

## Non-pharmacological treatments used to enhance sleep quality for patients experiencing sleep disturbances caused by chronic pain

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### Abstract

Chronic pain poses a significant burden on healthcare systems globally. It is often accompanied by sleep disturbances which further exacerbate a patient's condition, and therefore chronic pain can have a substantial impact on individuals' holistic health and wellbeing. This article explores the bidirectional relationship between chronic pain and sleep disturbances, before discussing three non-pharmacological aids that are recommended by NICE to treat chronic pain: cognitive behavioural therapy, exercise programmes and acupuncture. The efficacy of these various approaches is explored by assessing the latest evidence, which highlights the importance of implementing a multimodal approach that combines non-pharmacological aids to optimise patient outcomes.

### Abbreviations

*CBT-I* - Cognitive Behavioural Therapy for Insomnia

*GP* - general practitioner

*NSAIDS* - non-steroidal anti-inflammatory drugs

*PSQI* - Pittsburgh Sleep Quality Index

*RCT* - Randomised Controlled Trial

### Introduction

Pain serves as the predominant reason for individuals seeking medical care, with three of the ten modal presentations being chronic: back pain, osteoarthritis and headaches.<sup>1</sup> Chronic pain, as defined by NICE

guidelines, is pain that persists or recurs for more than three months.<sup>2</sup> This makes it no surprise that individuals experiencing chronic pain may also experience a sleep related issue. The relationship between sleep quality and chronic pain is a bidirectional one; pain can negatively impact sleep e.g. by making it difficult to fall asleep and increase awakenings, and a reduced sleep duration and quality can increase spontaneous pain and lower pain thresholds.<sup>3</sup> A systematic literature search evaluating the effect of sleep changes on subsequent pain-related outcomes established 16 longitudinal studies comprising 61,000 participants.<sup>4</sup> Results indicated a decline in sleep quantity and quality was associated with a two-to-three-fold increase of developing a pain condition.

Within healthcare, 88.9% of individuals attending a university pain clinic reported at least one sleep complaint, with over 65% regarding themselves as poor sleepers.<sup>5,6</sup> Considering the annual incidence rate of chronic pain in the UK being 8.3% with a recovery rate of 5.3%, evidenced by a large scale 4-year longitudinal study,<sup>1</sup> it is vital those affected gain a better understanding of the importance good sleep quality has on recovery. To combat this, healthcare workers recommend both pharmacological and non-pharmacological treatments. However, due to the range of potential risks associated with pharmacological treatment such as dependence, tolerance and withdrawal, non-pharmacological treatment is the preferred starting point.<sup>7</sup> Furthermore, the range of non-pharmacological treatments is extensive and has been well documented to improve sleep hygiene.<sup>8</sup> NICE guidelines identified cognitive behavioural therapy, exercise programmes and acupuncture as non-pharmacological treatments for chronic pain,<sup>2</sup> so each of these will be explored in this article.

## CBT-I

A meta-analysis evaluating the efficacy of non-pharmacological treatments for patients suffering with insomnia induced by chronic pain identified nine randomised control trials which found Cognitive Behavioural Therapy for Insomnia (CBT-I) as the main treatment plan.<sup>9</sup> CBT-I is a comprehensive treatment that addresses various aspects of insomnia by targeting behavioural, cognitive and physiological factors, and is typically conducted over 4–8 individual or group sessions. It aims to adjust and change maladaptive behaviours and misconstrued beliefs about sleep and insomnia.<sup>10</sup> Furthermore, CBT-I is the first line of treatment for individuals with insomnia caused by chronic pain, backed by the guidelines for chronic insomnia management.<sup>11</sup> These suggest that CBT-I provides better overall value compared to pharmacological interventions, as it poses fewer risks and has a stronger base for its benefits. Also, a systematic review indicated that pharmacological approaches to managing chronic pain show only minor impacts on reducing pain.<sup>10</sup> However, it may be imperative to address other interconnected symptom clusters, such as sleep disturbances, which also play a role in the persistence and severity of chronic pain, to enhance outcomes in pain management. Four randomised control trials (RCTs) examined the effectiveness of CBT-I in reducing insomnia and pain symptoms.<sup>10</sup> Overall, the results exhibit medically relevant enhancements in sleep symptoms. However, the results for pain management were inconsistent. Although the results showed advancements in pain-related outcomes within functional areas, including pain interference and disability, there was only limited evidence backing the short-term effectiveness for pain severity. Therefore, it is plausible to use CBT-I in conjunction with other treatments.

## Exercise

A common pharmacological treatment for chronic pain is long-term use of non-steroidal anti-inflammatory drugs (NSAIDs).<sup>12</sup> Although relatively safe for short-term use, they carry implications when taken long term, and one study recorded they are responsible for 30% of hospital admissions for adverse drug reactions, including renal damage, gastrointestinal bleeding, strokes and myocardial infarction.<sup>12</sup> A relatively safe and inexpensive alternative method of enhancing sleep quality is via exercise. Exercise has been supported by the 'National Sleep Foundation' and regularly features in sleep hygiene recommendations.<sup>6</sup> Research indicates that multimodal exercise regimens, incorporating a variety of activities have demonstrated efficacy in notably alleviating pain associated with the chronic pain conditions, chronic lower back pain, fibromyalgia, osteoarthritis and rheumatoid arthritis.<sup>13</sup> Furthermore, regular engagement in aerobic exercise has shown comparable effectiveness to NSAIDs in reducing pain.<sup>13</sup> More specifically, in fibromyalgia patients, a meta-analysis of RCTs examining movement therapies reported substantial improvements in sleep among 372 subjects.<sup>13</sup> Whilst research indicates that participating in exercise enhances sleep quality, the effect is reciprocal. Without a deliberate intervention, 119 chronic pain patients demonstrated a natural increase in exercise levels on days following nights of higher quality sleep. This suggests a promising build-up of events that should improve sleep quality in patient with chronic pain overtime.

Within healthcare, an 8 week 'quasi-experimental single group pretest-posttest design' was conducted by physiotherapists and nurses on the effect of light exercise in older adults experiencing chronic pain, including balancing, strengthening, stretching and towel dancing.<sup>14</sup> The study group consisted of 75 participants living in a nursing home, of which 73% had stated consistent pain in the previous 3 months. Pain intensity was collected before and after the programme using a 10-point scale. Before the programme the average pain score was 4.89, with a 2-point decrease post programme being 2.89. Although, this experiment was subjected to older adults, overall evidence suggests regular exercise is beneficial to those living with chronic pain. Therefore, it is important for healthcare workers to educate those with chronic pain on the benefits of staying physically

active, as well as adapting to the type of exercise that is safe for them to bear, as treatment for pain management.

Another healthcare study suggested exercise is a 'core' treatment for chronic knee pain, however general practitioners (GPs) do not recommend it enough.<sup>15</sup> A cross-sectional study surveyed 835 UK GPs to investigate the use of exercise in patient treatments.<sup>15</sup> 87% reported they would use exercise as an intervention, suggesting many GPs believe it has value in treating patients. However, there is evidence to suggest the utilisation of exercise for patients by GPs is linked to their attitudes and beliefs, regarding their perception of their role, responsibilities and competence in initiating exercise.<sup>15</sup> This implies some GPs may doubt the perceived efficacy of exercise in treating chronic pain, which could be down to many factors such as time constraints and perceived patient compliance to the treatment plan. Additionally, patients face social barriers when it comes to non-pharmacological treatment such as exercise, including high costs, lack of transport and lack of motivation.<sup>16</sup> This makes them less likely to comply to the treatment, limiting their condition from improving. Therefore, it is of high value that these resources are included as part of their treatment plan by the healthcare.

## Acupuncture

Acupuncture has been one of the oldest and most frequently used medical procedures for treatment of chronic conditions since being discovered in China over 2500 years ago.<sup>17</sup> It involves symptom relief by inserting needles at specified areas of the body. An increasing amount of research has shown that acupuncture could enhance various physical conditions associated with chronic pain, including fibromyalgia, headaches and musculoskeletal pain.<sup>17</sup>

A 10-week randomised clinical trial compared acupuncture with usual care for improvement in sleep quality in cancer survivors with clinically significant chronic musculoskeletal pain and sleep disturbance.<sup>18</sup> The usual care included analgesic medications, glucocorticoid injections and physical therapy. On the other hand, the acupuncture treatment consisted of both auricular acupuncture and electroacupuncture. Auricular acupuncture is specific to the ear region, whilst electroacupuncture combines traditional acupuncture of the body with electrical stimulation.<sup>18</sup> The assessment of sleep quality was measured by the Pittsburgh Sleep Quality Index (PSQI) global score.<sup>18</sup> PSQI assesses seven key aspects of sleep: subjective sleep quality, sleep latency, sleep efficiency, sleep duration, sleep disturbances, use of sleep medication and daytime dysfunction.<sup>19</sup> The PSQI global score is derived by summing the scores of these seven components and ranges from 0 to 21, with higher scores reflecting poorer sleep quality, with a cut-off of at least six points indicating poorer sleep quality. Moreover, a systematic literature search identified 49 studies evaluating different sleep quality questionnaires.<sup>19</sup> The results stated PSQI was the most widely used questionnaire for subjective sleep quality, showing good reliability and validity.

The findings from the 10-week randomised clinical trial showed both types of acupuncture significantly improved sleep quality, with patients who had auricular acupuncture PSQI score being 1.59 points lower than the usual care patients, and patients who had electroacupuncture average PSQI score being 1.42 points lower than the usual care patients.<sup>18</sup> This indicates that pain relief from acupuncture potentially improves sleep quality in cancer patients with chronic pain, compared to those that had usual treatment.

## Conclusion

In the US alone, the estimated annual cost of care and treatment for chronic pain is approximately \$650 billion.<sup>20</sup> Due to the high financial burden chronic pain has within healthcare, it is vastly important for resource allocation in this area. The management of sleep disturbances in chronic pain patients is crucial for enhancing these patients' recovery. CBT-I, exercise, and acupuncture have each

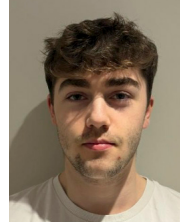
been proven to help aid this process. Nonetheless, although each of the three non-pharmacological treatments have been established as effective, it may be beneficial to not rely on them independently, but to be used in conjunction with other treatments for a more effective outcome.

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