

Mindfulness-Based Stress Reduction as supportive therapy in cancer care: systematic review

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Accepted for publication 21 December 2004

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SMITH J., RICHARDSON J., HOFFMAN C. & PILKINGTON K. (2005) *Journal of Advanced Nursing* 52(3), 315–327

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Aim. This paper reports a systematic review and critical appraisal of the evidence on the effectiveness of Mindfulness-Based Stress Reduction for cancer supportive care.

Background. The experience of cancer can have a negative impact on both psychological and physical health and on quality of life. Mindfulness-Based Stress Reduction is a therapy package that has been used with patients with a variety of conditions. In order to draw conclusions on its effectiveness for cancer patients, the evidence requires systematic assessment.

Methods. A comprehensive search of major biomedical and specialist complementary medicine databases was conducted. Additionally, efforts were made to identify unpublished and ongoing research. Relevant research was categorized by study type and appraised according to study design. Clinical commentaries were obtained for each study and included in the review.

Results. Three randomized controlled clinical trials and seven uncontrolled clinical trials were found. A lack of relevant qualitative research studies was identified. Studies report positive results, including improvements in mood, sleep quality and reductions in stress. A dose-response effect has been observed between practice of Mindfulness-Based Stress Reduction and improved outcome. A number of methodological limitations were identified. Modifications to the traditional Mindfulness-Based Stress Reduction programme make comparison between studies difficult and a lack of controlled studies precludes any firm conclusion on efficacy.

Conclusion. Mindfulness-Based Stress Reduction has potential as a clinically valuable self-administered intervention for cancer patients. Further research into

its efficacy, feasibility and safety for cancer patients in the nursing context is recommended.

Keywords: cancer, mindfulness meditation, Mindfulness-Based Stress Reduction, nursing, systematic review

Introduction

Receiving a cancer diagnosis and having to undergo cancer treatment prompts a high degree of emotional distress (Strain 1998, Derogatis *et al.* 1983, Zabora *et al.* 1997) and can have negative implications for psychological health, physical symptoms and may also adversely affect quality of life. A Canadian survey of 913 patients with cancer found that 94% experienced one or more of the following psychological and quality of life-related symptoms: fatigue (78%), anxiety (77%), depression (59%) and sleep disturbance (55%) (Ashbury *et al.* 1998). Estimates of sleep difficulties range between 31% and 54% (Degner & Sloan 1995, Savard *et al.* 2001), with problems reported to continue for several years after diagnosis in some patients (Couzi *et al.* 1995, Lindley *et al.* 1998).

The survey by Ashbury and colleagues reported that respondents were more likely to be dissatisfied with treatment for their symptoms than for their cancer (Ashbury *et al.* 1998). Nurses can play a vital role in addressing this deficit by incorporating complementary therapy programmes in their nursing role in the management of care for people affected by cancer.

Complementary therapies have the potential to alleviate the symptoms and side effects of cancer treatments, and may have a positive effect on levels of distress and quality of life during treatment and rehabilitation. A growing number of nurses are practising complementary therapies, ensuring that a variety of supportive interventions are in place in addition to conventional medical cancer treatments. Such programmes may include support groups, relaxation and visualization training and 'hands-on therapies' (Stevensen 2001).

Patients with cancer have a growing interest in complementary and mind-body therapies, and a systematic review of surveys in 13 countries indicated that 7–64% (mean 31%) had tried complementary medicine (Ernst & Cassileth 1998). In 1995, 70% of oncology centres in England and Wales were providing some form of complementary therapy (White 1998). A recent survey found that women chose complementary therapies in order to cure or slow down their cancer and relieve the symptoms of cancer and cancer treatment (Rees *et al.* 2000). Estimates of prevalence of the use of

relaxation/meditation techniques by patients with breast cancer vary between 8.4–41% (Jacobson & Verret 2001). Variations in reporting the use of complementary therapies may, in part, be because of differential definition of complementary therapies.

Mindfulness-Based Stress Reduction

Mindfulness-Based Stress Reduction (MBSR) is a specific, highly-structured psycho-educational and skill-based therapy package that combines mindfulness meditation (also known as vipassana or insight meditation, Ott 2004) with hatha yoga exercises and is traditionally delivered as an 8 week programme with an additional 7.5 hour intensive 'meditation retreat' that is taken in silence (Kabat-Zinn *et al.* 1992). Classes last 2.5 hours and are taken in groups, and 45-minute audiotapes of the intervention are provided for individual daily practice (Baer 2003, Proulx 2003).

An operational working definition of mindfulness is: '*moment-to-moment non-judgemental awareness*' (J. Kabat-Zinn, personal communication). Mindfulness has also been defined as a Zen-like approach to meditation, in which the individual focuses completely on the activity or event occurring at that moment; mindfulness contrasts with traditional meditation, in which the intention is to free the mind of all thought (Segen 1998). MBSR is not a 'technique' for stress reduction but rather a way of being or life, to be practised independent of illness state (Proulx 2003, Ott 2004).

MBSR was developed by Kabat-Zinn at the University of Massachusetts Medical Centre in 1979. The intervention was intended as a training vehicle for the relief of suffering in a variety of conditions, to complement medical treatments and as a model for other hospitals and medical centres to implement (Kabat-Zinn 2003). Research to date has included assessment of MBSR interventions for chronic pain (Kabat-Zinn *et al.* 1985), anxiety (Miller *et al.* 1995), depression (Segal *et al.* 2002), HIV (Robinson *et al.* 2003), fibromyalgia (Weissbecker *et al.* 2002); it has been studied with heterogeneous populations (Reibel *et al.* 2001). Mindfulness-based programmes are now offered in hospitals and clinics around the world, as well as in inner city health centres, and a range

of other settings (Kabat-Zinn 2003). In 1998, more than 200 clinics and hospitals were using MBSR in the United States of America (USA) (Majumdar *et al.* 2002).

To date, there has been little uptake of MBSR in cancer settings in the United Kingdom (UK); however, mindfulness-based programmes are slowly developing. Mindfulness-Based Cognitive Therapy (MBCT) is more commonly used in the UK (Segal *et al.* 2002) and is similar to MBSR, the major difference being an additional 3-minute breathing space incorporated as part of the programme. MBCT programmes are offered to people suffering depression and other psychological or psychiatric conditions in six geographically diverse locations both within and outside the NHS.

A planned MBSR clinical trial aims to evaluate the therapeutic effectiveness of MBSR in 240 women who are attending a day centre offering support, information and complementary therapies to people affected by breast cancer. This randomized controlled trial will be the largest of its kind to be undertaken in this field (C. Hoffman, personal communication).

Many patients wish to take control of their cancer management (Cassileth & Chapman 1996, Ernst & Cassileth 1998). The practice of holistic, self-help, mind-body therapies such as MBSR are congruent with patients' needs as well as nursing values and beliefs (Orem 1985, Proulx 2003), suggesting the potential for MBSR to be integrated into nursing practice (Ott 2004). As a patient-centred therapy, it uses self-mastery and draws on inner resources (Majumdar *et al.* 2002), integrating mind and body for increased awareness as well as providing stress relief.

There are no systematic reviews focusing specifically on MBSR and people with cancer. However, non-systematic reviews of MBSR have recently been published that included people with cancer (Proulx 2003, Baer 2003, Bishop 2002). Proulx (2003) failed to report any systematic assessment of methodological quality and excluded studies where only abstracts were available, with one exception. Baer (2003) conducted a meta-analysis of MBSR but failed to report the search strategy or assessment of methodological quality. Further research studies with people with cancer have been published since the completion of these reviews.

Aim

The aim of this review was to evaluate the evidence for the effectiveness (including safety and patient experience) of MBSR as a supportive cancer therapy.

Studies focusing on yoga and/or meditation individually, or including such therapies as a non-MBSR intervention are reviewed elsewhere (RCCM website).

Search methods

Databases

Systematic searches of major biomedical, nursing and specialist complementary therapy databases including MEDLINE, EMBASE, AMED, CISCOP, CINAHL, PsycINFO, British Nursing Index and the Cochrane Library were carried out between March and May 2004. A search of specialist resources included Cochrane Complementary Field Registry, and other Cochrane Specialist Registries. Search strategies were developed to accommodate the different indexing approaches used by the databases (Pilkington & Richardson 2003).

Efforts were made to identify unpublished and ongoing research using relevant databases such as the National Research Register (UK) and Clinicaltrials.gov (USA) together with contacting experts in the field. Reference lists of relevant articles were reviewed to identify further studies.

Search terms

The terms used for cancer were based primarily on those used by the Cochrane Cancer Field (Cochrane Cancer Network 2004). The terms used were: neoplasms (exp) or neoplas* or tumor* or tumour* or melanoma* or cancer* or malignan* or leukemia* or leukaemia* or carcin* or metastas* or sarcoma* or antineoplastic agents (exp) or chemotherapy or palliative care (exp) or palliative treatment (exp) or palliative therapy (exp) or terminal care (exp) and mindfulness or MBSR or yoga or pranayama or dhyana or asanas or yogic or meditation (exp) or meditat* or transcendental meditation.

Efforts were made to identify unpublished and ongoing research using relevant databases such as the National Research Register (UK) and Clinicaltrials.gov (USA) together with contacting experts in the field. Reference lists of relevant articles were reviewed to identify further studies.

Filtering

Potential research papers were noted for retrieval and given a preliminary 'study type' classification as systematic reviews, randomized controlled trials (RCT), uncontrolled studies, case reports, qualitative research and surveys. Animal and basic laboratory-based studies were not included in the categorization process. Two reviewers carried out this process independently, notes were compared and in cases of disagreement these papers were also retrieved.

Inclusion criteria

Study type

Filtering identified only a small number of randomized controlled studies, therefore, all research studies that included outcome measures were selected. In addition, qualitative studies were also included. Attempts were also made to locate relevant systematic reviews. No language restrictions were imposed at the search and filtering stages.

Types of participants

Only studies including participants with a primary diagnosis of cancer were selected.

Types of intervention

MBSR as a specific intervention, mindfulness meditation therapy alone or mindfulness meditation as part of a modified psychological intervention were included. Modified MBSR programmes were included to illustrate the disparity of application of MBSR in research in the hope of highlighting issues relating to the differential application of therapy.

Types of outcome measures

Studies with patient self-reported measures of subjective well-being, quality of life and physical functioning (pain and mobility) and psychological measures (stress, anxiety, coping) were included. Physical measures such as blood tests and saliva samples for tumour markers/immunological function were also included.

Data collection and analysis

All relevant studies were appraised and their methodological quality assessed. Relevant information was extracted independently by two reviewers using a standardized data extraction and critical appraisal form (DECA form). Differences were resolved by discussion and, if necessary, a third reviewer was involved. Where required, the advice of a statistician was sought. The DECA form was based primarily on a template published by the Centre for Reviews and Dissemination [Centre for Reviews and Dissemination (CRD) 2001], following development and testing by two researchers.

Clinical commentaries

A clinician with relevant training and experience in both MBSR and nursing was asked to comment on each study, focussing on the appropriateness of the intervention, clinical

relevance and practical issues. A semi-structured questionnaire format was developed specifically for this. Summaries of these commentaries are given in Table 1.

Results

No systematic reviews relating specifically to people with cancer were found. Two published randomized controlled trials of MBSR (Specia *et al.* 2000, Shapiro *et al.* 2003) were found. The follow-up to the Specia trial was reported in Carlson *et al.* (2001). In addition, one (ongoing) RCT focused on Mindfulness-Based Art Therapy (Monti 2002).

There were four published uncontrolled trials (Saxe *et al.* 2001, Majumdar *et al.* 2002, Carlson *et al.* 2003, 2004). Two unpublished studies (Spahn *et al.* 2003, S. Bauer-Wu *et al.* 2004, personal communication) and one abstract of a dissertation (Altman 2001) were also located.

There were no qualitative studies. However, two clinical studies contained a qualitative element in the study design (Majumdar *et al.* 2002, S. Bauer-Wu *et al.*, personal communication). No surveys, observational studies or case reports were located.

All clinical trials located are presented in Table 1, together with comments on their methodology and clinical relevance. Trials are also further discussed in narrative form in order to illustrate differences between studies and in an attempt to assist in highlighting the issues to be addressed in future research. It was not considered appropriate to combine the results of studies because of variation in the interventions and in the outcomes measures.

Randomized controlled trials

Three randomized controlled trials of MBSR for people with cancer were found. Shapiro *et al.* (2003) randomized 63 women with stage II breast cancer to receive either MBSR or to choose their own stress management activities (control group). No statistically significant relationship was found between group allocation and sleep efficacy, nevertheless, a statistically significant relationship was observed between reported MBSR practice and beneficial outcome over time in the MBSR group. The small sample size and between-group differences at baseline in levels of distress and sleep quality compromised the methodological rigour of this study. In addition, there was no explanation as to why 6 weeks, as opposed to the traditional 8 weeks, of intervention were provided. The implications of this amendment for patient outcome are unknown. Furthermore, details of the stress management chosen by the control group were not reported.

Table 1 Summary of clinical trials in Mindfulness-Based Stress Reduction (MBSR) for patients with cancer

Study	Study design	Sample	Inclusion criteria	Complementary treatment	Control treatment	Outcome measure(s)	Results	Methodology comments	Clinical comments
Bauer-Wu <i>et al.</i> (personal communication), abstract only	UCT Unknown recruitment and sampling	<i>n</i> = 20, age range unknown, mean age 51 years Hospital inpatients	Unknown, cancer diagnosis undergoing stem cell/bone marrow transplants	45 minutes Mindfulness meditation on a 1:1 basis, one to two times a week throughout hospitalization. Audio Compact Disk provided	No control group	Psychological and physical symptoms VAS. Heart and respiratory rate, HADS, brief POMS, Symptom Experience Scale Qualitative data Feasibility data	Statistically significant differences for relaxation, pain, happiness, comfort, heart rate, and respiratory rate	Abstract only. 9% refusal, 15% lost to follow-up Ethics board mentioned committee is not mentioned	Appropriate intervention, outcomes and follow up. Mindfulness meditation as opposed to MBSR.
Carlson <i>et al.</i> (2004)	UCT Recruitment by volunteers and invitation	<i>n</i> = 59 outpatients, Age range not stated (mean 54.5 years)	Stage 0, I or II breast cancer or localized prostate cancer outpatients, aged > 18, > 3 months since surgery	MBSR programme 90 minute weekly group sessions for 8 weeks 3-hour silent retreat. Audiotape provided	No control group	POMS, SOSI, EORTC QLQ-30, health behaviours questionnaire (including hours of sleep and sleep quality) of sleep and sleep quality) Blood and saliva samples for cortisol, dehydroepiandrosterone and its sulphate and melatonin	Significant improvements in QoL (<i>t</i> = -2.23, <i>P</i> < 0.05), stress (<i>t</i> = 3.23, <i>P</i> < 0.01) and sleep quality No significant improvements in mood disturbance or immunostimulation	29% lost to follow-up Compliance, missing values and co-interventions adequately reported Ethics board approval unknown Multiple statistical testing and over-interpretation of results	Appropriate intervention, outcomes and follow-up. Lack of longer-term follow-up
Carlson <i>et al.</i> (2003)	UCT Same as above	<i>n</i> = 59 age range not stated (mean 54.5 years)	As above	As above	No control group	Same as above and Blood samples for cell counts. No saliva samples taken	Same as above No significant improvements were seen in the overall number of lymphocytes or cell subsets	As above 29% lost to follow-up	As above

Table 1 (Continued)

Study	Study design	Sample	Inclusion criteria	Complementary treatment	Control treatment	Outcome measure(s)	Results	Methodology comments	Clinical comments
Shapiro <i>et al.</i> (2003)	RCT	<i>n</i> = 63	Sex (female only), age (18–80), english speaking, stage II breast cancer diagnosis	Weekly 2-hour MBSR sessions for 6 weeks. Six-hour silent retreat	Various stress management activities	Sleep diary Pre-and postmeasures of POMS, BDI, STAI, FACIT-B and others	No significant relationship found between sleep efficacy and MBSR practice A positive relationship between MBSR practice and time ($\beta = +0.339$)	Randomization method and other methodological factors unknown. Not blinded 12% controls and 16% treatment group lost to follow-up Ethics not stated	Appropriate intervention, control, outcomes and follow-up. Some missing data
Spahn <i>et al.</i> (2003), abstract only ongoing study	UCT	<i>n</i> = 24, one male, 23 female. Different cancer diagnosis and stage	Inclusion criteria unknown	60 hour MBSR program over a 10-week period. Exercise, diet, behavioural and self-care techniques, complementary therapies	No control group	Self-reported EORTC QLQ-30 and FAQ	No improvement in overall QoL. A significant improvement in role function and fatigue were shown No statistical data reported	Complete data were available for 18 patients only 25% lost to follow-up and 8.3% missing values for FAQ data. Ethics not reported	Appropriate intervention and outcomes measures Insufficient information to assess in detail Co-interventions
Majumdar <i>et al.</i> (2002)	UCT	<i>n</i> = 21, aged 22–62 years, patients had multiple conditions including cancer	Programme open to all interested providing they were not currently psychotic or suicidal	Weekly sessions for 2.5 hours of MBSR for 8 weeks, plus 7 hour silent retreat. Audio tapes provided	No control group	Five questionnaires for physical symptoms, quality of life and well being Postintervention telephone interviews and questionnaire	Statistically significant changes in emotional, general and physical well being ($P \leq 0.001$ to $P \leq 0.047$) and QoL ($P \leq 0.001$ to $P < 0.002$)	Two patient refusals Co-interventions and compliance unknown Ethics committee not mentioned Participants paid for the course themselves	Appropriate intervention, follow-up and outcomes measures. Small sample size. Qualitative data of clinical value

Table 1 (Continued)

Study	Study design	Sample	Inclusion criteria	Complementary treatment	Control treatment	Outcome measure(s)	Results	Methodology comments	Clinical comments
Monti (2002), abstract only	RCT	n = 96, Variety of cancer types	Aged > 21 years, diagnosis of cancer or cancer recurrence	Mindfulness-based art therapy (MBAT) sessions, 2.5 hours for 8 weeks.	Usual care crossed over to receive MBAT after trial	SF-36, SCL-90-R and COPE	No findings reported as yet	Insufficient information for full appraisal Study ongoing Co-interventions of art-therapy	Limited details preclude a detailed appraisal. Unknown relative effect of art therapy
Altman (2001), dissertation abstract	UCT	Unknown number of participants	Cancer outpatients, no further details reported	4 week MBSR program. No details provided	No control group	Physiological measures of heart rate, blood pressure and respiration rate. Unknown when measured	Unknown results. No statistical data reported. Results are suggested to be positive for stress reduction	Abstract only. A lack of statistical outcomes measures	Appropriate but short intervention. Outcomes measures are of limited clinical relevance
Carlson <i>et al.</i> (2001)	Uncontrolled outcomes study follow-up to Speca <i>et al.</i> 2000	n = 54 (all patients had undergone the intervention)	As in Speca <i>et al.</i> (2000)	As in Speca <i>et al.</i> (2000)	No control group	POMS and SOSI measures taken at 6 months postintervention	Mean POMS reduced from 17.4 to 10.7. Small but non-significant decreases were observed in SOSI scores	39% Lost to follow-up Compliance, ethical approval, handling of missing values, co-interventions unknown	Appropriate intervention, outcomes and follow-up
Saxe <i>et al.</i> (2001)	UCT recruitment by referral	n = 10 men and their partners	Diagnosed adenocarcinoma of the prostate, postprostatectomy with increasing levels of prostate specific antigen (PSA) on ≥ sequential tests	12 weekly classes of 3–4 hours duration. Plant base diet and MBSR course	No control group	Pre- and postmeasures of diet, weight and level of physical activity and PSA levels	PSA rate on increase decreased in 8N. Estimated mean doubling time increased from 6.5 months to 17.7 months	Not a controlled study, small sample size Differential conditions for the assessment on some patients' assays	Co-interventions of diet and exercise preclude evaluation of effectiveness of MBSR

Table 1 (Continued)

Study	Study design	Sample	Inclusion criteria	Complementary treatment	Control treatment	Outcome measure(s)	Results	Methodology comments	Clinical comments
Specia <i>et al.</i> (2000)	RCT Sample from volunteers and by invitation (see Carlson <i>et al.</i> 2001)	<i>n</i> = 109 (90 completed) Treatment = 53 Controls = 37, outpatients	Any patient having received a confirmed diagnosis of cancer at any time was eligible	Seven, 90 minute weekly sessions of MBSR program plus home practice	Wait list controls	POMS and SOSI	No significant differences between group or stress. Significant correlations between attendance, practice and stress reduction (<i>r</i> = 0.30, <i>P</i> < 0.05) and (<i>r</i> = -0.253, <i>P</i> < 0.10), respectively	Adequate randomization by table of numbers. Not blinded 17% Lost to follow-up Adequate measure of compliance	Appropriate intervention, control, outcomes and follow-up. No silent retreat

BDI, Beck Depression Inventory; EORTC QLQ-30, European Organization for Research on Treatment of Cancer Quality of Life Questionnaire; FACIT-B, Functional Assessment of Cancer Therapy-Breast Quality of Life Instrument; FAQ, Fatigue Assessment Questionnaire; HADS, Hospital Anxiety and Depression Scale; MBAT, Mindfulness Based Art Therapy; *n*, number of patients; POMS, Profile of Mood States; QoL, Quality of Life; RCT, Randomized Controlled Trial; SCL-90-R, Symptom Checklist-90 revised; SF-36, Short Form-36; SOSI, Symptoms of Stress Inventory; STAI, State Trait Anxiety Inventory; UCT, uncontrolled trial; VAS, Visual Analogue Scale.

Specia *et al.* (2000) conducted a RCT of MBSR in people with cancer, with long-term follow-up, 109 patients with different types and stages of cancer (of whom 86 were women, mean age 51 years), were randomized either to MBSR or to a wait list control group. No statistically significant differences in mood parameters were observed between the groups postintervention. A statistically significant positive relationship was observed between both class attendance and level of reported practice of stress reduction. This trial was not, however, powered or blinded, in contrast to the traditional programme, 1 day of mindfulness training (silent retreat) was missing. Results from follow-up analyses were reported in Carlson *et al.* (2001).

Carlson *et al.* (2001) reported the findings from 54 patients who completed the 6-month postintervention re-assessment, following the RCT conducted by Specia *et al.* Small but non-significant between-group improvements in mood were found at 6 months follow-up. In the absence of follow-up data from non-responders, the possibility cannot be dismissed that those who did not return the follow-up questionnaires did so because they did not sustain benefit.

Monti (2002, abstract only) reported details of an ongoing randomized controlled trial with 96 patients with mixed cancer diagnoses. The intervention included Mindfulness-Based Art Therapy. Controls received usual care and crossed over to receive the intervention after trial completion. No findings are available to date. In the absence of detailed information about the findings, only limited methodological appraisal and clinical commentary were possible. The intervention described differed from the traditional MBSR programme, and thus the effect of the adding art therapy to the MBSR intervention is unknown. No firm conclusions can be drawn from the abstract.

Uncontrolled studies of MBSR for people with cancer

Carlson *et al.* (2003) conducted an uncontrolled trial with 59 outpatients with cancer who underwent MBSR training. They assessed psychological measures, sleep quality, and this was the first study to assess changes in immune system parameters (including cancer-related cytokine production) associated with MBSR programme participation. Cell counts were taken pre- and postintervention. Statistically significant improvements were shown postintervention for overall quality of life, symptoms of stress and sleep quality. There were no significant differences for mood disturbance or number of lymphocytes or cell subsets between pre- and postintervention measures. Notwithstanding the positive results, the study suffered from key methodological limitations that the authors themselves identified. In the absence of a control group, no

firm conclusions can be drawn from this study with regard to the efficacy of the intervention.

Carlson *et al.* (2004) presented further findings from the same study population as Carlson *et al.* (2003). Additional outcome measures of interest included the effect of MBSR on hormone levels associated with immuno-suppression [cortisol, dehydroepiandrosterone and its sulphate (DHEAS) and melatonin]. However, no statistically significant improvements for either immunological suppression or tumour remission markers were observed. Methodological flaws included the absence of a control group and multiple statistical testing.

Majumdar *et al.* (2002) reported a German study involving 21 people with multiple cancer conditions, including non-Hodgkin's lymphoma and breast cancer, who were offered MBSR training. Outcomes measures included five self-completion questionnaires (not validated for a German cancer population). All major dependent health variables (emotional well being, general physical well being and quality of life) indicated substantial symptom improvement following treatment. Small sample size, heterogeneous patient population and lack of control group compromised the data. Nevertheless, semi-structured interviews conducted 3 months post-intervention provided clinically relevant qualitative findings of self-perceived alleviation of suffering, produced either through symptom reduction or enhanced coping skills developed as a result of MBSR practice. It is noteworthy that the participants in this study paid for the therapy themselves, thus potentially increasing compliance and motivation to practise.

Altman (dissertation abstract 2001) reported a 4-week MBSR intervention with people with cancer. The absence of detail on sample characteristics and lack of reporting of statistical analyses limited the extent to which this study could be methodologically appraised. The measures (heart rate, blood pressure and respiration rate) used to assess levels of stress were of limited relevance to clinical knowledge and practice in implementing MBSR, since heart and respiration rate are measures of short-term excitatory physiological state. No self-reported measures of stress or quality of life were used. In addition, the provision of only four as opposed to the traditional 8 weeks of intervention limited the ability to compare this study with others.

Spahn *et al.* (2003) evaluated a MBSR intervention with co-interventions of moderate exercise, a Mediterranean diet, behavioural techniques, self-care strategies and complementary therapies. This is an ongoing study, for which only the abstract was available. The nature of the MBSR intervention was not fully described, and statistical data were not reported. Insufficient information thus precluded detailed

methodological appraisal. Methodological limitations included lack of a control group, missing values and small sample size. The impact of the modifications to the traditional intervention on outcomes is unknown.

Saxe *et al.* (2001) documented an uncontrolled trial of a dietary intervention in conjunction with MBSR for patients with prostate cancer who had increasing levels of prostate specific antigen (PSA). All patients lost weight and the PSA rate of increase decreased in eight of 10 participants. However, the authors acknowledged limitations in measurement because of PSA levels being tested at different sites with different instruments. Differential conditions for PSA assessment in some patients limited both the validity of this study and the conclusions that could be drawn. In addition, it was difficult to ascertain which aspect of the intervention had an effect, since the study involved a modified MBSR programme with co-interventions of diet and exercise. This was a small sample and details on interventions were not provided.

S. Bauer-Wu *et al.* (personal communication) provided an abstract of a completed but unpublished uncontrolled study of cancer inpatients, undergoing stem cell/bone marrow transplant. Patients received mindfulness meditation sessions on a one-to-one basis with a trained instructor. Statistically significant differences were found for most sessions for relaxation, pain, happiness, comfort, heart and respiratory rate. Qualitative data suggested that patients found the therapy beneficial throughout hospitalization and postdischarge, nevertheless, live sessions were preferred to the audio CD that was provided for daily practice. This study is of interest since it considers mindfulness meditation provided to cancer inpatients on a one-to-one basis as opposed to the full MBSR intervention in a group format. The intervention used was appropriate in this group of hospitalized patients with advanced cancer. Such modifications draw attention to the feasibility and appropriateness of MBSR in specific groups of people with cancer. Moreover, the inclusion of qualitative data and data on feasibility provide information of clinical value with a view to planning further MBSR interventions. Since only the abstract was available, however, only limited methodological appraisal was possible. A larger RCT is planned (S. Bauer-Wu, personal communication, August 2004).

Discussion

Methodological issues

The methodological limitations of the studies reported in this review included small sample sizes, limited descriptions of the randomization process (Shapiro *et al.* 2003), lack of reporting

What is already known about this topic

- Receiving a cancer diagnosis and having to undergo cancer treatment can have negative implications for psychological health, physical symptoms and may also adversely affect quality of life.
- Mindfulness-Based Stress Reduction has been used with various populations to facilitate psychological and physical health, but its validity in the context of cancer management has not been systematically reviewed.

What this paper adds

- Mindfulness-Based Stress Reduction has potential as a clinically valuable intervention for cancer patients to improve mood, sleep quality and reduction in stress.
- Further research is needed to test its feasibility and usefulness as a nursing intervention for patients with cancer.

of sampling and recruitment methods (Majumdar *et al.* 2002, Shapiro *et al.* 2003), non-reporting of the reasons for why participants were lost to follow-up, non-reporting of co-interventions (Majumdar *et al.* 2002, Shapiro *et al.* 2003) and compliance rates (Saxe *et al.* 2001, Majumdar *et al.* 2002, Shapiro *et al.* 2003). Inadequate reporting of the specifics of the MBSR intervention (types of yoga and meditation, content of each weekly session) was also evident.

Outcomes measures for mood, stress, anxiety and quality of life were self-reported by patients. The instruments used for these measures (with the exception of Majumdar *et al.* 2002) have been shown to be reliable and valid in people with cancer and are easily administered by nursing staff. The physiological measures used by Altman (2001) had limited application to nursing practice. Outcome measures for immunological and tumour remission parameters are of interest, nevertheless, findings so far have not shown positive results. For those studies where only an abstract was available, only limited methodological evaluation, clinical appraisal of outcomes measures and commentary of the relevance of studies to practice was possible.

Application of MBSR packages

MBSR is a complex, multimodal intervention with mindfulness as its focus. It is impossible to determine which aspect of the intervention has the beneficial therapeutic effect. In a pragmatic trial this may not matter (Richardson 2000), but it does have implications for study replication,

comparison between interventions and transferability (Proulx 2003).

The literature reports MBSR interventions with variations in the number of sessions (range 4–10 weeks), session duration (range 45 minutes to 2.5 hours) and content, including co-interventions of art therapy, diet and other complementary therapies. The impact of such variations cannot be established in the light of the heterogeneity of sample characteristics, outcomes measures and follow-up times between studies. Some studies failed to report on critical points in patient trajectories, such as time since diagnosis and stage in cancer therapy. Such factors would have an influence on levels of stress, coping, sleep and quality of life and should be made explicit.

MBSR use with patients

In practice, MBSR has been offered to patients at any stage of the cancer journey. This is beneficial in terms of cost-effectiveness and facilitates long-term self-care. Kabat-Zinn's research on MBSR for anxiety, for example, reported that 84% of participants continued practice of MBSR after 3 months (Kabat-Zinn *et al.* 1992), with 56% still practising 3 years later (Miller *et al.* 1995). To date, only one study has included longer-term follow-up of the practice of MBSR by patients with cancer (Carlson *et al.* 2001). This found positive results for continued practice and maintained effect after 6 months.

MBSR is intended to be flexible and can be used according to individual need. Individuals participate in MBSR within their own levels of capability and can substitute one mindfulness activity for another to fulfil their individual needs, for example, using imagery rather than physical yoga. The provision of mindfulness meditation on an individual basis (as illustrated by S. Bauer-Wu *et al.*, personal communication) prompts the need for further research into the appropriateness of group intervention and of the feasibility of certain components of MBSR therapy for patients with different needs, cancer stages, mobility and function, treatment schedules and with different times since diagnosis.

MBSR is not, however, appropriate for those suffering from psychotic episodes or who are actively suicidal. One further issue for consideration is that it is generally taught as a group activity, thus it may be that people with borderline personality disorder may be inappropriate for training in a group setting.

The feasibility of the traditional 8-week intervention structure and content with a silent retreat (from a nursing staff as well as a patient perspective) would benefit from detailed evaluation in future research. The potential of a

silent retreat in a hospital setting or cancer centre was not discussed in any of the papers. A further issue is patient perception of the intervention (enjoyment, patient preference, satisfaction of the intervention/of different components of the intervention) that eludes empirical quantitative evaluation. This element is under-evaluated and its exploration would add to the body of knowledge on MBSR and assist in its implementation in clinical practice. This type of research may benefit from the application of qualitative research approaches.

The Center for Mindfulness at the University of Massachusetts and the University of Bangor, Wales currently offer training courses in MBSR; however, there are currently no formal standards by which to assess the competency of MBSR instructors. Further details on the criteria for teaching and details on training are available from the CFM website at <http://www.umassmed.edu/cfm>.

Conclusion

To date, studies on MBSR for people with cancer have focused specifically on psychological (mood and stress) and quality of life outcomes measures with some positive results. There have been no reported side effects. The finding of a positive relationship between increased practice and outcome is of interest. This emphasizes the importance of using appropriate measures to monitor compliance with daily practice. Thus far, there has been no systematic assessment of whether those who benefit most from MBSR have shared characteristics or attitudes. This provides an incentive to future investigators to explore such an angle.

RCTs on MBSR have relatively small samples and may be underpowered. However, findings from these and uncontrolled trials suggest some positive trends. Studies suffer from a number of methodological limitations. Therefore, it is clear that nurses need to consider integrating MBSR into practice in the context of methodologically rigorous research. Research should consider the appropriateness and feasibility of MBSR for patients with different characteristics (mobility, function, time since diagnosis, stage of cancer). The programme should be evaluated in comparison with other interventions (such as relaxation, progressive muscle relaxation, drug therapy) as part of standard care or along with other treatment packages. Additionally, the effectiveness of different core elements of the MBSR programme (body scan, sitting meditation, yoga stretches) should be compared. Qualitative data on patient expectations, commitment to practise and subjective experiences would add to the increasing body of knowledge of MBSR as a supportive therapy in cancer care.

Acknowledgements

The authors would like to thank Anelia Boshnakova, Electronic Information Officer, RCCM for advice and support with search strategies and searches; Veronica Tuffrey, Senior Lecturer, School of Integrated Health, University of Westminster for advice and comments on statistical issues; The Project Advisory Group and Specialist Advisory Group (cancer) for the NHS Priorities Project for advice and support to the project; and The NHS Priorities Project is funded by the Department of Health. The views and opinions expressed are those of the authors and do not necessarily reflect those of the Department of Health.

Author contributions

JR and KP were responsible for the study conception and design and supervision. JS, JR and KP performed the data collection. JS, JR and CH performed the data analysis. JS drafted the manuscript. JR, CH and KP made critical revisions. JR obtained funding. JR and KP supervised.

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