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REVIEW
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A scoping review on mindfulness-based interventions for families of patients with advanced cancer

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Abstract: We aimed to conduct a scoping review to investigate mindfulness-based interventions targeting the families of patients with advanced cancer to elucidate the characteristics of the target population, program content, and evaluation methods. The review followed the Joanna Briggs Institute guidelines, and relevant studies were identified through searches in the PubMed, CINAHL, and Cochrane databases. A total of 13 studies were included, with only one focusing solely on family members, while the rest involved both family members and patients. Among the 13 studies, 4 were randomized controlled trials (RCTs), and 10 were pilot studies. The sample sizes varied, with seven studies involving single-group designs, four using two-group designs, one with a three-group design, and one study where no information on group size was provided. The framework and content of the programs were adapted from existing mindfulness-based stress reduction techniques to suit the target context and were evaluated using multiple measures, including assessments of anxiety and depression. Most studies recruited families and patients together, and programs targeting families alone were underdeveloped. Future studies should address the needs and challenges faced by the families of patients with advanced cancer, refining program content and evaluation methods from the perspective of nurses.

***Keywords*:** family nursing, caregiver, mental health, intervention program, meditation

Introduction

The 5-year relative survival rate for all cancers has been improving annually, with approximately 70% of patients now reaching the fifth year after diagnosis (*1*). Although cancer is categorized as a chronic disease, advanced cases often follow a challenging course due to late detection, limited treatment options, and rapid progression. Many patients with advanced cancer undergo multidisciplinary treatment, including surgery, chemotherapy, and radiation therapy, tailored to their condition. Patients endure prolonged illness, while their families, who provide support, also experience significant strain.

Family members of patients with advanced cancer are forced to witness their loved one's suffering and the harshness of life. They sometimes endure more unbearable emotions than the patient, and referring to them as the "second" patient is not an exaggeration. From the moment of diagnosis, families take on multifaceted roles and must often restrict their social lives (*2,3*). Maintaining mental health becomes challenging (*2*), and they are sometimes required to make sacrifices in terms of their own well-being and finances (*4,5*). These compounded burdens affect family members' self-efficacy, quality of life (QOL), and contribute to increased rates of anxiety and depression (*6,7*). Approximately one-quarter of families of patients with advanced lung cancer experience depressive symptoms (*8*). In some cases, the anxiety experienced by family members surpasses that of the patients, depending on the nature of the disease (*9*).

Intervention studies using techniques, such as cognitive behavioral therapy, psychoeducation, and supportive interventions, are being conducted to reduce the burden on families of patients with advanced cancer. These studies have shown positive effects in improving the QOL of family members while also reducing levels of depression, anxiety, and caregiving strain (*10-13*). In recent years, mindfulness-based interventions (MBIs) have gained considerable attention. Mindfulness involves the intentional awareness of one's physical and mental processes, functioning both as a skill and a practice. The cultivation of mindfulness enhances the ability to remain present, and those who can sustain mindfulness amidst life's challenges have been

suggested to experience less suffering (*14*). The most widely recognized program is mindfulness-based stress reduction (MBSR), developed by Kabat-Zinn (*15*). This program, which typically spans 8 weeks, includes mindfulness meditation, body scanning, yoga, group discussions, and retreats. Recently, various programs have emerged, tailored to specific conditions, stages of illness, and symptoms. One such program is mindfulness-based cognitive therapy, which integrates cognitive therapy with mindfulness practices (*16*).

MBIs have been shown to be effective in managing mental health conditions, such as depression, anxiety disorders, and chronic pain. They also have a positive impact on stress, anxiety, fatigue, and post-traumatic growth in patients with cancer (*16,17*). Additionally, MBIs have been associated with a decrease in depressive symptoms, a reduction in caregiving burden, and an improvement in QOL among the families of patients with cancer (*18*). Some evidence even suggests that MBIs may improve overall mood within these families (*10*). Furthermore, improvements in mindfulness can have a ripple effect, reducing stress within the family unit (*19*). This allows individuals to continue applying the self-care skills they learned through MBIs even after the program has ended. MBIs may be particularly beneficial for families of patients with advanced cancer, as these caregivers are often overwhelmed by their responsibilities and may neglect their own mental health. However, research on MBIs for families of patients with advanced cancer in Japan has been limited, focusing mainly on the experiences and needs of family members, with few reports on MBI.

To gain a deeper understanding of the potential benefits of MBIs for these families and to guide future interventions in Japan, conducting a comprehensive review of prior international studies is important. This should include an overview of their scope and content, the identification of research gaps, and scoping reviews of intervention methods and outcome measures. In this study, we aimed to conduct a scoping review of MBIs for family members of patients with advanced cancer overseas. Our goal was to clarify the intervention methods and outcome indicators to gain insights for future MBI research and practice.

Research methods and literature review strategy

In this study, a family includes not only blood relatives, such as parents, siblings, or spouses (in the case of marriage), but also caregivers whom the patient recognizes as being close to them. MBI refers to clinical interventions that incorporate mindfulness meditation programs.

We conducted a scoping review (*20*) aimed at rapidly outlining the scope and content of a specific research area. It involved an extensive search of key concepts, information sources, and types of available papers and evidence, with findings reported based on the Joanna Briggs Institute's manual for evidence synthesis (*21*). The criteria for selecting studies are listed in Table 1: *i*) population: family members of adult patients with advanced cancer (stage III or IV) undergoing chemotherapy or radiotherapy; *ii*) concept: studies that implemented clinical interventions using mindfulness meditation programs; and *iii*) context: studies conducted in any country and published in English, with no restrictions on the year of publication. Reviews, conference proceedings, commentaries, and studies describing only protocols were excluded.

We used the PubMed, CINAHL, and Cochrane databases to conduct the search on September 4, 2024. The search included all literature up to the year of the search, using the following search terms: "mindfulness" AND "(cancer) OR (neoplasms)" AND "(family) OR (carer) OR (caregiver) OR (partner) OR (partners) OR (partnered) OR (partnering)".

Two independent researchers screened the literature. In the first screening, titles and abstracts were reviewed against the selection criteria. In the second screening, full texts were thoroughly read. Any disagreements between the researchers were discussed, and a final decision was made regarding the inclusion of each study.

Key findings based on the scoping review

Summary of the included studies

A flowchart for selecting literature was created based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020 guidelines (Figure 1). The search yielded 400 articles: 146 from Cochrane, 134 from Pubmed, and 120 from CINAHL. After applying the selection criteria and excluding

Table 1. Study selection criteria

Items	Selection criteria
Population	• Family members of adult patients with advanced cancer undergoing treatment with chemotherapy or radiotherapy, including stage III or IV.
Concept	• Studies in which clinical interventions using programs incorporating mindfulness meditation are being conducted. • Review articles, conference abstracts, conference proceedings, or commentaries, and protocol studies were excluded.
Context	• Studies from all countries written in English were included regardless of the date of publishing.

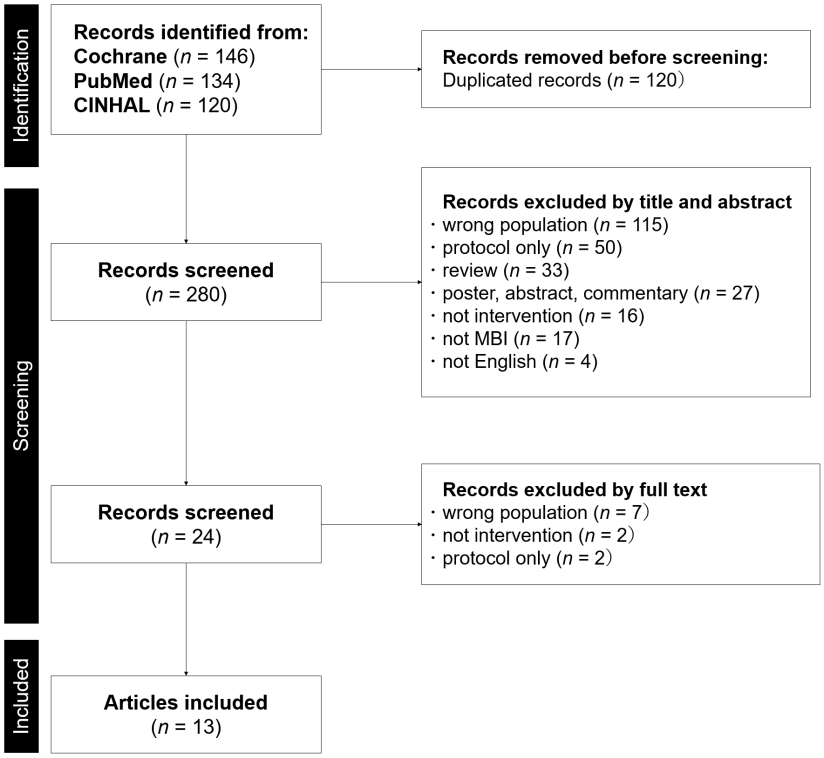

Figure 1. PRISMA flowchart of study selection.

120 duplicates, a total of 280 articles remained. The primary screening involved reviewing the titles and abstracts, leading to the exclusion of 256 articles from further analysis. During the secondary screening, 24 full-text articles were reviewed, and 13 were finally selected. Table 2 presents an overview of the 13 selected studies. All 13 studies were published in the 2000s, with the earliest published in 2012. The most common publication year was 2020, with five studies published that year; in other years, one or two studies were published annually. The studies surveyed were primarily from the USA (n = 12) and the Netherlands (n = 1). Among the 13 studies, four were randomized controlled trials (RCTs) and 10 were described as pilot studies.

The sample sizes varied, with seven studies involving single-group designs, four using two-group designs, one with a three-group design, and one study where no information on group size was provided.

Outline of the participants

Of the 13 studies, one involved only family members, while the remaining 12 studies included both patients and family members. Of these, three provided programs specifically designed for patient-family member pairs. The terminology used to describe family members varied considerably across the literature. The most common term was "family caregiver" (used in four studies), followed by "partner" and "informal caregiver" (three studies each), and "family member", "spouse", and "partner" (one study each). Six studies referred to "multiple cancers", which included both solid tumors and hematological cancers. Three studies mentioned "non-small cell lung cancer", two addressed "small cell and non-small cell lung cancer", one focused on "malignant glioma or brain metastasis", and one referred to "head and neck cancer". In terms of cancer progression, eight studies specified the stage of cancer, whereas five did not. The cancer stages varied, with some studies including all stages from I to IV and others being limited to stage IV. Certain studies also focused on patients who had completed or were undergoing treatment (*22*), were undergoing curative or palliative chemotherapy (*23*), had incurable cancer (*24*), were undergoing treatment with a prognosis of 12 months or less (*25*), and were receiving chemotherapy for progressive disease (*26*).

Characteristics of the interventions

The intervention methods, content of the MBI programs, and outcome measures for each study are listed in Table 3.

Regarding the intervention methods, the most common duration was 8weeks, as reported in five studies, followed by 6weeks in four studies, 4weeks in three studies, and 2weeks in one study. For the duration of each session, 120 minutes was the most common (in four studies), followed by 60 minutes (in three studies). Other session lengths included 150 minutes,

Table 2. Summary of the document

No. (*Ref.*)	Author (Year of Publication) Country	Title	Purpose	Research Design	Number of Participants (Number Analyzed)	Type of Cancer (Supplemental) / Stage	Family Notation
1 (*30*)	Lengacher *et al.* (2012) USA	A pilot study evaluating the effect of mindfulness-based stress reduction on psychological status, physical status, salivary cortisol, and interleukin-6 among advanced-stage cancer patients and their caregivers	To determine whether the Mindfulness-Based Stress Reduction Program for Cancer (MBSR-C) improves psychological and physical symptoms, quality of life, and stress in patients with advanced cancer and their caregivers.	one-group, quasi-experimental, pre-post test design	patient: 26 (23) family: 26 (24)	breast cancer, colon cancer, lung cancer, prostate cancer (during radiation or chemotherapy treatment) / Stage III or IV	family-caregiver
2 (*22*)	van den Hurk *et al.* (2015) Netherlands	Mindfulness-Based Stress Reduction for lung cancer patients and their partners: Results of a mixed methods pilot study	To determine whether MBSR is a feasible intervention for lung cancer patients and their partners, and whether it is effective in reducing psychological distress.	mixed methods pilot study	patient: 19 (13) family: 16 (11)	small cell lung cancer, non-small cell lung cancer (treatment completed or in progress) / No description	partner
3 (*33*)	Milbury .*et al.* (2017) USA	Pilot Testing of a Brief Couple-Based Mind-Body Intervention for Patients With Metastatic Non-Small Cell Lung Cancer and Their Partners	To examine the acceptability and effectiveness of the intervention for patients with metastatic lung cancer and their spouses undergoing treatment.	single-arm trial	patient: 7 (6) family: 7 (6)	non-small cell LC (under active treatment) / Stage IV	partner
4 (*32*)	Winger *et al.* (2018) USA	Coping Skills Practice and Symptom Change: A Secondary Analysis of a Pilot Telephone Symptom Management Intervention for Lung Cancer Patients and their Family Caregivers	To examine the relationship between the practice of coping skills and changes in symptoms in telephone symptom management (TSM) interventions conducted simultaneously with lung cancer patients and their caregivers.	randomized pilot trial	patient: 51 (51) family: 51 (51)	small cell lung cancer, non-small cell lung cancer (more than 3 weeks have passed since diagnosis, and at the time of recruitment, specific symptoms are moderate or more severe) / Stage I to IV	family-caregiver
5 (*31*)	Kubo *et al.* (2018) USA	A Pilot Mobile-based Mindfulness Intervention for Cancer Patients and their Informal Caregivers	To conduct a pilot feasibility study of an app/online-based mindfulness program within an integrated healthcare delivery system for cancer patients and their overburdened caregivers.	single-arm pilot study	patient: 28 (19) family: 14 (9)	breast cancer, digestive organ cancer, blood cancer, lung cancer (chemotherapy scheduled within at least 2 months after diagnosis of cancer) / Stage II to IV	informal-caregiver
6 (*23*)	Kubo *et al.* (2019) USA	A Randomized Controlled Trial of mHealth Mindfulness Intervention for Cancer Patients and Informal Cancer Caregivers: A Feasibility Study Within an Integrated Health Care Delivery System	Based on the results of the pilot study, we will examine the feasibility and effectiveness of an mHealth mindfulness program intervention for cancer patients and their caregivers.	two-arm RCT	patient: 97 (72) family: 31 (26)	breast cancer, blood cancer, digestive organ cancer (under curative or palliative chemotherapy) / No description	informal-caregiver
7 (*24*)	Cottingham *et al.* (2019) USA	Addressing personal barriers to advance care planning: Qualitative investigation of a mindfulness-based intervention for adults with cancer and their family caregivers	To examine the impact of a new mindfulness intervention, Mindfully Optimizing Delivery of End-of-Life (MODEL) Care, on the life experiences and ACP of patients with advanced cancer and their caregivers.	No description	patient: 13 (12) family: 13 (12)	solid malignant tumors (incurable) such as metastatic melanoma, lung cancer, sarcoma, and pancreatic cancer / Stage IIIb or IIIc, IV	caregiver

Table 2. Summary of the document (continued)

No. (*Ref.*)	Author (Year of Publication) Country	Title	Purpose	Research Design	Number of Participants (Number Analyzed)	Type of Cancer (Supplemental) / Stage	Family Notation
8 (*27*)	McDonnell *et al.* (2020) USA	A Prospective Pilot Study Evaluating Feasibility and Preliminary Effects of Breathe Easier: A Mindfulness-based Intervention for Survivors of Lung Cancer and Their Family Members (Dyads)	To evaluate the feasibility and preliminary effects of an intervention called Breathe Easier, which is based on evidence-based MBSR and MBCR programs, for NSCLC survivors (stages I-IIIa) and their families.	1-group pre-post design	patient: 26 (26) family: 23 (23)	non-small cell lung cancer (after first-line treatment) / Stage I to IIIa	family-member
9 (*34*)	Kubo *et al.* (2020) USA	Pilot pragmatic randomized trial of mHealth mindfulness-based intervention for advanced cancer patients and their informal caregivers	To conduct a feasibility study and evaluate patient preferences for two types of MBI provision, by conducting a large-scale RCT of a technology-based MBI program for patients with advanced cancer and their caregivers in a healthcare delivery system.	two-arm pilot cluster RCT	patient: 103 (80) family: 39 (33)	metastatic solid tumors such as breast cancer, gastrointestinal cancer, lung cancer, and urological cancer, or hematological cancer / No description	informal-caregiver
10 (*28*)	Milbury *et al.* (2020) USA	Online Couple-Based Meditation Intervention for Patients With Primary or Metastatic Brain Tumors and Their Partners: Results of a Pilot Randomized Controlled Trial	To examine the feasibility and preliminary efficacy of a Couple-Based Meditation (CBM) program for patients with primary and metastatic brain tumors and their partners, with the goal of improving symptoms and health status.	two-arm pilot trial	patient: 35 (22) family: 35 (22)	malignant glioma or solid malignant tumor that has metastasized to the brain (currently being treated) /No description	partner
11 (*29*)	Milbury *et al.* (2020) USA	A Mindfulness-Based Intervention as a Supportive Care Strategy for Patients with Metastatic Non-Small Cell Lung Cancer and Their Spouses: Results of a Three-Arm Pilot Randomized Controlled Trial	To test the efficacy of couple-based meditation (CBM) for patients with metastatic lung cancer and their spouses, compared to supportive expression (SE) and usual care (UC) groups, targeting psychological and spiritual distress.	three-arm RCT	patient: 75 (48) family: 75 (48)	non-small cell lung cancer (during radiation or chemotherapy) / Stage IV	spouse
12 (*25*)	Johns *et al.* (2020) USA	Mindfulness Training Supports Quality of Life and Advance Care Planning in Adults With Metastatic Cancer and Their Caregivers: Results of a Pilot Study	To develop and evaluate the feasibility and acceptability of a mindfulness-based intervention, Mindfully Optimizing Delivery of End-of-Life (MODEL) Care, for patients with advanced cancer and their family caregivers, and to evaluate preliminary effects.	single arm design	patient: 13 (13) family: 13 (13)	solid malignant tumor (under treatment, prognosis given by doctor is within 12 months) / Stage IIIb or IIIc, IV	family-caregiver
13 (*26*)	Chesak *et al.* (2022) USA	Outcomes of a Stress Management and Resiliency Training (SMART) Program for Family Caregivers of Individuals With Advanced Head and Neck Cancer	To investigate the feasibility, acceptability, and preliminary effects of the Stress Management and Resiliency Training (SMART) intervention for family members of head and neck cancer patients.	single-arm prospective pilot study	family: 26 (16)	head and neck cancer (advanced, undergoing chemotherapy) / No description	family-caregiver

Table 3. Program content and evaluation method

No.	Program name	Additional items	Period/Minutes per session	Intervention Method	A person who guides mindfulness	Timing of evaluation	Measuring tools
1	MBSR program for cancer (MBSR-C)	nutrition discussion	6 weeks / 15-45 min	3 face-to-face sessions and 3 CD sessions (group sessions)	a licensed clinical psychologist who was trained in MBSR	baseline (orientation)	➢ Perceived Stress Scale (PSS) ➢ Center for Epidemiologic Studies Depression Scale (C-ESD) ➢ State-Trait Anxiety Inventory (STAI) ➢ Memorial Symptom Assessment Scale (MSAS) ➢ Medical Outcomes Studies Short-Form General Health Survey (SF-36) ➢ cortisol, Il-6
						one week later (before and after the session)	➢ cortisol, Il-6
						3 weeks later (before and after the session)	➢ cortisol, Il-6
						6 weeks later (before and after the session)	➢ cortisol, Il-6
						6 weeks later	Same as the baseline
2	MBSR	psychological education related to grief	8 weeks / 150 min	face-to-face	health professionals and qualified mindfulness trainer	baseline	➢ Self-Perceived Pressure from Informal Care (SPPIC)* ➢ Caregiver Reaction Assessment (CRA)* ➢ Hospital Anxiety and Depression Scale (HADS) ➢ Core Quality of Life Questionnaire for Lung Cancer (QLQ-LC13) ➢ Impact of Event Scale (IES) ➢ Penn State Worry Questionnaire (PSWQ) ➢ Mindful Attention Awareness Scale (MAAS)
						8 weeks later	➢ Same as the baseline
						3 months after the program	➢ Same as the baseline
						within one year of the program ending	➢ interview
3	Couple-based mind-body (CBMB)	sharing of emotions between a couple	2 weeks / 60 min	no description	a master-level mind-body specialist	baseline (before the first session)	➢ Functional Assessment of Cancer Therapy-Spiritual Well-Being Scale (FACIT-SP) ➢ Center for Epidemiologic Studies Depression Scale (CES-D) ➢ Impact of Events Scale (IES) ➢ Pittsburgh Sleep Quality Index (PSQI)

*family only; **patient only.

Table 3. Program content and evaluation method (continued)

No.	Program name	Additional items	Period/Minutes per session	Intervention Method	A person who guides mindfulness	Timing of evaluation	Measuring tools
						within one week of the program ending	➢ before the first session
4	Telephone symptom management (TSM) intervention	symptom management	4 weeks / 45-60 min	phone-based session	licensed clinical social worker	baseline	➢ Brief Pain Inventory-Short Form ➢ Fatigue Symptom Inventory (FSI) ➢ Memorial Symptom Assessment Scale (MSAS) ➢ Patient Health Questionnaire (PHQ-8) ➢ Generalized Anxiety Disorder scale (GAD-7)
						6 weeks later	➢ same as the baseline
5	Commercial mindfulness mobile application Headspace™	no description	8 weeks / 10-20 min	application	not applicable	at the time of registration	➢ NCCN Distress Thermometer ➢ Hospital Anxiety and Depression Scale (HADS) ➢ Pittsburg Sleep Quality Index (PSQI) ➢ PROMIS Global Health Scale ➢ Brief Fatigue Inventory
						8 weeks later	➢ same as when it was registered. ➢ telephone interview
6	Commercial mindfulness mobile application Headspace™	no description	8 weeks / 10-20 min	application	not applicable	when consent is obtained	➢ NCCN Distress Thermometer ➢ Hospital Anxiety and Depression Scale (HADS) ➢ PROMIS Pain Intensity numeric rating scale ➢ PROMIS Sleep Disturbance scale ➢ Functional Assessment of Cancer Therapy General Scale (FACT-G) ➢ Brief Fatigue Inventory ➢ Posttraumatic Growth Inventory (PTGI) ➢ Five Facet Mindfulness Questionnaire–Short Form (FFMQ-SF)
						8 weeks later	➢ same as when consent was obtained ➢ telephone interview
7	Mindfully Optimizing Delivery of End-of-Life (MODEL) Care	practice mindful dialogue and listening, ACP	6 weeks / 120 min	face-to-face	a facilitator with extensive training in mindfulness teaching and practice methods	1 weeks later	➢ questionnaire (published in a different journal)
						4 weeks later	➢ the same as one week later
						within one week of the program ending	➢ interview

*family only; **patient only.

Table 3. Program content and evaluation method (continued)

No.	Program name	Additional items	Period/Minutes per session	Intervention Method	A person who guides mindfulness	Timing of evaluation	Measuring tools
8	Breathe Easier	presentations on multiple themes, including retreats, breathing difficulties and COPD	8 weeks+ retreat / 120 min	face-to-face	an advanced practice nurse and a board-certified psychiatrist, both of whom were mindfulness pactitioners	2 weeks later	➢ FACIT - Dyspnea 10 Item Short Form (Part 1) ➢ FACIT Fatigue Scale (Version 4) ➢ Perceived Stress Scale (PSS) ➢ Pittsburgh Sleep Quality Index (PSQI) ➢ Hospital Anxiety and Depression Scale (HADS) ➢ 6 Minute Walk Test ➢ Nic-Alert Saliva Test (Immunochromatographic assay for the quantitative determination of nicotine)
						5 weeks later	➢ the same as two weeks later
						8 weeks later	➢ the same as two weeks later
						after the program ends	➢ interview
9	Mobile-based Headspace and webinar-based eMindful	no description	6 weeks/ Headspace: 15 minutes a day with the app eMindful: 120 minutes online	application or online	not applicable	when consent is obtained	➢ Functional Assessment of Chronic Illness Therapy-Palliative Care (FACIT-Pal)** ➢ Caregiver Quality of Life Index-Cancer (CQOLC)* ➢ NCCN Distress Thermometer ➢ Hospital Anxiety and Depression Scale (HADS) ➢ Five Facet Mindfulness Questionnaire (FFMQ-SF)
						6 weeks later	➢ same as when consent was obtained
						6 weeks after the program ends	➢ same as when consent was obtained
						after the program ends	➢ telephone interview
10	Couple-Based Meditation (CBM)	sharing of feelings between couples, ACP	4 weeks / 60min	online	A master-level licensed phycological counselor intern	baseline	➢ MD Anderson Symptom Inventory-Brain Tumor (MDASI-BT) ➢ Center for Epidemiologic Studies-Depression Scale (CES-D) ➢ Mindful Attention Awareness Scale (MAAS) ➢ Self-Compassion Scale (SCS) ➢ Personal Assessment of Intimacy in Relationships Inventory
						6 weeks later	➢ same as the baseline
						12 weeks later	➢ same as the baseline

*family only; **patient only.

Table 3. Program content and evaluation method (continued)

No.	Program name	Additional items	Period/Minutes per session	Intervention Method	A person who guides mindfulness	Timing of evaluation	Measuring tools
11	Couple-Based Meditation (CBM)	sharing of feelings between couples, ACP	4 weeks / 60 min	online	A master's licensed phycologist counselor intern	baseline	➢ depression symptoms with the Center for Epidemiologic Studies Depression Scale (CES-D) ➢ Impact of Event Scale (IES) ➢ Functional Assessment of Cancer Therapy-Spiritual Well-Being Scale (FACIT-SP)
						1 month later	➢ same as the baseline
						3 months later	➢ same as the baseline
12	Mindfully Optimizing Delivery of End-of-Life (MODEL) Care	ACP	6 weeks / 120 min	face-to-face	A certified mindfulness facilitator with extensive training in mindfulness-based teaching methods	baseline	➢ McGill Quality of Life Inventory** ➢ Caregiver Quality of Life Index-Cancer (CQOLC)* ➢ Openness to Discuss Cancer in the Nuclear Family (ODCNF) ➢ Mini-Mental Adjustment to Cancer Scale (Mini-MAC): Cognitive Avoidance ➢ Brief COPE: self-distraction, denial, behavior disengagement ➢ Patient Health Questionnaire (PHQ-8) ➢ Generalized Anxiety Disorder scale (GAD-7) ➢ Pittsburgh Sleep Quality Index (PSQI) ➢ Fatigue Symptom Inventory (FSI)
						after intervention	➢ same as the baseline ➢ interview: (Already published in another journal)
						4 weeks after the program ends	➢ same as the baseline
13	The Stress Management and Resiliency Training (SMRT)	stress management and resilience training session	8 weeks / no description	face-to-face explanation and online (phone confirmation)	no description	baseline	➢ Perceived Stress Scale (PSS) ➢ Self-Compassion Scale Short Form (SCS-SF) ➢ Connor-Davidson Resilience Scale (CD-RISC) ➢ PROMIS Short Form v1.0-Anxiety 8a ➢ Mindful Attention Awareness Scale (MAAS)
						8 weeks later	➢ same as the baseline

*family only; **patient only.

15-45 minutes, and 45-60 minutes, each reported in one study, while another study noted a range of 10-20 minutes depending on the application. Program delivery methods varied, including face-to-face sessions (*22,24,25,27*), online formats (*28,29*), a combination of face-to-face and CD-based sessions (*30*), the use of commercial apps (*23,31*), telephone-delivered sessions (*32*), and a blend of face-to-face explanations with online components (*26*). In terms of program content, only one study (*22*) used the existing MBSR program in its original form, while most adapted MBSR to suit the target situation. These adaptations included three couple-specific programs, namely, couple-based mind-body and couple-based meditation (*28,29,33*), mindfully optimizing, as well as two programs focused on end-of-life care, such as the Delivery of End-of-Life (MODEL) Care (*24,25*). Additionally, three programs incorporated mobile-based platforms, such as Headspace™ (*23,31,34*), while others were cancer-specific (*30*), telephone-based symptom management interventions (*32*), or focused on breathing techniques (*27*). Most programs were structured to include unique sessions tailored to their specific target audience, such as discussions on nutrition (*30*), psychoeducation on grief (*22*), advance care planning (*24,25,28,29*), stress management, and resilience training (*26*).

Most of the program providers, namely the facilitators, were trained and qualified in mindfulness instruction and practice; these included clinical psychologists (*28-30*), social workers (*32*), medical professionals (*22*), and experts in mental and physical well-being (*33*). Only one study explicitly mentioned a facilitator being a nurse (*27*).

Outcome measures

The assessment instruments used in the included studies were questionnaires using established scales (six studies), combined questionnaires and semi-structured interviews (four studies), and a combination of questionnaires and telephone interviews (three studies).

The measurement tools employed in the questionnaire surveys can be broadly categorized as follows: mental and psychological state measures (*e.g.*, anxiety, depression, post-traumatic stress disorder, resilience, worry, and psychological adjustment); QOL measures; mindfulness and compassion measures; physical symptom measures (*e.g.*, fatigue, tiredness, and dyspnea); and scales assessing stress, sleep, and caregiver-related factors. Non-scale assessment methods included cortisol and interleukin-6 analysis *via* saliva sampling (*30*), the NicAlert saliva test, which measures nicotine levels in saliva, and the six-minute walk test (*27*).

The most commonly used scale was the hospital anxiety and depression scale (*22,23,27,31,34*), used in five studies. In addition, the Center for Epidemiologic Studies Depression Scale (*28,29,30,33*), which assesses depressive symptoms over the past week, and the Pittsburgh sleep quality index (*25,27,31,33*), which measures sleep quality, were each used in four studies. Other scales include the impact of event scale (*22,29,33*), which measures intrusive experiences and avoidance of event-related thoughts and images, and the perceived stress scale (*26,27,30*), which assesses how stressful a life situation was over the past month, both of which were used in three studies. The mindful attention awareness scale (*22,26,28*), which measures mindfulness and the degree of awareness and attention, was used in three studies. The five facet mindfulness questionnaire (*23,34*) and the self-compassion scale (*26,28*), which assesses traits like compassion and care for oneself, were each used in two studies. Regarding family-specific measures, the caregiver quality of life index-cancer, which assesses the QOL of family members of patients with cancer (*25,34*), and the caregiver burden reaction assessment were used in two studies, while the self-perceived pressure from informal care (*22*) was used in one study.

The number of questionnaire assessments typically ranges from two to four, with the timing including a baseline (*22,25,26,28,29,32*) or initial assessment at the point of consent or enrolment (*23,31,34*) or orientation (*30*). Some studies lacked pre-intervention baseline measurements, with initial assessments conducted one (*24,33*) or two weeks (*27*) after the start of the intervention. Post-program evaluations were generally carried out at 1 (*25*) and 3 months after the intervention (*22,28*). Interviews were immediately conducted after the intervention (*23,25,27,31,34*), within 1 week (*24*), or up to 1 year afterward (*22*). One study was identified that did not provide specific details regarding the timing of assessments.

Discussion

Characteristics of MBI-based intervention studies for families of patients with advanced cancer

The number of intervention studies involving MBIs for families of patients with advanced cancer outside the country was limited (*13*) and predominantly consisted of single-arm before-and-after comparisons. MBSR has been offered to patients with cancer, as well as to those with chronic and psychiatric conditions, since its development by Kabat-Zinn (*15*). Reviews and meta-analyses across various cancer types and stages have shown its positive impact on patient health (*35,36*). However, many RCTs remain in the pilot stage, indicating that further evidence is needed to verify its effectiveness.

Twelve of the 13 studies included both patients and family members, while one study focused exclusively on family members. Family members benefit from

participating in the program alongside the patient, as it provides them with a better understanding of the disease and allows them to handle challenges that may arise within the family. It is also considered easier for family members whose lives are already adjusted to the patient's treatment schedule to find the time to participate. MBIs require mandatory homework, such as meditation and reflection on home experiences, which can be practiced in a mutually supportive manner. For families with limited mental health resources and time, participating in MBI programs and completing homework assignments may be the only opportunity they have to focus on their own well-being. In addition, group work with family members in similar situations can help participants become more aware of their thoughts and emotions, providing a space for them to share these experiences with others. Therefore, considering family-specific programs that focus on distress and challenges families face while supporting patients with advanced cancer during their recovery is necessary.

Customizing the MBI to suit the family situation

In the programs, the duration, number of hours, content, and delivery methods were customized based on the needs of the target group. This customization was done using the MBSR model, which recommends face-to-face sessions lasting 2 to 3 hours once a week for 8 weeks. The meditation and yoga learned during the sessions are meant to be integrated into daily life. However, several studies have explored ways to shorten the program's duration and session length, introducing various innovations, such as online sessions, CDs, apps, and phone calls, in addition to face-to-face sessions. Other elements, such as education on nutrition, grief, advance care planning, and stress management, were also incorporated. Discussions on compassion and presentations on topics, such as chronic obstructive pulmonary disease, were included to enrich the content. Further research is needed to validate the effectiveness of shorter MBI formats, as it remains unclear whether shortened versions of the program can adequately reduce anxiety and depression in clinical settings (*14*).

The program providers were primarily psychologists, counselors, and facilitators trained in mindfulness, with only one study specifically mentioning a nurse. In contrast, a meta-analysis of MBIs for patients with lung cancer (*36*) indicated that most providers were nurses. Mindfulness practice and facilitation require a high level of expertise, and most certification training courses for instructors are conducted in Europe and the USA (*35*). In the future, increasing the number of nurses with mindfulness skills and considering incorporating content that utilizes nurses' unique perspectives on families in MBIs for families of patients with advanced cancer would be beneficial.

Regarding delivery methods, previous studies comparing face-to-face and online practices have reported no significant differences in the effectiveness of interventions. Online interventions, in particular, offer advantages such as greater flexibility in tailoring to the individual needs of patients and promoting autonomy in establishing a mindfulness practice (*37*). Given the widespread use of the Internet, the remarkable evolution of technology, and the proliferation of online projects due to the COVID-19 pandemic, online and app-based MBIs will continue to expand (14). Short, intensive sessions and the use of online services may be especially beneficial for families of patients with advanced cancer, as finding the time to attend in-person MBI sessions can be challenging (*38*).

MBI outcome indicators

The 12 included quantitative studies used a combination of multiple scales as the outcome measures. In all 12 of these studies, assessments of anxiety and depression were included, along with subjective measures capturing psychological states, such as stress, post-traumatic stress disorder, resilience, and psychological adjustment. Although several scales have been developed to measure mindfulness, only five studies used them. In addition, only two studies utilized carer-specific measures.

Since individual psychological aspects are inherently personal and subjective, there are limits to evaluating them objectively. Furthermore, as mindfulness itself is highly subjective, it suggests the need for a comprehensive evaluation using multiple scales, tailored to the purpose of the intervention and its outcomes. Mindfulness, being intrinsically subjective, further highlights the need for a comprehensive evaluation using multiple measures, depending on the intervention's purpose and expected outcomes. Furthermore, although cortisol and interleukin-6 analysis and the NicAlert saliva test have been explored, the validity of objective measures in MBIs has not yet been established (*17*), and further validation is necessary.

Study limitations and future challenges

The term "family", as defined in this study, may not sufficiently capture its uses in the literature, as English terminology varies widely based on cultural background, marital status, and other factors. In addition, this study aimed to provide an overview of MBI intervention studies for families of patients with advanced cancer, rather than analyzing the specific effects of each intervention. Therefore, future studies should examine the outcomes of individual intervention programs.

Conclusion

This scoping review examined 13 MBI studies conducted outside Japan, targeting families of patients with advanced cancer. Although the framework and content of the programs were based on MBSR, they were adapted to fit the circumstances of the target populations. However, in most studies, families and patients were recruited together, and original programs focusing exclusively on families were underdeveloped. In addition, many studies used before-and-after comparisons or single-group pilot studies, relying primarily on subjective measures, such as anxiety and depression scales. Therefore, additional RCTs are necessary to verify the effectiveness of these programs. Future studies should focus on the needs and challenges faced by the families of patients with advanced cancer, while examining program content and evaluation methods specific to families, incorporating nurses' perspectives.

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