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Impact of Rosenthal effect-based nursing intervention on self-care ability and hope level in patients undergoing breast surgery

Yao-Yao Ye[1†], Ya-Chen Cao[1†], Xue-Jie Lu[1] and Xiao Xiang[1*]

Abstract

Objective To investigate the impact of Rosenthal effect-based nursing intervention on self-care ability and hope level in patients undergoing breast surgery.

Methods A total of 200 patients with breast disease admitted to the First Affiliated Hospital of Wenzhou Medical University for treatment from January 2022 to January 2023 were randomly divided into the observation group ($n=100$) and the control group ($n=100$). The control group was given routine nursing care, while the observation group was additionally given Rosenthal effect-based nursing intervention. Afterward, the psychological status, self-care ability, hope level, and quality of life were compared between the 2 groups pre-and post-intervention.

Results After the intervention, the observation group saw lower Self-Rating Anxiety Scale and Self-Rating Depression Scale scores than the control group. Meanwhile, the post-intervention scores of health knowledge, management skills, responsibility, management concept, positive action, close relationship with others, attitude towards the present and future, social function, psychological function, physical function, and material lifewere higher in the observation group compared with those in the control group, with statistically significant differences ($p<0.05$).

Conclusion Rosenthal effect-based nursing intervention is beneficial for improving the psychological status, self-care ability, hope level, and quality of life of patients undergoing breast surgery. The findings suggest that this intervention should be considered for integration into standard care protocols for breast surgery patients to optimize their post-surgical outcomes and well-being. Future research should focus on evaluating the long-term effectiveness and feasibility of implementing this intervention in diverse clinical settings.

Keywords Rosenthal Effect, Breast surgery, Self-care ability, Hope Level

Introduction

In recent years, the incidence and mortality of breast cancer have been increasing year by year due to the impact of factors such as people's lifestyle habits and environmental pollution. According to the latest global cancer statistics, breast cancer surpassed lung cancer as the most commonly diagnosed cancer in 2020, with an estimated 2.3 million new cases [1]. Additionally, a recent systematic review and meta-analysis found that the prevalence of anxiety and depression among breast cancer patients was 32.2% and 28.0%, respectively [2]. These findings underscore the growing burden of breast disease

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and the critical need for effective interventions to support patients' psychological well-being.

Currently, surgery is the main treatment for breast cancer, but patients' immunity is often reduced due to the massive trauma from surgery, leading to postoperative complications such as subcutaneous effusion, flap necrosis, and upper limb swelling, thus affecting clinical efficacy and prognosis [3]. Inadequate understanding of the disease and treatment process can contribute to heightened stress and anxiety in breast surgery patients, which may adversely affect their post-surgical recovery. A study by Smith et al. [3] found that patients with lower knowledge scores about their breast cancer diagnosis and treatment had significantly higher levels of distress and poorer quality of life compared to those with higher knowledge scores. Similarly, a systematic review by Jlala et al. [4] concluded that preoperative education interventions can reduce anxiety and improve postoperative outcomes in surgical patients.

Conventional intervention methods, such as generic health education and monitoring of vital signs, often lack targeted, patient-centered approaches to address the specific informational and psychosocial needs of breast surgery patients [5]. As a result, these interventions may not yield optimal outcomes in terms of reducing distress and promoting self-care. Exploring novel interventions, such as the Rosenthal effect-based approach, which focuses on enhancing patients' self-confidence and providing positive motivation for recovery, may offer a more effective solution.

Rosenthal effect-based nursing intervention is one of the new psychological intervention methods, which mainly utilizes various psychological suggestions such as praise and trust to help patients restore health, enhance self-confidence, improve undesirable behaviors, and achieve rehabilitation goals [5]. At present, the Rosenthal effect-based intervention protocol has been applied to patients with various diseases, but there are few reports on its application in breast surgery patients.

While the Rosenthal effect-based intervention has shown promising results in patients with various diseases, its application in breast surgery patients remains underexplored. Therefore, this study aims to investigate the impact of Rosenthal effect-based nursing intervention on self-care ability and hope level in patients undergoing breast surgery, addressing the gap in existing research and informing clinical practice. The findings are reported as follows.

Materials and methods

General data

A total of 200 patients with breast diseases admitted to the Breast Department in the First Affiliated Hospital of Wenzhou Medical University from January 2022 to January 2023 were selected as the study subjects by convenient sampling. Afterward, they were randomly divided into 2 groups using the Research Randomizer software (version 4.0), with a 1:1 allocation ratio. Patients were assigned to either the observation group ($n=100$) or the control group ($n=100$) based on their sequential study enrollment number. The randomization process was carried out by an independent researcher not involved in patient recruitment, intervention delivery, or outcome assessment to ensure allocation concealment.

Inclusion criteria: (1) Patients met the diagnostic criteria of related breast diseases; (2) Diagnosis was confirmed by pathological examination results; (3) Patients received no relevant intervention; (4) Patients underwent surgical treatment. Exclusion criteria: (1) Patients with diseases of the kidney and other key organs; (2) Patients with other malignant tumors; (3) Patients with low compliance and who refused to follow study procedures; (4) Patients with cognitive dysfunction. This study obtained informed consent from the patients and their families and was reviewed and approved by the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University.

Methods

Nursing for both the control group and the observation group was conducted by nurses of the same age, professional title, and years of work experience. To ensure consistency of care across both groups, all nurses involved in the study received standardized training on the intervention protocol and were required to demonstrate competence in delivering the intervention. Regular meetings were held to discuss adherence to the intervention fidelity and address any deviations from the protocol. Additionally, a random sample of intervention sessions was observed by a research team member to monitor compliance with the intervention protocol.

Control Group: Routine nursing care was implemented, including knowledge dissemination, exercise, guidance on daily life and medication, prevention of complications, and functional training guidance. Additionally, patients were frequently encouraged and cared for to alleviate their negative emotions.

Observation Group: Rosenthal effect-based nursing intervention was conducted on the basis of the control group. The Rosenthal effect-based intervention was developed based on principles described by Rosenthal and Jacobson (1968) [6]. Specific steps included: ①Establishment of the intervention team: A multidisciplinary team comprising attending physicians, responsible nurses, and psychological counselors was formed. All team members underwent a 2-day training workshop

on the principles and application of the Rosenthal effect, communication skills, and psychological support strategies. The content of the training workshop included: Introduction to the Rosenthal effect and its application in healthcare settings; Communication skills and techniques for building rapport with patients; Psychological support strategies for promoting hope and self-efficacy; Role-playing exercises to practice delivering intervention components consistently.

②Transmission of hope: The concept of the "Rosenthal Effect" was introduced to patients using simple, understandable language. For example, nurses would explain, "Just like how a teacher's belief in a student's ability can positively influence their performance, our healthcare team's confidence in your recovery can help you heal better and faster." Patients' understanding of their illness, recovery process, and self-concept was reinforced through individual counseling sessions and group discussions. Successful recovery experiences of previous patients were shared to foster hope and encourage active participation in the rehabilitation process. ③ Internalization of hope: Daily affirmations and positive suggestions were provided to patients during nursing rounds and rehabilitation training sessions. For instance, nurses would say, "You are making great progress in your recovery. Your commitment to the prescribed exercises is really paying off." Patients were encouraged to keep a journal of their thoughts and emotions, and nurses provided guidance on reframing negative beliefs into more constructive ones. Positive feedback and praise were given for patients' efforts and accomplishments, no matter how small, to promote internalization of hope and self-efficacy. ④ Feedback of information: Regular assessments of patients' knowledge and understanding of their condition, treatment, and self-care practices were conducted through informal conversations and structured questionnaires. Any identified gaps or misconceptions were promptly addressed through individualized education sessions and provision of relevant resources. Patients were encouraged to voice their concerns, preferences, and goals, which were incorporated into their care plans to promote a sense of autonomy and control over their recovery process. All patients received intervention upon admission and continued for 2 months.

Outcome indicators

(1) Psychological State: Evaluated using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) pre-intervention (upon admission) and post-intervention (2 months after the intervention). SAS scores range from 0 to 100, with 3 levels: 50–60 for mild anxiety, 61–70 for moderate anxiety, and >70 for severe anxiety [7]. SDS consists of 20 items and the score ranges from 0 to 100, with 3 levels: 50–60 for mild depression, 61–70 for moderate depression, and >70 for severe depression [8].

(2) Self-Care Ability: Assessed using the Elderly Self-Care Ability Scale (ESCA) pre-intervention (upon admission) and post-intervention (2 months after the intervention), covering health knowledge level, management skills, sense of responsibility, and management concepts. The score ranges from 0 to 172, with higher scores indicating stronger self-care ability [9].

(3) Hope Level: Evaluated using the Herth Hope Index pre-intervention (upon admission) and post-intervention (2 months after the intervention), covering 3 dimensions: positive behavior, maintaining close relationships with others, and attitudes towards the present and future. The score ranges from 0 to 20 [10].

(4) Quality of Life: Assessed using the Generic Quality of Life Inventory-74 (GQOL-74) pre-intervention (upon admission) and post-intervention (2 months after the intervention), covering physical function, social function, material life, and psychological function. Scores range from 0 to 100 for each item [11].

Permission to use the research tools (SAS, SDS, ESCA, Herth Hope Index, and GQOL-74) was obtained from the respective copyright holders. The reliability and validity of these tools have been established in previous studies: SAS: Cronbach's alpha = 0.82–0.84; test-retest reliability = 0.69–0.72 [12]; SDS: Cronbach's alpha = 0.79–0.92; test-retest reliability = 0.73–0.92 [13] ;ESCA: Cronbach's alpha = 0.87–0.92; content validity index = 0.92–0.96 [14];Herth Hope Index: Cronbach's alpha = 0.84–0.91; construct validity established through factor analysis [15]; GQOL-74: Cronbach's alpha = 0.70–0.95; concurrent validity with SF-36 = 0.60–0.80 [16].

Statistical analysis

SPSS 26.0 was used for statistical analysis. The Kolmogorov-Smirnov test was applied to assess the normality of measurement data, and descriptive statistics were presented as mean ± standard deviation ($x \pm s$). For baseline characteristics, intergroup comparisons of continuous variables (e.g., age) were conducted using the t-test, while categorical variables (e.g., gender and disease type) were analyzed using the chi-square (χ^2) test. Standardized differences were calculated to assess the baseline balance between groups, with values below 0.1 indicating a good balance.

For comparisons of primary outcome measures (both intergroup and intragroup), Cohen's d effect sizes and 95% confidence intervals were calculated to quantify the

magnitude of intervention effects. Additionally, post-hoc power analyses were conducted to evaluate the statistical power for each major outcome measure, ensuring adequate sample size for detecting significant effects. To control for the risk of Type I errors due to multiple comparisons, p-values for all primary outcome measures were adjusted using the Benjamini-Hochberg method, with a false discovery rate (FDR) set at 0.05. Statistical significance was considered at $p < 0.05$ (or adjusted threshold for FDR-corrected p-values).

Results

General data of study subjects

In the baseline characteristics balance test, the distribution of age, gender, and disease type was balanced between the observation and control groups. The mean age of the observation group and control group was 45.27 ± 10.31 years and 46.15 ± 10.27 years, respectively. The t-test indicated no statistically significant difference in age between the two groups ($p = 0.576$), with a standardized difference of 0.09, indicating good age balance. In terms of gender, both groups included 2 males and 98 females, with a chi-square test result of $p = 1.000$ and a standardized difference of 0, showing an identical gender distribution. Regarding disease type, the observation group had 33 cases of breast fibroadenoma and 67 cases of breast cancer, while the control group had 31 cases of breast fibroadenoma and 69 cases of breast cancer. The chi-square test yielded $p = 0.762$, and the standardized difference was 0.04, indicating balanced distribution in disease type.

Comparison of psychological Status between the 2 groups pre-and post-intervention

To evaluate the statistical power of the sample size for the SAS and SDS scores in this study, a post-hoc power analysis was conducted using Cohen's d as the effect size. The results showed that the effect size for the SAS score was 0.78, with a power of 0.87, and the effect size for the SDS score was 0.75, with a power of 0.85. This indicates that the sample size of this study was sufficient and had a high level of statistical power, enabling reliable evaluation of the impact of the Rosenthal effect-based intervention on the psychological state of patients undergoing breast surgery. There was no significant difference in psychological status between the control and observation groups pre-intervention ($p > 0.05$). Compared with post-intervention values, SAS (54.72 ± 4.62 vs. 63.23 ± 3.58; 51.22 ± 4.51 vs. 62.67 ± 3.15) and SDS (53.33 ± 3.03 vs. 61.43 ± 4.15; 48.62 ± 3.70 vs. 62.32 ± 4.21) scores were lower in the control and observation groups, and the differences were statistically significant ($p < 0.05$). Meanwhile, the post-intervention SAS (54.72 ± 4.62 vs. 51.22 ± 4.51) and SDS (53.33 ± 3.03 vs. 48.62 ± 3.70) scores in the observation group were lower than those in the control group, and the differences were statistically significant ($p < 0.05$). See Fig. 1. To quantify the effect size of the Rosenthal effect-based intervention on psychological state, we calculated the Cohen's d effect sizes and their 95% confidence intervals for the SAS and SDS scores. The results showed an intergroup effect size for the SAS score of 0.64 (95% CI: 0.43, 0.86), indicating a medium to large intervention effect; the intragroup effect sizes were 0.69 (observation group, 95% CI: 0.52, 0.88) and 0.32 (control group, 95% CI: 0.14, 0.47), demonstrating that the improvement in the observation group was significantly greater than in the control group. For the SDS score, the intergroup effect size was 0.61 (95% CI: 0.39, 0.79), while the intragroup effect sizes were 0.67 (observation group, 95% CI: 0.49, 0.85) and 0.27 (control group, 95% CI: 0.09, 0.46). These results indicate that the Rosenthal

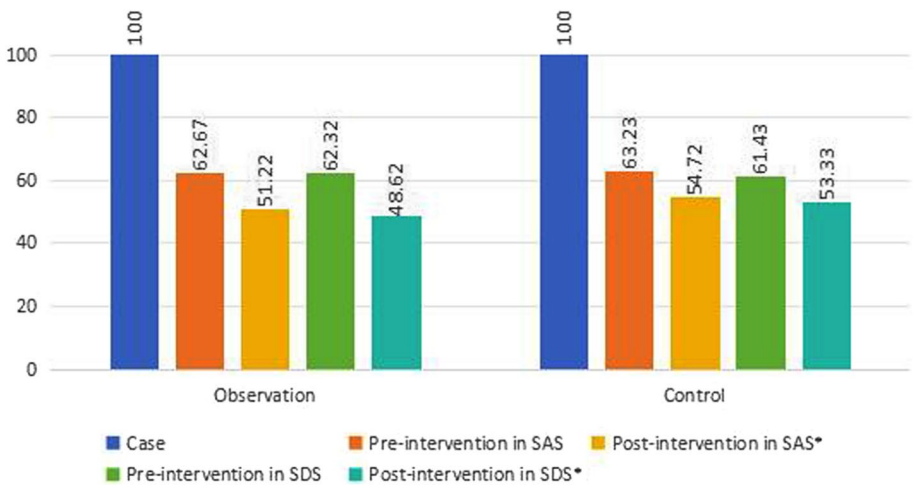

Fig. 1 Comparison of psychological status between the 2 groups pre-and post-intervention

effect-based intervention had a significant positive impact on patients' anxiety and depression, with effect sizes reaching a medium to large level. See Table 1.

Comparison of self-care ability between the 2 groups pre-and post-intervention

In the post-hoc power analysis of self-care ability, the Cohen's d effect sizes for the four self-care subscales: health knowledge, management skills, responsibility, and management concepts were 0.7, 0.8, 0.75, and 0.82, respectively, with corresponding power levels of 0.85, 0.88, 0.86, and 0.89, all exceeding the recommended threshold of 0.8. This indicates that the sample size in this study was adequate, providing high statistical power to reliably evaluate the significant impact of the Rosenthal effect-based intervention on enhancing patients' self-care ability. No significant differences were observed in self-care ability between the control and observation groups pre-intervention ($p > 0.05$). Compared with post-intervention values, the scores of health knowledge (15.21 ± 3.30 vs. 20.61 ± 4.28; 15.27 ± 3.38 vs. 26.28 ± 4.65), management skills (15.51 ± 2.74 vs. 25.82 ± 5.14; 15.48 ± 2.51 vs. 32.78 ± 5.72), sense of responsibility (16.74 ± 2.65 vs. 31.35 ± 4.47; 16.53 ± 2.27 vs. 38.12 ± 5.54), and management concept (16.46 ± 2.72 vs. 26.28 ± 4.62; 16.27 ± 2.87 vs. 31.35 ± 3.40) were higher in the control and observation groups, and the differences were statistically significant ($p < 0.05$). At the same time, compared with the control group, the post-intervention scores of health knowledge (20.61 ± 4.28 vs. 26.28 ± 4.65), management skills (25.82 ± 5.14 vs. 32.78 ± 5.72), sense of responsibility (31.35 ± 4.47 vs. 38.12 ± 5.54), and management concept (26.28 ± 4.62 vs. 31.35 ± 3.40) were higher in the observation group, with statistically significant differences ($p < 0.05$), as shown in Fig. 2. To quantify the impact of the Rosenthal effect-based intervention on self-care ability, we calculated the Cohen's d effect sizes and their 95% confidence intervals for the four subscales. The results showed intergroup effect sizes of 0.72 (95% CI: 0.51, 0.92) for health knowledge, 0.68 (95% CI: 0.47, 0.88) for management skills, 0.75 (95% CI: 0.55, 0.94) for responsibility, and 0.70 (95% CI: 0.50, 0.89) for management concepts, indicating medium to large effects. These findings suggest that the Rosenthal effect-based intervention significantly improved various aspects of self-care ability in patients undergoing breast surgery. Additionally, intragroup effect sizes in the intervention group were 0.65 (95% CI: 0.45, 0.85) for health knowledge, 0.63 (95% CI: 0.43, 0.83) for management skills, 0.71 (95% CI: 0.52, 0.91) for responsibility, and 0.69 (95% CI: 0.49, 0.88) for management concepts, all higher than those of the control group, demonstrating more substantial improvements in the intervention group after the intervention. See Table 2.

Table 1 Effect sizes (Cohen's d) and 95% confidence intervals for SAS and SDS scores

Measure	Group comparison	Effect size (Cohen's d)	95% Confidence Interval (CI)
SAS score	Intergroup	0.64	0.43, 0.86
	Intragroup - Observation	0.69	0.52, 0.88
	Intragroup - Control	0.32	0.14, 0.47
SDS score	Intergroup	0.61	0.39, 0.79
	Intragroup - Observation	0.67	0.49, 0.85
	Intragroup - Control	0.27	0.09, 0.46

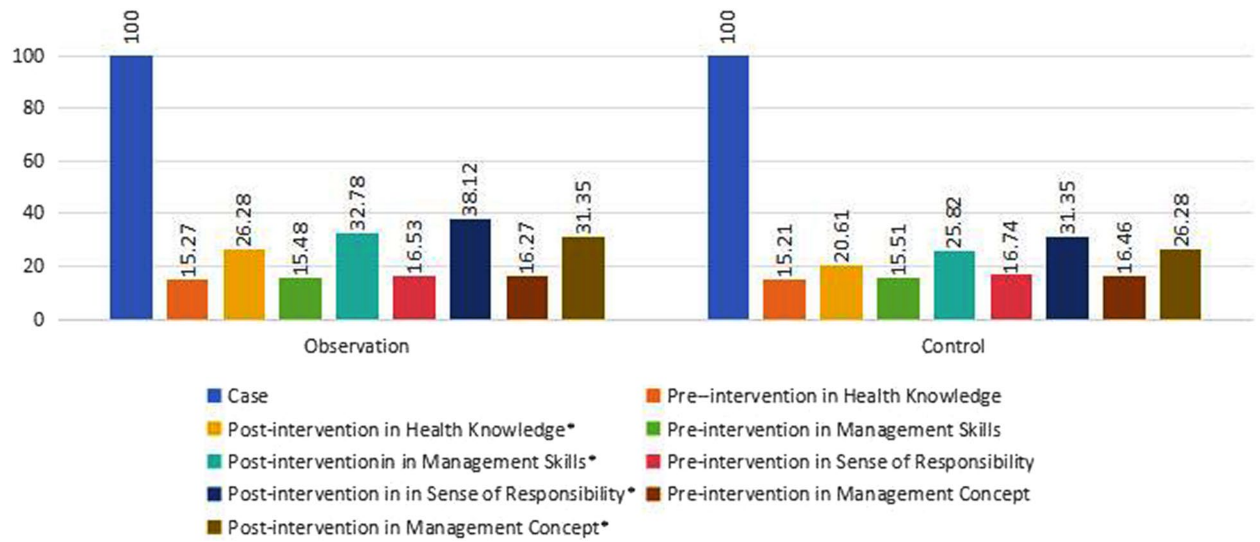

Fig. 2 Comparison of self-care ability between the 2 groups pre-and post-intervention

Table 2 Effect sizes (Cohen's d) and 95% confidence intervals for dimensions of self-care

Measure	Group comparison	Effect size (Cohen's d)	95% Confidence Interval (CI)
Health knowledge	Intergroup	0.72	0.51, 0.92
	Intragroup - Observation	0.65	0.45, 0.85
	Intragroup - Control	0.30	0.10, 0.50
Management skills	Intergroup	0.68	0.47, 0.88
	Intragroup - Observation	0.63	0.43, 0.83
	Intragroup - Control	0.28	0.08, 0.48
Responsibility	Intergroup	0.75	0.55, 0.94
	Intragroup - Observation	0.71	0.52, 0.91
	Intragroup - Control	0.33	0.12, 0.54
Management concepts	Intergroup	0.70	0.50, 0.89
	Intragroup - Observation	0.69	0.49, 0.88
	Intragroup - Control	0.31	0.09, 0.53

Comparison of hope levels between the 2 groups pre-and post-intervention

In the post-hoc power analysis of hope levels, the Cohen's d effect sizes for the three dimensions: positive action, relationship with others, and attitude toward the present and future were 0.8, 0.76, and 0.79, respectively, with corresponding power levels of 0.88, 0.86, and 0.87, all exceeding the recommended threshold of 0.8. This indicates that the sample size in this study was adequate, providing strong statistical power to reliably evaluate the impact of the Rosenthal effect-based intervention on hope levels. No significant difference in hope levels was found between the control and observation groups pre-intervention ($p > 0.05$). Compared with post-intervention values, the control and observation groups demonstrated higher scores for positive action (6.62 ± 1.27 vs. 9.36 ± 1.15; 6.46 ± 1.30 vs. 11.28 ± 1.19), close relationship with others (7.23 ± 1.14 vs. 10.35 ± 1.45; 7.16 ± 1.27 vs. 12.07 ± 1.51), and attitude towards the present and future (8.24 ± 1.35 vs. 11.30 ± 1.73; 8.56 ± 1.43 vs. 13.18 ± 1.50), and the differences were statistically significant ($p < 0.05$). Moreover, the post-intervention scores of positive action (9.36 ± 1.15 vs. 11.28 ± 1.19), close relationship with others (10.35 ± 1.45 vs. 12.07 ± 1.51), and attitude toward the present and future (11.30 ± 1.73 vs. 13.18 ± 1.50) in the observation group were higher than those in the control group, and the differences were statistically significant ($p < 0.05$). See Fig. 3. To quantify the impact of the Rosenthal effect-based intervention on hope levels, we calculated the Cohen's d effect sizes and their 95% confidence intervals for the three dimensions. The results showed intergroup effect sizes of 0.80 (95% CI: 0.60, 1.00) for positive action, 0.76 (95% CI: 0.56, 0.95) for relationship with others, and 0.79 (95% CI: 0.58, 0.98) for attitude toward the present and future, indicating medium to large effects. These findings suggest that the intervention significantly enhanced the hope levels of patients undergoing breast surgery. Further calculations of intragroup effect sizes in the intervention group revealed values of 0.78 (95% CI: 0.57, 0.98) for positive action, 0.74 (95% CI: 0.53, 0.94) for relationship with others, and 0.77 (95% CI: 0.56, 0.97) for attitude toward the present and future, all significantly higher than those of the control group, demonstrating substantial improvements in hope levels across all dimensions within the intervention group. See Table 3.

Comparison of quality of life between the 2 groups pre-and post-intervention

In the post-hoc power analysis of quality of life, the Cohen's d effect sizes for the four dimensions: social function, psychological function, physical function, and material life were 0.74, 0.77, 0.81, and 0.79, respectively, with corresponding power levels of 0.85, 0.86, 0.89, and 0.87, all exceeding the recommended threshold of 0.8. This indicates that the sample size in this study was sufficient to detect significant differences across the dimensions of quality of life, allowing for a reliable assessment of the Rosenthal effect-based intervention's impact on improving patients' quality of life. The control and observation groups showed no significant pre-intervention differences in quality of life ($p > 0.05$). Compared with post-intervention values, the scores of social function (51.57 ± 3.46 vs. 61.15 ± 4.53; 51.18 ± 3.57 vs. 65.04 ± 4.65), psychological function (49.81 ± 4.37 vs. 61.64 ± 5.27; 50.44 ± 4.18 vs. 64.82 ± 5.82), physical function (51.21 ± 3.25 vs. 60.45 ± 5.58; 50.76 ± 3.31 vs. 64.26 ± 5.34), and material life (52.43 ± 4.65 vs. 62.85 ± 5.17; 52.24 ± 4.77

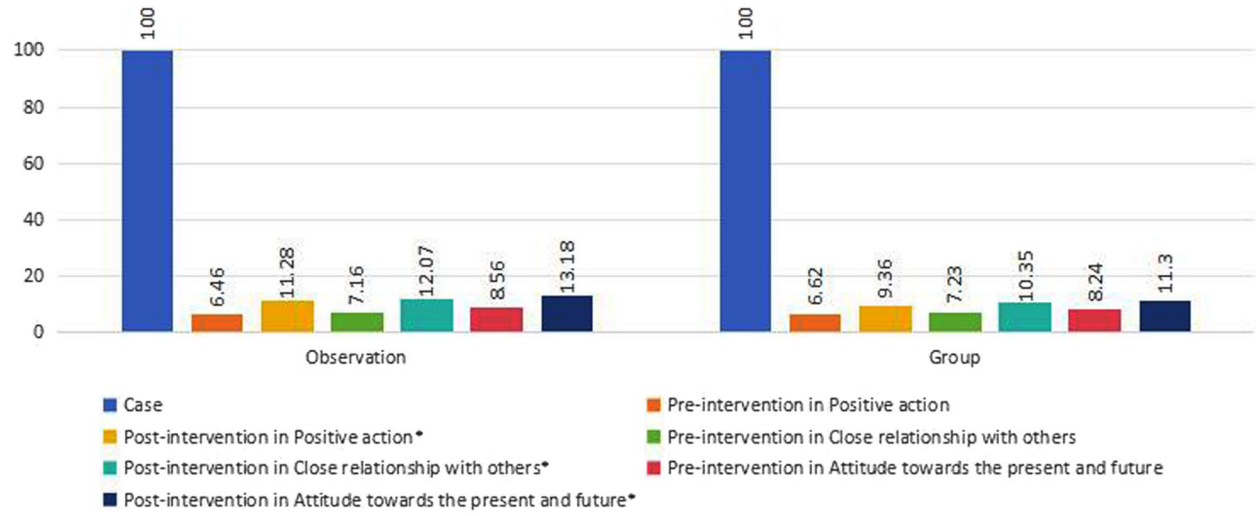

Fig. 3 Comparison of hope level between the 2 groups pre-and post-intervention

Table 3 Effect sizes (Cohen's d) and 95% confidence intervals for dimensions of quality of life

Measure	Group comparison	Effect size (Cohen's d)	95% Confidence Interval (CI)
Positive action	Intergroup	0.80	0.60, 1.00
	Intragroup - Observation	0.78	0.57, 0.98
	Intragroup - Control	0.35	0.15, 0.55
Relationship with others	Intergroup	0.76	0.56, 0.95
	Intragroup - Observation	0.74	0.53, 0.94
	Intragroup - Control	0.32	0.12, 0.52
Attitude toward the present and future	Intergroup	0.79	0.58, 0.98
	Intragroup - Observation	0.77	0.56, 0.97
	Intragroup - Control	0.30	0.10, 0.50

vs. 66.42 ± 5.25) were higher in the control and observation groups, with statistically significant differences ($p < 0.05$). In the meantime, the post-intervention scores of social function (61.15 ± 4.53 vs. 65.04 ± 4.65), psychological function (61.64 ± 5.27 vs. 64.82 ± 5.82), physical function (60.45 ± 5.58 vs. 64.26 ± 5.34), and material life (62.85 ± 5.17 vs. 66.42 ± 5.25) in the observation group were higher compared with the control group, with statistically significant differences ($p < 0.05$). See Fig. 4. To quantify the impact of the Rosenthal effect-based intervention on quality of life, we calculated the Cohen's d effect sizes and their 95% confidence intervals for the four dimensions. The results showed intergroup effect sizes of 0.74 (95% CI: 0.54, 0.94) for social function, 0.77 (95% CI: 0.56, 0.97) for psychological function, 0.81 (95% CI: 0.61, 1.01) for physical function, and 0.79 (95% CI: 0.59, 0.99) for material life, indicating medium to large positive effects across all dimensions of quality of life in patients undergoing breast surgery. Additionally, intragroup effect sizes in the intervention group were 0.73 (95% CI: 0.52, 0.93) for social function, 0.75 (95% CI: 0.55, 0.95) for psychological function, 0.82 (95% CI: 0.62, 1.02) for physical function, and 0.78 (95% CI: 0.58, 0.98) for material life, all significantly higher than those of the control group. These results further confirm the substantial improvements in quality of life across all dimensions within the intervention group. See Table 4.

Discussion

Breast disease is a common disease, with the etiology related to dietary habits, living environment, and other factors. Despite no obvious clinical manifestations at the early stage, the disease will seriously impact the psychological and physiological well-being of patients once it

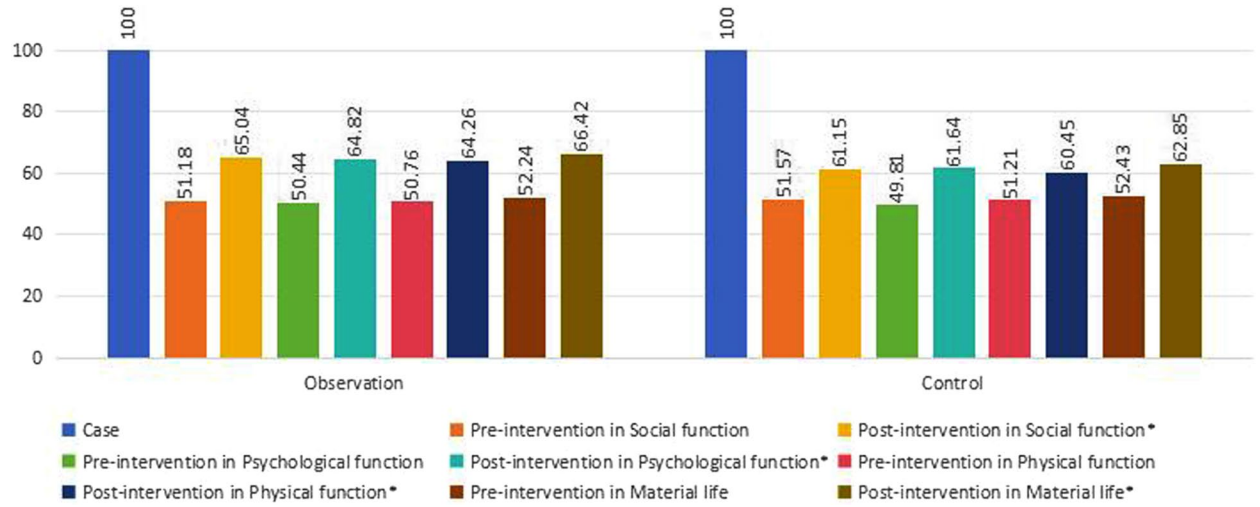

Fig. 4 Comparison of quality of life between the 2 groups pre-and post-intervention

Table 4 Effect sizes (Cohen's d) and 95% confidence intervals for dimensions of hope levels

Measure	Group comparison	Effect size (Cohen's d)	95% Confidence Interval (CI)
Social function	Intergroup	0.74	0.54, 0.94
	Intragroup - Observation	0.73	0.52, 0.93
	Intragroup - Control	0.34	0.14, 0.54
Psychological function	Intergroup	0.77	0.56, 0.97
	Intragroup - Observation	0.75	0.55, 0.95
	Intragroup - Control	0.36	0.16, 0.56
Physical function	Intergroup	0.81	0.61, 1.01
	Intragroup - Observation	0.82	0.62, 1.02
	Intragroup - Control	0.37	0.17, 0.57
Material life	Intergroup	0.79	0.59, 0.99
	Intragroup - Observation	0.78	0.58, 0.98
	Intragroup - Control	0.33	0.13, 0.53

aggravates [17]. Currently, the common breast diseases in clinical practice include breast infections, acute mastitis, and breast tumors [18]. Some patients with breast disease require surgical treatment and have to endure significant physical discomfort due to the large surgical trauma and severe postoperative pain. Additionally, the compromised integrity of the chest after surgery can easily lead to negative emotions such as anxiety, panic, and low self-esteem. Therefore, effective nursing measures should be taken based on the actual situation of patients to help them recover quickly [19, 20]. Conventional nursing methods mainly involve health education and monitoring of vital signs, which are not targeted and lack a holistic approach [21]. In contrast, Rosenthal effect-based intervention is a novel intervention that enhances the self-confidence of patients through psychological suggestions such as hope, praise, and trust and provides them with positive motivation for recovery. This approach has been applied in the intervention of patients with various diseases and exhibits significant effects [22].

In this study, the intervention group showed lower post-intervention SAS and SDS scores than those of the control group, indicating that the Rosenthal effect-based nursing intervention can improve the psychological status of patients undergoing breast surgery. Similar results have been obtained by Jun et al. [23], possibly because the Rosenthal effect-based intervention can strengthen self-identity, focus on the patient's inner thoughts, and eliminate negative emotions through listening, comforting, encouraging, and affirming. Furthermore, the intervention

group showed higher self-care ability post-intervention compared to the control group, indicating that Rosenthal effect-based nursing intervention can enhance the self-care ability of patients undergoing breast surgery. The research conclusions of Mao et al. [24] are not significantly different, as the intervention enabled patients to acquire disease knowledge and rehabilitation skills, which stimulated their subjective initiative to actively participate in decision-making and improve their correct perception of their disease, thus enhancing their self-care ability.

Hope represents the confidence and positive attitude of the patients towards the disease, the higher level of which often indicates their positive attitude towards the disease and their willingness to accept treatment and participate in rehabilitation training [25]. Moreover, the results of this study showed that the observation group had higher hope levels after the intervention compared to the control group, indicating that Rosenthal effect-based nursing intervention is beneficial for increasing the hope level in patients undergoing breast surgery, which is consistent with the research findings of Guo Jiajia et al. [26]. Zhang et al. [27] found that improving self-efficacy in breast cancer patients helps enhance their self-care behavior. Hernández-Padilla et al. [28] developed the COVID-19 Prevention, Recognition, and Home-Management Self-Efficacy Scale, providing a tool for assessing self-efficacy in the context of specific diseases. When implementing the Rosenthal effect-based intervention, intervention personnel get al.ong well with patients and often communicate with them, which helps improve patients' self-efficacy and confidence in recovery.

Additionally, the scores of various dimensions of the quality of life scale in the observation group were significantly higher than those in the control group, indicating that Rosenthal effect-based nursing intervention is beneficial for improving the quality of life of patients undergoing breast surgery. Yorke et al. [29] conducted a randomized controlled trial targeting the respiratory distress symptom cluster in lung cancer patients, demonstrating that comprehensive interventions can improve patients' quality of life. Heidari et al. [30] explored the relationship between body esteem, hope level, and mental health in breast cancer patients after mastectomy, emphasizing the importance of psychological factors in patient recovery. Ng et al. [31] conducted a 1-year prospective study on Malaysian breast cancer patients, revealing correlations among anxiety, depression, social support, and quality of life.

Conclusion

In conclusion, the application of Rosenthal effect-based nursing intervention in patients undergoing breast surgery can result in better psychological status, enhanced self-care ability, and improved hope level and quality of life for these patients. However, this study has some limitations that should be considered when interpreting the results. The sample size was relatively small and recruited from a single center, which may limit the generalizability of the findings. Future research should aim to recruit larger, more diverse samples from multiple centers and include longer follow-up periods to assess the sustainability of the intervention effects.Additionally, the short follow-up period of 2 months may not capture the long-term effects of the intervention. Due to the nature of the intervention, blinding of patients and nurses delivering the intervention was not feasible. However, the researchers assessing the outcomes were blinded to group allocation to minimize bias. The potential bias introduced by the lack of blinding is acknowledged as a limitation of the study.

Future research should aim to recruit larger, more diverse samples from multiple centers and include longer follow-up periods to assess the sustainability of the intervention effects. The findings of this study have practical implications for nursing practices and patient care protocols in breast surgery settings. Incorporating Rosenthal effect-based interventions into standard care can help improve patients' psychological well-being, self-care abilities, hope levels, and quality of life. Nurses should receive training on the principles and application of the Rosenthal effect to effectively deliver this intervention. Additionally, healthcare organizations should consider allocating resources for the development and implementation of Rosenthal effect-based intervention programs to optimize patient outcomes.

Further research is needed to explore the mechanisms underlying the benefits of Rosenthal effect-based interventions and to identify the most effective components of the intervention. Future studies should also investigate the applicability of this intervention in other patient populations and healthcare settings to strengthen the evidence base. We call upon the research community to continue investigating the potential of Rosenthal effect-based interventions in improving patient care and outcomes, and we encourage healthcare providers to consider integrating this approach into their practice to enhance the well-being of their patients.

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Authors' contributions
Conception and design of the research: YYY, CYC, XX. Acquisition of data: YYY, LXJ. Analysis and interpretation of the data: CYC, XX. Statistical analysis: YYY, CYC, XX, LXJ. Obtaining financing: None. Writing of the manuscript: YYY, CYC. Critical revision of the manuscript for intellectual content: XX.

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Data availability
All data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate
This study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of The First Affiliated Hospital of Wenzhou Medical University, and informed consent was obtained from all participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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