



Metacognitive Processes in Cancer: A Review

Rekha Rashmi¹  Chhakchhuak Vanlalhruii¹

¹Centre for Health Psychology, University of Hyderabad, Hyderabad, India

Address for correspondence Chhakchhuak Vanlalhruii, PhD, Centre for Health Psychology, University of Hyderabad, Telangana-500046, India (e-mail: vanlalhruii@uohyd.ac.in).

Ind J Med Paediatr Oncol 2023;44:398–407.

Abstract

When diagnosed with cancer, the patients and their family go through emotional turmoil across the different phases: diagnosis, assessment, treatment, and aftercare, which decrease their quality of life and well-being. Previously, many studies have highlighted the association of metacognition with the development and maintenance of mental health conditions. Several recent studies have pointed out the significant role of dysfunctional metacognitive beliefs in the context of chronic disease. Thus, the present study aims to explore the role of metacognitive processes in cancer. The researchers conducted a narrative review of literature using PubMed, Semantic Scholar, and Science Direct. A total of 31 articles were selected and analyzed. This review article established that patients with cancer and caregivers experience metacognitive beliefs, which are associated with emotional distress, and the effectiveness of metacognitive therapy in reducing distress. This study also provides insight into the broader scope to advance research in this field.

Keywords

- ▶ metacognition
- ▶ cancer
- ▶ chronic medical conditions

Metacognitive Processes in Cancer

Metacognition is a higher order cognitive function where an individual actively evaluates, monitors, and controls their cognitive processes.¹ John Flavell coined the term “metacognition” as a self-regulatory learning process.² However, since its conceptualization, metacognition has gained much attention across various disciplines.¹ The metacognitive skills are used for problem-solving,³ decision making,^{4,5} critical reasoning,⁶ and coping with emotional stressors.⁷ Researchers have highlighted the role of the metacognitive beliefs in the development and maintenance of mental health conditions mainly depression and anxiety using the self-regulatory executive function (S-REF) theory.^{8,9} According to the S-REF theory, positive metacognitive beliefs, i.e., “worry is helpful,” increase negative thoughts and expose the person to view a situation as more threatening, and negative metacognitive beliefs about the uncontrollability and danger of the worrying, maintain the worry.¹⁰ Both metacognitive beliefs reinforce cognitive attentional syndrome that comprises three processes: (1) perseverative thinking such as worry, rumination, and over-analyzing events, (2) inflexible

self-focused attention to threatful events, (3) maladaptive coping strategies that impair cognitive and emotional regulation; thereby, maintaining the emotional distress. The association of metacognitive beliefs is also linked in development of anxiety and depression across different chronic medical conditions,^{11,12} due to which quality of life is compromised.¹³ As cancer is a common chronic physical health condition and has been found to have association with mental health conditions such as depression,^{14,15} through this review article, we try to understand the role of metacognitive processes in patients with cancer and caregivers at different phases (diagnosis, assessment, treatment, after-care) of cancer.

Methods

We conducted a narrative review of literature to explore the metacognitive processes in patients with cancer and caregivers. Articles were selected using PubMed, Semantic Scholar, and Science Direct. The search term included “metacognition and cancer,” “metacognitive processes and cancer,” “metacognitive beliefs and cancer,” “metacognitive

article published online
April 24, 2023

DOI <https://doi.org/10.1055/s-0043-1768050>.
ISSN 0971-5851.

© 2023. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution License, permitting unrestricted use, distribution, and reproduction so long as the original work is properly cited. (<https://creativecommons.org/licenses/by/4.0/>)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

therapy and cancer,” “metacognitive intervention and cancer,” “metacognition and cancer caregivers,” and “metacognition and caregiving in cancer.” We included all types of articles published in the English language from 2012 to 2022. Search for the articles was not restricted to any specific age group, cancer type, cancer stage, or country. Author R.R. performed the literature search and selected papers for the review first based on the titles and then based on the abstracts before reviewing the full texts. All the duplicate articles were removed. Uncertainties related to the relevance of the articles were discussed between the authors. Data extraction included publication information (title of the paper, authors, year of publication), sample characteristics (number of participants, age group, gender, cancer type, phase of cancer, country), research design used, and the findings.

Literature Search Results

The last search was performed on November 14, 2022. After rigorous search for articles and removal of duplicates, a total of 31 articles were included in the study. Studies on metacognition in cancer have been conducted using different study designs (cross-sectional, case-control, experimental designs, qualitative, longitudinal, and theoretical paper) on various forms of cancer (breast, ovarian, liver) among adolescents, young adults, and old adults. From our literature search, we found 7 studies investigated the impact of metacognition on fear of cancer recurrence, 10 studies discussed the benefits of the metacognitive therapy on patients with cancer, and 1 study validated the metacognitive scale for use in the cancer population. Only two studies investigated role of metacognition in caregivers. We also identified that studies on metacognition in patients with cancer had been conducted in United States, UK, Italy, Australia, Iran, Turkey, Hong Kong and China (→ **Table 1**).

Tools to Assess Metacognitive Beliefs

There are several tools to measure metacognition; however, in our analysis, we found most studies used Metacognition Questionnaire-30 (MCQ-30)¹⁶ to assess metacognitive beliefs in patients with cancer. The scale is the short version of the Metacognition Questionnaire (MCQ-65).¹⁷ It comprises five sub-scales that include: (1) positive beliefs about worry (PB), e.g., “Worrying helps me to avoid problems in the future,” (2) negative beliefs about the uncontrollability and danger of worry (NB), e.g., “My worry is dangerous for me,” (3) beliefs about the need for control of thoughts (NFC), e.g., “It is bad to think certain thoughts,” (4) beliefs concerning cognitive competence (CC), e.g., “I have a poor memory,” and (5) cognitive self-consciousness (CSC), e.g., “I think a lot about my thoughts.” To calculate the score of positive beliefs in worry, the following items are scored 1, 7, 10, 19, 23, and 28. Similarly for negative beliefs in uncontrollability and danger: 2, 4, 9, 11, 15 and 2; need to control thoughts: 6, 13, 20, 22, 25 and 27; lack of cognitive confidence: 8, 14, 17,

24, 26, and 29; cognitive self-consciousness: 3, 5, 12, 16, 18, and 30 are calculated. The items are scored on a scale of 1 (do not agree) to 4 (agree very much). Therefore, the total score for the scale ranges from 30 to 120 and 6 to 30 for each subscale. The MCQ-30 scale has also been adapted in several languages, Turkish,¹⁸ Italian,¹⁹ and Polish,²⁰ and can also be used for children²¹ and adolescents.¹⁶ A recent study²² validated MCQ-30 and found that the scale has good internal consistency and is valid for use among patients with breast and prostate cancer. Evidence regarding the scale’s validity in assessing metacognition in patients diagnosed with other forms of cancer is lacking.

Metacognitive Beliefs Result in Emotional Distress

Patients with cancer have impaired metacognitive functions.²³ They ruminate about cancer-related worries, its consequences on them and other family members, financial problems, family members’ illness, and neighbor disputes.²⁴ Based on the S-REF theory, a study has found positive metacognitive beliefs related to worry and negative metacognitive beliefs related to uncontrollability and danger of worry are significantly higher in the patient group than the control group.²³ Anxiety and depression in patients with cancer are associated with positive and negative metacognitions.²⁵ However, the negative metacognitive beliefs compared to positive metacognitive beliefs have larger contribution to the development of anxiety and depressive symptoms after diagnosis²⁶ and while undergoing chemotherapy.^{19,27-29} This suggests that though positive metacognitive beliefs initially guide a patient to worry but negative metacognitive beliefs maintain the worry by activating meta worry (worry about worry), which further intensifies the worry.²⁶ Another study found that metacognitive beliefs present after cancer diagnosis and before treatment predict depression, anxiety, and trauma in patients with cancer even after 1 year of diagnosis.³⁰ People diagnosed with cancer at a young age show severe anxiety symptoms, and a study suggests that it is due to the negative metacognitive beliefs about uncontrollability and the danger, which are found to be significantly higher in young people who have cancer than in adults.³¹ Another study revealed negative metacognitive beliefs are heightened at 12 months of diagnosis and between 24 to 36 months postdiagnosis, suggesting patients with cancer engage in negative metacognitive beliefs mainly after primary treatment and after the treatment when they fear cancer recurrence.³² Negative metacognitive beliefs are also higher in patients in the early stage of cancer than in patients in the advanced stage.²⁷ Caregivers of the patients diagnosed with cancer also experience positive and negative metacognitive beliefs, which are associated with a lower score in subjective well-being.³³ In young adult female cancer survivors, metacognitive beliefs were associated with their reproductive concerns such as fertility potential, partner disclosure, child’s health, personal health, acceptance, and being pregnant.³⁴

Table 1 Describing the studies included

Sl. No.	Title	Author and year	Sample characteristics	Research design and scale
1	Self-esteem, metacognition, and coping strategies in cancer patients: a case-control study	Inci et al, 2021	Sample size: ($N = 100$) Cancer patients ($n_1 = 50$) Control group ($n_2 = 50$) Age: 33–82 years Cancer type: gastric, colon, cervical, rectum, breast, liver, ovarian, and nasopharyngeal cancer Cancer phase: being treated for cancer Country: Turkey	Cross-sectional, case-control Scale: MCQ-30
2	Metacognitions and quality of life in survivorship after breast cancer diagnosis	Ranieri et al, 2021	Sample size: ($N = 72$) Age: 30–55 years Cancer type: breast cancer Cancer phase: at different time intervals; T0: 6–11 months, T1: 12–18 months, T2: 19–24 months, T3: 25–31 months Country: Italy	Cross-sectional study Scale: MCQ-30
3	Metacognitive aspects influence subjective well-being in parents of children with cancer	Toffalini et al, 2015	Sample size: ($N = 96$) Study group ($n_1 = 30$; age: 30–50 years) Hospitalized control group ($n_2 = 36$; age: 24–47 years) Healthy control group ($n_3 = 30$; age: 29–54 years) Cancer type: unspecified Cancer phase: active treatment (chemotherapy) Country: Italy	Case-control Scale: MCQ-30
4	A comparison of metacognitive factors among patients with cancer and the control group	Mutlu et al, 2018	Sample size: ($N = 491$) Cancer patients ($n_1 = 279$); age: 54.73 years ($SD = 12.12$) Control group ($n_2 = 212$); age: 51.15 years ($SD = 12.86$) Cancer type: breast cancer, lung, gastrointestinal, gynecological, urogenital, sarcoma, head/neck, skin, brain, other Cancer phase: treatment (operation, chemotherapy, radiotherapy) Country: Turkey	Case-control Scale: MCQ-30
5	Predictive factors of anxiety and depression symptoms in patients with breast cancer undergoing chemotherapy. An explorative study based on metacognitions	Quattropani et al, 2017	Sample size: ($N = 80$) Age: 27–82 years Cancer type: breast Cancer phase: undergoing chemotherapy Country: Italy	Cross-sectional Scale: MCQ-30
6	The role of metacognitions in predicting anxiety and depression levels in cancer patients ongoing chemotherapy	Quattropani et al, 2015	Sample size: ($N = 175$) Age: 27–85 years Cancer type: breast, colon, and others Cancer phase: undergoing treatment Country: Italy	Cross-sectional Scale: MCQ-30

Table 1 (Continued)

Sl. No.	Title	Author and year	Sample characteristics	Research design and scale
7	Metacognition as predictor of emotional distress in cancer patients	Quattropani et al, 2016	Sample size: (N = 175) Age: 27–85 years Cancer type: breast, colon and other Cancer phase: undergoing treatment Country: Italy	Cross-sectional Scale: MCQ-30
8	The association of metacognitive beliefs with emotional distress and trauma symptoms in adolescents and young adult survivors of cancer	Fisher et al, 2019	Sample size: (N = 87) Age: 16–24 years Cancer type: leukemia, lymphoma, brain and central nervous system, bone, soft tissues sarcoma, germ cell tumors, others Cancer phase: completed acute treatment Country: not known	Cross-sectional Scale: MCQ-30
9	A prospective study of the association of metacognitive beliefs and processes with persistent emotional distress after diagnosis of cancer	Cook et al, 2015	Sample size: (N = 206) Age: 39–85 years Cancer type: breast or prostate Cancer phase: T1 (shortly after diagnosis and before treatment) T2 (follow-up after 12 months) Country: UK	Cohort design Scale: MCQ-30
10	The association of metacognitive beliefs with emotional distress after diagnosis of cancer	Cook et al, 2015	Sample size: (N = 229) Age: 38–85 years Cancer type: breast or prostate Cancer phase: within 3 months of diagnosis and before treatment Country: UK	Cross-sectional Scale: MCQ-30
11	Role of metacognition thinking and psychological traits in breast cancer survivorship	Ranieri et al, 2020	Sample size: N = 72 Young (n ₁ = 36) Adult (n ₂ = 36) Age: 38–55 years Cancer type: breast Cancer phase: after primary treatment Country: Italy	Observational study design Scale: MCQ-30
12	Testing relationships between metacognitive beliefs, anxiety and depression in cardiac and cancer patients: are they transdiagnostic?	Anderson et al, 2019	Secondary data	
13	Measuring metacognition in cancer: validation of the Metacognitions Questionnaire 30 (MCQ-30)	Cook et al, 2014	Sample size: (N = 229) Age: 38–85 years Cancer type: breast and prostate Cancer phase: before treatment (T1) and follow-up after 12 months (T2) Country: UK	Scale: MCQ

(Continued)

Table 1 (Continued)

Sl. No.	Title	Author and year	Sample characteristics	Research design and scale
14	Fear of cancer recurrence among Chinese cancer survivors: prevalence and associations with metacognition and neuroticism.	Ng et al, 2019	Sample size: (N = 285) Age: 59.9 years (SD = 10.3) Cancer type: breast and colorectal Cancer phase: completed treatment Country: Hong Kong	Cross-sectional and longitudinal Scale: MCQ-30
15	Fear of cancer recurrence in young early-stage breast cancer survivors: the role of metacognitive style and disease-related factors.	Thewes et al, 2013	Sample size: (N = 218) Age: 28–45 years Cancer type: breast Cancer phase: completed treatment Country: Australia	Cross-sectional Scale: MCQ-30
16	The role of metacognition and its indirect effect through cognitive attentional syndrome on fear of cancer recurrence trajectories: a longitudinal study	Ng et al, 2020	Sample size: (N = 270) Age: Cancer type: breast and colorectal Cancer phase: after treatment Country: Hong Kong	Longitudinal study Scale: MCQ-30
17	Attentional bias and metacognitions in cancer survivors with high fear of cancer recurrence	Butow et al, 2015	Sample size: (N = 63) Age: 64.05 years (SD = 11.80) Cancer type: breast or prostate Cancer phase: after treatment Country: Australia	Cross-sectional Scale: MCQ-30
18	Psychological resilience, metacognitions, and fear of recurrence among cancer survivors and family caregivers	Ağaç and Üzar-Özçetin, 2022	Sample size: (N = 112) Cancer survivors (n ₁ = 112) Family caregivers (n ₂ = 112) Cancer type: lung, breast, colorectal, others Cancer phase: in remission Country: Turkey	Cross-sectional Scale: MCQ-30
19	Group meta-cognitive therapy and depression in women with breast cancer: a randomized controlled trial	Zahedian et al, 2021	Sample size: (N = 24) Age: 27–67 years Cancer type: breast Cancer phase: under treatment Country: Iran	Experimental design Scale: MCQ-30
20	Metacognitive therapy for emotional distress in adult cancer survivors: a case series	Fisher et al, 2017	Sample size: (N = 4) Age: 45–55 years Cancer type: breast and endometrial cancer Cancer phase: completed acute medical treatment Country: UK	Experimental design Scale: MCQ-30
21	Brief metacognitive therapy for emotional distress in adult cancer survivors	Fisher et al, 2019	Sample size: (N = 27) Age: 29–67 years Cancer type: breast, hematological, ovarian, sarcoma, colorectal, ocular, lung Cancer phase: cancer survivors Country: UK	Experimental design Scale: MCQ-30

Table 1 (Continued)

Sl. No.	Title	Author and year	Sample characteristics	Research design and scale
22	Qualitative evaluation of cancer survivors' experiences of metacognitive therapy: a new perspective on psychotherapy in cancer care	Cherry et al, 2019	Sample size: (N = 17) Age: 25–69 years Cancer type: breast, sarcoma, ocular, hematology, ovarian, colorectal Cancer phase: completed acute medical treatment for cancer Country: UK	Qualitative study
23	Comparison of effectiveness of the metacognition treatment and the mindfulness-based stress reduction treatment on global and specific life quality of women with breast cancer	Rahmani et al, 2014	Sample size: (N = 36) Age: 38–49 years Cancer type: breast Cancer phase: under treatment Country: Iran	Quasi-experimental design
24	The feasibility of using metacognitive strategy training to improve cognitive performance and neural connectivity in women with chemotherapy-induced cognitive impairment	Wolf et al, 2016	Sample size: (N = 14) Age: 36–65 years Cancer type: breast Cancer phase: completed medical treatment (chemotherapy) Country: United States	Experimental design
25	Alleviating emotional distress in adolescent and young adult cancer survivors: an open trial of metacognitive therapy	Fisher et al, 2015	Sample size: (N = 12) Age: 18–23 years Cancer type: lymphoma, leukemia, brain tumor, rhabdomyosarcoma, osteosarcoma Cancer phase: cancer survivors Country: UK	Experimental design Scale: MCQ-30
26	Comparison of effectiveness of the mindfulness-based cognitive therapy and the metacognition treatment on anxiety, depression and stress among breast cancer patients	Javadi et al, 2018	Sample size: (N = 36) Age: 38–49 years Cancer type: breast Cancer phase: diagnosis of breast cancer Country: Iran	Quasi-experimental design
27	The effectiveness of group metacognition treatment on metacognition beliefs of women with breast cancer	Rahmani et al, 2014	Sample size: (N = 24) Age: 41–47 years Cancer type: breast Cancer phase: diagnosis Country: Iran	Quasi-experimental design Scale: MCQ-30
28	Metacognition as an educational technology in self-care learning: the case of prevention of post-surgical lymphedema of breast cancer	Assis et al, 2018		Theoretical paper
29	Effectiveness of positive thinking training on perceived stress, metacognitive beliefs, and death anxiety in women with breast cancer	Barjoe et al, 2022	Sample size: (N = 30) Age: 42.81 years (SD = 7.35) Cancer type: breast Cancer phase: before treatment Country: Iran	Quasi-experimental design Scale: MCQ-30

(Continued)

Table 1 (Continued)

Sl. No.	Title	Author and year	Sample characteristics	Research design and scale
30	Mindfulness and metacognition in facing with fear of recurrence: a proof-of-concept study with breast-cancer women	Cheli et al, 2019	Sample size: (N = 114) Age: 18–65 years Cancer type: breast Cancer phase: after treatment Country: Italy	Mixed-method design
31	Metacognitions associated with reproductive concerns: a cross-sectional study of young adult female cancer survivors in China	Xiao et al, 2022	Sample size: N = 318 Age: 18–39 years Cancer type: unspecified Cancer phase: after primary treatment Country: China	Cross-sectional Scale: MCQ-30

Abbreviations: MCQ-30, Metacognition Questionnaire-30; SD, standard deviation.

Fear of Recurrence in Patients with Cancer

The metacognitive aspects are also linked to patients' fear of cancer recurrence.^{35,36} A study reported psychological resilience in patients is low due to firm negative meta beliefs that predict fear of cancer recurrence (FCR) in patients.^{37,38} Negative metacognitive beliefs partially mediate the relationship between neuroticism and fear of cancer recurrence,³⁹ suggesting that neuroticism and negative metacognition are positively associated. Patients with higher neuroticism are predisposed to experience negative beliefs about worry which increases their fear for cancer recurrence.³⁹ Studies suggest individuals with high FCR tend to perceive their worry as more beneficial, dangerous, uncontrollable, and important to control than those with lower FCR.^{39,40} A study investigated difference between sub-clinical (scoring 13–21) and clinical (22 or above) FCR patients on Fear of Cancer Recurrence Inventory and found that subclinical FCR patients perceive worry as beneficial and a distress management strategy.³⁹ A longitudinal study examining fear of cancer recurrence over 12 months in patients with cancer found that negative meta beliefs are higher in patients at an initial stage and tend to decrease over time.³⁶

Metacognitive Therapy for Cancer Treatment

Metacognition therapy administered individually or in a group is effective in challenging metacognitive beliefs and thereby is helpful in the treatment of depression, anxiety, posttraumatic symptoms, worry and rumination, sexual functioning, sleep disorder, fear of recurrence, and improves the quality of life in patients with cancer undergoing primary treatment.^{41–43} The main objective of metacognitive therapy is to modify the metacognitive beliefs that maintain negative thinking styles and coping strategies. Metacognitive therapy typically includes 5 to 10 sessions¹⁰ and in a study it was found that delivery of metacognitive therapy including six sessions helps in reducing emotional distress in patients with cancer.⁴² The therapist identifies the positive and negative metacognitive beliefs in the first two sessions and generates a case formulation. The patient

is then psycho-educated about their rumination time and thinking process, including the emotional consequences of it. From, the S-REF theory, we understand that modifying negative metacognitive beliefs is crucial as once an individual views their worry as uncontrollable, they have difficulty to control it.¹⁰ Therefore, in the third, fourth, fifth, and sixth sessions, patients are taught and asked to practice attention training techniques, detached mindfulness, rumination postponement, modifying negative meta beliefs, and then the positive metacognitive beliefs using verbal methods, rumination modulation experiment, advantage–disadvantages analysis, and behavioral experiments. In the last session, the focus is on relapse prevention. Before administration of metacognitive therapy, participants reported being caught in a spiral of worry making them feel helpless, hopeless, and overwhelmed but, after the therapeutic intervention, they found themselves accepting and controlling their thoughts effectively and gained a sense of freedom to live lives free from fear about cancer and other challenges of survivorship.²⁴ It was observed that with the use of metacognitive therapy recovery status is maintained even after 1 month⁴³ to 6 months of follow-up^{41,42} in adult cancer survivors and in adolescent and young adult cancer survivors.⁴⁴ A comparative study found that though metacognitive therapy is effective in reducing depression, anxiety, and stress symptoms in patients with breast cancer, mindfulness-based therapy has maximum effectiveness on emotion function, pain symptoms, and fatigue.^{45,46} A study also made an attempt to integrate mindfulness and metacognitive-based therapy for patients with cancer and the result suggested effectiveness of integrating both therapeutic approaches in reducing distress, anxiety, depression, and posttraumatic symptoms.³⁵ In another study, it was found that positive thinking training effectively reduces metacognitive beliefs in patients with breast cancer.⁴⁷ To address the chemotherapy-induced cognitive impairment, a study found that Cognitive Orientation to Daily Occupational Performance (CO-OP), a type of metacognitive strategy training, has positive effect on cognitive performance and neural connectivity in women with breast cancer.⁴⁸ A

theoretical paper suggests that metacognition can act as educational technology and help breast cancer survivors to engage in preventive self-care practices for lymphedema.⁴⁹

Discussion

This review article focused on the metacognitive processes in patients with cancer and caregivers. The study findings suggest that patients diagnosed with cancer suffer from emotional distress, depression, anxiety, and posttraumatic symptoms, and metacognitive beliefs play a significant role in developing and maintaining them, notably, the negative meta beliefs.²⁵ As the S-REF theory suggests both positive and negative metacognitive beliefs result in emotional distress; however, the role of negative metacognitive beliefs is crucial as once an individual view their worry as uncontrollable, they are unable to control it and feel helpless, hopeless, and get overwhelmed with worry.¹⁰ Therefore, findings of several studies suggest a strong association between negative metacognitive beliefs with depression and anxiety.^{23,26} Negative metacognition has been observed with young patients,³¹ also among patients who were in early stages of cancer,²⁷ and received chemotherapy.^{19,27-29} This is because adults who are young or are in early stage of cancer are more worried about the prognosis and fear about negative consequences such as fear of recurrence.^{27,31} Similarly, patients who received chemotherapy are aware of its negative effects on health, i.e., nausea, weakness, hair loss, and loss of appetite. They understand that they have to be at home while the treatment is continuing, have to visit hospitals frequently to receive treatment, and they also experience uncertainty about recurrence of cancer which may suggest their higher scores in negative metacognitive beliefs than patients receiving radiotherapy or going through operation.²⁷

Emotional distress, worry, ruminative thoughts, and symptoms of depression were also observed among family caregivers of patients diagnosed with cancer^{50,51} and since family caregivers' support has great influence in the cancer treatment, it is important to understand their metacognitive beliefs. However, from our literature search, we found studies on metacognitive processes in caregivers are limited. We found two studies assessing metacognitive beliefs in caregivers indicating both positive and negative metacognitive beliefs are associated with subjective well-being³³ and psychological resilience.³⁷ Therefore, it is important to address metacognitive beliefs of caregivers and help them in dealing with the stressful situation and improving their quality of life.

We also focused on the benefits of the metacognitive therapy in patients with cancer. It was found that metacognitive therapy is effective in reducing emotional distress, anxiety, posttraumatic symptoms, and fear of recurrence in patients with cancer.⁴¹⁻⁴³ We also found studies comparing the effectiveness of mindfulness-based therapy and metacognition therapy.^{45,46} From the comparison, it was evident that though mindfulness-based therapy reduced emotional distress in patients, however, the positive impact of the treatment was not observed in follow-up.⁴⁵ Again, another study attempted

to integrate both mindfulness-based therapy and metacognition therapy and found taking both therapeutic approaches together had better outcomes rather than administering only one of the therapeutic approaches.³⁵ Also, one study found out the effectiveness of positive thinking training in reducing metacognitive beliefs.⁴⁷ There are other therapies such as Acceptance Commitment-Based Therapy⁵²⁻⁵⁴ and Cognitive Behavior Therapy^{55,56} that are used to treat emotional distress in patients with cancer. However, from our literature search we did not find any comparative studies to understand the effectiveness of metacognitive therapy with the other therapies. Also, we did not find any other studies integrating with metacognitive therapy other than mindfulness-based therapy. It would have been interesting to observe the outcome of using metacognitive therapy with complementary therapies like Art Therapy^{57,58} and Dance Movement Therapy.⁵⁹ Metacognition has also been used as a strategy for improving executive function in patients who underwent chemotherapy⁴⁸ and can be used as an education tool to promote self-care practices in patients with breast cancer.⁴⁹

It was also noted that studies included for review used MCQ-30 as a tool to assess metacognitive beliefs in patients with cancer. A study validated the scale in 2014 for use among patients diagnosed with breast and prostate cancer, limiting its use across different cancer diagnoses.²¹ Although MCQ-30 has been used to a great extent to assess metacognitive beliefs in research studies, nevertheless, researchers can work on developing effective tools to assess metacognitive beliefs by taking participants with other forms of a cancer diagnosis.

Further, as mentioned above, we found limited countries conducted studies to understand the role of metacognition in patients diagnosed with cancer. We identified seven studies conducted each in UK and Italy, two studies each in Australia and Hong Kong, five in Iran, three in Turkey, and one study each in United States, and China. From our search results, we did not find studies conducted on the Indian population to know how metacognitive beliefs influence the psychological condition of people diagnosed with cancer and how therapy or specific strategies can be used to minimize the distress caused by the disease. This suggests that metacognition is still an emerging concept in health psychology, and looking at its contribution during diagnosis, treatment, and recovery, more research should be promoted in this area. In India, cancer cases are on the rise^{60,61}; therefore, to improve the quality of life of patients diagnosed with cancer and to contribute to the pool of Indian scientific research, young researchers can explore the significance of metacognitive aspects in patients diagnosed with cancer in India.

Limitation

In this review article, researchers used more than one search database and included studies on different research designs. We did not limit the search for studies to any age group, cancer type, cancer stage, or country. However, the studies included have not been assessed for methodological quality and risk of bias. Despite this, the findings of the study will help in

advancing research studies in this area and mental health professionals, specifically working in the field of oncology.

Conclusion

This review helped us understand that patients with cancer experience metacognitive beliefs at different phases of cancer, i.e., before the primary treatment, during treatment, and after treatment, and metacognitive therapy contributes significantly to reducing emotional distress observed among patients with cancer. Hence, to improve the quality of life of patients with cancer and caregivers, research on metacognitive processes in cancer should be promoted.

Conflict of Interest

None declared.

References

- Baker L. Metacognition. In: Peterson P, Baker E, McGaw B, eds. *International Encyclopaedia of Education*. 3rd ed. Amsterdam: Elsevier; 2010:204–210
- Flavell JH. *Metacognitive Aspects of Problem Solving*. Resnick LR, ed. Mahwah, NJ: Lawrence Erlbaum; 1976
- Aurah CM, Koloiki-Keaitse S, Isaacs C, Finch H. The role of metacognition in everyday problem solving among primary students in Kenya. *Probl Educ 21st Century* 2011;30:9–21
- Basu S, Dixit S. Role of metacognition in explaining decision-making styles: a study of knowledge about cognition and regulation of cognition. *Pers Individ Dif* 2022;185:111318
- Yeung N, Summerfield C. Metacognition in human decision-making: confidence and error monitoring. *Philos Trans R Soc Lond B Biol Sci* 2012;367(1594):1310–1321
- Choy SC, Cheah PK. Teacher perceptions of critical thinking among students and its influence on higher education. *Int J Teach Learn High Educ* 2009;20(02):198–206
- Matthews G, Hillyard EJ, Campbell SE. Metacognition and maladaptive coping as components of test anxiety. *Clin Psychol Psychother* 1999;6(02):111–125
- Hagen R, Hjemdal O, Solem S, et al. Metacognitive therapy for depression in adults: a waiting list randomized controlled trial with six months follow-up. *Front Psychol* 2017;8:31
- Papageorgiou C, Wells A. Metacognitive beliefs about rumination in recurrent major depression. *Cognit Behav Pract* 2001;8(02):160–164
- Wells A. *Metacognitive Therapy for Anxiety and Depression*. New York, NY: Guilford press; 2011
- Capobianco L, Fajia C, Husain Z, Wells A. Metacognitive beliefs and their relationship with anxiety and depression in physical illnesses: a systematic review. *PLoS One* 2020;15(09):e0238457
- Lenzo V, Sardella A, Martino G, Quattropiani MC. A systematic review of metacognitive beliefs in chronic medical conditions. *Front Psychol* 2020;10:2875
- Khodabakhshi Koolae A, Falsafinejad MR, Ghorbani Sakachaei L, Sanagoo A. Relation between metacognitive beliefs and psychological adjustment with improving quality of life in type II diabetic patients. *Majallah-i Danishgah-i Ulum-i Pizishki-i Gurgan* 2019;21(03):79–87
- Naser AY, Hameed AN, Mustafa N, et al. Depression and anxiety in patients with cancer: a cross-sectional study. *Front Psychol* 2021;12:585534
- Riedl D, Schuessler G. Prevalence of depression and cancer - a systematic review. *Z Psychosom Med Psychother* 2022;68(01):74–86
- Wells A, Cartwright-Hatton S. A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behav Res Ther* 2004;42(04):385–396
- Cartwright-Hatton S, Wells A. Beliefs about worry and intrusions: the Meta-Cognitions Questionnaire and its correlates. *J Anxiety Disord* 1997;11(03):279–296
- Tosun A, Irak M. Adaptation, validity, and reliability of the Metacognition Questionnaire-30 for the Turkish population, and its relationship to anxiety and obsessive-compulsive symptoms [in Turkish]. *Turk Psikiyatr Derg* 2008;19(01):67–80
- Quattropiani MC, Lenzo V, Mucciardi M, Toffle ME. The role of metacognitions in predicting anxiety and depression levels in cancer patients ongoing chemotherapy. *Procedia Soc Behav Sci* 2015;205:463–473
- Dragan M., Dragan W. Ł. (2011). Psychometric properties of the Polish version of the Metacognitions Questionnaire-30. *Psychiatria polska* 45(04):545–553
- Gerlach A, Adam S, Marschke S, Melfsen S. Development and validation of a child version of the Metacognitions Questionnaire. Paper presented at: 38th Annual Congress of the European Association for Behavioural and Cognitive Therapies; Helsinki; September 10–13, 2008
- Cook SA, Salmon P, Dunn G, Fisher P. Measuring metacognition in cancer: validation of the Metacognitions Questionnaire 30 (MCQ-30). *PLoS One* 2014;9(09):e107302
- Inci H, Inci F, Ersoy S, Karatas F, Adahan D. Self-esteem, metacognition, and coping strategies in cancer patients: a case-control study. *J Cancer Res Ther* 2021;17(04):956–962
- Cherry MG, Salmon P, Byrne A, Ullmer H, Abbey G, Fisher PL. Qualitative evaluation of cancer survivors' experiences of metacognitive therapy: a new perspective on psychotherapy in cancer care. *Front Psychol* 2019;10:949
- Anderson R, Capobianco L, Fisher P, et al. Testing relationships between metacognitive beliefs, anxiety and depression in cardiac and cancer patients: are they transdiagnostic? *J Psychosom Res* 2019;124:109738
- Cook SA, Salmon P, Dunn G, Holcombe C, Cornford P, Fisher P. The association of metacognitive beliefs with emotional distress after diagnosis of cancer. *Health Psychol* 2015a;34(03):207–215
- Mutlu HH, Bilican FI, Mutlu HH, Gumus M. A comparison of metacognitive factors among patients with cancer and the control group. *Psychooncology* 2018;27(04):1277–1283
- Quattropiani MC, Lenzo V, Mucciardi M, Toffle ME. Metacognition as predictor of emotional distress in cancer patients. *Life Span Disabil* 2016;19(02):221–239
- Quattropiani MC, Lenzo V, Filastro A. Predictive factors of anxiety and depression symptoms in patients with breast cancer undergoing chemotherapy. An explorative study based on metacognitions. *J Psychopathol* 2017;23:67–73
- Cook SA, Salmon P, Dunn G, Holcombe C, Cornford P, Fisher P. A prospective study of the association of metacognitive beliefs and processes with persistent emotional distress after diagnosis of cancer. *Cognit Ther Res* 2015b;39(01):51–60
- Ranieri J, Guerra F, Perilli E, Cilli E, Di Giacomo D. Metacognitions and quality of life in survivorship after breast cancer diagnosis [in Italian]. *Riv Psichiatr* 2021;56(04):217–222
- Ranieri J, Guerra F, Di Giacomo D. Role of metacognition thinking and psychological traits in breast cancer survivorship. *Behav Sci (Basel)* 2020;10(09):135
- Toffalini E, Veltri A, Cornoldi C. Metacognitive aspects influence subjective well-being in parents of children with cancer. *Psychooncology* 2015;24(02):175–180
- Xiao PP, Ding SQ, Duan YL, et al. Metacognitions associated with reproductive concerns: a cross-sectional study of young adult female cancer survivors in China. *Front Psychol* 2022;13:987221
- Cheli S, Caligiani L, Martella F, De Bartolo P, Mancini F, Fioretto L. Mindfulness and metacognition in facing with fear of recurrence: a proof-of-concept study with breast-cancer women. *Psychooncology* 2019;28(03):600–606

- 36 Ng DWL, Foo CC, Ng SSM, et al. The role of metacognition and its indirect effect through cognitive attentional syndrome on fear of cancer recurrence trajectories: a longitudinal study. *Psychooncology* 2020;29(02):271–279
- 37 Ağaç M, Üzar-Özçetin YS. Psychological resilience, metacognitions, and fear of recurrence among cancer survivors and family caregivers. *Cancer Nurs* 2022;45(02):E454–E462
- 38 Thewes B, Bell ML, Butow P. Fear of cancer recurrence in young early-stage breast cancer survivors: the role of metacognitive style and disease-related factors. *Psychooncology* 2013;22(09):2059–2063
- 39 Ng DWL, Kwong A, Suen D, et al. Fear of cancer recurrence among Chinese cancer survivors: prevalence and associations with metacognition and neuroticism. *Psychooncology* 2019;28(06):1243–1251
- 40 Butow P, Kelly S, Thewes B, Hruby G, Sharpe L, Beith J. Attentional bias and metacognitions in cancer survivors with high fear of cancer recurrence. *Psychooncology* 2015;24(04):416–423
- 41 Fisher PL, Byrne A, Salmon P. Metacognitive therapy for emotional distress in adult cancer survivors: a case series. *Cognit Ther Res* 2017;41(06):891–901
- 42 Fisher PL, Byrne A, Fairburn L, Ullmer H, Abbey G, Salmon P. Brief metacognitive therapy for emotional distress in adult cancer survivors. *Front Psychol* 2019;10:162
- 43 Zahedian E, Bahreini M, Ghasemi N, Mirzaei K. Group meta-cognitive therapy and depression in women with breast cancer: a randomized controlled trial. *BMC Womens Health* 2021;21(01):111
- 44 Fisher PL, McNicol K, Young B, Smith E, Salmon P. Alleviating emotional distress in adolescent and young adult cancer survivors: an open trial of metacognitive therapy. *J Adolesc Young Adult Oncol* 2015;4(02):64–69
- 45 Javadi THS, Tajikzadeh F, Bayat H, Eshraghi N, Roshandel Z, Rahmani S. Comparison of effectiveness of the mindfulness-based cognitive therapy and the metacognition treatment on anxiety, depression and stress among breast cancer patients. *Int Clin Neurosci J* 2018;5(02):62–66
- 46 Rahmani S, Talepasand S, Ghanbary-Motlagh A. Comparison of effectiveness of the metacognition treatment and the mindfulness-based stress reduction treatment on global and specific life quality of women with breast cancer. *Iran J Cancer Prev* 2014;7(04):184–196
- 47 Barjoe LK, Amini N, Keykhosrovani M, Shafiabadi A. Effectiveness of positive thinking training on perceived stress, metacognitive beliefs, and death anxiety in women with breast cancer: perceived stress in women with breast cancer. *Arch Breast Cancer* 2022;9:195–203
- 48 Wolf TJ, Doherty M, Kallogjeri D, et al. The feasibility of using metacognitive strategy training to improve cognitive performance and neural connectivity in women with chemotherapy-induced cognitive impairment. *Oncology* 2016;91(03):143–152
- 49 Assis MRD, Maraglia PH, Brandão MAG, Peixoto MAP. Metacognition as an educational technology in self-care learning: the case of prevention of post-surgical lymphedema of breast cancer. *Esc Anna Nery* 2018;22;
- 50 Geng HM, Chuang DM, Yang F, et al. Prevalence and determinants of depression in caregivers of cancer patients: a systematic review and meta-analysis. *Medicine (Baltimore)* 2018;97(39):e11863
- 51 Northouse LL, Katapodi MC, Schafenacker AM, Weiss D. The impact of caregiving on the psychological well-being of family caregivers and cancer patients. *Semin Oncol Nurs* 2012;28(04):236–245
- 52 Fashler SR, Weinrib AZ, Azam MA, Katz J. The use of acceptance and commitment therapy in oncology settings: a narrative review. *Psychol Rep* 2018;121(02):229–252
- 53 Li Z, Li Y, Guo L, Li M, Yang K. Effectiveness of acceptance and commitment therapy for mental illness in cancer patients: a systematic review and meta-analysis of randomised controlled trials. *Int J Clin Pract* 2021;75(06):e13982
- 54 Zhao C, Lai L, Zhang L, et al. The effects of acceptance and commitment therapy on the psychological and physical outcomes among cancer patients: a meta-analysis with trial sequential analysis. *J Psychosom Res* 2021;140:110304
- 55 Blumenstein KG, Brose A, Kemp C, et al. Effectiveness of cognitive behavioral therapy in improving functional health in cancer survivors: a systematic review and meta-analysis. *Crit Rev Oncol Hematol* 2022;175:103709
- 56 Kucherer S, Ferguson RJ. Cognitive behavioral therapy for cancer-related cognitive dysfunction. *Curr Opin Support Palliat Care* 2017;11(01):46–51
- 57 Elimimian EB, Elson L, Stone E, et al. A pilot study of improved psychological distress with art therapy in patients with cancer undergoing chemotherapy. *BMC Cancer* 2020;20(01):899
- 58 Forzoni S, Perez M, Martignetti A, Crispino S. Art therapy with cancer patients during chemotherapy sessions: an analysis of the patients' perception of helpfulness. *Palliat Support Care* 2010;8(01):41–48
- 59 Bradt J, Shim M, Goodill SW. Dance/movement therapy for improving psychological and physical outcomes in cancer patients. *Cochrane Database Syst Rev* 2015;1(01):CD007103
- 60 Datt KB Cancer cases likely to go up by over 12% between '20 & '25, says ICMR. *The New Indian Express*. December 1, 2022. Accessed March 15, 2023 at: <https://www.newindianexpress.com/nation/2022/dec/01/cancer-cases-likely-to-go-up-by-over-12-between-20-25-says-icmr-2523925.html>
- 61 Sharma P India's cancer burden to rise to 29.8 million in 2025: ICMR report. *Mint*. May 13, 2022. Accessed March 15, 2023 at: <https://www.livemint.com/science/health/indias-cancer-burden-to-rise-to-29-8-million-in-2025-icmr-report-11652382169284.html>