Non-pharmacological Approaches to Stress Reduction and the Treatment of Migraines

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Non-pharmacological Approaches to Stress Reduction and the Treatment of Migraines

Megan O’Connell

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Abstract

Migraines are a disabling neurological medical condition that affects about 12% of the population. Traditionally, migraines are managed with medication however, many patients still experience migraines even while on medication. This study examines the effects of non-pharmacological treatments for migraines such as meditation, deep breaking, or yoga. First, a literature review of published systematic reviews was completed to explore the effectiveness of alternative treatment approaches. Twenty-four studies were included in the review, and the literature concluded patients with migraines can benefit from psychological interventions. Second, a qualitative online survey of 91 respondents, aged 15-40, who either experience migraines personally, or know someone with migraines, examines the positive impact of stress reducing alternatives on the disease. Finally, this research includes semi-structured interviews to how instructors feel these techniques could be beneficial for someone with migraines. In conclusion, while medication might be needed for some patients with migraines, this project studied less invasive treatment methods for migraines that could complement medication or could potentially be more effective. Results of the literature, survey, and interviews are presented with considerations for alternative approaches. Implications for future research are discussed.

Keywords: migraines, non-pharmacological, stress, treatment

Introduction

Migraines are severely painful, recurrent headaches that are suspected to result from abnormal activity in the brain. The hallmark symptom of a migraine is an escalating, unbearable, debilitating headache (Murrell 2017). Genetics make one susceptible to a migraine, but most are set off by triggers including hormonal changes, alcohol, caffeine, insufficient sleep, anxiety or
Treatment is aimed at alleviating symptoms and preventing attacks. Standard treatment includes medications that are either taken preventively or acutely to abort an attack. Commonly used medications include analgesics, triptans, antihypertensives, anticonvulsants, or antidepressants. While medications could provide some benefits, there are major side effects involved, and most patients will still experience migraines. Common side effects to these medications are fatigue, depression, weight gain, constipation, confusion, slowed thinking, and changes in appetite (“American Migraine Foundation”). Patients are forced to choose between experiencing debilitating migraines or unpleasant side effects.

Stress is a main trigger and exacerbator of migraines but is often not addressed in treatment due to the standard medication therapy. Some non-pharmacological approaches to reduce stress include reiki, yoga, meditation, hypnosis and deep-breathing. These alternatives are slowly being introduced into the healthcare field as treatment for chronic diseases. This study explores non-pharmacological approaches to reduce stress in patients with migraines that can be used either in addition to medication or as the primary treatment.

Literature review

Mindfulness based stress reduction encompasses various techniques for positive psychological and physical benefits. According to an article published by NYU department of applied psychology, key techniques of mindfulness include the ability to sustain attention and non-judgmentally accepting the present experience. After a review of the benefits of mindfulness stress reduction techniques it was concluded that “this technique works by reducing symptoms of worry associated with anxiety and helping individuals focus their attention on more present thoughts and control their emotions and tendency towards worry and rumination” (Sethi 2014).
A systematic review published in the UK in 2016 examined psychological interventions for migraines. The selection criteria consisted of trials that included participants with a diagnosis of migraine, employed a psychological intervention (Biofeedback, relaxation therapy and/or cognitive based therapy), and was published through 1999 to 2014 and were in English. Over half of the studies reviewed were conducted in the USA. Studies were excluded if they did not report a specific headache diagnosis, the participants had a diagnosis of another headache type, the study employed a non-psychological intervention, it lacked published results, or it only published physiological outcomes. An electronic search of databases using keywords found and reviewed twenty-four previously published studies. The texts were assessed by two independent people using the Yates scale, which is scored out of 35 points. Trials that did not include a therapist were score out of 33 points. The points were converted to percentages to account for the differences in max scoring. A Cochrane review was done to split the scores by midpoint (score of 18) into ‘high quality’ or ‘low quality’ studies. ≥ to 50% is considered ‘high quality’ while ≤49 is considered ‘low quality’. Seventeen out of the twenty-four reviewed studies were considered ‘high quality’. The results can be seen in table 1 below. The outcome measures used could be classified by either headache, psychological effect, disability or quality of life. Eighteen studies measured the effect of the intervention on headache outcome; fifteen of these studies reported significant improvements ranging from 20-67%. Eleven studies reported changes in headache frequency with a self-reporting method and showed a 21-67% improvement after the intervention. The largest improvement was seen when psychotherapy was combined with pharmacotherapy. Out of fifteen studies that assessed psychological outcomes, there was a 14-32% improvement in anxiety and a 18-62% improvement in depression. Disability and quality of life also had significant improvements. The results noted a large range in efficacy of
psychological interventions which could be attributed to the intensity of therapeutic content, or the diversity of the interventions reviewed. Limitations to the review included problems in methodology. Only about half of the studies published included randomization or blinding. This methodology problem of lack of studies with randomization is indicative of the fact that medication is the standard treatment of migraines and the health care system has not yet entirely accepted the impact of non-pharmacological treatments. The evidence presented in this literature review suggests that psychological interventions can be effective for migraines. However, additional research is needed to further test the effectiveness of psychological interventions for headaches (Sullivan, Andrew, et al. 2016).

Personal Survey

To complement the literature review, personal research was done with a qualitative survey created using Survey Monkey. The survey was posted online and advertised through various social media sites such as Facebook. Participation was optional and informed consent was obtained. 91 respondents, aged 15-40, responded to the survey. Participants either personally experience migraines or know of someone that does. The survey asked participants to reflect on their experience with migraines and how they feel stress could be impacting their disease. Six questions from the “Chronic Illness Qualitative Survey” published by Pacific University was adapted to focus on migraines. Qualitative responses were reviewed by two independent nursing students and through inductive methods were grouped into categories. Each category was converted to reflect percentages and were displayed on graphs.
Results

Results are presented in figures included at the end of this report. Displayed in Figure 1, half of the respondents reported being personally affected with migraines. The other 43% know someone with migraines; 7% did not experience migraines or know anyone that does. When participants were asked which strategies or actions they take to cope with migraines, 29% responded use a combination of medication and stress relief measures. 16% try to relax by decreasing the environmental stimuli and laying down with the lights off. Respondent 1 said, “The pain is excruciating, and I would do anything to make it go away.” Other mentioned forms of relief included exercise, meditation, essential oils, hot/cold towels, dietary changes, hydration and other stress reducers (Figure 2). When participants were asked if they have tried yoga, deep breathing, meditation, exercise or any other stress reducers to help with migraines, the most common response was yoga (25%). The second most common performed intervention, indicated by 17% of responses, was deep breathing (Figure 3). Other questions asked about personal control over migraines, motivation to make healthy lifestyle adjustments, and the impact of stress on migraines (Figures 4-6). 45% of respondents feel they have “a lot” of influence on their own migraines. 49% of participants have been motivated to take on healthy behaviors to “feel good” and 27% incorporated healthy changes in their life to improve their migraines. 70% believe stress has a big impact on their migraines. Respondent 2 said, “When I was younger, migraines caused me to miss too many events… I took on healthy behaviors because I wanted to try to take back some control so I could lead a life less affected by migraines.” The final question assessed if there are any stress reduction methods the respondent had not yet tried but would be interested in trying. As displayed in Figure 7, 18% responded they were interested in trying yoga. Other responses included exercise, deep breathing, massage, meditation, and journaling.
Discussion

Results of the qualitative survey indicated that many people diagnosed with migraines believe stress is a trigger for their migraines and that their condition might improve after reducing stress. Suggested methods mentioned in the survey included yoga, deep breathing, exercise, lights off, and meditation. It was interesting to see that most respondents have either tried some of these to relieve stress during a migraine attack or were interested in trying some. Reducing this stress in patients with migraines is important because about 66% believe stress influences their migraines.

Limitations to the survey can be found in the sample population. While the survey included those who experience migraines, in addition to some that do not, the survey was optional and posted online, so the respondents were most likely interested in the research topic. In future research, the sample should be random to include participants that might have not voluntarily (without prompting) opened the survey to respond. Randomizing the sample would make for a more accurate representation of the general population. The survey was able to capture the belief that stress, and migraines have an important relationship and more surprisingly, that most are interested in exploring that relationship.

Interviews

Two semi-structured interviews of those with certifications in stress reduction methods explore how and why various stress reduction methods are being adopted. Ellisa Gumina, a yoga instructor at Hope Yoga in New Jersey, believes everyone, including those with migraines, can benefit from yoga. To find out a little about Ellisa’s role as a yoga instructor, I asked her “What do you do at the yoga studio?”. Ellisa responded by saying she teaches yoga classes three times a
week including basic yoga and vinyasa yoga. Vinyasa yoga is a practice that synchronizes breath with various yoga poses. In addition to teaching classes she has also started a group at the studio for caregivers to relieve stress through yoga. Ellisa originally became interested in yoga in 2009 after being stressed as a caregiver for her husband after he had an unexpected stroke. To determine the impact of yoga on stress I asked, “How do you think yoga affects stress?” Ellisa responded by saying “I specifically went to yoga in 2009 for stress reduction. You get so much through yoga in one session. Yoga is superior because it affects mind, body and spirit all at once”.

I inquired if any of her students have migraines and she responded with, “Some students, especially lately, do come in due to physical stress on the body from diseases. Yoga is great for symptom relief because everyone can be at their own level and can listen to their own body.” Although Ellisa did not know if any of her students specifically have migraines, as an instructor she does believe people with migraines can benefit from yoga. When asked this question, Ellisa responded with “Definitely! I do think everyone can and should take yoga for reduction of stress; it is one of the biggest benefits of yoga. Yoga is more than just physical, certain physical poses calm the nervous system and bring our bodies into a state of rest and digest. For example, gentle inversions such as head below heart, changes the way the blood is flowing and can slow a heart rate. When these poses are paired with breath, the body gets more oxygen and relaxes.”

According to Ellisa, the main benefits of yoga is that it is a combined mind, body, spirit self-study. Yogi’s can learn what is going on with their own body. Before yoga many people do not pay attention to signs from their body. However, with yoga, Ellisa suspects someone going through migraines can learn to listen to their body, relax, and become more aware of self and/or triggers (Ellisa Gumina, personal communication, March 18, 2019).
Erin Garvey, owner of Earth Spirit Center in Arizona, is certified in reiki, meditation and hypnosis. Reiki emerged in Japan in the late 1800s and is an alternative form of energy otherwise known as energy healing. Reiki practitioners use palms of their “hands on” certain spots on the body to produce energy therapy. The idea is that the energy is being broken up which will relieve pain. Diseases are known to be “dis-ease”; the disease is coming through energy from the universe and breaking up or cleaning out the energy will eventually make the disease go away (Newman 2017). Erin reflected on various reiki sessions she has conducted, “I have performed reiki on people with cancer, migraines, fibromyalgia, and people that are overly stressed. People come to be helped and find a relief of pain, not necessarily to have their disease be cured”. When asked if she thinks reiki could be beneficial for people with migraines, she responded by saying she has performed reiki on many migraine sufferers and have seen both immediate relief of pain and long-term relief through the reduction in stress in result of multiple sessions.

Erin has also performed meditation and hypnosis. Hypnosis is a deeper form of meditation that can be performed by another person or eventually by self. Guided Mediation is simply another name for entering a hypnotic state. Both meditation and hypnosis can provide relief of stress and can provide pleasant, positive experiences for people to lead happier, more fulfilled lives (St John 2019). Erin acknowledged “The most important part of meditation or hypnosis is acknowledging that it does not need to be perfect. In as little as ten minutes a day, people can see reductions in their stress. Many people believe they cannot have a clear mind for that long. However meditation is about allowing the thoughts to pass through without entertaining them.” Erin also mentioned other stress reduction techniques she incorporates into her practice including anti-anxiety tips, music, binaural beats, crystals and deep breathing. Considering many respondents to the survey responded with using music to reduce stress, I
inquired to learn more about this. Erin responded with, “Meditation music produces sounds at a
certain vibration and rate. When our brains hear these sounds, our heart rate and breath is
naturally brought down to the same rate, even if we do not realize the music is being played.
Binaural beats can even play two different tones in each ear. With either method, the brain will
slow down to match the rate of the music and cause relaxation.” Deep breathing is another
method Erin discussed. There are many different types of deep breathing including beginner
methods such as belly breathing, which focuses on breathing with hands placed on the belly.
Another advanced method is 4-7-8 breathing. 4-7-8 breathing involves breathing in for 4,
holding for 7 and then out for 8 (Healthwise Staff 2018). Erin noted “By focusing on your
breath, your mind cannot pay attention to anything else, so stress is reduced.”

The final aspect of Erin’s stress reduction interventions investigated the impact of
crystals. Erin told me, “Our bodies are mostly water and the vibrations of our body fluctuate at
various points. While our vibrations are changed by stress, crystals have a constant vibration.
The idea is that the crystals, like music, can change our body’s vibrations to match the vibration
of the crystal. Crystals such as lepidolite and chrysoprase are used for anxiety and can help pull
the body into alignment and reduce stress”. Erin believes that these discussed methods could
benefit someone with migraines because headaches are often a collection of energy. Breaking up
this energy, calming our bodies vibrations and slowing our heart rate can provide symptomatic
relief during an attack or allow us to live a less stressful life which in turn will decrease the
frequency of migraine attacks (Erin Garvey, personal communication, March 18, 2019).

Conclusion

Migraines are a debilitating condition that often result in patients taking medications that
do not offer complete remission but do have intense side effects. Through this project, I hoped to
learn more about options for migraine sufferers that were less invasive than medication. The literature review analyzes scientific studies that review stress reduction to reduce migraines. The results reflect this treatment option is evidence-based theory that can be effective. The online survey showed that migraine sufferers either have tried these techniques and found them to be effective or are interested in trying them. The interviews highlight the key benefits of common stress reduction techniques from an instructor perspective. After the literature review, online survey, and interviews, I concluded that those with migraines can benefit from stress reduction interventions. Further research is needed to explore whether medication is unavoidable in treatment. However, it is indisputable that a primary trigger in migraines is stress. To alleviate migraines, it is essential to use non-pharmacological interventions and to reduce one’s stress.
References


Hoppe, Christina. “Coping with Chronic Illness: A Qualitative Study of Graduate Students in Health Professions Programs.” Pacific University Common Knowledge, 26 July 2013.


Appendix A

**Figure 1.** Assessment of migraine diagnosis

**Figure 2.** Previously attempted coping methods for migraines.
Figure 3. Previously attempted stress relief interventions for migraines.

Figure 4. Perceived control on migraines.
Figure 5. Motivation to be healthy.

Figure 6. Impact of stress on migraines.
Figure 7. Stress reduction methods that seem appealing or could possibly be beneficial.

Figure 8. Demographics (Location: State)
## Appendix B

### Table 1. Study characteristics, quality and effect on daily self-report headache frequency

<table>
<thead>
<tr>
<th>#</th>
<th>Study</th>
<th>Diagnosis (sample size)</th>
<th>Intervention</th>
<th>Duration</th>
<th>Control</th>
<th>Outcome measures</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thornton et al. [15]</td>
<td>Migraine (94)</td>
<td>Group CBT</td>
<td>10 weeks (10 x 1.5 h sessions)</td>
<td>Wait-list</td>
<td>Headache frequency, intensity (diary); psychological variables (K-III, BAI, BES, PSS-10, HAM-D)</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>De Vries and Blaesild [18]</td>
<td>Migraine (109)</td>
<td>Internet-based relaxation training</td>
<td>8 weeks</td>
<td>Wait-list</td>
<td>Headache index (diary); NPI; psychological variables (CIDI-D, SEAS); Disability (HDS)</td>
<td>N/A</td>
</tr>
<tr>
<td>3a</td>
<td>D’Errico et al. [19]</td>
<td>Migraine (108)</td>
<td>Written emotional disclosure or nonemotional writing</td>
<td>2 weeks (4 sessions)</td>
<td>Unintentional writing</td>
<td>Headache frequency (diary); intensity (anterior); severity (anterior); disability (MDADI); NDI-90</td>
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<tr>
<td>3b</td>
<td>D’Errico et al. [20]</td>
<td>Migraine (90)</td>
<td>As above</td>
<td>As above</td>
<td>As above</td>
<td>Headache frequency, NPI; psychological variables (SEAC, HAM-D, PANAS); Disability (HDS)</td>
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<tr>
<td>4</td>
<td>Dretzke et al. [21]</td>
<td>Migraine (90)</td>
<td>Exercise + relaxation</td>
<td>6 weeks (12 x 1 h sessions)</td>
<td>Information giving</td>
<td>Headache frequency, intensity (diary); Psychological variables (K-III, BAI, BES, PSS-10, HAM-D); QoL (MQoL)</td>
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<td>5</td>
<td>Vlahov et al. [22]</td>
<td>Migraine (91)</td>
<td>Physio-led relaxation training</td>
<td>3 months (6 sessions)</td>
<td>Exercise or no treatment</td>
<td>Headache frequency, days, intensity, medication (diary); QoL (MQoL)</td>
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<td>6</td>
<td>Vassallo et al. [23]</td>
<td>Migraine (58)</td>
<td>Biofeedback</td>
<td>12 weeks (12 x 30 min sessions)</td>
<td>Self-relaxation</td>
<td>Askrelaxo Blood flow velocity, headache index (log score), psychological variables (BDI, SF-36)</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Kang et al. [24]</td>
<td>Migraine (58)</td>
<td>Biofeedback + anticoagulant therapy</td>
<td>4 weeks (8 x 30 min sessions)</td>
<td>Simple biofeedback</td>
<td>Headache frequency (diary); NPI; psychological variables (CIDI-D, SEAS); Disability (HDS)</td>
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<tr>
<td>8</td>
<td>Lung et al. [25]</td>
<td>Migraine (84)</td>
<td>Exercise, stress management lecture, relaxation therapy lecture, massage therapy</td>
<td>6 weeks</td>
<td>Wait-list</td>
<td>Headache frequency, intensity, medication consumption (repetitive); psychological variable (BDI); disability (HDS); QoL; Visual analog scale</td>
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<td>9</td>
<td>Anderson et al. [26]</td>
<td>Migraine (44)</td>
<td>Internet-based self-help + therapist phone call</td>
<td>6 weeks (6 x 10 min sessions)</td>
<td>Internet-based self-help only</td>
<td>Headache index, frequency, intensity (diary); psychological variables (HISME, BAI, PSS-10, HAM-D); disability (HDS)</td>
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### Table 1 continued

<table>
<thead>
<tr>
<th>#</th>
<th>Study</th>
<th>Diagnosis (sample size)</th>
<th>Intervention</th>
<th>Duration</th>
<th>Control</th>
<th>Outcome measures</th>
<th>Quality</th>
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<tbody>
<tr>
<td>10</td>
<td>Mitrea et al. [27]</td>
<td>Migraine (120)</td>
<td>Group-based behavioral training delivered by lay therapists</td>
<td>10 weeks (7 x 2 h sessions)</td>
<td>Wait-list</td>
<td>Headache frequency, intensity (diary); psychological variables (HISME, HISSE, QoL, MQoL); disability (MIDAS); SF-36</td>
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<td>11</td>
<td>Mitrea et al. [28]</td>
<td>Migraine (126)</td>
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<td>As above</td>
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<td>N/A</td>
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<tr>
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<td>Mitrea et al. [29]</td>
<td>Migraine (126)</td>
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<td>As above</td>
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<td>Mitrea et al. [30]</td>
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<td>Migraine (120)</td>
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<td>Mitrea et al. [32]</td>
<td>Migraine (126)</td>
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<td>16</td>
<td>Mitrea et al. [33]</td>
<td>Migraine (126)</td>
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<td>As above</td>
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<td>17a</td>
<td>Mitrea et al. [34]</td>
<td>Migraine (126)</td>
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<td>Mitrea et al. [35]</td>
<td>Migraine (126)</td>
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<td>As above</td>
<td>As above</td>
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### CBT + relaxation therapy + biofeedback

<table>
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<th>#</th>
<th>Study</th>
<th>Diagnosis (sample size)</th>
<th>Intervention</th>
<th>Duration</th>
<th>Control</th>
<th>Outcome measures</th>
<th>Quality</th>
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<td>18</td>
<td>Murthy et al. [36]</td>
<td>Migraine (94)</td>
<td>CBT + relaxation training delivered by a psychologist, or temporal pulse biofeedback</td>
<td>8 weeks (8 x 1 h sessions)</td>
<td>Wait-list</td>
<td>N/A</td>
<td>N/A</td>
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<td>19</td>
<td>Mitrea et al. [37]</td>
<td>Migraine (58)</td>
<td>CBT + relaxation training delivered by a psychologist, or temporal pulse biofeedback</td>
<td>8 weeks (8 x 1 h sessions)</td>
<td>Wait-list</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>20</td>
<td>Mitrea et al. [38]</td>
<td>Migraine (58)</td>
<td>CBT + relaxation training delivered by a psychologist, or temporal pulse biofeedback</td>
<td>8 weeks (8 x 1 h sessions)</td>
<td>Wait-list</td>
<td>N/A</td>
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</table>

### Non-pharmacological treatment of migraines

- **CBT**
  - **Behavioral therapy**
  - **Exercise**
  - **Meditation**
  - **Self-relaxation**
  - **Biofeedback**
  - **Massage therapy**
  - **Stress management**
  - **Exercise training**
  - **Relaxation therapy**

### Quality assessment

- **Quality**: 25/25 (71%)
- **Percentage change in headache frequency from baseline to endpoint**: N/A
- **Quality**: 25/25 (71%)
- **Percentage change in headache frequency from baseline to endpoint**: N/A
- **Quality**: 25/25 (71%)
- **Percentage change in headache frequency from baseline to endpoint**: N/A
- **Quality**: 25/25 (71%)
- **Percentage change in headache frequency from baseline to endpoint**: N/A
- **Quality**: 25/25 (71%)
- **Percentage change in headache frequency from baseline to endpoint**: N/A

### Outcome measures

- **Headache frequency**
- **Headache intensity**
- **Medication consumption**
- **Psychological variables**
- **Disability**
- **Quality of life**
- **Visual analog scale**
Table 1. Summary of Systematic Review (Sullivan, Andrew, et al. 2016)

<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnosis (sample size)</th>
<th>Intervention</th>
<th>Duration</th>
<th>Control</th>
<th>Outcome measures</th>
<th>Quality</th>
<th>Percentage change in daily self-report headache frequency from baseline to endpoint, when reported (duration of follow up)</th>
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<td>17c</td>
<td>Migraine (177)</td>
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<td>As above</td>
<td>As above</td>
<td>Headache frequency, characteristics (diary), Disability (HDI), QOL (MgQL)</td>
<td>29/35</td>
<td>N/A (71 %)</td>
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<tr>
<td>Seng and Holroyd [38]</td>
<td>Migraine (40)</td>
<td>Behavioral sleep instructions</td>
<td>N/A</td>
<td>Placebo instruction</td>
<td>Headache frequency, index (diary)</td>
<td>13/55</td>
<td>(37 %) –26 % (12 weeks)</td>
</tr>
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<td>18</td>
<td>Migraine (40)</td>
<td>Medication</td>
<td>2 weeks (20 minutes)</td>
<td>Muscle relaxation</td>
<td>Headache days, severity (diary), Psychological measures (PANAS, STAI, VSUS), QOL (MgQL), spiritual measures</td>
<td>21/35</td>
<td>(40 %) –37 % (2 weeks)</td>
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</tbody>
</table>

BAI = beck anxiety inventory, BDI = beck depression inventory, CAPI = cognitive appraisal inventory, CES-D = Centre for Epidemiologic Studies Depression Scale, CGI-S = Clinical Global Impression severity scale, CPQ = Chronic Pain Acceptance Questionnaire, CPTQ = Coping Strategies Inventory, CSQ = coping strategies questionnaire, DASS-21 = Depression Anxiety Stress Scales, EAC = Emotional Approach Coping Scale, FFB = Feeling of Body Image (German), HADS = Hospital Anxiety and Depression Scale, HAM-A = Hamilton Rating Scale for Anxiety, HAM-D = Hamilton Rating Scale for Depression, HIB = headache disability inventory, HSS = Headache Self-efficacy Scale, HSLE = headache specific locus of control, HMS = Headache Management Self-efficacy Scale, HRQ = headache symptom questionnaire, HRS = questionnaire for assessment of control beliefs about illness and health, MADRS-S = Montgomery-Asberg Depression Rating Scale, MIDAS = migraine disability assessment questionnaire, MPQ = McGill pain questionnaire, MgQL = migraine specific quality of life, PANS = positive and negative affect schedule, PASS = Pain Anxiety Symptom Scale, PSOS = Pain Catastrophizing Scale, PSC = Pain Disability Index, PGIC = patient global impression of change, PICT = Profile d’Evaluation des Levabilités de la Chronique (German), PGQ = quality of life questionnaire, PRSS = Pain-related Self-Statements Scale, PSS = Perceived Stress Scale, SQ-88R = symptom checklist-90-R, SF-36 = Short Form 36 Health Survey, STAI = state-trait anxiety inventory

a Did not measure headache frequency
b Secondary analysis
c Retrospective headache frequency measurements used