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Evaluating distance education of a mindfulness-based meditation programme for chronic pain management

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Summary

Patients with chronic pain were recruited from two large urban hospitals and from rural hospitals in Ontario. Patients on the waiting list served as controls. The intervention was a Mindfulness-Based Chronic Pain Management course, delivered to patients for two hours per week for 10 weeks. Pre- and postcourse measures of quality of life, pain catastrophizing and usual pain ratings were collected over a period of two years. Patients received the course via traditional face-to-face, in-person teaching (Present site group) or via videoconferencing at their local hospital site (Distant site group). In all, there were 99 Present site participants, 57 at Distant sites and 59 waitlist controls. Patients at Present and Distant sites achieved similar gains in mental health ($P < 0.01$) and pain catastrophizing levels ($P < 0.01$) relative to controls. However, the Present site group obtained significantly higher scores on the physical dimension of quality of life ($P < 0.01$) and lower usual-pain ratings ($P < 0.05$) than the Distant site group. The results suggest that videoconferencing is an effective mode of delivery for the Mindfulness course and may represent a new way of helping chronic pain patients in rural areas manage their suffering.

Introduction

Pain is the most common complaint in primary care. Chronic pain is reported in 20% of visits to general practitioners¹ and affects 20% of adults, rising to half of those in the older age population.² Chronic pain, defined as 'pain persisting longer than six months or beyond the regular healing time for a given injury' can affect patients' physical and emotional wellbeing³ and is often associated with disability disproportionate to degree of injury as well as depression and anxiety.^{4,5} It remains a condition that is poorly controlled by traditional Western medicine with only about half of patients who suffer from acute and chronic pain receiving adequate relief.^{2,6,7} One of the best options for chronic pain sufferers is access to a multidisciplinary pain clinic,⁸ but these are not usually located in rural areas. Furthermore, chronic pain sufferers often have limited mobility as well as finances, making travelling long distances difficult.

Psychological factors such as mood changes and anxiety have been shown to alter pain perception.^{3,9} Pain

catastrophizing, defined as 'an exaggerated negative orientation toward pain stimuli and pain experience',¹⁰ is a significant predictor of suffering.¹¹ Psychological interventions are thought to decrease pain rather than just assist in coping strategies.¹²

The course described in this paper is called Mindfulness-Based Chronic Pain Management (MBCPM), and is based on a mindfulness-based stress reduction course developed by Kabat-Zinn.^{12,13} Mindfulness consists of the practice of being aware of thoughts, actions and existence in the present moment, non-judgmentally.¹³ It is described as teaching skills that facilitate detached observation and reduce the experience of suffering via cognitive re-appraisal.¹⁴ The present course provides participants with experiential exercises in Mindfulness practice, and teaching in meditation. Central to this course is learning to observe emotions associated with pain. There is also a component of general health education covered within these sessions, touching on topics such as nutrition, exercise, sleep and medication. Visualization techniques to manage pain are also taught. CDs of meditations narrated by the instructor were provided to each participant for daily home use.

Chronic pain patients have reported significant reductions in their pain levels^{14,15} which correlated with a reduction in pain-related drug utilization as well as improved mental health. Females with fibromyalgia who

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received a Mindfulness intervention exhibited a significant decrease in their depressive symptoms when compared to a waitlist control group.¹⁶

A recent study we conducted based on self-reported health-related quality of life questionnaires suggested that the MBCPM course improved the mental health of patients suffering from chronic pain when delivered in the conventional face-to-face manner, as well as when delivered through telemedicine to distant sites. In the present study we have compared the outcomes between participants at Distant and Present sites.

Methods

Individuals eligible for the study were chronic pain patients newly referred to the Mindfulness course for courses during 2005–2006. Present site patients received the course via traditional face-to-face, in-person teaching at either Sunnybrook Health Sciences Centre or St Michael’s Hospital in Toronto, and Distant site patients received the Mindfulness course via videoconferencing at their local hospital. Patients were referred to the course from family practice and specialty clinics throughout Ontario. Ethics permission was obtained from the appropriate committee and participants gave informed consent.

The Ontario Telemedicine Network was used to allow discussion between the instructor and the patients, and transmission of meditation CDs to the Distant sites. IP transmission was employed at 384 kbit/s. All Distant site classes comprised 10–20 patients meeting simultaneously at two different sites, based at their local hospitals. Classes met for two hours per week over a period of 10 weeks. The distant sites were: Wawa, Sudbury, Bracebridge, Espanola, Barrie, Campbellford, Lindsay and Elliott Lake.

Present site patient classes at the two Toronto hospital sites were of similar size, meeting for two hours once per week for 10 weeks during the same time periods as the Distant site courses, though on a different day or time of day.

Outcome measures

The Short Form-36 (SF-36v2) is a widely used health-related quality of life questionnaire.¹⁷ It provides two summary measures for physical and mental health. The Physical Component Score (PCS) is composed of the physical functioning, role physical, bodily pain and general health domains while the Mental Component Score (MCS) is composed of vitality, role emotional, social functioning and mental health domains.

The Pain Catastrophizing Scale¹⁸ is a 13-item one page survey. Each item is scored on a 5-point scale (0–4) and measures three subdomains: rumination (persisting negative thoughts), magnification (fear-driven pain exacerbations) and helplessness (no control). Patients who

catastrophize expect more from their pain, ruminate over it and feel helpless in their ability to control their pain.

In order to measure patients’ level of pain that they usually experience, we administered the ‘Usual Pain’ score of the Numerical Rating Scale for Pain.¹⁹ In this widely used clinical tool, patients rate their usual pain intensities in the past week on an 11-point numerical scale (0 = no pain to 10 = excruciating pain).

Procedure

Only classes that consisted of either a present or distant site group alone were analysed. Patients in the Present and Distant site groups completed the questionnaires at classes 1 and 10 and questionnaires were collected from the Control group 8–10 weeks prior to starting classes, while they were on the waitlist and at class 1. The SF-36 scores were converted into Norm-Based Scores using the QualityMetric SF Health Outcomes Scoring Software. The resulting scores were converted so that a value of 50 represented the US norm and 10 points away from 50 signified one SD. For the Pain Catastrophizing Scale, the total score was analysed, and raw scores of the Numerical Rating Scale were used. Repeated measures analyses of variance (ANOVAs) were performed to determine if there were any significant differences in score changes between the Present, Distant and Control groups. Participants who failed to complete a questionnaire at either of the measurement points were excluded from the analyses.

Results

Study population

Two hundred and seventy-eight patients were eligible for participation in the present study. Patients failing to complete questionnaires at either of the measurement points or who completed less than five classes were excluded from the analysis. The drop-out rate was 33%. The attrition rates, including those who did not start the course, for the Present, Distant and Control groups were 49%, 30% and 10%, respectively. In all, there were 99 Present site participants, 57 at Distant sites and 59 waitlist controls.

The demographic profile of the population studied is listed in Table 1. The average age of patients in all three groups was 50–55 years (range 24–89). Patients were

Table 1 Study sample demographics

	Present	Distant	Control
Mean age (years)	51	54	52
Proportion of women (%)	80	88	75
Retention rate (%)*	67	77	91
Site sample size**	96–99	56–57	51–57

* Retention rate reflects the number of patients in each group that completed end-point questionnaires divided by the total number of patients initially included in each group
 ** Not all patients completed every measure at all measurement points; the ranges reflect this

Table 2 Baseline SF-36, pain catastrophizing and usual pain scores between groups

Dependent variable	Present			Distant			Control			P value
	n	Mean	SD	n	Mean	SD	n	Mean	SD	
SF-36 PCS	99	33.7	7.8	57	30.4	7.2	57	32.5	8.27	0.044*
SF-36 MCS	99	34.8	13.1	57	34.5	12.6	57	33.2	11.6	0.738
Pain catastrophizing	98	25.9	12.7	57	27.7	11.4	56	28.8	12.2	0.343
Usual pain	99	5.9	2.3	57	6.1	2.2	54	6.0	2.2	0.919

*Significant at $P < 0.05$

predominantly women. The gender distribution did not differ between the groups ($X^2 = 3.2, P = 0.20$). At least 50% were back pain sufferers. Other pain conditions included migraines and headaches, arthritis, facial pain, fibromyalgia, abdominal pain and 'other' pain (e.g. chronic chest pain, pain resulting from multiple sclerosis, neuropathies).

One-way ANOVAs revealed that the baseline SF-36 MCS ($F = 0.3, P = 0.74$), Pain Catastrophizing Scale ($F = 1.1, P = 0.34$) and Usual Pain Scale scores ($F = 0.1, P = 0.92$) were similar in the Present, Distant and Control groups (Table 2). Patients in all three groups were well below the norm for the SF-36 Mental Scores, registering approximately 1.5–2 SDs below average values for the US population. Catastrophizing scores at Week 1 were similar to those of pain clinic patients with chronic soft tissue injuries,²⁰ further supporting the morbidity of the study population. The baseline SF-36 PCS scores differed significantly ($F = 3.2, P < 0.05$). The Present group had much higher initial PCS scores than the Distant group ($q = 4.15, P < 0.01$), indicating that the physical health of these groups differed before treatment was introduced.

Quality of life

A repeated measures ANOVA examining the effect of the Mindfulness course on the PCS domain of the SF-36 revealed a significant difference in PCS scores ($F = 5.7, P < 0.05$). This effect was explored further using Tukey's HSD post hoc test. The Present group's PCS scores were significantly higher than those of the Control group at Week 10 ($q = 5.46, P < 0.01$), while the Distant group did not differ from the Controls ($q = 0.68, P > 0.05$). It was also found that the PCS scores of the Present group were significantly higher than those of the Distant group at Week 10 ($q = 4.58, P < 0.01$) (Table 3). These findings suggest that

while the Mindfulness course did improve physical scores for certain patients, these effects may have been hindered by the use of videoconferencing for treatment delivery.

Upon examining the MCS domain of the SF-36, it was found that the groups' overall scores differed significantly from the Control group ($F = 14.3, P < 0.001$). Further examination revealed that the overall mental health of the Present group was better than that of the Control group at week 10 ($q = 7.54, P < 0.01$) and the same was true for the Distant group ($q = 5.56, P < 0.01$). However, analyses between the Present and Distant groups did not reach significance ($q = 0.31, P > 0.05$) (Table 3). These results suggest that the effectiveness of the Mindfulness course on patients' mental health is similar when delivered in person or by videoconferencing.

Pain catastrophizing scale

At Week 10, patients in the Present group catastrophized an average of 15% less than those in the Control group while those in the distant group catastrophized 12% less than the Controls. A repeated measures ANOVA revealed a significant catastrophizing by Group interaction ($F = 5.6, P < 0.01$), which was explored further using simple main effects and Tukey's HSD post hoc analyses. It was found that the groups' catastrophizing scores differed significantly at Week 10 ($F = 7.1, P < 0.01$) but not at Week 1 ($F = 1.1, P > 0.05$). Specifically, both the Present group ($q = 12.09, P < 0.01$) and the Distant group ($q = 7.84, P < 0.01$) catastrophized significantly less than the Control group at Week 10. The catastrophizing scores of the Present and Distant groups did not differ at Week 10 ($q = 1.89, P > 0.05$) (Table 3). This finding suggests that the effect of Mindfulness on catastrophizing is not hindered by the videoconferencing mode of delivery.

Table 3 Pre- and post-treatment scores between groups

Group	Present				Distant				Control				P value
	Week 1		Week 10		Week 1		Week 10		Week 1		Week 10		
	Mean	SD											
SF-36 PCS	33.7	7.8	35.1	8.9	30.6	7.1	32.8	8.5	32.5	8.2	32.4	8.1	0.018*
SF-36 MCS	34.8	13.2	38.7	13.2	34.3	12.6	38.5	12.9	33.2	11.6	33.2	13.1	0.001
Pain catastrophizing	25.9	12.7	21.1	11.8	27.7	11.4	22.3	13.2	29.1	12.1	28.7	12.9	0.004†
Usual pain	5.9	2.3	5.2	2.3	6.1	2.2	5.6	2.1	6.1	2.2	6.2	2.0	0.02*

*Significant at $P < 0.05$

†Significant at $P < 0.01$

Pain rating scale

A significant Pain by Group interaction was found ($F = 4.0$, $P < 0.05$) and was explored further. The three groups reported different usual pain levels at Week 10 ($F = 3.7$, $P < 0.05$) but not at Week 1 ($F = 0.1$, $P > 0.05$). More specifically, both the Present ($q = 7.95$, $P < 0.01$) and the Distant groups ($q = 3.67$, $P < 0.05$) experienced significantly lower usual pain levels than the Control group at Week 10. However, the post hoc tests also revealed that the Present group reported lower usual pain levels than the Distant group at Week 10 ($q = 3.37$, $P < 0.05$) which indicates that the benefits that patients at distant sites received in terms of pain reduction might be somewhat hindered by the use of videoconferencing (Table 3).

Discussion

The findings from the present study indicate that the Mindfulness-Based Chronic Pain Management course significantly improved the physical and mental component scores of the SF-36, usual pain levels and Pain Catastrophizing behaviour in Present site participants, and the mental component scores and pain catastrophizing behaviour in Distant site participants.

Baseline SF-36 scores of patients in this study were representative of a population approximately 1.5–2 SDs below the US norm. With Mindfulness, the improvements seen in the MCS represented an improvement of approximately 0.5 SD towards the norm and were similar irrespective of whether participants were taught in-person or by videoconferencing.

One strength of the present study was that the present and distant site courses were delivered by the same instructor and over the same period of time to normalize the course as much as possible between the groups. This could also be perceived as a limitation: a different instructor might have been less effective in delivering distance education compared to Present site.

The urban and rural groups may inherently be different in nature. Present and Distant group patients differed prior to the initiation of the study in terms of their PCS scores. It was noted that Physical Component scores were lower at week 1 for Distant site participants compared to Present site, which might be due to the greater travel and parking difficulties for the Toronto attendees causing those with greater physical disability to not enrol and also to drop out: attrition rates were higher for Present site participants. The Distant site participants saw the instructor on the TV screen on her own, which may have promoted a feeling of receiving individualized instruction and interaction, compared to the shared feeling by the Present site participants.

The results support the effectiveness of mind-body interventions, the use of which is becoming more common in the clinical literature. A recent meta-analysis of psychological interventions in chronic low-back pain

provided support for the efficacy of psychological interventions in reducing self-reported pain, pain-related interference, depression and disability in sufferers of low-back pain.²¹ Hoffman *et al.*²¹ also demonstrated that multidisciplinary programmes which included psychological interventions were superior to other active treatment programmes at improving work-related outcomes at both short- and long-term follow-up, a finding which supports the delivery of psychological modalities to rural areas by telemedicine.

Psychological interventions such as mindfulness and meditation probably have physiological effects mediating the improvements experienced by the participants. Two studies showed improvements in immune system variables associated with Mindfulness programme participation in breast and prostate cancer,²² and in T cell counts in HIV positive men receiving instruction on relaxation, hypnosis and meditation.²³ It is possible that inflammation and neural instability at the site of damage might change in participants of these courses, leading to reduced pain and enhanced healing.

The results of the present study suggest that videoconferencing is an effective mode of delivery for the Mindfulness course and may represent a new way of helping chronic pain patients in rural areas manage their suffering.

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