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Changes in Memory, Cognitive Function, and Pattern of Distress among Breast Cancer Patients and Survivors: A Study from a Tertiary Cancer Center

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Abstract

Introduction Cancer-related cognitive impairment is an unexplored area, which can be distressing and can affect the daily functioning and quality of life of a cancer patient.

Objective The aim of the study was to find the changes in memory, cognitive function, and pattern of distress among breast cancer patients and survivors using a cross-sectional comparative study design.

Materials and Methods Women diagnosed with early breast cancer, aged between 20 and 60 years and planned for or those who underwent chemotherapy were included. Seventy-nine participants (survivors [$N = 27$], postchemotherapy patients [$N = 27$], and prechemotherapy patients [$N = 25$]) were assessed using the Post-Graduate Institute Memory Scale, Montreal Cognitive Assessment, National Comprehensive Cancer Network Distress Thermometer, and Distress Inventory for Cancer.

Results Most of the survivors and postchemotherapy patients had increased cognitive ($p = 0.02$) and memory impairment ($p = 0.057$) than prechemotherapy patients. Memory was positively correlated with cognitive function ($p = 0.000$, $r = 0.669$) and negatively correlated with distress ($p = 0.045$, $r = -0.226$). Memory ($p < 0.001$) and cognitive functioning ($p = 0.002$) were better with higher education levels. Older participants had higher memory impairment ($p = 0.05$, $r = -0.218$).

Conclusion The study concluded that there was cognitive decline and distress among breast cancer patients and survivors after completion of chemotherapy. Thus, the study highlights the importance of psychotherapeutic interventions to prevent and manage changes in memory, cognitive decline, and distress among breast cancer patients and survivors.

Keywords
- breast cancer
- neurocognition
- memory
- distress
- survivors

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Introduction

Every 14 seconds, somewhere in the world, a woman is diagnosed with breast cancer—yet for many, the battle is far from over.[1] Oncologists combine various treatment modalities to treat breast cancer, depending on disease stage and subtype classification. Chemotherapy forms the mainstay of cancer treatment, often resulting in physical side effects ranging from nausea, vomiting, diarrhea, discoloration of nails, hair loss, and mouth sores to febrile neutropenia, bleeding, and rarely, death.[2,3]

Psychological distress among breast cancer patients was found to be ranging from 25 to 70%.[4] Distress experienced by patients and survivors vary from the time of diagnosis to survivorship, where it is the highest at the time of diagnosis, and with at least one-fourth of the survivors experiencing severe stress even after completion of treatment.[5] Undergoing chemotherapy is considered as one of the most stressful experiences during the breast cancer treatment journey, with majority of the cancer patients experiencing some levels of distress.[6]

Literature shows that a significant cognitive decline was also reported by many breast cancer survivors.[7] Changes in memory, attention, and general cognition, referred to as "chemo brain" or "chemo fog," during or immediately after chemotherapy or hormone therapies or as delayed episodes were also commonly reported.[8] This is frequently expressed as difficulties in remembering, poor concentration and attention, and slower processing speed, which often lead to lower quality of life, making it difficult for them to engage in daily activities, return to work, and participate in social events during their survivorship activities.[9]

Following the completion of their curative intent cancer treatment, patients are expected to resume their normal lives. However, many of them experience adverse side effects later in life.[10] This study's findings may benefit patients, survivors, and health care professionals to better understand the psychological and cognitive difficulties they face and plan appropriate interventions to prevent, manage, and rehabilitate their psychological distress as well as cognitive and memory impairments. This is important as the patient has to lead a normal life after completion of their treatment. Thus, this study aimed to understand the changes in memory, cognitive function, and pattern of distress among breast cancer patients planning for chemotherapy, completed chemotherapy, and survivors.

What's New?

Although cancer is curable, the cancer care journey is not solely biomedical, it is profoundly psychological, with the survivors often experiencing psychological late effects that can significantly affect their quality of life. Changes in cognition that arise with diagnosis and its treatment can affect an individual's daily functioning and hinder a smooth return to normal life. Unlike most studies that compared patients and healthy individuals, our study compared the cognitive and emotional changes across three treatment trajectories: before chemotherapy, after chemotherapy, and during survivorship. These findings offer a comprehensive understanding of patient concerns across the cancer journey, thus informing the development of early interventions and rehabilitation for those diagnosed with and surviving cancer, a crucial step toward providing holistic, equitable, and dignified care for all individuals affected and treated for cancer.

Materials and Methods

A cross-sectional comparative study was conducted to assess the changes in memory, cognitive function, and the pattern of distress among survivors, breast cancer patients completed chemotherapy and planning for chemotherapy at a tertiary cancer center in South India, between August 2023 and February 2024. Purposive sampling was used to obtain the data from those breast cancer patients and survivors reported to the outpatient department planned for/have completed chemotherapy or were on follow-up. Participants fulfilling the eligibility criteria who visited the study center during the study period were enrolled. Data was collected from the participants after obtaining the written informed consent.

Inclusion and Exclusion Criteria

Patients (planning for chemotherapy and completed chemotherapy) and survivors between the ages of 20 and 60 years, diagnosed with breast cancer (stages I/II/III), and survivors on follow-up, who can read, write, and understand English or Malayalam, were included in the study. Those with any evidence of recurrence or second primary, history of/current long-term substance use, persons with a history of mental retardation or neurological disease, or psychiatric conditions at the time of enrollment were excluded.

Survivors were those who have completed a survival period of 1 to 3 years and were on follow-up without any recurrence, postchemotherapy patients were those breast cancer patients who have completed 1 week to 1 month after their curative intent chemotherapy and before initiating any adjuvant treatment, and prechemotherapy patients were those breast cancer patients planned for both adjuvant or neoadjuvant chemotherapy meeting other inclusion and exclusion criteria.

Tools

Memory, as measured by the Post-Graduate Institute Memory Scale is a structured verbal test that measures 10 different components of memory.[11]

Cognitive functions, as measured by the Montreal Cognitive Assessment, consist of items spanning several cognitive domains. The Malayalam translated version of this scale was used for the study.[12]

Distress was assessed using National Comprehensive Cancer Network Distress Thermometer (NCCN DT) and Distress Inventory Cancer Version 2 (DIC V2). NCCN DT Version 2, 2022 (Malayalam) is a tool used to detect distress. A score of 4 or more reported by the patient in the DT implies

moderate distress that he/she might need interventions to address their concerns. The Malayalam-translated version of the scale was used in the study.[13]

Distress Inventory Cancer Version 2 (DICV2) is a 33-item tool based on six domains that can be administered by an interviewer or can be self-administered. The scale is scored on a 5-point Likert scale and greater score implies greater distress. The Malayalam-translated version of this scale was used in the study.[14]

Primary and Secondary Outcomes

Primary outcome of this study were the differences in memory, cognitive function, and distress among the three groups. Secondary outcomes of this study were the relationship between the memory, cognitive function, and distress and the association of patient-related and treatment-related factors with these variables.

Statistical Analysis

Descriptive statistics, correlation, and one-way analysis of variance (ANOVA) were used to analyze the data. Descriptive statistics such as frequency and percentage were used to describe the variables, patient-related and treatment-related factors. Pearson correlation coefficient was done to find the significant relationship between the variables memory, cognitive function, distress (DICV2 and DT), age, and domains of DICV2. One-way ANOVA was used to find the significant difference in memory, cognitive function, and distress (DICV2 and DT) among the three groups and also to find the significant difference in memory, cognitive function, and distress (DICV2 and DT) among the three groups based on educational qualification. Post hoc tests were used to follow-up on a significant ANOVA by identifying which specific means are significantly different from each other.

Ethical Approval

The protocol of the present study was approved by the Institutional Review Board and Institutional Ethics Committee dated August 22, 2023 (IEC No. 1617/IRB-IEC/13/MCC/22–8-2023/3) and data collection was initiated after registering in the Clinical Trial Registry of India (CTRI/2023/10/058932). The study was conducted according to the ethical guidelines outlined in the Declaration of Helsinki and the Indian Council of Medical Research guidelines for ethical research.

Results

Seventy-nine participants meeting the eligibility criteria and willing to participate in the study were recruited (►**Fig. 1**). The sample consisted of three groups—survivors ($N = 27$), postchemotherapy patients ($N = 27$), and prechemotherapy patients ($N = 25$). Among the 98 participants identified, 18 did not meet the eligibility criteria. Out of the 80 participants who signed the informed consent, 1 participant was excluded as the participant could not complete the tasks due to excessive fatigue. Of the 79 participants who were enrolled in the study, 27 were breast cancer survivors, 27 were participants who completed chemotherapy (postchemotherapy), and 25 were participants planned for chemotherapy (prechemotherapy). Majority of the participants in the order survivors, postchemotherapy, and prechemotherapy were married (88.9, 85.2, and 92%), completed their higher secondary education (37, 74.1, and 60%), were unemployed (63, 40, and 55.6%), reported to have no comorbidities (55.6, 52, and 68%), received adjuvant chemotherapy (74.1,59.3, and 60%), and were diagnosed with stage II breast cancer (51.9, 37, and 56%).

Patient-Related and Treatment-Related Factors of the Participants

►**Table 1** shows the frequency and percentage of patient-related and treatment-related factors. The mean age of the participants was found to be 47.44 years.

Memory, Cognitive Function, and Distress—Descriptives

►**Table 2** shows the frequency and percentage of memory, cognitive function, and distress. Low-level memory was found in 15 (55.6%), 18 (66.7%), and 10 (40%) of the survivors, postchemotherapy patients, and prechemotherapy patients, respectively.

Among survivors, postchemotherapy patients, and prechemotherapy patients, 16 (59.3%), 22 (81.5%), and 18 (72%) participants, respectively, were found to have mild cognitive impairment.

On the DT 19 (63%), 17 (63%), and 18 (72%) participants reported having moderate-severe distress, respectively, among survivors, postchemotherapy patients, and prechemotherapy patients. On DICV2, 92.6% of survivors, 74.1% of postchemotherapy patients, and 84% of prechemotherapy patients were found to have increased distress.

Comparison of Memory, Cognitive Function, and Distress

►**Table 3** shows the comparison of memory, cognitive function, and distress. There was a significant difference in cognitive function among the three groups ($p = 0.02$). Post hoc test found that cognitive function was higher among the prechemotherapy participants (mean = 23.20, $p = 0.002$) when compared with survivors (mean = 19.59, $p = 0.019$) and postchemotherapy participants (mean = 22.37, $p = 0.019$).

Even though there was no statistically significant difference in memory ($p = 0.057$) among the three groups, based on the mean scores, it was found that the prechemotherapy patients (mean = 72.00, $p = 0.054$) had better memory when compared with the survivors (mean = 64.30) and postchemotherapy patients (mean = 66.26). There was no statistically significant difference in distress ($p = 0.960$; $p = 0.770$) among the three groups.

Correlation Analysis between Parameters

A significant positive relationship was found between memory and cognitive function ($r = 0.669$, $p < 0.001$), and a

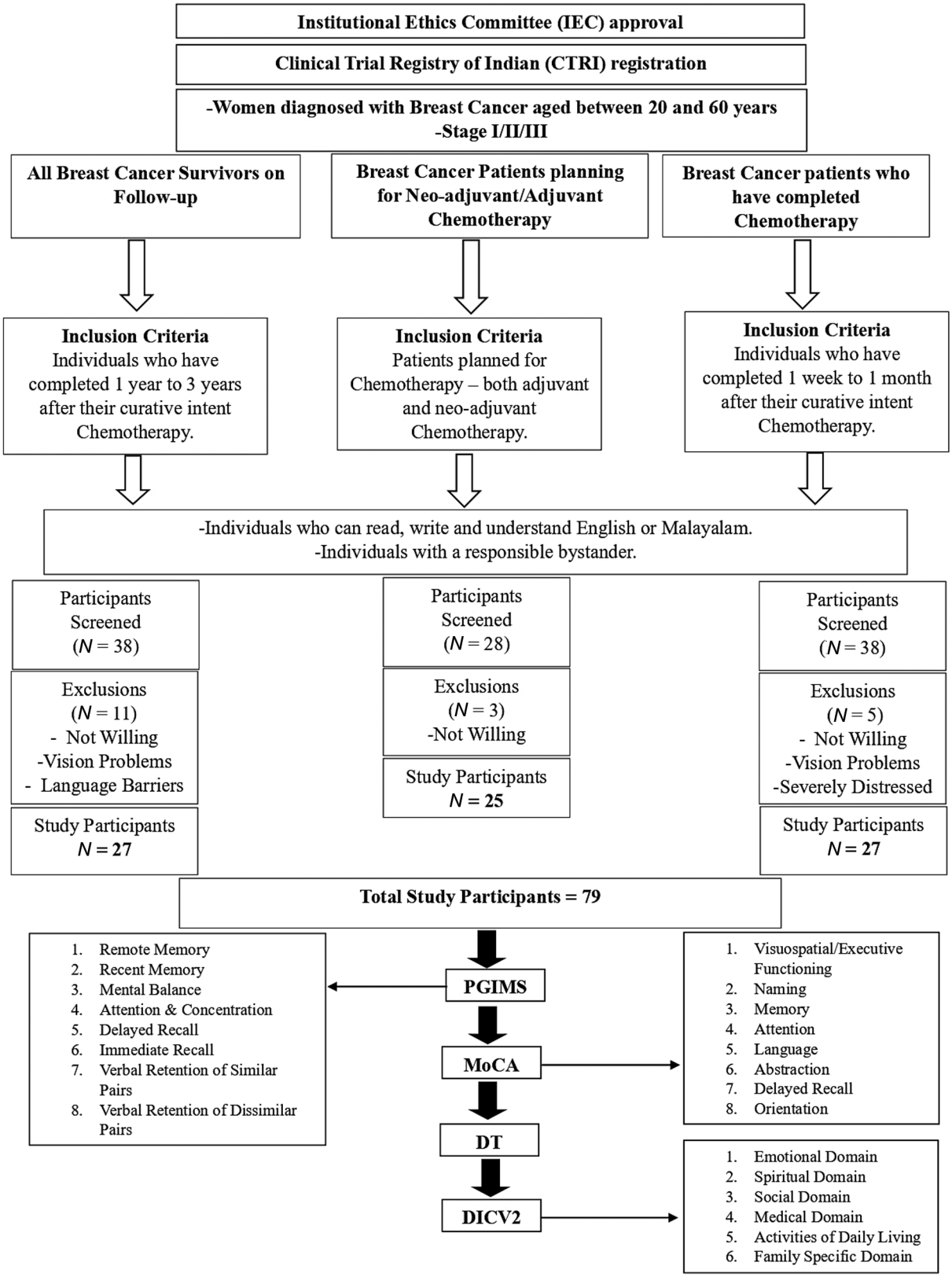

Fig. 1 Study flowchart.

significant negative relationship between memory and distress when assessed using DICV2 ($r = -0.226$, $p = 0.045$). There was no significant relationship between cognitive function and distress (DICV2: $r = -0.126$, $p = 0.268$).

A significant negative relationship was found between memory and age ($r = -0.218$, $p = 0.05$). It was also found that there was no significant relationship between the variables age with cognitive function ($r = -0.088$, $p = 0.440$) and age

Table 1 Frequency and percentage of patient-related and treatment-related factors

Variables		Frequency	Percentage
Age (y)			
Survivors	20–35	1	3.7
	36–50	15	55.6
	51–60	11	40.7
Postchemo	20–35	0	0
	36–50	17	63.0
	51–60	10	37.0
Prechemo	20–35	5	20.0
	36–50	10	40.0
	51–60	10	40.0
Educational qualification			
Survivors	Primary	10	37.0
	Higher secondary	10	37.0
	Undergraduate	4	14.8
	Postgraduate	3	11.1
Postchemo	Primary	5	18.5
	Higher secondary	20	74.1
	Undergraduate	2	7.4
	Postgraduate	0	0
Prechemo	Primary	2	8.0
	Higher secondary	15	60.0
	Undergraduate	5	20.0
	Postgraduate	3	12.0
Marital status			
Survivors	Married	24	88.9
	Unmarried	1	3.7
	Widowed/Separated/Divorced	2	7.4
Postchemo	Married	23	85.2
	Unmarried	2	7.4
	Widowed/Separated/Divorced	2	7.4
Prechemo	Married	23	92.0
	Unmarried	1	4.0
	Widowed/Separated/Divorced	1	4.0
Occupation			
Survivors	Employed	10	37.0
	Unemployed	17	63.0
Postchemo	Employed	10	37.0
	Unemployed	17	63.0
Prechemo	Employed	15	60.0
	Unemployed	10	40.0
Comorbidities			
Survivors	Yes	12	44.4
	No	15	55.6

(*Continued*)

Table 1 (*Continued*)

Variables		Frequency	Percentage
Postchemo	Yes	12	48.0
	No	13	52.0
Prechemo	Yes	8	32.0
	No	17	68.0
Chemotherapy			
Survivors	NACT	7	25.9
	Adj. CT	20	74.1
Postchemo	NACT	11	40.7
	Adj. CT	16	59.3
Prechemo	NACT	10	40.0
	Adj. CT	15	60.0
Stage			
Survivors	Stage 1	2	7.4
	Stage 2	14	51.9
	Stage3	11	40.7
Postchemo	Stage 1	4	14.8
	Stage 2	10	37.0
	Stage3	13	48.1
Prechemo	Stage 1	5	20.0
	Stage 2	14	56.0
	Stage3	6	24.0

Abbreviations: Adj. CT, adjuvant chemotherapy; NACT, neoadjuvant chemotherapy.

Table 2 Frequency and percentage of memory, cognitive function, and distress

Variables		Frequency	Percentage
Memory (PGIMS)			
Survivors	Excellent memory	1	3.7
	Above average memory	2	7.4
	Moderate/Average memory	3	11.1
	Below average memory	6	22.2
	Low level memory	15	55.6
Postchemo	Excellent memory	0	0
	Above average memory	1	3.7
	Moderate/Average memory	0	0
	Below average memory	8	29.6
	Low level memory	18	66.7
Prechemo	Excellent memory	0	0
	Above average memory	2	8.0
	Moderate/Average memory	4	16.0
	Below average memory	9	36.0
	Low level memory	10	40.0

Table 2 (*Continued*)

Variables		Frequency	Percentage
Cognitive function (MoCA)			
Survivors	No impairment	2	7.4
	Mild	16	59.3
	Moderate	9	33.3
	Severe	0	0
Postchemo	No impairment	4	14.8
	Mild	22	81.5
	Moderate	1	3.7
	Severe	0	0
Prechemo	No impairment	6	24.0
	Mild	18	72.0
	Moderate	1	4.0
	Severe	0	0
Distress (DICV2)			
Survivors	Distressed	25	92.6
	Reduced distress	2	7.4
Postchemo	Distressed	20	74.1
	Reduced distress	7	25.9
Prechemo	Distressed	21	84.0
	Reduced distress	4	16.0
Distress (DT)			
Survivors	Moderate-severe distress	19	70.4
	Not clinically significant distress	8	29.6
Postchemo	Moderate-severe distress	17	63.0
	Not clinically significant distress	10	37.0
Prechemo	Moderate-severe distress	18	72.0
	Not clinically significant distress	7	28.0

Abbreviations: DICV2, Distress Inventory Cancer Version 2; DT, Distress Thermometer; MoCA, Montreal Cognitive Assessment; PGIMS, Post-Graduate Institute Memory Scale.

with distress (DICV2: $r = -0.030$, $p = 0.792$, and DT: $r = 0.167$, $p = 0.142$).

Comparison of Memory, Cognitive Function, and Distress Based on Educational Qualification

While comparing memory, cognitive function, and distress among the three groups based on educational qualification, it was found that there was a significant difference in memory ($p < 0.001$) and cognitive function ($p = 0.002$), where participants with postgraduation (mean = 80; mean = 24.33) had better memory and cognitive function than participants with graduation (mean = 75.73; mean = 24.55), higher secondary education (mean = 67.36; mean = 21.47), and primary education (mean = 57.71; mean = 19.47). However, there was no significant difference in distress (DICV2; DT) ($p = 0.978$; $p = 0.423$) among the three groups based on educational qualification.

There were no analyses performed using other treatment-related factors due to the small sample size in each group.

Discussion

The study aimed to understand the changes in memory, cognitive function, and pattern of distress among breast cancer patients planned for chemotherapy, completed chemotherapy, and survivors.

Performance of the three groups on memory found that the most of the breast cancer survivors, postchemotherapy patients, and prechemotherapy patients had low-level or below-average memory. This is in line with the existing literature that even before initiation of cancer treatment, patients with breast cancer showed cognitive difficulties.[15] There was no statistically significant difference in memory among the three groups. However, when we evaluate the

Table 3 Comparison of memory, cognitive function, and distress

Variable	Group(s)	*N*	Mean	SD	*F*	*p*-Value
Memory	Survivors	27	64.30	14.570	2.978	0.057
	Postchemo	27	66.26	8.150		
	Prechemo	25	72.00	11.676		
Cognitive function	Survivors	27	19.59	4.012	6.968	0.002[a]
	Postchemo	27	22.37	3.399		
	Prechemo	25	23.20	3.582		
Distress (DICV2)	Survivors	27	60.39	6.39	0.041	0.960
	Postchemo	27	59.98	10.43		
	Prechemo	25	60.70	10.07		
Distress (DT)	Survivors	27	4.81	2.802	0.262	0.770
	Postchemo	27	4.41	3.116		
	Prechemo	25	5.00	3.175		

Abbreviations: DICV2, Distress Inventory Cancer Version 2; DT, Distress Thermometer; *F*, test statistic (*F* statistic) of analysis of variance; SD, standard deviation.
[a]$p < 0.05$.

memory changes in the three groups, it may be noted that a difference was observed where the survivors and postchemotherapy patients had lower levels of memory when compared with the prechemotherapy patients. There was also previous literature which showed that breast cancer patients and one-fourth of the survivors treated with chemotherapy had higher memory impairment than healthy individuals.[10,16,17] Chemotherapy drugs have been known to affect the functioning of the hippocampus, leading to reduced rates of hippocampal neurogenesis and thereby affecting performance on learning and memory tasks mediated by the hippocampus. Thus, the memory decline observed in this study may be attributed to the above-stated effects of chemotherapeutic drugs.[18]

The majority of the breast cancer survivors, postchemotherapy patients, and prechemotherapy patients had mild cognitive impairment. Furthermore, it was found that survivors and postchemotherapy patients had impaired cognitive functioning when compared with the prechemotherapy patients. Studies among postchemotherapy patients support our findings where 37% of older adults with early breast cancer developed impairment after treatment.[19] A study found significant objective and subjective neurocognitive deficits in young adult sarcoma patients undergoing chemotherapy compared with prechemotherapy patients and healthy controls.[20] In another study comparing the nonchemotherapy group and the chemotherapy group, it was also found that there was significantly lower motor and cognitive functioning among the chemotherapy group.[21] A similar trend was observed among survivors in the previous studies, where deterioration in the domains of cognitive function was found during survivorship.[22] The most commonly affected domains reported were information processing, alerting, visuospatial skills, executive control, and attention.[23] The scale used in the current study to understand cognitive functioning also evaluated the same domains. Our study findings, which reported to have deficits in cognitive function, may be explained by previous functional magnetic resonance imaging and neuropsychological testing studies, which found that structural changes such as hyporesponsiveness of dorsolateral prefrontal cortex, parahippocampal gyrus, and bilateral posterior parietal cortex, and lower volume and density in gray and white matter especially in the frontal and temporal brain regions contributed to the impairment in cognitive function.[24,25]

The majority of the participants in the three groups reported increased or moderate to severe distress. A similar study found that distress was higher before starting chemotherapy and 6 months after completing chemotherapy.[26] Accordingly, another study among survivors also found that approximately half of them reported having clinically moderate to severe levels of distress.[27] While comparing the three groups on distress, it was found that there was no clinically significant difference among the three groups. The distress score pattern depicted a higher score during prechemotherapy and survivorship compared with postchemotherapy. Previous literature correlated with our findings that psychological distress was more prominent before treatment and during the 6-month follow-up.[28] Disease-related symptoms, treatment side effects, alopecia, concerns regarding body image changes, and returning to normal life were commonly reported as distressing by breast cancer patients, and intrusive thoughts about the disease, trait-anxiety, health complaints, fear of recurrence, and insomnia were the causes of distress among survivors.[29,30]

While determining the relationship between memory, cognitive function, and distress, it was found that there was a significant positive relationship between memory and cognitive function, which implied that when memory deteriorates, the cognitive function also deteriorates and vice versa. Existing literature also confirms our findings that

memory capacity strongly correlates with measures of cognitive ability.[31]

The current study found that there was a significant negative relationship between distress (DICV2) and memory, indicating that, as the distress increases, memory deteriorates or vice versa. Being diagnosed and treated for cancer is considered as a stressful and potentially traumatic life experience, contributing to higher levels of distress and poorer memory performance among newly diagnosed breast cancer patients when compared with the general population.[32,33] Similar findings were obtained in a study conducted among breast cancer survivors postchemotherapy, with those experiencing higher distress demonstrating more subjective memory complaints.[34] They may be mutually contributing to each other, leading to worsening of memory and an increase in psychological distress. Whereas no significant relationship was observed between memory and the domains of distress (DICV2).

Furthermore, no significant relationship was found between cognitive function, distress (DICV2), and domains of distress (DICV2). Our results were comparable to those of other studies that indicated a low correlation between psychological functioning and performance-based cognitive assessments, suggesting that executive functioning and processing speed may not be linked to depression and anxiety in breast cancer survivors.[35] The above results contradict the claims of Oliva et al, who found that the complex interplay of negative feelings and distress can lead to the worsening and persistence of cognitive problems.[36] Since both supportive and contradictory studies have been obtained, more studies using extensive and broader measures of different psychological variables among larger samples have to be conducted to make concrete assumptions regarding the same.

A significant negative relationship was found between memory and age; this implies that as age increases, memory deteriorates. These findings build on the existing literature that half of the older breast cancer survivors above 60 years experienced cognitive decline in domains such as memory, executive functioning, and processing speed.[37] The current study findings could also be interpreted as due to age-related cognitive decline seen in older adults.[38] Further large sample longitudinal studies may be conducted to generalize the above findings.

There was no significant relationship between the variables, cognitive function, and age. A study among older breast cancer survivors found that participants between the ages of 60 and 82 had lower levels of cognitive difficulties compared with the younger ones aged between 24 and 59 years.[39] Contrary to our results, a subset of older breast cancer survivors experienced a decline in cognitive function from diagnosis when compared with healthy controls.[40] This may be due to several factors, including normal aging processes, a reduced cognitive reserve prior to cancer diagnosis and its treatment, and the neurotoxic effects of cancer treatment, which may put breast cancer patients and survivors 60 years of age and older at higher risk for cognitive impairment.[41] Since our study participants included patients and survivors between the ages of 20 to 60 years only, and from a different cultural setting like India, further multicenter studies conducted in Asian countries or India may be required to generalize the findings.

Distress (DICV2 and DT) was not found to be related to age. This contrasted with previous research that revealed older breast cancer survivors reported lower levels of emotional distress than younger breast cancer survivors, and younger women reported more distress than older women.[39]

On comparison of memory, cognitive function, and distress among the three groups based on educational qualification, it was found that there was a significant difference in memory and cognitive function among the three groups based on educational qualification, where participants with higher educational qualification performed better on memory and cognitive function. These findings were in line with previous research by Perrier et al, where they found that patients with higher levels of educational qualification compared with lower levels exhibited higher episodic memory retrieval.[42]

Significant differences in distress were not observed among the three groups based on educational qualification.

Implications of the Study

The study was relevant as it compared patients (prechemotherapy and postchemotherapy) and survivors of breast cancer on memory, cognitive function, and distress. The study findings emphasized the importance of assessing emotional as well as neuropsychological functioning of breast cancer patients and survivors. The study directed us to the need for medical and psychological intervention methods to prevent, manage, and rehabilitate the cognitive problems in breast cancer patients undergoing curative intent treatment.

Limitations

Some of the limitations of the study were a relatively small sample size compared with the total number of breast cancer survivors and patients reporting for treatment at the study setting. Intragroup analysis could not be conducted among variables and subdomains due to the small sample size in each group. Additionally, analysis of some of the patient-related, disease-related, and treatment-related factors was not done due to the small sample size in each group. The study also relied on a brief screening tool for assessing cognitive function, which may not have captured the full spectrum of cognitive changes. Furthermore, the data collection was constrained by a limited period. Future research should focus on larger samples and adopt longitudinal designs to better understand the progression of cognitive and emotional changes in breast cancer patients and survivors. Studies using comprehensive cognitive assessments and exploring intervention strategies, psychosocial factors, and treatment-related variables would provide deeper insights and guide effective rehabilitation approaches.

Conclusion

This study sought to shed light on the often-overlooked cognitive and emotional challenges that breast cancer patients and survivors must navigate through and long after their treatment. Most of the survivors and postchemotherapy patients had reduced cognitive functioning when compared with the prechemotherapy patients. Those with better cognitive function were found to have better memory and vice versa. Distress was found to be related to memory functioning. Better memory and cognitive functioning were found among those with higher levels of education, and changes in memory were noticed with an increase in age. Thus, a clinically significant change in memory, cognitive function, and distress was found among breast cancer patients and survivors after the completion of chemotherapy. This may be prevented and managed with appropriate educational, cognitive retraining methods, psychotherapeutic interventions, and other complimentary therapies like yoga and music therapy, thereby increasing the quality of life of those surviving breast cancer.

Prior Presentation and Publication in Abstract Book

Scientific Poster presented at the International Psycho-Oncology Society (IPOS 2024) World Congress of Psycho-oncology in Maastricht, the Netherlands, held from September 24th to September 27th, 2024, and published in Abstract Book for the 25th IPOS World Congress of Psycho-Oncology, *Journal of Psychosocial Oncology Research and Practice*, 2024.

Authors' Contributions

N.J.: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, writing-original draft, and writing-review and editing.

J.A.: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, supervision, writing-original draft, and writing-review and editing.

S.V.K.: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, supervision, writing-original draft, and writing-review and editing.

P.K.S.V.P.: Conceptualization, project administration, resources, writing-original draft, and writing-review and editing.

R.K.: Formal analysis, methodology, writing-original draft, and writing-review and editing.

S.B.: Conceptualization, project administration, resources, and writing-review and editing.

G.M.: Project administration, resources, and writing-review and editing.

A.R.G.: Project administration, resources, and writing-review and editing.

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Conflict of Interest

None declared.

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