

Asynchronous and Virtual Mindfulness-Based Treatments for Chronic Pain

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Abstract

Chronic pain conditions affect a significant proportion of Canadian and U.S. citizens and is a leading driver in the opioid crisis. They are usually non-life threatening and debilitating; however, most healthcare professionals opt to prescribe pain-relief drugs despite evidence showing pharmacological treatments often cause lower mental wellbeing and more functional limitations. Non-pharmacological treatments, such as mindfulness-based treatments (MBTs), are a fairly new approach that have been proven to be better at long-term pain management for chronic pain conditions. MBTs also provide opportunities for creating asynchronous and virtual delivery methods of treatment for chronic pain. This study seeks to synthesize research conducted on the delivery of MBTs through virtual and asynchronous methods. Five studies were used in this review from which seven themes emerged: motivation, patient empowerment, reduced medication overuse, accessibility, increased life skills, technological difficulties, and consistency. Virtual MBTs can greatly improve the quality, efficiency and accessibility of chronic pain treatment services through reducing healthcare expenditures, removing transportation barriers and providing immediate access to care. Although MBTs are a powerful pain management tool, there is still a lack of research in the field, especially concerning remote methods of delivery. Additional large-scale studies and standardization of MBTs are needed to improve the efficacy and delivery of services.

Keywords — Chronic pain, Mindfulness-based treatments, Opioids, E-health

1. INTRODUCTION

Chronic pain is the leading cause of disability in Canada and the U.S. In 2012, 19% of the Canadian population was estimated to have a chronic pain condition and, in the U.S., 8.0% reported persistent chronic pain that restricted daily activities for six months or more [1, 2]. Additionally, individuals with severe cases of chronic pain were found to be frequent visitors to hospitals, which resulted in increased healthcare expenditures [3]. In 2008, the total cost of healthcare expenditures from chronic pain and losses due to worker productivity resulted in losses ranging from \$560 to \$635 billion for the U.S. [3].

Many healthcare professionals often opt to prescribe opioids to chronic pain patients, which can lead to opioid misuse disorders and overdoses [4]. However, recent research has shown the long-term use of opioids may result in significant health concerns due to fear, distress and avoidance of activities that may cause pain. This, in turn, can lead to the disuse and decreased functioning of muscles [5, 6]. There is a growing need

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in healthcare to find evidence-based alternatives that allow chronic pain patients to manage pain effectively and in a dignified manner. With the rising rates of prescription opioid-related deaths, more patients and healthcare professionals are being cautious of the use of opioids in treating chronic pain long-term. The Center for Disease Control and Prevention (CDC) recently published a set of guidelines for chronic pain that recommended exploring non-opioid treatments first and only using opioids if benefits outweigh the risks [7]. Even non-opioids can cause health problems, such as ulcers and internal bleeding, depending on the dosage, patient's age, and how long the patient has been taking them [8].

Chronic pain conditions can be treated through three different types of treatments: opioids, non-opioids, and non-pharmacological treatments. Several studies have shown non-pharmacological treatments, such as mindfulness-based treatments (MBTs), are often more effective in long-term pain management. MBTs focus on building awareness and target psychosocial factors that may influence the trajectory and severity of chronic pain conditions [9, 10]. MBTs also seek to increase patients' self-efficacy during flare-ups or difficult times by providing them with effective coping skills [9]. This allows patients to feel more confident in their ability to handle long-term pain and reduce their reliance on short-term fixes, such as opioids. Pharmacological treatments do not cure chronic pain but decrease pain and inflammation, and often require physical rehabilitation as well to ensure full function [10].

Due to the pandemic, there has been a proliferation and increased demand and acceptability for remote health services in an effort to stem the transmission of COVID-19 [11]. Due to the rise of technology, an increasing number of households have access to at least one digital device with which they can connect remotely to others, making remote delivery of services more feasible and acceptable [12]. Moreover, technology provides many benefits, such as better patient outcomes and reduced demands on resources and wait times in hospitals as patients can be connected to a healthcare professional quicker and more easily [11, 13]. As MBTs do not require prescriptions or in-person care, they provide opportunities for virtual and asynchronous methods of delivery that can help reduce barriers to access and wait times. In this paper, I will be investigating whether MBTs are an acceptable non-pharmacological treatment for chronic pain patients that can be delivered through virtual and asynchronous means.

2. MATERIALS AND METHODS

A scan of the literature on PubMed was conducted using the search terms "chronic pain", "mindfulness", and "ehealth", with the date of publication restricted to 2010 to 2021. Qualitative and quantitative data were included to gather insight on users' experience and the success of the program based on the study's outcomes. Studies needed to have an intervention targeting chronic pain that included an element of mindfulness.

3. RESULTS

3.1. Description of Included Studies

The study selection process is summarized in Fig. 1. A total of 561 eligible studies were gathered; however, based on the titles and abstracts, only 17 were found to be relevant to the study and were considered original research. After reviewing the abstracts of the articles for relevance to the research question, a further 12 studies were eliminated as they were not related to chronic pain or did not contain results of a completed study. Three studies were not related to virtual care delivery methods, but, as their intervention could be translated to a virtual platform or delivered asynchronously, they were retained.

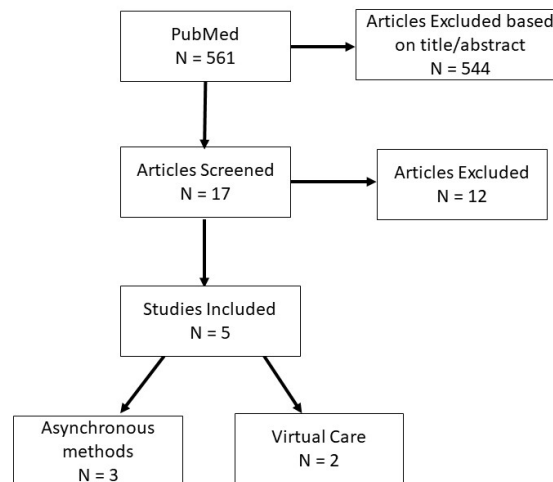


Figure 1: Flowchart of systematic review. Shows the exclusion and inclusion processes.

Studies used in the review were from the United States [14, 15, 16], the United Kingdom [17], and Italy [18]. The studies were a blend of randomized control trials and pilot studies with sample sizes varying from 20 to 206 participants. All of the studies aimed to examine the effectiveness and adherence rate of a mindfulness-based program targeting chronic pain. Some of the studies focused on a general chronic pain population [14, 15], while others focussed on more specific populations, such as chronic lower back pain [16], chronic pelvic pain [17], and chronic migraines [18]. Study populations were mostly mixed genders and adults of a wide age range and demographic, except for one study that looked exclusively at women and another study that recruited participants from a veteran's clinic. Studies looked at various virtual platforms for MBTs, such as apps [14] and digital monitoring devices [15], as well as hybrid formats that combined in-person and virtual delivery care methods [16? , 18]. The studies are summarized in Fi. ??.

Study	Design	Sample Size and Population	Intervention and Control	Sessions and Duration	Summary of findings
Zgierska et al., 2016	RCT	35 Adults in the US with Chronic Lower Back Pain treated with ≥ 30 mg of morphine-equivalent dose per day for 3+ months	Control: usual care alone Intervention: MM-based intervention combined with usual care	8 sessions 2 hours group sessions + 30 minutes/d, 6 days/wk home practice	59% (10/17) reported course was useful for pain management 47% (8/17) reported improved pain coping skills
Cosio & Swaroop, 2016	RCT	96 veterans in the US with chronic, non-cancer pain	Intervention 1: Acceptance and Commitment Therapy (ACT) Intervention 2: Cognitive Behavioral Therapy (CBT)	N/A (self-help workbook)	ACT: decreasing trend for distress with number of sessions CBT: quadratic trend (sig increases for certain lessons such as pleasant activity scheduling and activity pacing)
Greenberg et al., 2020	RCT	82 Adults in the US with chronic pain	Intervention 1: Mind-body physical activity program (GetActive) Intervention 2: GetActive with a digital monitoring device	N/A conducted on their own time	Program 1: +41m with effect size of 0.99 SD units for physical function Program 2: +50m with effect size of 0.85 SD units for physical function
Ball et al., 2019	RCT	90 patients from two gynaecology clinics within Barts Health NHS, London, UK who have chronic pelvic pain for 6+ months with access to smartphone or computer and understand English	Control: waiting list (usual care) Intervention 1: MBT + additional pain module delivered by smartphone app Intervention 2: muscle relaxation from same app	N/A smartphone app used on their own time	Qualitative data Patients: were excited before study, but less positive after Staff: expressed concerns of extra workload support due to need to troubleshoot tech problems
Grazzi et al., 2020	RCT	20 patients in Italy with history of chronic migraine ≥ 10 years and overuse of triptans or non-steroidal anti-inflammatory drugs ≥ 5 years	Intervention 1: Pharmacological prophylaxis Intervention 2: MBT delivered through smartphone	6 weekly-45-min sessions for 12 months + 12 mins long daily asynchronous sessions	Headache frequency decreased significantly ($p < 0.001$) for both groups at 6M and 12M

Figure 2: Summary of Characteristics of Studies Included.

4. DISCUSSION

With the rising incidence of opioid-related deaths, MBTs provide a powerful tool in combatting this growing issue. MBTs have the ability to reduce healthcare expenditures significantly from reducing unplanned hospital visits to cutting the costs associated with pharmacological treatments. Chronic pain patients are also more likely to see sustainable long-term improvements in their pain resilience and are better able to perform daily activities of living through MBTs. MBTs can also improve the quality of life and wellbeing of chronic pain patients by increasing an individual's self-efficacy and providing them with the skills needed to manage their pain effectively without medications. Virtual and asynchronous delivery methods of MBTs, such as through apps, CDs, booklets, and other virtual platforms, are a fairly new field in research. However, through further research and quality improvement, they have the ability to provide people with tools to manage pain on their own after an MBT program has ended and to decrease the burden on the healthcare system. Results from the systematic review have been summarized into seven themes concerning the benefits and barriers to implementing virtual and asynchronous MBTs, as well as the limitations of the review.

4.1. Motivation

The effectiveness and usefulness of MBTs are often underestimated and discounted, leading to low adherence rates. One study found providing staff with training on how to introduce MBTs, as well as information about the link between psychology and pain management, was extremely important in translating the importance of MBTs to participants [17]. It is also important to remember that MBTs require a significant time

commitment from participants to regularly practice these skills, especially during pain flare-ups. Therefore, programs must be accessible to allow participants to recognize the objectives are achievable. Greenberg et al. [14] found personalized goal-setting also helped motivate and empower participants. In this study, participants set physical activity goals; however, if they missed a weekly goal, they were given the opportunity to decrease their goals or set a more realistic one based on their weekly activity. This allowed participants to stay in control of their goals and to ensure that the goals matched their lifestyle and capabilities. It is important that the goals and layout of the program are easily understood and tailored to participants.

4.2. Patient Empowerment

Participants all enrolled in the studies due to an interest in learning new coping skills and tools for pain management. Pharmacological treatments often have accompanying side effects and may not be as effective in all situations [5]. Cosio & Swaroop [17] found participants reported more interest in the programs after they learned more about the link between psychology and pain maintenance. Throughout the program, participants were also taught cognitive defusion techniques to help them identify their values and relinquish pain anxiety, which allowed participants to feel more in control during flare-ups. Greenberg et al. [15] also reported significant reductions in catastrophizing and kinesiophobia, as well as improvements in pain resilience. Ball et al. [14] found participants reported that, after a while, they were able to use MBT skills on their own to manage their pain. Although all the programs provided different curriculums featuring different mind-body skills, they all provided participants with new skills that helped them with pain management.

4.3. Reduced Medicine Overuse

Prior to the start of one of the studies, participants were enrolled into a medication withdrawal program [18]. Throughout the MBT program portion, staff would reinforce the mindfulness-based practices and discourage participants from reverting back to pharmacological treatments. This led to higher adherence to treatment than usual in-person clinic visits and a very low drop-out rate (5% at 6M and 14% at 12M). This shows that patients receiving MBTs were able to successfully maintain the transition away from opioid treatments to mindfulness-based practices. Zgierska et al.'s [16] study also focussed on a sample who used opioids. They found only three participants reported that the program was not helpful. This was due to many reporting it was not tailored enough for their population, chronic lower back pain, or that talking about pain caused an increase in their pain levels. However, treatment groups in both studies showed high adherence rate to MBTs. Thus, MBTs provide a non-pharmacological alternative to pain management that can reduce opioid-related mortality and morbidity amongst chronic pain patients.

4.4. Accessibility

Transportation and getting to chronic pain services create barriers to chronic pain patients who may experience high pain severity and frequency of flare-ups. Virtual and asynchronous methods of delivery help remedy this by allowing services to be accessed at a convenient time for patients. It also provides access to high-quality services for those living in areas where chronic pain services or culturally-appropriate services may not be easily accessible for them. Asynchronous programs provide flexibility and portability for those who may also experience chronic fatigue or have a busy schedule [17]. They also allow services to be accessed as a preventative method and on an as-needed basis. Some studies have also found that, over time, participants became self-sufficient and no longer needed resources (18). Asynchronous programs can also reduce wait times and other barriers to enrollment into programs, such as anxiety towards group therapy programs [19]. MBTs provide alternatives to pharmacological treatments that can be delivered efficiently and are effective at pain management.

4.5. Increased Life Skills

MBTs provide skills that can be used in other areas of life. In Greenberg et al.'s [15] study, participants reported significant improvement in their performance-based and self-reported physical function. Participants in Zgierska et al.'s [16] study noted the skills they learned could be used in other aspects of life, such as stopping arguments, improving sleep and keeping a positive mindset. Many of the studies also found participants reported general improvement in their mental health [14, 15, 16, 17, 18]. MBTs were also reported to help participants relax and destress [17]. The skills gained from MBTs can be applied to many other aspects of life outside of pain management and, in turn, significantly improve quality of life.

4.6. Technological Difficulties

All virtual platforms of delivering healthcare services come with inherent technological difficulties and barriers to access. Ball et al. [14] reported participants who had difficulties or were not comfortable with technology were less likely to stick with the program, restrict the functionality of the program or refuse to start the program. To remedy this, participants suggested creating infographics and video tutorials to help orient first-time users to virtual platforms. Ball et al. [14] also recognized there may be barriers to technology, such as not having a smartphone or storage space on a device for downloading an app. Components that require Wi-Fi connectivity may also create problems with accessibility. Staff recommended lending devices, creating desktop versions, and allowing for download capabilities for when access to internet is not possible. Staff also expressed concern at the additional workload it would place on them to orient patients to apps and technology. When designing virtual methods of delivery, it is important to consider the barriers that may be presented through this method and the steps needed to address them.

4.7. Consistency

Studies that did not have weekly check-ins found participants were less likely to adhere to the program. Ball et al. (15) found withdrawal by participants was mostly caused by lack of time by participants, as well as lack of motivation to try out mindfulness-based practices. Ball et al.'s (15) program was designed to be part of a routine that was meant to be practiced regularly in order to see benefits. However, some participants reported using it intermittently due to missed reminders and not being able to fit it into their routine or devote adequate time to it. In Greenberg et al.'s (16) study, participants' progress was constantly monitored throughout the duration of the program. If they missed a goal, staff members would check up on them to take steps towards meeting the next goal. They also had weekly group sessions where they reviewed the weekly lessons and solved barriers to adherence. This forced participants to stick with the program and provided support and solutions, so participants felt motivated to persevere through the program.

Virtual platforms can also be seen as impersonal and less favourable by participants in comparison to face-to-face contact. Greenberg et al. [15] remedied technological difficulties and provided social connection through conducting weekly check-ins with participants to troubleshoot barriers to adherence and review the lessons for that week. These check-ins assisted with adherence and provided a layer of accountability for participants. Additionally, Zgierska et al.'s [16] study found peer support increased motivation and adherence to the program. Although asynchronous programs increase accessibility, they may also create barriers to services for others and should not replace face-to-face services entirely. Hybrid programs that have a synchronous option and opportunities for peer support and social connection should be further explored. The biggest barrier to adherence for participants was motivation, which can be targeted by adding accountability measures for participants and providing support from check-ins by staff members and/or peer support.

4.8. Limitations of this Review

This review had several limitations. MBTs and e-health are both new fields in research and, thus, have little research conducted. Therefore, the studies used in this review were mostly pilot studies with small sample sizes. MBTs also currently have no standardized guidelines on how they are delivered and what should be included in the different sessions. Due to the lack of consistency in the programming between the different studies, comparing the different studies' effectiveness may not be feasible. Chronic pain conditions also vary. Two studies looked at general chronic pain conditions and three studies looked at specific conditions. Further research is needed to truly investigate the effects MBTs can have on specific conditions to see if an all-size-fits approach is applicable for chronic pain conditions.

5. CONCLUSION

Studies have shown us that future virtual and remote delivery of MBTs must have certain requirements and considerations. Programs must be patient-centred by fitting

the needs and lifestyle of participants. MBTs must also be accompanied with education in order for programs to have high adherence. The science of how MBTs work is not well understood by participants and, thus, can lead to misinformation. Proper education about the importance and impact mindfulness-based treatments can have on chronic pain in combination with the program can greatly increase motivation. As chronic pain can be an isolating experience, providing opportunities for peer support allow for participants to build relationships and support each other through their journey. Apps and other asynchronous methods of delivery should look at ways to build in social connection into their programs, as this will also provide alternatives to individuals that are not keen on group therapies but are still looking for ways to connect with others. Participants need accountability from a staff person to meet their goals and stick with the program, as asynchronous programs can be impersonal and lead to high drop-out rates. Staff can also troubleshoot any technological problems and barriers to adherence for participants as they arise. Although many studies have been successful in showing the benefits over usual care, there is still more research needed to understand the costs and benefits of MBTs and to refine the design of virtual and remote MBTs. MBTs have the power to revolutionize pain management and inspire future innovation in the field of chronic pain of MBTs. However, there is still a long way to go in terms of research and providing high quality MBTs to patients.

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