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| **CRITICALLY APPRAISED TOPIC** |

**FOCUSED CLINICAL QUESTION**

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| In middle age adults with chronic pain, is meditation an effective means of reported pain management or pain reduction? |

**AUTHOR**

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| **Prepared by** | Abbie Marrale | **Date** | 3/13/2016 |
| **Email address** | Abbie\_marrale@med.unc.edu | | |

**SUMMARY OF SEARCH**

[Best evidence appraised and key findings]

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| Jeitler et al (2015)1: This study suggests that meditation might be an effective treatment for reducing chronic neck pain and pain-related bothersomeness while not affective function disability, and psychological outcomes.  Onieva-Zafra et al (2015)2: The treatment group reported statistically significant lower levels of pain (p<.046) and depression (p<.010) than the control group at the week 4 evaluation. A statistically significant effect on pain as measured by the daily VAS diary was also found in the experimental group. At week 8, no significant differences were found for pain.  Banth & Ardebil (2015)3: The results showed that the experimental group who were subjected to the MBSR showed a significant improvement in their overall pain severity, physical and mental quality of life scores due to the training received as compared to the control group who received only usual medical care.  la Cour & Peterson (2015)4: A standardized mindfulness program (MBSR) contributes positively to pain management and can exert clinically relevant effects on several important dimensions in patients with long-lasting chronic pain.  Reiner et al (2015)5: Results showed that mindfulness training had a significant effect on heat pain threshold and on the response pattern of tonic heat pain stimuli  Lee et al (2014)6: The majority of the studies showed favourable effects for mindfulness/meditation, with five studies reporting overall small effect sizes (d=0.2-0.5). Based on the current evidence, no recommendation could be made for meditation/mindfulness as a treatment for chronic pain symptoms at this time.  Busch et al (2012)7: The results suggest that the way of breathing decisively influences autonomic and pain processing, thereby identifying DSB in concert with relaxation as the essential feature in the modulation of sympathetic arousal and pain perception. |

**CLINICAL BOTTOM LINE**

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| The evidence suggests that meditation is an effective means to manage pain. However, there is very little evidence that meditation actually reduces pain. There are many different types of meditation that have been studied, and while this helps broaden the application of meditation, it also dampens the evidence.  This review of the literature concludes that the ultimate goal of mindfulness based stress reduction therapy, or meditation, should not be primarily focused on pain reduction, but on cultivating a better relationship with the pain. It should also be noted that while meditation may be an effective strategy for pain management, it is not a replacement for standard treatment. |

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| ***This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor*** |

*The above information should fit onto the first page of your CAT*

**SEARCH STRATEGY**

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| **Terms used to guide the search strategy** | | | |
| **P**atient/Client Group | **I**ntervention (or Assessment) | **C**omparison | **O**utcome(s) |
| Chronic Pain  Pain | Meditation  Breathing Techniques  Guided Relaxation | N/A | Pain  Reported Pain  Pain Management  Pain Perception |

**Final search strategy:**

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| **Databases and Sites Searched** | **Number of results** | **Limits applied, revised number of results (if applicable)** |
| **Pubmed** |  |  |
| Search #1: (pain OR chronic pain) | 633,454 |  |
| Search #2: (Meditation OR breathing techniques OR guided relaxation OR diaphragmatic breathing) | 88,228 |  |
| Search #3: (pain OR reported pain OF pain management OR pain perception) | 633,705 |  |
| Search #4: (pain OR chronic pain) AND (Meditation OR breathing techniques OR guided relaxation OR diaphragmatic breathing) | 3,690 |  |
| Search #4b: (chronic pain) AND (Meditation OR breathing techniques OR guided relaxation OR diaphragmatic breathing) | 442 |  |
| Search #5: (chronic pain) AND (Meditation OR breathing techniques OR guided relaxation OR diaphragmatic breathing) AND (pain OR reported pain OF pain management OR pain perception) | 287 | Clinical Trial  Review |
| Search #6: “chronic pain” AND (Meditation OR breathing techniques OR guided relaxation OR diaphragmatic breathing) AND (pain OR reported pain OF pain management OR pain perception) | 84 | Clinical Trial  Review  English |

**RESULTS OF SEARCH**

**Summary of articles retrieved that met inclusion and exclusion criteria**

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| **Author (Year)** | **Study quality score** | **Level of Evidence** | **Study design** |
| Jeitler et al (2015)1 |  |  | Randomized Controlled Clinical Trial |
| Onieva-Zafra et al (2015)2 |  |  | Randomized Controlled Trial |
| Banth & Ardebil (2015)3 |  |  | Randomized Controlled Trial |
| la Cour & Peterson (2015)4 |  |  | Randomized Controlled Trial |
| Reiner et al (2015)5 |  |  | Randomized Controlled Trial |
| Lee et al (2014)6 |  |  | Systematic Review |
| Busch et al (2012)7 |  |  | Assessor-blinded, single-arm, prospective study design |

Jeitler M, Brunnhuber S, Meieir L, et al. **Effectiveness of Jyoti meditation for patients with chronic neck pain and psychological distress – A randomized controlled clinical trial**. *The Journal of Pain*. 2015;16(1):77-86.

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| **Aim/Objective of the Study/Systematic Review:** |
| Aimed to evaluate the effectiveness of an 8-week meditation program (jyoti meditation) in patients with chronic neck pain by means of a randomized clinical trial. |
| **Intervention Investigated** |
| *Control* |
| * Home-based exercise program with a wait list offer for meditation. |
| *Experimental* |
| * 8-week meditation program with weekly 90-minute classes |
| **Main Findings** |
| Meditation training significantly reduced pain when compared to the exercise group after 8 weeks (reduction of 44.5 +/- 23.3 mm to 21 +/- 17.2 mm in the meditation group, and 43.8 mm +/- 22.0 mm to 37.7 +/- 21.5 mm in the exercise group; mean difference: 13.2 mm [95% CI: 2.1, 24.4; p=.02]). Pain-related bothersomeness decreased more in the meditation group (group difference 11.0 mm [95% CI:1.0, 21.0; p=.03]). No significant treatment effects were found for pain at motion, psychological scores, and quality of life, although the meditation group showed nonsignificant greater improvements compared to the exercise group. |
| **Original Authors’ Conclusions** |
| This study suggests that meditation might be an effective treatment for reducing chronic neck pain and pain-related bothersomeness while not affective function disability, and psychological outcomes. |
| **Interpretation of Results** |
| Jyoti meditation is a technique for controlling and directing attention away from the physical body and sensations through 1) sitting motionless, 2) repeating a mantra, and 3) visual concentration while keeping the eyes closed. Patients were asked to participate in a 75- to 90-minute meditation once a week for 8 weeks. It was also recommended that participants practice meditation at home for 15-30 minutes per day. This study demonstrated a surprisingly high dropout rate in both groups, and between 58% (meditation group) and 66% (exercise group) reported adhering to the recommendations of meditation or exercise. For the participants that were included in the analysis, meditation was still more beneficial than exercise for the primary outcome of neck pain intensity as rest. In fact, the pain measure dropped by nearly 50%. This demonstrates that meditation may be a beneficial therapy in ‘resetting’ baseline pain scores, especially considering there were no other significant differences in the secondary outcomes (pain with motion, stress, anxiety depression, and disability). |

Onieva-Zafra MD, Garcia LH, del Valle MG. **Effectiveness of guided imagery relaxation on levels of pain and depression in patients diagnosed with fibromyalgia.** *Holis Nurs Pract*. 2015;29(1):13-21.

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| **Aim/Objective of the Study/Systematic Review:** |
| The aim of this study was to examine the effectiveness of guided imagery intervention in a heterogeneous group of people suffering with fibromyalgia. The hypothesis tested in the study was that there would be significant improvements in pain and depression for the treatment group and no significant changes in the control group. |
| **Intervention Investigated** |
| *Control* |
| * Those in the guided imagery group participated in an 8-week guided imagery course presented in the form of two CDs developed by the authors. The CDs were 15 minutes in duration, and for the first two weeks they were instructed to use the CD at least 4 times per week. On subsequent weeks they were instructed to use the CD no more than once per day as many days as they chose. Pain was recorded via the VAS daily and they were instructed to keep a diary of when they used the CD. |
| *Experimental* |
| * Participants provided baseline data, 4- & 8-week data. |
| **Main Findings** |
| The treatment group reported statistically significant lower levels of pain (p<.046) and depression (p<.010) than the control group at the week 4 evaluation. A statistically significant effect on pain as measured by the daily VAS diary was also found in the experimental group. At week 8, no significant differences were found for pain. |
| **Original Authors’ Conclusions** |
| Patients diagnosed with fibromyalgia may benefit from this nursing intervention in terms of relieving pain and depression. Guided imagery relaxation therapy could be incorporated as part of fibromyalgia treatment to promote health among people with fibromyalgia. Diagnosed individuals need emotional support, education training, and involvement in clinical decision-making with positive strategies to improve pain management. The use of guided imagery by nurses should be strongly encouraged as it is inexpensive, straightforward to implement, and readily available, and can be used without great investment in material or training to improve pain and depression in patients diagnosed with fibromyalgia. Moreover, it does not produce adverse effects, and patients receiving guided imagery for pain control can achieve a sense of mastery over their general symptoms. |
| **Interpretation of Results** |
| This study does not demonstrate strong evidence in the effectiveness of guided imagery as a long-term pain and/or depression reducer. However, looking at the graphs of pain at rest and pain with movement between the two groups demonstrates a progressive decline in symptoms as the study progresses. The control group, on the other hand, appears to have dramatically different numbers that may be associated with “good days” and “bad days”. The steady progression demonstrated by the intervention group is a positive sign that this may be a better way to promote stabilization of pain management. |

Banth S, Ardebil MD. **Effectiveness of mindfulness meditation on pain and quality of life of patients with chronic low back pain**. *Int J Yoga*. 2015;8(2):128-33

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| **Aim/Objective of the Study/Systematic Review:** |
| The aim of this study was to examine the efficacy of mindfulness based stress reduction (MBSR) as a mind-body intervention on quality of life and pain severity of female patients with nonspecific chronic LBP. |
| **Intervention Investigated** |
| *Control* |
| * Usual medical care only |
| *Experimental* |
| * MBSR + usual medical care   + MBSR program administered one session per week for explaining techniques, practice, and feedback and share their experience for 8 weeks beside 30-45 min’ daily home practice. |
| **Main Findings** |
| The results showed that the experimental group who were subjected to the MBSR showed a significant improvement in their overall pain severity, physical and mental quality of life scores due to the training received as compared to the control group who received only usual medical care. |
| **Original Authors’ Conclusions** |
| MBSR as a mind-body therapy including body scan, sitting and walking meditation was effective intervention on reduction of pain severity and improvement of physical and mental quality of life of female patients with nonspecific LBP. |
| **Interpretation of Results** |
| This was an interesting study that performed an intensive 8-week MBSR program. This study was surprisingly able to demonstrate decreased pain perception, which has not been demonstrated by many other studies. The authors of this study suggest that MBSR can harness the gate control theory of pain through changing the way the brain processes pain. |

la Cour P, Peterson M. **Effects of mindfulness meditation on chronic pain: A randomized controlled trial**. *Pain Medicine*. 2015;16:641-652

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| **Aim/Objective of the Study/Systematic Review:** |
| The objective of this randomized controlled clinical trial investigated the effects of mindfulness meditation on chronic pain. |
| **Intervention Investigated** |
| *Control* |
| * Usual Care: Wait-list controls who could participate in the meditation program 2 to 2.5 months following. |
| *Experimental* |
| * MBSR + Usual Care: Participants where taught to meditate daily for 45 minutes at home following instructions on a CD and were instructed to keep a diary. Participants also attended at least 6 meetings. |
| **Main Findings** |
| Significant effect (Cohen’s d=0.39) was found on the primary outcome measure, SF36 vitality scale. On the secondary variables, significant medium to large size effects (Cohen’s d=0.37-0.71) were found for lower general anxiety and depression, better mental quality of life (psychological well-being), feeling in control of the pain, and higher pain acceptance. Small (nonsignificant) effect sizes were found for pain measures. These results remained at the 6-month follow-up. |
| **Original Authors’ Conclusions** |
| A standardized mindfulness program (MBSR) contributes positively to pain management and can exert clinically relevant effects on several important dimensions in patients with long-lasting chronic pain. |
| **Interpretation of Results** |
| This was a great study on several levels. Not only was the quality of the study high, it looked at all chronic pain, and endeavoured to closely follow a standardized MBSR program. Patients where those being seen at a pain clinic and all had been there for some time, meaning that their pain condition and medications were all stable at that point. To be included in the study, participants had to attend at least 6 out of the 9 meetings. This study does a tremendous job of demonstrate a changed mindset that is better able to cope with the pain. Although the pain scores did decrease in both groups, there was a nonsignficant effect size. There were higher scores (large effect size) on the SF36 (vitality), pain acceptance, being in control of pain, and general anxiety measures. There were also medium effect sizes for mental health quality of life, psychological well-being, and depressive symptoms. “Mindfulness is not targeted at minimizing pain but rather at changing the relationship with pain”. (pg 650) |

Reiner K, Granot M, Soffer E, Lipsitz JD. **A brief mindfulness meditation training increases pain threshold and accelerates modulation of response to tonic pain in an experimental study**. *Pain Medicine*. 2015. [Epub ahead of print]

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| **Aim/Objective of the Study/Systematic Review:** |
| Research shows that mindfulness meditation affects pain perception; however, studies have yet to measure patterns of change over time. The objective of this study was to measure patterns of change over time. They examined effects of mindfulness meditation on perception of experimental heat pain using multiple psychophysiocal indices, including pattern of change in response to tonic painful stimuli. They also tested the potential moderating role of baseline mindfulness. |
| **Intervention Investigated** |
| *Control* |
| * 20 students who were not randomized to mindfulness meditation group |
| *Experimental* |
| * 20 students were randomized to mindfulness meditation training. Participants were instructed on a 20-minute meditation after baseline testing, and were instructed to meditate 25 minutes per day for the next two weeks. They were given an audio file and paper instructions. |
| **Main Findings** |
| Those in the intervention group recorded an average of 10 minutes of practice per day, with an average of 6 days of practice. In the mindfulness meditation group a significant time effect for the heat pain threshold was found. Both groups demonstrated a decrease in pain ratings. |
| **Original Authors’ Conclusions** |
| This study investigated the effect of a brief mindfulness training on experimentally induced pain. In line with the first hypothesis, results showed that mindfulness training had a significant effect on heat pain threshold and on the response pattern of tonic heat pain stimuli. Results partially supported their second hypothesis as pain threshold was the only experimental pain variable found to be moderated by dispositional mindfulness. |
| **Interpretation of Results** |
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Lee C, Crawford C, Hickey A. **Mind-body therapies for the self-management of chronic pain symptoms**. *Pain Medicine*. 2014;15:S21-S39.

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| **Aim/Objective of the Study/Systematic Review:** |
| Chronic pain management typically consists of prescription medications or provider-based, behavioural, or interventional procedures, which are often ineffective, may be costly, and can be associated with undesirable side effects. Because chronic pain affects the whole person (body, mind, and spirit), patient-centered complementary and integrative medicine (CIM) therapies that acknowledge the patients’ roles in their own healing processes have the potential to provide more efficient and comprehensive chronic pain management. Active self-care complementary and integrative medicine (ACT-CIM) therapies allow for a more diverse, patient-centered treatment of complex symptoms, promote self-management, and are relatively safe and cost effective. To date, there are no systematic reviews examining the full range of ACT-CIM used for chronic pain symptom management |
| **Intervention Investigated** |
| *Control (number of studies)* |
| * 146 randomized controlled trails were included in the review   + 54 investigated mind-body therapies.     - 37 were of poor quality     - 17 were of high quality |
| *Experimental* |
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| **Main Findings** |
| Eleven studies, involving a total 1,209 participants, investigated the use of mindfulness/meditation for management of several pain conditions including chronic low back pain, fibromyalgia, failed back surgery syndrome, chornic pain, musculoskeletal pain, and diabetic neuropathy. Mindfulness-meditation duration and frequency of participation were fairly consistent, with most studies reporting 12 hours of practice over 8 weeks. |
| **Original Authors’ Conclusions** |
| The majority of the studies showed favourable effects for mindfulness/meditation, with five studies reporting overall small effect sizes (d=0.2-0.5). A little over half of the studies, however, were of poor quality, suffering from methodological flaws surrounding randomization, dropout rates, and safety reporting. Based on the high-quality studies reported, the SMEs agreed that further research is likely to have an important impact on the confidence in the estimate of an effect, which may change should a more highly powered, high-quality study be introduced into the literature. Based on the current evidence, no recommendation could be made for meditation/mindfulness as a treatment for chronic pain symptoms at this time. |
| **Interpretation of Results** |
| This systematic review points out many of the holes and issues in research regarding mind-body therapies. The main issues are lack of safety reporting and poor methodological quality. The authors strongly suggest further high-quality studies be done in this area prior to giving a recommendation for mind-body therapy. They acknowledge that in general the studies demonstrate small to moderate effect sizes of mind-body therapy as beneficial for chronic pain symptoms. However, safety needs to be demonstrated and further high-quality studies need to be performed. Other areas that research needs to address when discussing mind body therapies is cost analysis and any potential savings utilizing mind-body therapy can aid in. |

Busch V, Magerl W, Kern U, Haas J, Hajak G, Eichhammer P. **The effect of deep and slow breathing on pain perception, autonomic activity, and mood processing – an experimental study**. *Pain Medicine*. 2012;13:215-228.

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| **Aim/Objective of the Study/Systematic Review:** |
| Deep slow breathing techniques, as a component of various relaxation techniques, have been reported as complementary approaches in the treatment of chronic pain syndromes, but the relevance of relaxation for alleviating pain during a breathing intervention was not evaluated so far. |
| **Intervention Investigated** |
| *Control (number of studies)* |
| * In order to disentangle the effects of relaxation and respiration, they investigated two different DSB techniques at the same respiration rates and depths on pain perception, autonomic activity, and mood in 16 healthy subjects. In the attentive DSB intervention, subjects were asked to breathe guided by a respiratory feedback task requiring a high degree of concentration and constant attention. In the relaxing DSB intervention, the subjects relaxed during the breathing training. The skin conductance levels, indicating sympathetic tone, were measured during the breathing maneuvers. Thermal detection and pain thresholds for cold and hot stimuli and profile of mood states were examined before and after the breathing sessions. |
| *Experimental* |
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| **Main Findings** |
| The mean detection and pain thresholds showed a significant increase resulting from the relaxation DSB, whereas no significant changes of these thresholds were found associated with the attentive DSB. The mean skin conductance levels indicating sympathetic activity decreased significantly during the relaxing DSB intervention but not during the relaxing DSB. Both breathing interventions showed similar reductions in negative feelings (tension, anger, and depression). |
| **Original Authors’ Conclusions** |
| The results suggest that the way of breathing decisively influences autonomic and pain processing, thereby identifying DSB in concert with relaxation as the essential feature in the modulation of sympathetic arousal and pain perception. |
| **Interpretation of Results** |
| This study by Busch offers a fantastic description and evidence that deep breathing alone does not soley influence pain processing and perception. The relaxation component is essential for stimulating the sympathetic system and modulating pain perception. |

**EVIDENCE SYNTHESIS AND IMPLICATIONS**

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| The evidence suggests that meditation is an effective means to manage pain. However, there is very little evidence that meditation actually reduces pain. There are many different types of meditation that have been studied, and while this helps broaden the application of meditation, it also dampens the evidence. La Cour et al mentions that in their study, stating that the research does a poor job of adhering to a meditation protocol.4 Such a protocol does exist and is the mindfulness based stress reduction (MBSR) protocol.8-9 Use of standardized protocols in the research would certainly help with evidentiary support of mindfulness based stress reduction and pain management. Unfortunately, the evidence and validity of the studies greatly varies from one to another.6 Although the evidence supports the use of MBSR in addition to standard treatment for chronic pain, it should be noted that quality of the evidence varies dramatically.  There is a general moderate effect-size of mind-body therapy on chronic pain symptoms,6 with some of the literature indicating that MBSR targets the patient’s relationship with the pain, as opposed to the pain itself.2,4,6-7 Some studies were able to demonstrate a decrease in pain.1,3,5 However, the type of pain that was lessened varied and was inconsistent between studies. Jeitler et al1 performed a mantra-base meditation (Jyoti meditatin) and saw significant decreased in resting pain, however did not see decreases in pain with motion. Banth et al3 demonstrated a significant decrease in pain severity of females with nonspecific low back pain when compared with controls. Reiner et al5 conducted an experimental study on healthy individuals and found that mindfulness meditation training decreased experimentally induced pain thresholds.  All of the studies were carried out over the course of 8-weeks, with participants instructed to meditate everyday for 20-45 minutes. Most studies did not track participant adherence, however the few that did showed participants practiced about 10 minutes per day on average.5 This indicates that even though the participants were instructed to meditate every day, the likelihood of that happening is slim. However, even with the limited amount of daily practice, all studies demonstrated improved outcomes, whether those were pain, quality of life, anxiety, depression, or pain acceptance.  La Cour et al4 conducted a fabulous study demonstrating how a changed mindset, due to MBSR, is better able to cope with pain. This was a high quality study that looked at all types of chronic pain and how MBSR interacted with pain, anxiety, depression, mental quality of life, feeling in control of pain, and pain acceptance. They were able to demonstrate a significant effect (Cohen’s d=0.39) on the primary outcome measure, the SF36 vitality scale.4 On the secondary variables, significant medium to large size effects (Cohen’s d=0.37-0.71) were found for lower general anxiety and depression, better mental quality of life (psychological well-being), feeling in control of the pain, and higher pain acceptance. Small (nonsignificant) effect sizes were found for pain measures. These results remained at the 6-month follow-up. The authors concluded, “Mindfulness is not targeted at minimizing pain but rather at changing the relationship with pain”.4 (pg 650).  This review of the literature concludes that the ultimate goal of mindfulness based stress reduction therapy, or meditation, should not be primarily focused on pain reduction, but on cultivating a better relationship with the pain. It should also be noted that while meditation may be an effective strategy for pain management, it is not a replacement for standard treatment. |

**REFERENCES**

[List all references cited in the CAT]

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| 1. Jeitler M, Brunnhuber S, Meieir L, et al. Effectiveness of Jyoti meditation for patients with chronic neck pain and psychological distress – A randomized controlled clinical trial. *The Journal of Pain*. 2015;16(1):77-86. 2. Onieva-Zafra MD, Garcia LH, del Valle MG. Effectiveness of guided imagery relaxation on levels of pain and depression in patients diagnosed with fibromyalgia. *Holis Nurs Pract*. 2015;29(1):13-21. 3. Banth S, Ardebil MD. Effectiveness of mindfulness meditation on pain and quality of life of patients with chronic low back pain. *Int J Yoga*. 2015;8(2):128-33. 4. la Cour P, Peterson M. Effects of mindfulness meditation on chronic pain: A randomized controlled trial. *Pain Medicine*. 2015;16:641-652. 5. Reiner K, Granot M, Soffer E, Lipsitz JD. A brief mindfulness meditation training increases pain threshold and accelerates modulation of response to tonic pain in an experimental study. Pain Medicine. 2015. [Epub ahead of print] 6. Lee C, Crawford C, Hickey A. Mind-body therapies for the self-management of chronic pain symptoms. *Pain Medicine*. 2014;15:S21-S39. 7. Busch V, Magerl W, Kern U, Haas J, Hajak G, Eichhammer P. The effect of deep and slow breathing on pain perception, autonomic activity, and mood processing – an experimental study. *Pain Medicine*. 2012;13:215-228. 8. Kabat-Zinn J. Getting started in the practice; Glimpses of wholeness, delusions of separateness; On healing. In full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. Third edition. New York, Bantam Dell, 1990, pp 140-184. 9. Kabat-Zinn J. An outpatient program in behavioural medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. Gen Hosp Psychiatry. 1982;4(1):33-47. |