



Research Article

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Non-Operative Non-Pharmacologic Management of Knee Osteoarthritis Disability-Meditation and Its Potential

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Abstract

Knee osteoarthritis, a highly common, disabling joint disease is not always amenable to surgery or pharmacologic interventions. This mini report which sought to examine the utility of some form of meditative practice as an adjunct to alleviating the pain and disability of knee osteoarthritis in later life implies that alone or in combination, several meditative practices may reduce the suffering associated with the disease process quite favorably, regardless of whether surgical and or pharmacologic strategies are indicated.

Keywords: Aging; Disability; Meditation; Knee Joint Osteoarthritis; Outcomes

Introduction

Osteoarthritis, the most common rheumatic disease, is a chronic non-fatal condition with significant individual, social and economic ramifications [1-3]. Principally due to localized disruptions in the articular cartilage tissue lining all freely joints of the body, osteoarthritis often causes varying degrees of painful mechanical dysfunction [2] that can severely impair an individual's ability to function physically without compromise [3]. Unfortunately, while useful in restoring function and ameliorating pain in severe cases of the disease, not all cases of osteoarthritis may be amenable to artificial joint-replacement surgery, especially if multiple joint sites are affected. Reducing osteoarthritic pain by means of analgesic medication and non-steroidal anti-inflammatory drugs, also frequently proves ineffective or harmful [2].

In seeking to assist people with osteoarthritis, who are frequently 60 years or older, to meet the challenges of daily life as optimally as possible, and the degree of life quality they desire,

a wide array of adjunctive methods other than medications, or surgery that might reduce the pain and disability associated with osteoarthritis, and are cost effective, have consequently been advocated and employed over the years. While helpful, persistent pain of high intensity that may accompany the disease and that stem from multiple alterations in cognitive, sensory, and emotional neural responses in addition to peripheral factors may not however be duly addressed directly albeit important to acknowledge and intervene upon to ensure osteoarthritis self-management fidelity and adherence [3]. At the same time, despite its promise in selected cases, adults with disabling osteoarthritis may report not being sufficiently educated about the disease and its multiple treatment options and prognosis, a situation traceable in part to the presence of poorly described and possibly applied usage descriptions and outcomes of patient education approaches published in the current evidence base [4], including the value and potential of one or more meditation based approaches [3]. Many too, may not employ or

engage in any non-pharmacologic strategy even though these are recommended before surgical treatment options are considered [5] if both clinicians as well as patients do not feel confident in generalizing the idea of conservative self-management treatments for mitigating their osteoarthritis pain via mind-based methods and others. Indeed, patients themselves may not be sufficiently enthused towards applying the principles of disease self-management in general [6] if their providers do not mention the value of this approach, especially those that include the option of one or more low cost non toxic or noxious mind-body practices [7].

Since there is increasing evidence that the rates of disability produced by osteoarthritis are not inevitable, but that lifestyles and behaviours have powerful influences as well, the objective of this brief was to review whether mind body applications of any format might be effectively applied for mitigating chronic osteoarthritis pain [7]. Although directed towards a conservative prescription for the management of knee osteoarthritis, an important cause of pain and physical disability in the community [8], the therapeutic rationale outlined should be applicable to other joint sites commonly affected by osteoarthritis.

Methods

To obtain relevant data, and to examine the validity of the premise that it is possible to prevent or moderate excess knee osteoarthritis disability and pain among at least some affected older adults, the PUBMED data base housing the largest collection of peer reviewed medical data in the world was searched using the key words, chronic pain, osteoarthritis, knee joint, mindfulness, and meditation. Although some work has been implemented to systematically review the research in this realm, most studies alluding to meditation techniques and their influence on one or more osteoarthritis symptoms focus on diverse approaches, non-uniform samples, and various subjective rather than objective outcomes, topics, precluding any useful quantitative synthesis at the present time. Several posted articles were proposals for future study, not completed studies, and although denoting interest in this idea, were not examined. The data extracted were also not analyzed systematically as the samples studied were low in number, were followed for limited time periods that were highly variable, and samples studied were heterogeneous with no uniform sample characteristics in many cases. Consequently, we elected to examine some of the observed trends in what is known about the attributes and impact of meditation as applied to alleviate knee osteoarthritis pain in an aging adult and only completed studies and original publications that mapped the themes of interest were considered. Using a narrative description, the most salient mind body perspectives examined clinically as either one component of conservative or surgical interventions for knee osteoarthritis is presented. A focus was placed on meditative approaches that have some proven efficacy in other health realms but are possibly underutilized and reported, and in regards to the knee joint, the joint most affected by osteoarthritis regardless of degree of pathology. Populations younger than 60 years of age and those who were not resident in the community were excluded.

Overall Findings

The disease known as osteoarthritis remains one of the top causes of disability in later life, especially when affecting one or both knee joints. Creating an immeasurable public and personal health burden, these costs are likely to rise as many adults live to higher ages. Although the pathology of osteoarthritis, which largely entails the presence of varying degrees of cartilage tissue damage that normally serves as a protective and knee shock absorbing role, the disease also entails various degrees of underlying bone tissue remodelling and over time its progressive exposure. As the disease progresses, the affected joint or joints may become very painful, inflamed, and stiff, thus limiting the ability to move freely as well as safely, especially if the knee becomes unstable. As time progresses, many sufferers also inevitably develop progressive weakness in their knee muscles, muscle contractures and wasting, as well as poor muscle endurance. They may also exhibit an array of reactive cognitive features of anxiety, depression, fatigue, poor self-confidence, and despondency if pain persists or becomes more intense over time [9]. As a result, the person suffering from this disease may find their health situation very challenging and stressful, and thus may feel overwhelmed and unmotivated to undertake those health behaviours that could slow or retard its painful progression. At the same time, both persons with the condition as well as their providers may simply believe osteoarthritis is inevitable, and that the thought of reversing or attenuating this condition through alternate nontraditional approaches is 'heresy'. They may also believe strongly and more ardently in the use of various modes of injection, plus an array of narcotics and surgery to mitigate the condition. As a result, in addition to neglecting or refuting the idea that it is possible to reduce the osteoarthritis burden quite considerably through self-management techniques, the failure to act accordingly commonly predicts a hastening of ensuing joint destruction processes [10].

This is unfortunate because as a result of the above-mentioned pathological changes and others, the individual, such as an older adult, may find it impossible to live independently in the community as desired, even if planned for. Their desired life quality may not be achieved either, and may decline more rapidly than those with comparable joint lesions who are willing to apply or partake in one or more long term meditative or mindfully oriented health practices [7]. On the other hand, anxiety, depression, and impaired psychosocial functioning, along with an improved self-image and better mobility, are additional possible attributes of disability that could be enhanced post meditation [7]. Similarly, the ability of an individual to carry out his or her normal activities of daily living without undue stress may improve, even if only a single bout of virtual meditation is forthcoming [9,10]. Also envisioned is an enhanced ability to live independently with less pain and disability, better psychological health, and a greater ability to carry out self-care management and activities [3,12-18]. In particular, because mechanical stimuli are essential for the growth and maintenance of cartilage [19] it appears that an improved ability to move in the face of a post meditative assisted decline in pain intensity may yield multiple disease-related benefits [20].

In short, while osteoarthritis may not be inevitable regardless of age, nor severely disabling in all cases, even if both knees are affected, when present, older adults who are evaluated carefully and assisted to follow a carefully construed and timely set of non-invasive drug free treatment strategies to reduce pain and enhance function may yet find this beneficial. In particular, it now appears that meditation or periods of silence or cognitive rest or tranquillity, and/or musings applied independently or as an adjunctive mode of conservative therapy can help initiate a state of calm and with this more effective goal setting and achievement, and over time one or more clinically relevant anti osteoarthritis outcomes, even if not consistently recognized, or practiced [14]. This is because meditative oriented practices, often advocated for mitigating chronic pain, may also help catalyze and set the stage for better health in general, and more profound action-based effects among those knee osteoarthritis cases already trying to self-manage their disease, especially if these are implemented in the early phases of the disease [9]. They may also help reduce depression, and stress, while fostering a sense of self-efficacy, power, and motivation for taking charge, rather than becoming overwhelmed, expending unnecessary energy, and feeling dejected, and consequently for heightening their life quality and possibility longevity [13], and pain coping ability [13]. As well, if practiced diligently over time, there may be fewer disease flare ups, less fatigue, and if required, better post operative healing of a surgically replaced knee joint [15]. Moreover, mechanisms of action are quite well studied and known and the benefits of meditation have long been revered and revealed in many health realms and others in Eastern cultures [15].

The effects of meditation approaches may however require discipline, and only emerge over time, and because the favourable impacts that emerge are possibly cumulative, are difficult to capture in observational studies, and others, and hence to aggregate. At the same time, it is often impossible to differentiate meditation impacts when practiced from other rehabilitation program and intervention impacts. Their wide variations also renders it especially disadvantageous to replicate-synthesize or reproduce. In addition to multiple presentations of knee joint osteoarthritis among the older population, it is challenging to quantify meditation oriented practices because they are mental techniques that range from those designed to 'empty' the mind of thoughts to a variety of: Yoga Practices, Biofeedback, Breathing or Device Assisted Breathing Exercises, Qi-Gong, Imagery, Mindfulness Based Stress Reduction Practices, Music Listening, Prayer, Relaxation, Visualizations, Self-Talk, Goal Setting, or Tai-Chi. Further challenges that limit anything, but careful design at this point to exclude or limit confounding factors is the fact meditation can proceed with or without the application of a variety of physical modalities known to relieve pain and enhance muscle function and intermittent joint compression in those with knee osteoarthritis [16-19]. However, rather than simply sitting or reclining in quiet to clear the mind, it appears the general principle of focusing the mind internally and/or externally in a proactive positively expectant manner may help the knee osteoarthritis sufferer to experience a feeling of calm and less distress, more motivation, less pain, depression, or anxiety. The practitioner may gain an important sense of being more

empowered, and sufficiently energized to be more functional and productive economically and socially. It is also possible that those older adults who consistently undertake both mental activities of mediation origin plus modest physical activity thereafter can expect more joint flexibility, strength, and functional stability and hence acquire the apparent ability to live successfully despite their knee osteoarthritis. This realm of practice may in fact prevail and be quite widespread, but under reported or acknowledged or is not revealed due to scepticism in the medical realm, non-inclusion in training curricula, and others.

Clearly an area of great promise, it appears more research will greatly help to enlighten practitioners, policy makers, and the general public about this promising realm of health protection, and apparently safe, effective form of pain mitigation. and hence until more research is forthcoming, the clinician can feel confident they can advocate for this intervention if the clinical aim to achieve: 1) a reduction in knee joint pain, knee muscle spasm and/or swelling, 2) an increase in knee mobility, stability, strength, endurance, proprioception, balance control and/or gait efficiency, 3) optimal aerobic fitness or weight control, or 4) high life quality, and socio emotional as well as physical wellbeing. They can clarify what mode of intervention might be most suitable, plus the frequency of application in light of their client's beliefs and abilities.

In the interim, as revealed over time in Asian settings, more contemporary pilot evidence implies a beneficial role for mantra-oriented meditation in alleviating mood factors and related outcomes associated with knee osteoarthritis [21], including pain and coping especially if the intervention is carefully tailored to the patient's specific needs and beliefs and condition [22-26].

Gao et al. [27] concluded that virtual reality (VR)-based mindfulness is a further promising well accepted method that can be applied to improve the health of older adults. Furthermore, VR mind-body exercises may be combined with other forms of exercise as a mixed method to promote the health of older adults successfully at low cost. Other data show spiritually based interventions including meditation and yoga can also benefit blood pressure control-a common knee osteoarthritis co-occurring sign [28] as well as pain [29] and lipid levels [30] that may be helpful in a disease where obesity is a key factor [31]. It is also possible that observed autonomic system dysfunction in osteoarthritis that evokes pain may be favorably affected via the adoption and practice of one or more meditative approaches [32].

In this regard, as with other forms of therapy responses as well as needs cases may well differ, hence the selected approach or combination thereof should be developed not only based on a thorough evaluation process, but in conjunction with input from the affected individual so as regarding: (a) the nature of any recommended form of meditative practice, (b) its benefits and safety record; (c) and low cost. As in other realms of therapy, desirable mind-body interventions applied alone or in combination with other approaches are likely to be most effective if they are supported by a skilled empathetic interventionist who has a positive outlook, and is also conversant with the importance of health

beliefs and practices in the disease management process. Written or videotaped instructions and others that are understandable by both the patient and their significant may prove especially beneficial. Finally, to mitigate the impact of depression due to the pervasiveness of the disease and to help build self-regulation ability [25] plus patient confidence and neural benefits that can be demonstrated objectively [26], employing one or more meditative practices on a regular basis, while enacting concurrent small achievable non stressful management steps and /or other forms of conservative intervention, may prove highly beneficial [32-34] even if more study is needed [35]. In addition, a long-term rather than short-term view plus appropriate ongoing feedback as indicated, along with emotional support for both patients and caregivers may likewise prove highly advantageous, as it appears chronic pain that is unrelieved can alter certain related brain circuits or pathways such that they are less readily impacted by efforts to alleviate pain [36] and stress or sleep disturbances that are unrelieved [37, 38].

By contrast, patients who suffer excess pain and emotional distress may not perceive improvements in their symptoms, no matter what treatments are forthcoming if possible emotional correlates of the disease remain unaddressed. Others may not consider the importance of acknowledging osteoarthritis psychological complications and addressing these in the context of more obvious physical joint signs such as effusion, muscle mass loss, joint instability, and fatigue. Many patients too may have high blood pressure, which may not be well controlled, but are not cautioned to avoid excess exercising, while others who wish to follow more static forms of cognitive intervention are not given clear directions or support and information regarding the parallel importance of joint protection, especially if pain is relieved.

To be effective, meditative oriented prescriptions to counter osteoarthritis debility should receive the same attention as other forms of intervention, while taking into account the individual's personal goals, preferences and interests, as well as their psychosocial status, and perceived self-efficacy for undertaking self-care and mind body practices. The finding that participation in meditation in some form enhances overall mindfulness and attention attributes [39] may be a salient osteoarthritis disease mediator that reduces opioid dependency and possibly the ease and motivation for disease self-management, coping and control, and protection against stress due to their associated cortical neural modulation potential and ensuing painful stressful disease relieving features [39-42]. Another possible favorable outcome is an improved degree of self-efficacy or confidence beliefs that impact coping ability and motivation in the face of adversity [41] plus self-regulation ability and decreased pain meditation need in response to an extended program of progressive muscle relaxation, meditative breathing, and guided imagery [43]. Moreover, it appears self-reported decreases in disablement may increase feelings of empowerment to remain active and improve their wellbeing, especially among older adults who live in relative isolation [44], and regardless of most insurance barriers [45]. The rate of cellular aging may also decline, as may perceived osteoarthritis severity [46], while positive aging expectations may be enhanced. In addition, pain, depression and

anxiety may be mitigated. Sleep quality, energy levels, and executive function may also improve in response to extended as well as brief meditative practices or attempts to foster positive mindfulness states [47-50, 46].

Discussion

This review focuses on osteoarthritis, a common painful progressive disabling disease, frequently affecting the knee joint of older adults and thereby imposing considerable disability and high societal costs that are rising rather than falling. Unfortunately, pharmacotherapy and surgery applied to control or reduce pain, improve function, and retard disability, are not universally indicated or safe or effective. In addition, and despite years of research, a variety of conservative management approaches recommended for reducing or minimizing the disability as safely as possible and that can offer some possible promises are often overlooked or practised sporadically rather than consistently.

One reason for this latter observation may be the lack of appreciation that osteoarthritis is not only a physical condition, but one that has multiple emotional and cognitive features and cannot usually be successfully addressed by a single or singular approach in the face of chronic pain. Another is that, not only is targeted therapy less likely to address cognitions and distress based on current standard practice recommendations of diet and exercise, but even if they do, effective education directing older adults with knee osteoarthritis to be mindful in their health behaviours, as well as consistent with their individual health recommendation applications may fail to foster desired improvements in care. To this end, preventing undue disability via the independent or supportive use of meditation like practices may prove more helpful than not, especially if there is some bearing on stress relief plus greater motivation for undertaking recommended exercises and joint protection [41].

Indeed, research from other realms and that can be applied to knee osteoarthritis or any other affected joint shows psycho-affective states or traits such as stress, depression, and anxiety that can accompany the disease and can affect sleep, cognitive and mental health, can also impact overall health status and pain. On the other hand, some degree of mental or meditative oriented training designed to enhance mindfulness states and reduce stress may not only improve brain structural and functional attributes that foster emotional and attention regulation, but may help reduce those adverse emotional states often found in the older adult suffering from chronic pain [51].

That is, unlike medications which do not reverse the disease process, and may be harmful, addictive, toxic, or contra indicated, a significant proportion of older adults both healthy and those with health challenges have shown adequate distress symptom relief with the initiation and practice of various mind based therapeutic approaches such as meditation, especially pain relief. This may be advantageous from multiple view points, including having the patient play a more active role in their own self-care that can optimize joint physiology and joint integrity as well as healing in light of all potential contributing factors including emotions to any

prevailing structural joint stresses, damage and dysfunction [52, 53]. Shown to have the potential to reduce pain and inflammation, its usage may yet help prevent excess disability, while promoting independence, as well as life quality, even if surgery is required [54] and the pain state is deemed neuropathic [55, 56].

At the same time, excessive fatigue that accompanies the disease may diminish, treatment goals may be more readily attainable, and outcome expectations as well as measurable outcomes indicative of a higher life quality and functional ability may emerge. Finally, dispelling the myth that osteoarthritis is inevitable and progressive and that nothing can be done in this regard, and revealing the promising results of many current non-pharmacologic intervention options with meditation oriented approaches plus their low negative outcomes [57] and freedom from risk of side-effects may provide patients and providers with a strong rationale for pursuing such a program alone or in conjunction with standard care to foster wellbeing and alleviate suffering [57]. The approach, although hard to examine collectively is also apparently one that can be done at low cost and without provider presence.

In this regard, in light of the failure of prevailing pharmacologic and surgical interventions to prevent osteoarthritis disability in all cases, and especially the high chances of reactive disease manifestations such as depression, the promise of mindfulness interventions that may foster overall function safely should not be ignored. Current research is indeed promising and can be strengthened by future research to investigate the short and long-term benefits of the various mindfulness intervention approaches carefully and with advanced technologies. As well, efforts to comprehend the mechanisms underlying mindfulness meditative efforts on osteoarthritis wellbeing may reveal novel understandings of the disease processes. Based on their ability to heighten healing processes, whether they can assist in efforts to improve cartilage regeneration efforts or minimize inflammation that can worsen structural damage should be examined. In the interim it appears adding a mindfulness-based intervention to neuromuscular exercises and others appears to reduce pain intensity and improve function, balance and quality of life in adults with knee osteoarthritis [55], in addition to speeding up recovery post knee joint replacement therapy [58].

However, success in this regard is more likely to be heightened by consistent rather than sporadic applications [59-62, 53], and as with other forms of treatment should entail careful assessments of what appears most appropriate as well as acceptable to the individual patient, followed by well construed educational component and the provision of resources and clear prescriptive advice [61]. It is also the author's view that even if such an approach only reduces pain to some degree [62] but does not prevent the progression of the disease or reverse it, health status as a whole is likely to be more positively impacted than not by employing these aforementioned non pharmacologic self-management directives especially among those who are anxious or lonely. Mindfulness as one post-surgical rehabilitation strategy also appears to yield more favorable outcomes than not even if pain itself is generally mitigated and especially if it is not [63]. Attributes that may require

attention in this regard as well as other disease states include catastrophic thinking, dysfunctional illness perception, worry, fear, negative attention, fatalism, poor mental health, anxiety, rumination, depression [63] and obesity, inflammation, physical activity avoidance [64]. The basis for the application of a mind body perspective into osteoarthritis care is that pain, depression, obesity and osteoarthritis that often occur concurrently can exacerbate each condition via their common physiological correlates and that involve systemic inflammation and a complex set of mind-body interactions, but are not usually helped by standard care relative to placebo, and do not emphasize mind-body practices or activities to target the underlying cognitive and emotional pathological attributes [64] especially if pain can be modulated peripherally and/or centrally along with brain related function to some degree [9, 65-68]. An association between having a higher degree of mindfulness and life quality in knee osteoarthritis cases as well as less post-surgical pain and better function has also been reported [66,69,52].

In sum, based on a scan of available data, and regardless of study design, many aspects of knee osteoarthritis disability may be lessened in response to meditative mind body strategies. These include positive mood, pain, anxiety, immune function, mobility, inflammation, stress reduction, emotional regulation changes, cognitive processing and coping efficacy, muscle strengthening, flexibility, and self-healing benefits even in older adults with declining cognitive capacity [28,70,71,72,73]. Regardless of mode employed, more intense consistent practice appears to safely and cost effectively induce one or more favorable measurable results compared with limited or no practice, even if the meditative technique is no longer practiced. It is simple to learn and apply with no time constraints and does not need direct hands-on help because it can generally be supported by multiple information sources and devices for home self-cultivation and management or clinic usage such as:

- a) Apps
- b) Books
- c) Digital/internet delivered methods [64]
- d) Digital culturally tailored music-based mindfulness intervention [53]
- e) Health provider[s]
- f) Instructors/classes
- g) Instruction manuals [64]
- h) Podcasts
- i) Telephone instruction and guidance
- j) Videos [50]

However, as in all areas of osteoarthritis more insightful well controlled research is clearly needed here in efforts to offset excess knee osteoarthritis disability [74] and to inform the planning of resources and resolve its numerous health economic dilemmas and others [1]. Possible mechanisms to explain meditative

induced effects on joint status, depression and anxiety, and joint inflammation, which await further study, could likewise prove highly valuable. Efforts to conduct more criterion stringent subgroup studies and that account for numbers of knees affected, source of condition, if known, plus health status, and status of other joints and exposure to other interventions must be carefully delineated to avoid null, flawed, non-conclusive, or questionable results.

Implications and Conclusions

Emerging evidence that osteoarthritis of the knee has multiple cognitive, behavioral, perceptual, neurological and inflammatory correlates and is not universally responsive to standard care with any degree of reproducibility and high efficacy implies that some possible gap exists in either the research or practice realm or both that warrants attention. Indeed, even if data are incomplete and definitions inconsistent, commonly omitted from the 'weaponry' recommended for treating or alleviating this condition, and even though multiple cognitive as well as physical benefits of clinical relevance prevail, meditative interventions are usually not embedded in practice-based reports or recommendations for the future. This may in fact be an oversight that requires due consideration because the older adult may otherwise suffer needlessly and unsuccessfully. Indeed, at a time when alternative medicine is being sought because mainstream approaches may not suffice, the reason may be that many clinicians commonly fail to consider knee osteoarthritis cognitive and emotional correlates and their interactions with joint status as a primary intervention

consideration, thus potentially yielding less than optimum or anticipated results.

In the meantime, despite our currently limited English based review and possible publication bias and multiple design flaws what does appear to have merit is the:

- i. Considerable promise being shown in emerging data to indicate that even if the provider and/or patient are skeptical and more research is needed, actionable efforts to undertake meditative practices may be helpful for reducing the disability of knee and other forms of osteoarthritis.
- ii. Evidence showing meditative practices may be especially helpful in those older adults with chronic pain because they can objectively alter neural structures and pathways that have the potential to induce a decrease in pain intensity immediately, as well as cumulatively, over time in a nontoxic manner.
- iii. Evidence showing, they may help to lessen stress, obesity, blood pressure, muscle weakness, muscle tension, fatigue, and depression analogues that could otherwise worsen the knee osteoarthritis condition, while improving self-management ability, self-confidence, sleep quality, and motivation.

Modes of brief or intermittent meditation approaches or techniques that show promise and are easy to apply at any time of day in most venues other than clinics or hospitals and at low cost-include but are not limited to:

Body scanning
 Controlled breathing [65, 77]
 Focus-based meditation
 Guided meditation
 Heartfulness meditation [72]
 Imagery
 Mantra based meditation [22, 60]
 Meditative movement practice [71]
 Mindfulness-based stress reduction program [61, 67, 69]
 Mindfulness meditation
 Positive emotion enhancing/ Savoring meditation [77]
 Sitting meditation
 Tantric self healing meditation [69]
 Telehealth mindful exercises [78, 80]
 Visualization or prayer mediation
 Walking meditation [79]

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Conflict of Interest

No conflict of interest.

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