

Original Article

The Impact of Gratitude Combined with Relaxation Therapy on Anxiety Reduction in Breast Cancer Patients Undergoing Chemotherapy: A Comparative Study

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ABSTRACT

Objectives: Anxiety is a common concern among breast cancer patients undergoing chemotherapy. This study aimed to explore the impact of relaxation therapy combined with natural expressions of gratitude, either towards God or in a non-religious context, on anxiety levels in these patients.

Materials and Methods: A quasi-experimental study was conducted with 46 breast cancer patients aged 18–65 years at Ngoerah Hospital One Day Care Chemotherapy Clinic from March to December 2023. Participants underwent a 15-minute relaxation therapy. Following the session, they were naturally assigned to one of two groups based on their response: 26 participants expressed gratitude towards God, and 20 participants expressed plain gratitude. Anxiety levels were measured using the Beck Anxiety Inventory (BAI) before and after the intervention. Data were analysed statistically.

Results: The gratitude to God group showed a greater reduction in BAI scores (mean difference = 10.93, standard deviation [SD] = 5.73) compared to the plain gratitude group (mean difference = 5.56, SD = 3.43). Paired *t*-tests indicated significant reductions in anxiety for both groups ($P < 0.001$ for both). The independent *t*-test revealed a significant difference in anxiety reduction between the two groups ($t[44] = 3.24, P < 0.01, 95\%$ confidence interval = 0.89–8.27), with the gratitude to God group experiencing a larger decrease in anxiety levels.

Conclusion: The findings suggest that relaxation therapy, particularly when accompanied by a natural expression of gratitude directed towards a higher power, may be more effective in reducing anxiety among breast cancer patients undergoing chemotherapy.

Keywords: Anxiety, Breast cancer, Gratitude, Relaxation therapy, Spirituality

INTRODUCTION

Breast cancer is the most common cancer in women, with around 2.3 million new cases diagnosed globally each year, representing 25% of all cancer diagnoses in women and causing over 500,000 deaths annually.^[1] While chemotherapy is a cornerstone of breast cancer treatment, it is associated with a range of side effects, including anxiety, depression, fatigue and cognitive impairment, which significantly impact patients' quality of life.^[2-4] Anxiety, in particular, is highly prevalent among cancer patients in the Southeast Asia region, with rates ranging from 7% to 88% depending on the type and stage of cancer.^[5] Notably, anxiety has been identified as a factor that influences cancer recurrence and recovery during chemotherapy, underscoring the importance of effective anxiety management in this population.^[2] In breast

cancer patients, anxiety exacerbates physical symptoms, impairs immune function and negatively affects overall quality of life.^[6,7]

Relaxation therapies, such as guided imagery, deep breathing and progressive muscle relaxation, have shown the potential to reduce anxiety and enhance the quality of life for breast cancer patients undergoing chemotherapy. However, while these therapies are effective in alleviating psychological distress, their impact on chemotherapy-related adverse effects remains limited.^[8-10] Incorporating gratitude with a spiritual focus into relaxation therapies aligns with the significant role of spirituality and religion in cancer care, providing comfort and support throughout treatment.^[11]

Gratitude, the recognition of benefits received and the feeling of thankfulness, has emerged as a valuable intervention for psychological and physical well-being.^[12] Gratitude

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interventions have been shown to lower psychological distress, enhance psychological resilience, improve emotional regulation and foster positive moods with reduced symptoms of anxiety and depression.^[13-15] In addition, gratitude may alleviate existential fears, such as the fear of death, by fostering a sense of fulfilment and meaning in life.^[16] Neurobiologically, gratitude activates brain regions associated with positive emotions and reward processing, such as the right dorsomedial prefrontal cortex, ventral striatum and amygdala, while also reducing proinflammatory cytokines such as tumour necrosis factor alpha (TNF- α) and interleukin (IL)-6.^[17-19]

Gratitude is often interwoven with spirituality and religious practices, which may enhance its psychological benefits. For individuals with high levels of spirituality, gratitude exercises have been found to yield the greatest benefits.^[20] Studies suggest that religious gratitude, such as gratitude towards God, may strengthen the presence of gratitude and amplify its psychological impact.^[21] Gratitude to God has been identified as an essential component of religious and spiritual well-being, making it a critical variable in positive psychology and the study of religion and spirituality.^[22] Moreover, gratitude has been shown to improve mental, physical, spiritual and social well-being, making it a holistic tool for enhancing quality of life.^[23]

In the context of cancer care, gratitude has been associated with the successful management of physical symptoms, emotional support, improved attitudes towards death and a stronger connection to spirituality. Patients who expressed gratitude often highlighted the importance of communication, humanity and a familiar environment in their experiences.^[24] Qualitative studies also underscore the role of gratitude as a significant and empowering experience for cancer patients, providing vital support in navigating the challenges of chronic illness.^[25]

Considering the intertwined relationship between gratitude and spirituality and the potential for their combined use in relaxation therapy to amplify anxiety reduction, this study aims to compare the impact of gratitude towards God versus plain gratitude following relaxation therapy on anxiety levels in breast cancer patients undergoing chemotherapy. By exploring this distinction, we hope to contribute to the development of tailored interventions that holistically address the psychological and spiritual well-being of this vulnerable population.

MATERIALS AND METHODS

Study design

This study employed a quasi-experimental design with a one-group pre- and post-test approach to evaluate the effectiveness of relaxation therapy combined with gratitude expression in reducing anxiety levels among breast cancer

patients undergoing chemotherapy. The study was carried out at Ngoerah Hospital One Day Care (ODC) Chemotherapy Clinic from March to December 2023.

Participants

The study involved 46 female breast cancer patients aged 18–65 years undergoing chemotherapy treatment at the Ngoerah Hospital ODC Chemotherapy Clinic. Inclusion criteria required patients to have a confirmed diagnosis of breast cancer and active chemotherapy treatment. Exclusion criteria included patients with decreased consciousness, cognitive impairment, illiteracy, severe medical comorbidities or refusal to participate in the study. Participants were naturally grouped based on their gratitude responses following the intervention:

- Gratitude to God group (26 participants): Patients expressed gratitude directed towards God or a higher power
- Plain Gratitude group (20 participants): Patients expressed general gratitude without any spiritual or religious connotations.

Relaxation therapy and gratitude intervention

The relaxation therapy involved a 15-minute session comprising guided imagery and deep breathing exercises. The session was designed to help patients relax by controlling breathing, reducing muscle tension and alleviating anxiety. After completing the relaxation session, participants were prompted to naturally express gratitude, which was recorded to assign them to the appropriate group.

The procedure for relaxation therapy and gratitude intervention included the following steps:

Preparation

Patients' anxiety levels were identified, readiness was assessed, and the therapy procedure was explained. A quiet and comfortable environment was created to ensure that patients could fully focus on the relaxation process.

Execution

- Patients were seated comfortably with their eyes closed and instructed to focus on slow, deep breaths
- Muscle relaxation was guided progressively from the legs to the head
- Patients were encouraged to focus on a word or phrase during exhalation, such as 'relax' or 'peace'
- The process lasted for 15–20 minutes, after which patients rested quietly before resuming normal activities.

Gratitude expression

After the relaxation therapy, patients naturally expressed either gratitude to God or plain gratitude, depending on their individual responses.

Anxiety assessment using Beck Anxiety Inventory (BAI)

The BAI was utilised to evaluate patients' anxiety levels before and after the intervention. It measures symptoms such as nervousness, dizziness and difficulty relaxing experienced over the past week. The tool comprises 21 items rated on a four-point scale (0 = not at all to 3 = very much). The total scores of the BAI are treated as continuous numeric variables for statistical analysis.

Statistical analysis

Descriptive statistics summarised demographic data, including mean, median, range and standard deviation (SD). The Shapiro–Wilk test assessed data normality due to the small sample size (<50 participants), while Levene's test evaluated variance homogeneity.

If the data met normality and homogeneity assumptions, a paired *t*-test was used to compare pre- and post-intervention anxiety levels within each group, while an independent *t*-test assessed differences in anxiety reduction between groups. For non-normal data, the Wilcoxon signed-rank test was applied. Data were analysed using the Statistical Package for the Social Sciences version 26.0, with statistical significance set at $P < 0.05$.

RESULTS

Participant characteristics

A total of 46 participants were included in the study, with 26 assigned to the Gratitude to God group and 20 assigned to the Plain Gratitude group. The baseline characteristics of the participants were comparable between the two groups [Table 1]. The mean age of participants in the Gratitude to God group was 52.4 years (SD = 7.3), while the mean age in the Plain Gratitude group was 50.7 years (SD = 6.9). The difference in age between the groups was not statistically significant ($P = 0.47$).

In terms of cancer stage, 46% of participants in the Gratitude to God group were in Stage II and 54% were in Stage III. Similarly, 45% of participants in the Plain Gratitude group were in Stage II, while 55% were in Stage III. The distribution of cancer stages between the two groups was nearly identical, with no significant difference ($P = 0.82$).

Baseline anxiety levels, measured using the BAI, were also similar between the two groups. The Gratitude to God group had a mean BAI score of 27.5 (SD = 9.1), and the Plain

Gratitude group had a mean BAI score of 28.1 (SD = 8.7). This difference was not statistically significant ($P = 0.75$). These findings indicate that the groups were well-matched in terms of demographic and clinical characteristics before the intervention.

Anxiety levels pre- and post-intervention

The effectiveness of the gratitude intervention on anxiety levels was assessed using the BAI. The Shapiro–Wilk test confirmed that the data for pre- and post-intervention BAI scores in both groups followed a normal distribution ($P > 0.05$). Therefore, parametric tests, including paired *t*-tests and independent *t*-tests, were used for analysis. The Gratitude to God group and Plain Gratitude group showed significant reductions in anxiety scores from pre- to post-intervention.

In the Gratitude to God group, the mean pre-intervention BAI score was 27.5 (SD = 9.1), which decreased to 16.6 (SD = 7.8) post-intervention, resulting in a mean difference of 10.93 (SD = 5.73). The reduction was statistically significant with a *t*-value of 10.93 ($P < 0.001$, 95% confidence interval [CI] 8.62–13.24).

Similarly, in the Plain Gratitude group, the mean pre-intervention BAI score was 28.1 (SD = 8.7), which decreased to 22.5 (SD = 7.2) post-intervention. The mean difference was 5.56 (SD = 3.43), and this reduction was also statistically significant, with a *t*-value of 5.56 ($P < 0.001$, 95% CI 3.95–7.17).

Although both groups demonstrated significant reductions in anxiety levels, the Gratitude to God group showed a larger mean reduction compared to the Plain Gratitude group, as seen in Table 2.

Between-group comparison of BAI reduction

The reduction in anxiety levels between the two groups was compared to evaluate the effect of gratitude type on intervention outcomes. The Gratitude to God group exhibited a significantly greater mean reduction in BAI scores (mean difference = 10.93, SD = 5.73) compared to the Plain Gratitude group (Mean Difference = 5.56, SD = 3.43). Statistical analysis revealed a significant difference between the two groups, with a *t*-value of 3.24 ($P < 0.01$), indicating that the Gratitude to God intervention was more effective in reducing anxiety. The independent *t*-test revealed a significant difference in anxiety reduction between the two groups ($t[44] = 3.24$, $P < 0.01$, 95% CI 0.89–8.27).

Table 1: Participant demographic and clinical characteristics.

Characteristic	Gratitude to God group (n=26)	Plain gratitude group (n=20)	P-value
Age (years)	Mean (SD)=52.4 (7.3)	Mean (SD)=50.7 (6.9)	0.47
Stage of cancer	Stage II: 12 (46%), Stage III: 14 (54%)	Stage II: 9 (45%), Stage III: 11 (55%)	0.82
Baseline BAI score	Mean (SD)=27.5 (9.1)	Mean (SD)=28.1 (8.7)	0.75

Statistical significance set at $P < 0.05$. SD: Standard deviation, BAI: Beck Anxiety Inventory

These results, as shown in Table 3, highlight the superior effectiveness of expressing gratitude to God in alleviating anxiety levels compared to plain gratitude. This suggests that incorporating spiritual gratitude into interventions could offer additional benefits for patients undergoing chemotherapy.

DISCUSSION

The baseline characteristics of the participants demonstrated that the groups were well-matched in terms of age, cancer stage and baseline anxiety levels. This comparability ensured that the observed differences in outcomes could be attributed to the interventions rather than confounding factors. Research has shown that addressing anxiety and emotional distress in breast cancer patients is critical, as untreated anxiety not only diminishes quality of life but can also negatively impact treatment adherence and outcomes.^[26]

The comparable characteristics of the groups allowed this study to explore the potential role of gratitude interventions without bias introduced by differing baseline conditions.

Spiritual gratitude, as utilised in the Gratitude to God group, has been identified in previous studies as a particularly effective tool for reducing psychological distress. Koenig emphasised that spiritual interventions significantly reduce depression and anxiety in cancer patients, as they provide a sense of connection, purpose and hope that traditional psychological interventions may lack. Furthermore, this study builds on such evidence, highlighting the importance of spiritual components in gratitude-based therapies.^[26]

Both interventions – Gratitude to God and Plain Gratitude – demonstrated significant reductions in anxiety levels, with the Gratitude to God group achieving a greater decrease. These findings are supported by Kyeong *et al.*,^[19] who found that gratitude interventions reduce amygdala hyperactivity, a neurological marker associated with anxiety. The modulation of brain activity by gratitude may create a sense of calmness and reduced threat perception, which are essential for alleviating anxiety in cancer patients.

Otto *et al.* investigated a brief, low-cost gratitude

intervention's effect on fear of cancer recurrence (FOR), particularly death-related FOR, in women with early-stage breast cancer. Sixty-seven participants underwent either a 6-week online gratitude intervention or were assigned to a control group. The intervention significantly reduced death-related FOR by fostering meaningful goal-setting rather than enhancing positive affect (PA). It also helped maintain PA levels, unlike the control group. These results suggest that gratitude interventions can improve psychological adaptation and well-being in cancer patients.^[27]

Furthermore, gratitude has been shown to influence immunological processes, particularly by reducing proinflammatory cytokines such as IL-1, IL-6 and TNF- α , which are associated with the progression of breast cancer.^[18] By decreasing these inflammatory markers, gratitude interventions may not only alleviate anxiety but also provide indirect benefits for disease progression and overall health. These findings align with the greater anxiety reduction observed in the Gratitude to God group, suggesting that spiritual gratitude may amplify the neurobiological and immunological benefits of gratitude interventions.

In addition to these physiological effects, gratitude interventions are correlated with psychological improvements such as increased PA and self-esteem.^[28] Positive active affect, in particular, helps patients maintain an optimistic outlook, which is crucial for coping with the physical and emotional challenges of chemotherapy. These findings highlight the multifaceted benefits of gratitude interventions and reinforce the importance of incorporating them into cancer care.

The between-group comparison revealed that the Gratitude to God group achieved significantly greater reductions in anxiety levels compared to the Plain Gratitude group. This result is consistent with previous research emphasising the enhanced efficacy of spiritual gratitude in chronic and critical illnesses. For instance, Leão and Nasution collectively demonstrated that spiritual gratitude interventions are more effective in improving well-being compared to non-spiritual gratitude interventions. Spiritual gratitude provides a sense of purpose, hope and connection to a higher power, which may

Table 2: Anxiety levels pre- and post-intervention.

Group	BAI score pre (Mean \pm SD)	BAI score post (Mean \pm SD)	Mean difference	t-value	P-value	95% CI
Gratitude to god (n=26)	27.5 (9.1)	16.6 (7.8)	10.93 (5.73)	10.93	<0.001	8.62–13.24
Plain gratitude (n=20)	28.1 (8.7)	22.5 (7.2)	5.56 (3.43)	5.56	<0.001	3.95–7.17

Statistical significance set at $P < 0.05$. SD: Standard deviation, CI: Confidence interval, BAI: Beck Anxiety Inventory

Table 3: Between-group comparison of BAI reduction.

Comparison	Mean difference (God)	Mean difference (Plain)	t-value/P-value	95% CI
BAI reduction	10.93 (5.73)	5.56 (3.43)	3.24/<0.01	0.89–8.27

Statistical significance set at $P < 0.05$. CI: Confidence interval, BAI: Beck Anxiety Inventory

be especially meaningful for patients facing life-threatening conditions.^[29,30]

Moreover, spiritual gratitude appears to enhance coping mechanisms. Tomczyk identified a strong correlation between gratitude and task-oriented and socially-oriented coping strategies, which are essential for managing the psychological burden of chronic illnesses like breast cancer. These strategies not only reduce anxiety and depression but also improve overall well-being by promoting effective problem-solving and fostering social support. Furthermore, the findings of this study suggest that the Gratitude to God group may have benefited from these enhanced coping mechanisms, leading to greater reductions in anxiety.^[31]

Spiritual gratitude also addresses existential concerns that are often heightened in cancer patients. By fostering a sense of connection to something greater than oneself, spiritual gratitude can provide emotional resilience and a sense of peace in the face of uncertainty.^[32] This may explain the greater reductions in anxiety observed in the Gratitude to God group, as the intervention likely addressed both the emotional and existential dimensions of distress.

Strengths

The findings of this study have important implications for clinical practice. They suggest that incorporating gratitude interventions, particularly those with a spiritual component, into standard psychological support programmes for breast cancer patients can provide significant benefits. By addressing both emotional and spiritual needs, these interventions can enhance overall well-being, reduce anxiety and potentially improve treatment adherence and outcomes.

Furthermore, the physiological benefits of gratitude, such as reduced inflammatory markers, highlight its potential to complement traditional medical treatments. Healthcare providers should consider tailoring gratitude interventions to the spiritual beliefs and preferences of patients, as this personalisation may maximise their effectiveness. Future research should explore the long-term effects of gratitude interventions and investigate their impact on other psychological and physiological outcomes.

Limitations

This study has some limitations. The small sample size and quasi-experimental design may limit the generalisability of the findings. Self-reported measures, such as the BAI, may be subject to bias. In addition, the short study duration did not assess long-term effects, and baseline spiritual or religious beliefs were not fully controlled. Future research with larger samples and randomised designs is recommended.

CONCLUSION

The findings suggest that relaxation therapy, particularly when accompanied by a natural expression of gratitude directed towards a higher power, may be more effective in

reducing anxiety among breast cancer patients undergoing chemotherapy.

Availability of data and materials: The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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