1 (16.7%)
Profession	PhD = 5 (100.0%) General practitioner = 1 (20.0%) Neurologist = 1 (20.0%) Physical therapist = 2 (40.0%)	PhD = 5 (83.3%) Physical therapist = 6 (100.0%)
Mean (SD) years of clinical experience	16.0 (14.4)	9.8 (6.9)

Abbreviations: SD, standard deviation

TABLE 2: Demographics of participants included in the Delphi-study (n = 19).

Gender	Male = 12 Female = 7
Profession	Physiotherapist = 9 Manual therapist = 10
Country of residence	Belgium United Kingdom The Netherlands Switzerland Australia Spain Thailand
Mean (SD) age, years	39.3 (13.3)
Mean (SD) years of experience	15.3 (13.5)
Mean (SD) % of headache patients treated	33.8 (33.8)

Abbreviations: SD, standard deviation

TABLE 3*: Overview of all interventions with their percentages of consensus after round 2 and 3*

	TTH Consensus level of agreement (%)		CeH Consensus level of agreement (%)		Migraine Consensus level of agreement (%)	
	R2	R3	R2	R3	R2	R3
Upper cervical spine mobilisations	-	-	**93.33**	**93.33**	-	-
Mid cervical spine mobilisations	-	-	-	-	-	-
Lower cervical/ Cervicothoracic spine mobilisations	-	-	-	-	-	-
Upper cervical spine high-velocity, low-amplitude manipulations	-	-	-	-	-	-
Mid cervical spine high-velocity, low-amplitude manipulations	-	-	-	-	-	-
Lower cervical spine high-velocity, low-amplitude manipulations	-	-	-	-	-	-
MWM	-	-	86.67	86.67	-	-
Manual trigger point techniques	**84.62**	**92.86**	-	-	-	-
Dry needling	-	-	-	-	-	-
Kinesiotaping	-	-	-	-	-	-
Massage	-	-	-	-	-	-
Passive accessory intervertebral movements, Maitland mobilisations	-	-	-	-	-	-
Neural tissue mobilisations (sliders and tensioners)	-	-	-	-	-	-
Passive stretching (including hold-relax, CR, CRAC, ...)	-	-	-	-	-	-
Acupuncture	-	-	-	-	-	-
TENS	-	-	-	-	-	-
Active mobilisation exercices cervical spine	73.33	73.33	**100.00**	**100.00**	-	-
Active MWM	-	-	**80.00**	**80.00**	-	-
Active mobilisation exercices cervicothoracic joint/thoracic spine	-	-	-	73.33	-	-
Aerobic exercises	76.92	73.33	-	-	-	-
Neuromotor control training cervical flexor region	-	-	-	-	-	-
Neuromotor control training cervical extensor region	-	-	-	-	-	-
Neuromotor control training axioscapular region	-	-	-	-	-	-
Work-related ergonomic training	**85.71**	**80.00**	**86.67**	**86.67**	-	-
Time-contingent graded activity	-	-	-	-	-	-
Pain-contingent graded activity	-	-	-	-	-	-

General relaxation or breathing techniques	-	-	-	-	-	-
Upper limb strength training	-	-	-	-	-	-
Stretching exercises for neck/shoulder muscles	-	-	-	-	-	-
Cognitive behavioural therapy	-	-	-	-	-	-
Pain education	-	73.33	-	73.33	-	73.33
Lifestyle advice	**92.86**	**93.33**	**85.71**	-	**86.67**	**93.33**

Abbreviations: R1: round 1; R2: round 2; TTH: tension-type headache; CeH: cervicogenic headache; MWM: mobilization with movement; CR: Contract - Relax; CRAC: Contract - Relax - Antagonist - Contract; TENS: Transcutaneous electrical nerve stimulation.

- : consensus level < 70%.

Bold: consensual efficient treatments; - : non-consensual treatments

***TABLE 4**: Final list of consensual (≥ 80% agreement) interventions according to the experts*

Upper cervical spine mobilisations for CeH	*Experiencing headache symptoms at the same time as cervical spine related symptoms.* *Limited ROM (upper cervical spine, mid cervical spine, thoracic spine)* *Unilateral pain on movement** *Positive passive joint provocation test** *Positive cervical flexion rotation test**
MWM for CeH	*Limited ROM (upper cervical spine, mid cervical spine, thoracic spine)* *Experiencing headache symptoms at the same time as cervical spine related symptoms* *Unilateral pain on movement** *Positive passive joint provocation test* *Positive cervical flexion rotation test*
Active mobilisation exercises of the cervical spine for CeH	*Experiencing headache symptoms at the same time as cervical spine related symptoms* *Limited ROM (upper cervical spine, mid cervical spine, thoracic spine)* *Unilateral pain on movement**
Active MWM for CeH	*Experiencing headache symptoms at the same time as cervical spine related symptoms* *Unilateral pain on movement* *Limited ROM (upper cervical spine, mid cervical spine, thoracic spine)* *Positive cervical flexion rotation test**
Work-related ergonomic training for CeH	*Posture-related complaints (e.g. antalgic posture, complaints modified by changes in posture, changed posture such as forward head posture, chin tuck, etc.)*
Manual trigger point techniques for TTH	*Impaired muscle length/muscle stiffness (muscle tightness, sensation of tension)*
Work-related ergonomic training for TTH	*Posture-related complaints (e.g. antalgic posture, complaints modified by changes in*

	posture, changed posture such as forward head posture, chin tuck, etc.) *
Lifestyle advice for TTH	*Unhealthy lifestyle (staying awake for long periods, limited physical activity, poor diet, sleep disturbances, stress and stress-related symptoms, etc.)*
Lifestyle advice for migraine	*Unhealthy lifestyle (staying awake for long periods, limited physical activity, poor diet, sleep disturbances, stress and stress-related symptoms, etc.)*

Abbrevations: TTH: tension-type headache; CeH: cervicogenic headache; ROM: range of motion, MWM: mobilization with movement.
* *consensus at the 70% agreement level.*

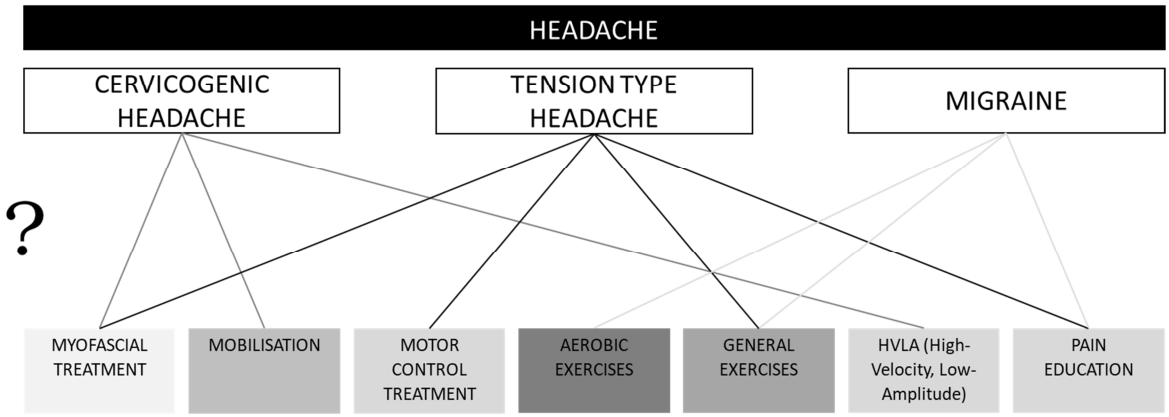

FIGURE 1: Overview of Delphi-survey structure

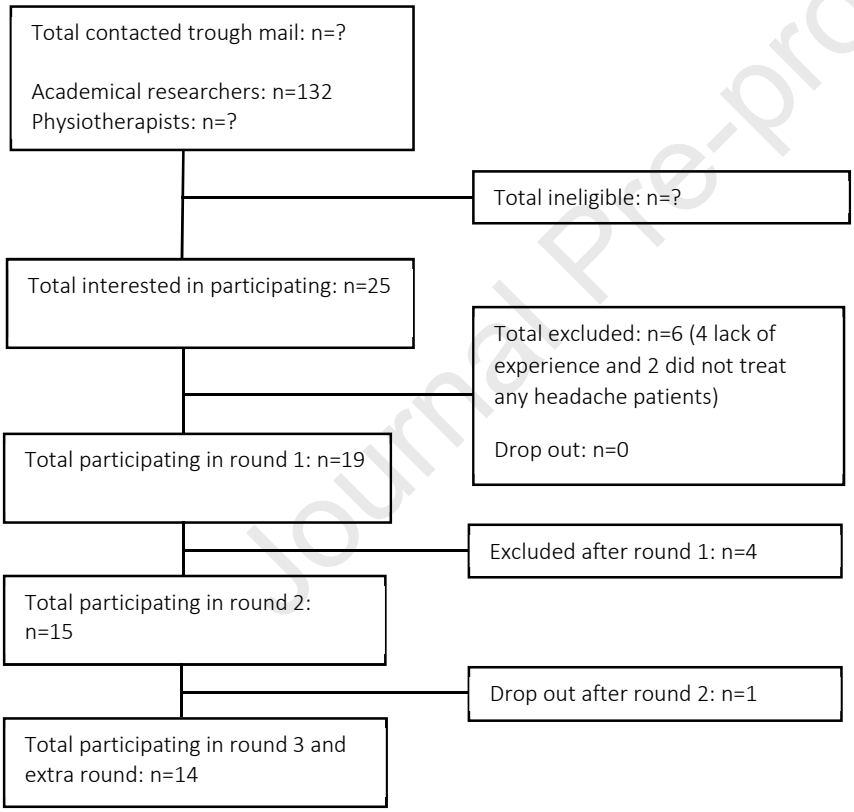

FIGURE 2: Flowchart of participation rate in the different Delphi-rounds

FIGURE 3: Overview of the results after Delphi-round 3.

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HIGHLIGHTS

- Mobilisation exercises & ergonomic training are useful for cervicogenic headache.
- Tension-type headache can best be treated with advice, and trigger point techniques.
- This study emphasizes the usefulness of clinical indicators in clinical practice.