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Mindfulness-Based Stress Reduction in Early Palliative Care for people with Metastatic Cancer: A Mixed-method study

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Abstract:

Objectives: To explore the impact of a Mindfulness-Based Stress Reduction (MBSR) intervention for people with metastatic cancer integrated in Early Palliative Care (EPC). *Design:* Mixed-method study. *Settings/Location:* EPC Service integrated with Oncology Unit, Carpi General Hospital, Italy from January to October 2017. The MBSR intervention took place inside the hospital. *Subjects:* Study participation was offered to 25 consecutive people referred to the EPC service. Inclusion criteria: people with metastatic cancer between 18 and 75 years old; informed consent. Exclusion criteria: Performance Status <60% according to Karnofsky scale; active psychiatric disorder. 20 patients were included in the study. *Intervention:* The adapted program consists of 8 meetings for 2.5 h once a week, a 4.5 h session between the 6th and 7th weeks and 0.5 h home practice daily. The following mindfulness practices were included during the training: formal sitting meditation, body scan, light yoga, walking meditation, and Aikido exercises. Participants were provided with materials for home practice. A qualified MBSR instructor conducted the program. Sessions were attended by a clinical psychologist and a physician trained in meditation, together with the palliative nurse as facilitators. *Outcome Measures:* Feasibility and acceptability were assessed on 16 participants. In addition, pre-post measures of cancer pain and mood state were collected. Semi-structured, in-depth interviews were conducted on a subset of 8 participants at the end of the study and analysed using the Interpretative-Phenomenological approach. *Results:* MBSR attendance to meetings and adherence to home practice were 75%. MBSR intervention helped participants to develop an accepting attitude in respect to metastatic cancer disease helping them to face anxiety and cancer pain. MBSR improves self-regulation of mood state engendering feelings of compassion MBSR program supports participants in questioning and reconnecting with their values and spiritual beliefs. *Conclusions:* a Mindfulness intervention integrated into EPC setting is feasible, well accepted and could help metastatic cancer patients to control cancer pain together with an opportunity of emotional and spiritual relief.

INTRODUCTION

Metastatic cancer deeply affects physical and psychosocial well-being [1]. Early integration of oncology and palliative care (PC) improves symptom management [2-4] and quality of life [5, 6]. According to international recommendations and guidelines, people with metastatic cancer should receive Early Palliative Care (EPC) and active treatment simultaneously [7]. To meet these guidelines, EPC is delivered in most clinical practices by a multi-professional team, which includes a specialist in palliative medicine [8]. Little is known, however, about the best content and way to offer EPC services [9, 10]. There is consensus on the effectiveness of psychosocial interventions in reducing cancer-related pain and distress [11-13]. Chronic pain related to cancer is a multidimensional construct that includes physical, emotional and spiritual dimensions [14, 15]. Spiritual well-being and coping are increasingly important needs among patients with chronic conditions [16-21].

In recent years, mindfulness meditation has gained in popularity as a non-pharmacological intervention [22, 23]. Mindfulness-based techniques teach how to pay attention to the present moment in a non-judgmental way focusing on bodily sensations and particularly on the movement of breath [22-23]. This process aims to increase the awareness that thoughts, feelings and perceptions are not intrinsically real but only an interpretation of reality [24]. The Mindfulness-Based Stress Reduction (MBSR) program has been broadly implemented in clinical settings to alleviate suffering associated with physical, psychosomatic and psychiatric disorders [25]. The MBSR program was shown to be effective in helping people with cancer to face stress and anxiety and improve quality of life [26-31]. People with metastatic cancer face greater challenges in coping with a terminal disease, yet there is limited evidence to support MBSR intervention in these people [32-33]. A recent systematic review did not show benefits of MBSR for people in palliative care in terms of quantitative outcomes [53]. Therefore, we decided to explore the effect of an MBSR intervention integrated in EPC by using a mixed-method approach [34]. We aimed to examine the feasibility, acceptability, and effectiveness of an 8-week MBSR intervention adapted for people with metastatic cancer integrated in EPC.

MATERIAL AND METHODS

Study Design and Participants

Early palliative care is routinely offered to all metastatic cancer patients as part of supportive care, mainly for cancer pain management. The EPC supportive program also includes individual and group psycho-oncological counselling at various stages focused on stress and pain management, cognitive restructuring, personalised plans for coping with cancer, decision making, and evaluation of specific needs.

Recruitment to the MBSR program took place from January to February 2017 at the EPC inpatient facility within the Oncology Unit of the Carpi General Hospital, Italy. The local Ethics Committee approved the study. We included people with any metastatic cancer, aged between 18 and 75, in the EPC setting, who provided written informed consent. To make the intervention accessible following standard procedures in EPC, people with performance status less than 60%, according to Karnofsky scale [³⁵] or with an active psychiatric disorder were excluded. These standards guarantee maximal compliance and adherence of eligible participants by taking into account the severity of their ongoing clinical condition. We invited eligible patients to participate immediately after their scheduled EPC appointment with a palliative oncologist and nurse.

Intervention

An MBSR instructor (RF) conducted the program in a quiet room in the hospital [a similar format was used in a previous study ³⁶]. The trainer has long-term meditation experience in the Zen Buddhist tradition and 8 years of application of MBSR programs in clinical trials characterised by chronic medical conditions such as metastatic cancer, tetraplegia, and idiopathic pulmonary fibrosis [³⁶]. In 2012 he achieved certification at the University of Florence, Department of Neurological and Psychiatric Sciences, completing a 2nd level master's degree in “Mindfulness Meditation: Neurosciences and Clinical Applications”. For the last 30 years, he focused on teaching yoga, meditation and MBSR. He also trained in yoga-sensitive trauma therapy.

A clinical psychologist experienced in research about mindfulness interventions (SP), a physician trained in meditation (MPR), and a palliative care nurse (CB) attended all sessions. In fact, as increasingly recognised in palliative integrative approaches, to bring together administrative, organizational, clinical and service aspects enables to realize continuity of care between all actors involved in the care networks of patients receiving palliative care [37]. The adapted program consisted of 8 weekly meetings of 2.5 h, and a 4.5 h session between the 6th and 7th week. Meetings included training in formal meditation techniques and the following practices: sitting meditation, body scan, light yoga, simple walking meditation and Aikido exercises that RF made accessible to participants with physical limitations. RF provided participants with an audio CD for home practice (at least 30 min daily) and a diary to record their home practice. After the study, the research coordinator (GR) checked diaries for completeness.

Data collection & measures

We assessed the impact of the MBSR intervention by collecting and combining quantitative and qualitative data. While the main objective of qualitative data is to explore how participants integrate the MBSR program, quantitative outcome measures provide information on attendance, adherence and dropout.

Quantitative data

We measured the feasibility and acceptability of the MBSR program in terms of attendance, adherence and dropout rate.

The Numerical Rating scale (NRS) was used to rate pain on a scale from 0 to 10 where 0 indicates "No pain" and 10 "The worst possible pain" [38]. The profile of Mood States (POMS) test, consisting of 40 items, clustered into 6 domains (anger, confusion, depression, fatigue, tension, vigour), was used to assess changes in participants' mood [39].

Questionnaires were self-administered before (T0) and at the end of the intervention period (T1), at 2 (T2) and 4 (T3) months post-intervention.

Qualitative data

At the end of the study, the clinical psychologist conducted semi-structured, in-depth interviews with 8 participants at the oncological outpatient clinic. The list of key questions is reported in Table 4. To answer the research question we followed a purposive sampling procedure based on performance status; we stopped interviews upon reaching data saturation.

The clinical psychologist gave adequate provisions to protect respondent privacy and maintain confidentiality to participants; he also informed them that they could stop the interview at any time if desired. The questions were open-ended to allow participants to share what was most relevant to them. Interviews were recorded with a Zoom H1 recorder, providing sufficient audio quality voice files that were later transcribed verbatim. Interviews were kept in Italian and coded in English. We translated relevant portion of text to provide quotes.

Data Analysis

Quantitative data

We examined Baseline characteristics and quantitative outcomes using descriptive statistics. We examined changes in NRS measures across the study time-points using the Wilcoxon signed-rank test ($p < 0.05$). POMS scales were analysed using a repeated measure ANOVA, using R and nlme packages [40, 41]. Statistical analyses were conducted by STATA software (version 12.0; STATA, College Station, TX).

Qualitative data

Within a cognitive-constructivist framework, SP is mainly trained in clinical psychology and phenomenological qualitative methodologies. He conducted all the coding procedures, sharing the

state of art and keeping the process open to discussion with the other authors and specialists. In particular, SP closely compared his analysis procedures with the diaries (of both the trainer and the participants) and the recordings of the meetings. This time-consuming procedure allowed to reduce the complexity of the data, distinguishing the “noise” from valuable, “structural invariants”. SP and RF kept a constant exchange after each meeting to evaluate possible criticalities or saliencies to be accounted for the next meeting. The analysis of the transcripts followed the Interpretive-Phenomenological Approach [42, 43] with the support of Atlas.ti7 software. To detail the experience of participants, SP used a preliminary descriptive procedure, followed by an interpretive approach. We analysed probing statements around the research topics, especially the acceptability and feasibility of a mindfulness intervention in the EPC setting.

The interviews explored three main areas, which guided the analysis procedure:

- 1) *Coping with cancer*: what are the participants’ needs related to cancer, personal suffering, and related stressors?
- 2) *Mindfulness and coping*: how did participants integrate MBSR intervention in their lives? Did any mindfulness-related coping strategy emerge?
- 3) *Integrative healthcare*: how does the MBSR intervention complement EPC approaches?

We implemented an inductive open-coding procedure recursively reading interviews in their entirety. SP then grouped the collected codes into categories, based on both thematic and narrative similarities. He interpreted the themes and their connections by gathering the accounts into the most representative invariants, emphasising the most meaningful information connected with the program. Finally, SP, RF, and GR organised relevant themes with respect to their connections within the text structure. Finally, all authors prolonged the engagement with the coding process by sharing reflections and ensuring reliability between themes and transcripts [44].

Reliability criteria:

To reach interpretative accuracy we performed the following validity checks:

- 1) SP performed systematic phenomenological reformulations during the interviews to prompt honest and open responses. He restated and summarised information, then questioned the participant to determine accuracy.
- 2) GR shared interview transcripts with the participants via email. This allowed participants to provide feedback on the contents and confirm that transcripts adequately reflected their views, feelings, and experiences.
- 3) Finally, SP, RF, GR, and EB challenged emerging theories while interpreting findings to increase the quality of the analysis.

RESULTS

We offered participation in the study to 25 consecutive patients referred to the EPC service; three declined because of the mindfulness intervention and two for scheduling conflicts. 20 participants, aged 42 to 73 years, were included in the study. Relevant demographic data and baseline clinical characteristics are shown in Table 1.

Quantitative findings

Three participants dropped out before the first MBSR session and one immediately after. Of the remaining 16, only 12 attended all mindfulness sessions: two attended seven sessions and the remaining two attended only six sessions due to worsening clinical condition. The overall attendance was 75%. Participants actively attended the activity sessions at the hospital. Diary records show 12 out of 16 participants carried out home practice according to protocol. One participant did not do any home practice over the eight weeks. On average, participants practiced 4.75 times per week for 28 min per session, listening to guided meditations on CDs throughout the program. The overall adherence was 75%.

NRS and POMS scores are shown in Tables 2a and 2b.

The average pain score at baseline (NRS =4.38) decreased throughout the MBSR program although this did not reach statistical significance (see Table 2a). The total POMS score was significantly lower at the end of MBSR program compared to baseline; notably, significantly lower scores were reported in the fatigue and depression domains. Mood improvement persisted at both two and four-month follow-up (see Table 2b).

Qualitative findings

The average duration of the eight interviews was 82 minutes (SD= ±18.9). Verbatim length averaged 23 pages (min= 11, max= 36). The coding procedure identified 57 codes: each occurring 1 to 76 times in the text: 64% of them occurred more than 10 times, 31% more than 20 times, and 14% more than 30 times.

Coping with cancer: need to calm down while fighting relentlessly

Participants with metastatic cancer report two opposite needs. On one hand, they need to calm down, plan priorities and dedicate time to themselves: *'I must moderate, slow down, breathe, and I'll make it, I'll be a bit slower, but I'll make it'* (participant 4). *'I am still not able to find a moment where I can stop. Maybe, I often say to myself, maybe that moment will arrive at some point, maybe things will be better'* (p. 2). On the other hand, participants feel the urge to fight relentlessly against the cancer: *'Either you move on, with all the implicated issues, or you give up. If you decide to move on you have to accept yourself, even if ill and depressed. You have to accept everything. It's the only thing that keeps me going. Otherwise, if I stand here and think about all the problems, particularly about solitude, I should better give up and get it over with'* (p. 5). These opposing needs lead to anticipatory worry, catastrophic thinking, and rumination. Participants describe a state of constant struggle: *'There is no sense. Everything is absurd! Hence, I go ahead without sense, without a direction! I already thought of that, since I'm going through a lot of challenges at the moment.'* (p. 8).

Prevailing critical feelings are loss of trust and hope: *'I have no one left to help me or talk with. I only find support here at the hospital'* (p. 6). *'Before I trusted myself, now I cannot, what can I do? I lost trust, I'm exhausted, I reached the limit'* (p. 8).

Pain related to cancer keeps participants in a state of alarm they can barely overcome: *'I'm scared because another patient died so quickly (...). Cancer changed my perspective: to experience constant pain keeps me awake, it tells me that there is a problem and that I have to move on'* (p. 3).

Mindfulness and coping: From bodily attunement to embracing a new space filled with calm

We identified five themes that referred to specific mindfulness-inspired coping processes. Each theme is illustrated by representative quotes from interviews.

1) Attuning attention while listening to the body and pausing into feelings:

At the end of the MBSR intervention, participants develop strategies to trust bodily sensations with a major focus on the breath: *'You can slow down a bit and taste yourself, through the touch, taste, smell, with your eyes closed, disentangle the mind from all kind of oppressive thoughts, and find in the silence the opportunity to focus on your body'* (p. 3).

By focusing attention on the present, they can bridge mind and body: *'I thought mindfulness could heal the body: I believed that mind control could reorganize crazy cells. Instead, mindfulness results in centring me in the body, through feelings and sensations, while I always have been centred in the head. In the past, I looked for this centre for example by praying and centring in the heart, but it was difficult'* (p. 7). Participants often pay mindful attention and act proactively when dealing with stressors. The MBSR program satisfies their need for calmness and balance in facing daily challenges: *'How do I feel? How am I living that? Pausing in little things I rest in the fullness of the present moment; before I did not acknowledge it, now it penetrates my skin'* (p. 8). *'Before, I always hid myself, my feelings were insignificant. Now all what I feel and live is a new fact. I see each passing day differently. Life could end tomorrow'* (p. 8).

2) *Abiding inner-centeredness and intimate spaciousness:*

Mindfulness leads participants to discover an inner centre, an intimate space filled with calm and inner strength: *'The most important thing is that I rediscovered a special space within me, in the heart, a solid, stable point, firm, certain, upon which I can rely. Before it was there, but I did not notice it. Now I know it exists, and it will always be there. It's me, my own being, my own feeling. For as long as I shall live, it will be there.'* (p. 4). Participants relate this center to a spiritual dimension: *'If I intimately talk to myself, I can find a space related to "something more". I can feel huge as the universe and small as a speck of dust'* (p. 2).

3) *Embracing and integrating the pain related to cancer:*

Participants report an attentional shift from the state of health towards the "immediate" experience, enabling a different integration of cancer pain and suffering: *'Now, as pain starts I relax and listen. I follow it, I divert thoughts from pain, substantiating it as a physical presence'* (p. 4).

'Mindfulness taught me to always bring back the mind inside, that things do not change, they exist, they stay, what is important is to be aware of them, to be present to them. I am aware of my problem, and it's better to look for solutions, rather than panicking because of it.' (p. 7).

The narrative of fighting cancer is thus transformed by a more accepting attitude: *'We have to accept pain because it belongs to us. If we accept it, we are at peace with others'* (p. 3).

4) *Finding balance in facing anxiety:*

At the beginning of the MBSR program participants felt exhaustion, confusion and cognitive as well emotional reactivity. At the fourth session, the fear of death becomes more explicit. These themes allow some participants to become leading examples of courage, presenting the strength of awareness to other participants: *'This program helped me in handling and reducing anxiety. Before, I was*

intensely daydreaming all the time. Now as I feel that mind wandering is starting, think: no, wait a second, I am here, nothing is happening, breathe, calm down' (p. 1).

With the trainer's guidance, participants can contemplate their inner vulnerability with renewed strength, progressively de-identifying with emotional patterns: *I was terrified by the contrast liquid. I started to focus on breath, it was helpful. Even if I was really anxious, I didn't ask for medication because I could handle that apprehension. You're always there with your problem, you just have to be aware of it'*(p. 6).. *'It brings a lot of peace. Before going to the hospital it helps me to be more lucid when facing bad news. Mindfulness transforms my perception and reactions to bad news. Actually, sometimes news is not so bad'* (p. 3).

5) *Opening to spiritual dimensions:*

The MBSR program supports participants in questioning and reconnecting with their values and spiritual beliefs: *'This tool opens to the present moment as it is, but it can also open a wider spiritual perspective, something which goes beyond the illness, something related to the whole person as such. This gives value to me and my disease'* (p. 3). While de-identifying from automatic thoughts and persistent narratives, they can suspend beliefs, assumptions and related expectations, thus surrendering to a "higher dimension", a source of kindness towards themselves: *'Now I let this greater dimension take care of me, as it likes. The uncertainty of what will come has become my practice. I can stop and become aware of the present moment'* (p. 4).

During mindfulness sessions, participants can share existential experiences connected with a strong feeling of gratitude and compassion.

To a lesser extent, participants are also filled with a sense of preciousness of existence, wonder, and nostalgia: *'in my view, religion is about creation: nothing comes from nothing. Spirituality is a light, an axis which brings you, guides you. Life cannot be only pink. If something beautiful happens, we welcome it. If something bad happens, we have to tackle it'* (p. 2).

'Reality is not a dream, it is made up by little things. Now I find my spiritual dimension in relation with nature. In nature I feel nurtured' (p. 7).

The combination of mindfulness practice and group dynamics revealed an additional coping resource. The interaction between participants generates mutual support, allowing a strong feeling of intimacy: *'I stop and think: why can I not do it too? Now, I must, as Participant 4 says, 'pause and dwell'. I can go a bit slower'* (p. 1).

'The courage connects us. Here I showed my soul, I felt in a safe place, here I could open myself: there's no other place to do that' (p. 4).

Participants feel supported by the trainer's instructions while focusing and sustaining their attention on breath and looking for what happens in the body: *'Working together, even without talking too much, but just to share a space, to be there with a teacher, trying to focus on your body. Everyone shares what she felt, with a different shade'* (p. 6).

Integrative healthcare: feeling deeply supported

Participants reported as facilitators of participating in the MBSR program the presence of the cancer team and the fact that the course took place in the cancer palliative unit. Participants appreciated this format, the proposal of the hospital through their attending physician or nurse, and the presence of few professionals during the meetings. Their presence was relevant in guaranteeing continuity of care, contributing to the perception of being closely followed by the care system.

Participants report oncological treatments as a disease-centered rather than person-centered: *'I'm a person, I'm not only the definition of a cancer. It's not only the medication, but the way they are given to you that matters'* (p. 4).

Conversely, participants feel deeply supported by the mindfulness program as a complementary intervention. Participants especially praised the unit of EPC in taking care of them as people, rather than mere patients: *'The opportunity to choose a different approach was a huge benefit. Because it's*

not medication that matters, but integrating and healing many other factors. Here I am a person with a name. I'm asked about how I'm doing in general, also about suffering unrelated to cancer. I don't feel abandoned. By just coming here, you interact and we patients help each other. It was helpful to talk. Often I would like to hear « how do you feel? ». I talked a lot, and I listened a lot' (p. 6).

DISCUSSION

Our results show that an MBSR program for people with metastatic cancer in EPC is feasible and well accepted. We report recommendations for implementation in Table 3. Participants attended most mindfulness sessions and complied with the home practice. Five patients who declined participation did not sign study informed consent and therefore were not reached for interview. Three participants dropped out before the first session for worsening clinical condition and were then unreachable, while the one who immediately dropped out did so for personal reason and refused to get in touch. Despite adaptations to participants' performance status, the dropout was similar to other studies [^{36,45}].

There was a significant reduction in both fatigue and depression domains of the POMS at the end of MBSR intervention and throughout the four months of follow-up. Cancer-related pain showed a trend for reduction at the four-month follow-up visit due to EPC time-effect and was not worsened by mindfulness activities. Pain at baseline was higher than reported in other EPC studies, due to the variable duration of EPC within our sample at the start of the study.

Our interpretative phenomenological analysis confirms that people with metastatic cancer face existential uncertainty and hopelessness [^{46,47}]. At the beginning of the MBSR program depressive-anxious thoughts such as worry and catastrophic rumination were causing exhaustion, avoidance, reactivity, and self-blaming. These patterns drew attention exclusively onto the cancer condition, framing it as an inescapable threat. The protected environment of MBSR program, facilitated by the EPC team and the trainer's guidance, encouraged participants' commitment to the mindfulness intervention. Participants were able to suspend cognitive-emotional patterns related to the metastatic

cancer, shifting their attention to the present moment. Especially acknowledging and pausing into bodily sensations refines awareness and supports coping with stress and anxiety.

In accordance with the Mindfulness-to-Meaning Theory [48, 49] mindfulness-related processes, reshape one's identity defined by negative judgments and automatic catastrophic evaluations. Participants were able to de-identify from these persistent thoughts and to let go physical tension. Consistent with other findings, participants directly relate self-consciousness with a stable centre of perception [50], from which is possible to better acknowledge the emergence of catastrophic thoughts and feelings. This re-centering process contributes to regulation of the narrative-self and reframing of the perception of cancer, leading to a new attitude of self-compassion and kindness.

Group dynamics between study participants generate horizontal support and protection, and a strong feeling of intimacy. Moreover, each participant can reconnect with deep spiritual values and beliefs about life and death. The interplay between these two processes shaped a collective identity that people with metastatic cancer strongly need [33, 51], and engendered a growing ability to face anxiety and cancer-related pain.

Healthcare professionals and practitioners involved in complementary medicine are important for a narrative-centred instead of a disease-centred healing process [52]. Participants report that the MBSR intervention improves relationships with their relatives and health professionals. While the disease-centred oncological treatments are reported as a source of suffering, the participants feel deeply recognised and supported by the MBSR intervention integrated into EPC model, and express gratitude and compassion directed towards study team and participants. This might have contributed to high adherence and compliance to the intervention. Compared to baseline, people with metastatic cancer show a higher level of commitment not limited to cancer pain management [19]. Accordingly, in our study, stress and pain management through the mindfulness intervention was associated with feelings of purpose, self-worth and spiritual connection (i.e. "something more"), leading to a re-appreciation of life by participants. This genuine, open, appreciation for value and meaning could be termed "existential gratitude", i.e. not taking anything for granted, the realisation that each little gesture,

word, breath, as existence itself, is a gift; this was an main outcome of our study. The MBSR-related coping processes that were identified in our sample are summarised in Figure 1.

Strengths and limitations

Qualitative research is important to understand the complex needs of people with metastatic cancer, yet few qualitative studies are conducted [54]. Our study aligns with the European Complementary and Alternative Medicine research program [55], and adheres to CAMs guidelines for qualitative interviews and fieldwork studies with in-depth explorations of local experiences and interdisciplinary research involving mixed-methods with CAM providers and participants as research partners [53, 54]. This was a single arm, non-randomized design and that improvements in outcomes could be due to time and other nonspecific effects. Parallel psycho-oncological counselling could have affected quantitative outcomes. The intervention was attended by a clinical psychologist, a physician trained in mindfulness and a palliative care nurse who participated as volunteers. Psychologist, physician, and nurse all participated as volunteers without being paid. This may raise concerns regarding feasibility in other settings as well as cost and scalability in other settings. The small sample limits the generalization of our results, which consistently with the IPA approach focuses on the idiographic-idiosyncratic character of the data [43, 44]. The recruitment procedure excluded non-performant patients. Our results pertain to an upper-middle class group composed by Italian women with metastatic cancer and good performance status. Programs delivered in participants with lower performance status should consider online meetings options to make sessions accessible from home. Recruitment procedures limit the outcomes of this study as we included only patients referring to EPC inpatient facility, therefore able to care for most of their personal needs and able to understand study proposal. Further studies in different samples are needed to confirm our findings.

Conclusions

We show that an MBSR intervention in the context of early palliative care for people with metastatic cancer is feasible and well accepted. It increases body awareness and promotes an accepting attitude toward the experience with cancer, which is important for emotional regulation.

Finally, our study suggests that mindfulness intervention integrated in EPC settings could help control cancer-related pain and offers emotional and spiritual relief.

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Author Contributions

RF, GR, EB designed the study. RF led mindfulness interventions. SP collected and analysed qualitative data. RF and GR assisted with the data analyses. GAS performed the statistical analysis. SP, GR, RF wrote the manuscript. All authors shared reflections, ensured reliability between theory, themes and transcripts, and collaborated in the interpretation and writing of the manuscript.

Author Disclosure Statement

No competing financial interests exist.

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Fig. 1: MBSR-related overall coping processes

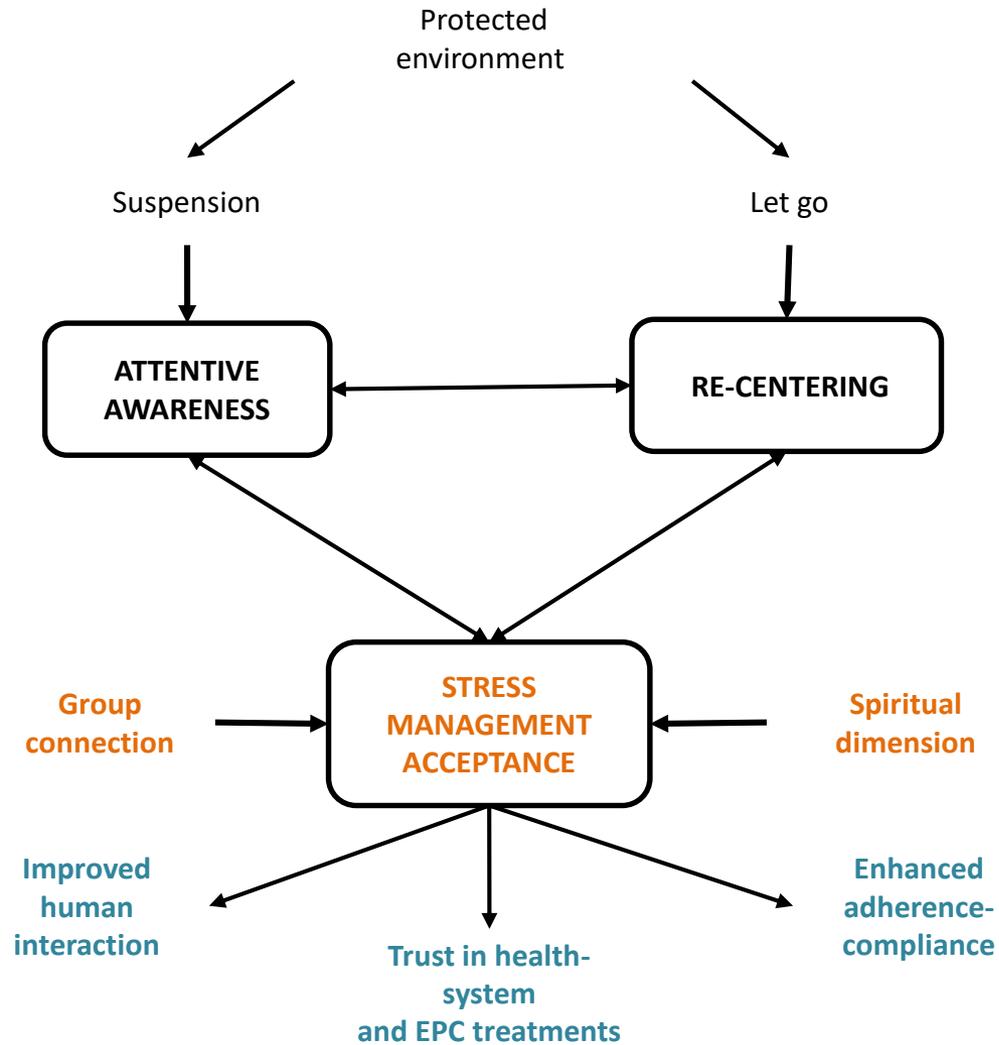


Table 1. Baseline sociodemographic and clinical characteristics of the patients.

	n=20	
	No.	%
<i>Age, years</i>		
mean	54	
Sd	7.72	
<i>Educational qualification</i>		
Primary school	2	10
Secondary school	16	80
University Degree	2	10
<i>Sex</i>		
female	17	85
male	3	15
<i>Ongoing treatment for cancer</i>		
yes	12	60
no	8	40
<i>Current use of opioids</i>		
yes	7	35
no	13	65
<i>EPC</i>		
<=3 months after diagnosis	4	20
> 3 months after diagnosis	16	80
<i>Karnosky score</i>		
60-80	6	30
90-100	14	70
<i>Sd= standard deviation;</i>		

Table 2a. NRS measure score by time for MBSR participants (n=16)

	Mean (sd)				
Measure score	T0	T1	T2	T3	P-value
NRS	4.38	4.13	4.13	3.75	.76
	(1.96)	(2.36)	(2.55)	(2.52)	

Table 2b: POMS scale measure score by time for MBSR participants (n=16). POMS scales have been analysed under a repeated measure ANOVA approach, by the used of R and nlme packages.

Measure	T0	T1	T2	T3	Sd residuals	P-value
POMS	49.4	10.0	20.5	-0.3	2.23	.01
<i>POMS domain</i>						
Anger	10.2	2.3	4.4	3.8	0.59	.06
Confusion	13.7	7.3	9.2	8.2	0.39	.05
Depression	16.3	3.3	5.6	4.2	0.60	.00
Fatigue	13.5	5.0	5.2	5.3	0.40	.00
Tension	12.0	6.3	7.5	7.0	0.45	.11
Vigour	14.8	14.3	13.6	18.0	0.57	.05

Table 3: Recommendations for Mindfulness-Based Interventions in EPC

Recommendations	
Physical adaptations	<p>Adapt practices to individual constraints (e.g. fatigue, scars, drugs, catheters, port-a-cath). Avoid yoga long-standing positions and extensive movements, adapt walking meditation, use supports and chairs, allow meditation laying on ground, lighten aikido/chi-kung exercises.</p>
	<p>Adapt communication: gentle language, suggest alternatives and personalized durations. No physically assisting. Make participants feel safe in their body and shared space, with light invitation to try new movements.</p>
	<p>Shorten practices: in weekly sessions, body scan 20-25 min, sitting meditation 10-15 min, walking meditation 10 min. Weekly meetings 2.5 h are suitable for metastatic participants to foster discussion and group dynamic. Home practice 30 min daily.</p>
Trainer	<p>Encourage home daily practice: even if demanding, participants can progressively embody it and rely on it dealing with critical emotions.</p>
	<p>Engage in recordings/notes analysis after each weekly session; clarification of main themes relevance allows widening them in the following meeting. Intense daily personal practice is essential for the trainer to sustain emotional impact in the group.</p>
	<p>The support of 1-2 clinicians and 1 meditation practitioner enriches feedback for the trainer. Participants appreciated physicians, nurses and psychologist's participation.</p>
Group	<p>Sampling method: open and purposive. Participant's motivation is relevant in attending the program.</p>
	<p>Group size: 20 members represent a suitable limit to keep interpersonal intimacy and shape group connection. Mixed gender, in a female majority, was positively perceived.</p>
	<p>Attendance: absences are due to critical health conditions and overlapping therapies.</p>

Length- location	Program: 8 weekly meetings of 2,5 hours + 1 meeting of 4,5 hours.
	4 Follow up, 2 hours each, one per month.
	Location: hospital, unit of oncology.
Material	Audio CDs are useful; participants preferred the recorded trainer's voice.
	Supports: pillows, plaids, soft mats are necessary for a comfortable body scan and sitting meditation.
	Sanitation: very clean floor: these participants' immune defenses can be very low.

Table 4: List of key questions during semi-structured interviews

1. Would you like to share with me your experience of the program?
2. Which was your motivation to take part in, and what encouraged you to attend the whole program?
3. Did any particular or meaningful experience occur during the program or in connection with it?
4. Did the program somehow affect your life? Do you have any example you would like to share?
5. Did you face any difficulty in taking part to the group, practicing mindfulness meditation, or doing home exercises? Do you have any example you would like to share?
6. Did any positive or negative experience occurred during the program or in connection with it? Do you have any example you would like to share?
7. Did the program affect yourself or your perception of yourself, in and out of the program?
8. Did the program affect the way you interact or perceive others, in and out of the program?
9. What function did the group play for you? How did you experience it?
10. Did the program somehow affect your worldview or your way to frame life? If yes, how?
11. What part did play the material given as a support? How did you experience it?
12. What part did play the personal of the hospital? How did the hospital invite you taking part to this program?
13. What part did play the trainer in leading the program?
14. What part did play the place and the space where the program took place? If it had a role, how did affect you?
15. Do you have any suggestion to improve this kind of intervention for people affected by spinal injury?
16. Would you like to add something, a final consideration or comment?