

Factors Influencing the Occurrence of Psychological Imbalance in Patients Undergoing Chemotherapy After Modified Radical Mastectomy for Breast Cancer

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Abstract: *Objective:* To analyze the factors affecting the occurrence of psychological imbalance in chemotherapy patients after modified radical surgery for breast cancer. *Methods:* Retrospectively analyzed the clinical data of 285 post-chemotherapy patients with breast cancer who received chemotherapy treatment in a hospital between November 2022 and December 2023 and applied to analyze the incidence rate of psychological imbalance and influencing factors by using logistic regression analysis. *Results:* Psychological imbalance occurred in 178 cases of 285 post-chemotherapy patients after modified radical mastectomy for breast cancer, accounting for 62.46%. Comparing the patients in the occurrence group and the non-occurrence group in terms of age, family history, marital status, place of residence, and per capita monthly income of the family, the differences were not statistically significant ($P > 0.05$), whereas in terms of high school or lower education level, low social support, and having a burden of self-feeling, the proportion of the occurrence group was higher than that of the non-occurrence group, and the differences were statistically significant ($P < 0.05$). *Conclusion:* The risk of psychological imbalance is higher in patients undergoing chemotherapy after modified radical mastectomy for breast cancer, while high school and below educational background, low social support, and having self-perceived burdens are the main risk factors ($OR > 1$, $P < 0.05$).

Keywords: Breast cancer; Modified radical surgery; Chemotherapy; Psychological imbalance; Educational level; Risk factors

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1. Introduction

Breast cancer is one of the most common malignant tumours in women, and its morbidity and mortality rates are on the rise worldwide. With the advancement of modern medical technology, early diagnosis and treatment of breast cancer have been improved, and modified radical surgery and chemotherapy have become important means of breast cancer treatment. Chemotherapy, as an important part of comprehensive treatment after

modified radical surgery for breast cancer, patients not only have to face physical pain and dysfunction but also have to bear the psychological impact brought about by physical changes, often accompanied by nausea, vomiting, hair loss, fatigue and other serious side effects, which further aggravate the psychological burden of the patients, and lead to psychological problems such as anxiety, depression, fear, etc., and may even develop into a serious psychological imbalance, which not only affect the emotional state of breast cancer patients but also may weaken their adherence to treatment, thus affecting the treatment effect and prognosis ^[1]. Therefore, it is of great clinical significance to explore the factors influencing the occurrence of psychological imbalance in chemotherapy patients after modified radical surgery for breast cancer to formulate effective psychological interventions and improve the psychological health of patients. It has been found that psychological imbalance in breast cancer patients is influenced by a variety of factors, including demographic characteristics (e.g., age, marital status, economic status, etc.), disease characteristics (e.g., tumour stage, treatment modality, side effects, etc.), social support (e.g., family support, friend support, etc.), and individual psychological traits (e.g., personality traits, coping styles, etc.) ^[2]. However, the specific mechanisms regarding the influence of these factors in patients undergoing chemotherapy after modified radical mastectomy for breast cancer are not yet completely clear, and there are some differences in the results between different studies. Based on this, the present study aims to systematically investigate the main risk factors for psychological imbalance in patients undergoing chemotherapy after modified radical surgery for breast cancer, with a view to providing a scientific basis for the clinic and helping the medical team to formulate a more effective psychological intervention strategy, so as to improve the overall health status of patients with breast cancer, and to enhance their quality of life and adherence to treatment.

2. Methodology

2.1. General information

This retrospective study included 285 patients after modified radical mastectomy for breast cancer who received chemotherapy treatment at a hospital between November 2022 and December 2023. The age range of the patients was 29–57 years old, with a mean of 38.46 ± 1.83 years old; tumour staging (TNM staging): 137 patients in stage I and 107 patients in stage II; and family history of 41 patients. The study was approved for implementation by the Ethics Committee of the hospital.

Inclusion criteria: (1) Meet the diagnostic criteria of breast cancer in surgery and diagnosed with breast cancer by clinical symptoms, imaging examination and pathological tissue examination; (2) Meet the indications for surgical treatment, and all of them received modified radical mastectomy for breast cancer and postoperative chemotherapy comprehensive plan; (3) Patients should voluntarily participate in this study and sign the informed consent.

Exclusion criteria: (1) Those who have recently (3 months) received radiotherapy, targeted therapy and other breast cancer treatment plans; (2) Those who are combined with other malignant tumours; (3) Those who are accompanied by a history of serious mental illness or serious cognitive dysfunction; (4) Those who have incomplete clinical data; (5) Those who refused to sign the informed consent or those who are not willing to participate in the study.

2.2. Methodology

- (1) A hospital-made general information questionnaire was used, covering the following: age (> 35 years old, ≤ 35 years old); family history (yes, no); marital status (married, unmarried/divorced); place of residence (urban, rural); monthly family income per capita ($\geq 4,000$ yuan, $< 4,000$ yuan); and education

level (high school and below, junior college and above).

- (2) Social support assessment: After one course of chemotherapy, patients were assessed for social support using the Social Support Rating Scale (SSRS), which consists of objective support (3 entries), subjective support (4 entries), and support utilization (3 entries), for a total of 10 entries and a total score of 66 points. An SSRS score of ≥ 20 was classified as normal, and a score of < 20 was classified as low.
- (3) Self-perceived burden assessment: After one course of chemotherapy, patients were assessed for self-perceived burden using the Self-Perceived Burden Scale (SPBS). The SPBS includes physical burden (5 entries, total score of 25), emotional burden (4 entries, total score of 20), and economic burden (1 entry, total score of 5), with a total of 10 entries and a reverse scoring of the 8th entry. Each entry was scored on a scale of 1 to 5, for a total of 50 points. An SPBS score of < 30 was classified as no significant burden, and ≥ 30 was classified as burdened.

2.3. Observation indicators

- (1) Judgement criteria of psychological imbalance: After completing one course of chemotherapy treatment, the patients were assessed by the Symptom Self-assessment Scale (SCL-90) in 10 dimensions of feeling, emotion, thinking, etc. There were 90 entries, and the scores of each entry ranged from 1 to 5, for a total score of 450 points. A score of more than 160 points on the SCL-90 was judged to be a psychological imbalance.
- (2) Compare the clinical data of the two groups of patients for univariate analysis, and then include variables that are statistically significant in the univariate analysis in the multivariate analysis. Use multifactorial logistic regression to analyze the independent risk factors for the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical surgery for breast cancer.

2.4. Statistical methods

Data were analyzed and processed using SPSS 23.00 statistical software. Count data were expressed as n (%), and comparisons between groups were made using the χ^2 test. Logistic regression analysis was used for multifactorial analysis, and $P < 0.05$ was used to indicate that the difference was statistically significant.

3. Results

3.1. Incidence of psychological imbalance in patients treated with chemotherapy after modified radical mastectomy for breast cancer

Psychological imbalance occurred in 178 cases with an incidence of 62.46% in 285 patients undergoing chemotherapy after modified radical mastectomy for breast cancer. It did not occur in 107 cases with an incidence rate of 37.54.

3.2. Analysis of single factors influencing the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical mastectomy for breast cancer

In a comparison of single factors such as age, family history, marital status, place of residence, and per capita monthly family income of the patients in the two groups, the difference was not statistically significant ($P > 0.05$). In the comparison of the percentage of patients with high school or lower education, low social support, and self-perceived burdens in the two groups, the incidence group was significantly higher than that of the group

that did not incur the burdens, and the difference was statistically significant ($P < 0.05$). Refer to **Table 1**.

Table 1 Analysis of single factors influencing the occurrence of psychological imbalance in both groups [n (%)]

Group	Age (>35 years/≤35 years)	Family history	Marital status (married/unmarried, divorced)	Monthly household income per capita (yuan) (≥ 4000, < 4000)	Place of residence (town/coconut)	Educational level (high school and below/college and above)	Social support (normal/low)	Self-perceived burden (burdened/no apparent burden)
Occurrence group ($n = 178$)	142 (79.78)	35 (19.67)	124 (69.67)	135 (75.84)	97 (54.49)	86 (48.31)	127 (71.35)	96 (53.93)
	36 (20.22)		54 (30.33)	43 (24.16)	81 (45.51)	92 (51.69)	51 (28.65)	82 (46.07)
Non-occurrence group ($n = 107$)	80 (74.77)	16 (14.95)	79 (73.83)	77 (71.96)	67 (62.62)	38 (35.51)	89 (83.18)	43 (40.19)
	28 (25.23)		28 (26.17)	30 (28.04)	40 (37.38)	69 (64.49)	18 (16.82)	64 (59.81)
χ^2	0.9737	1.0089	0.5667	0.5280	1.8046	4.4551	5.0964	5.0537
P	0.3238	0.3152	0.4516	0.4674	0.1792	0.0348	0.0240	0.0246

3.3. Multifactorial logistic analysis of the influence on the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical breast cancer surgery

The results of multifactorial logistic regression analysis showed that high school and below education level, low social support, and having self-perceived burdens were all independent risk factors influencing the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical mastectomy for breast cancer ($OR > 1$, $P < 0.05$). Refer to **Table 2**.

Table 2 Multifactorial logistic analysis influencing the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical mastectomy for breast cancer

Variant	β	SE	Wald/ χ^2	OR value	95 per cent CI	P -value
Educational level (high school and below/college and above)	0.540	0.250	4.648	1.712	1.051 to 2.793	< 0.01
Social support (normal/low)	0.659	0.302	4.740	1.935	1.066 to 3.509	< 0.01
Self-perceived burden (burdened/no apparent burden)	0.552	0.251	4.995	1.431	1.071 to 2.806	< 0.05

4. Discussion

Breast cancer is one of the most common malignant tumours among women worldwide, with high morbidity and mortality rates. With the development of medical science and technology, the treatment of breast cancer has been improving, among which modified radical surgery is a widely used surgical method [3]. The procedure aims to maximize control of the condition by removing the breast tumour and some of the surrounding tissue. Although modified radical breast cancer surgery has improved in preserving the appearance of the breasts, the physical changes after surgery remain a significant psychological burden for many women [4]. To further reduce the risk of recurrence and metastasis after surgery, further chemotherapy treatment is required. As chemotherapy is an important post-surgical treatment, the impact of its side effects on the patient's mental health should not be underestimated [5]. Common side effects during chemotherapy, such as nausea, vomiting, hair loss, fatigue, etc., not only make patients suffer physically but also make them feel depressed and helpless psychologically, which makes them prone to psychological problems such as anxiety and depression [6].

The results of this study showed that 178 cases of psychological imbalance occurred in 285 patients with breast cancer chemotherapy after modified radical surgery, accounting for 62.46%. A comparison of single factors such as age, family history, marital status, place of residence, and monthly family income per capita between the two groups showed no statistically significant difference ($P > 0.05$). Further analysis of the main reasons for the presence of the following: whether urban or rural, the physical and psychological stresses brought about by surgery and chemotherapy for breast cancer are equally present in patients of all types of places of residence, suggesting that place of residence is not the key factor. In the present study, both groups of patients had an evenly distributed family history of breast cancer, showing no significant difference^[7]. In addition, the age of onset of breast cancer is relatively concentrated and the patient groups did not show significant differences in age distribution, further explaining why family history and age were not significant in the univariate analysis of psychological imbalance^[8]. Due to the relatively small sample size of this study, differences between these variables may not have been fully apparent. Marital status and economic level, although affecting patients' psychological status to a certain extent, failed to show statistical significance in this study, which may be related to the insufficient sample size. The results of multifactorial logistic regression analysis showed that high school and below education level, low social support, and having self-perceived burdens were all independent risk factors ($OR > 1, P < 0.05$) influencing the occurrence of psychological imbalance in patients undergoing chemotherapy after modified radical mastectomy for breast cancer. The reasons were analyzed as follows:

- (1) Lower educational level, i.e. high school and below education level, is one of the independent risk factors for the occurrence of psychological imbalance in chemotherapy patients after modified radical surgery for breast cancer. Patients with lower educational levels are confused and upset when faced with complex medical information and treatment options. At the same time, the lack of sufficient medical knowledge to understand the nature of the disease, the treatment process and its side effects leads to increased uncertainty and fear of the future. In addition, patients with low literacy may face more pressure and challenges socially and professionally, thus having difficulties in seeking and utilizing social resources, further aggravating their psychological burden. Patients with low literacy are more prone to psychological imbalance in coping with stress and regulating their emotions because they are not adept at alleviating psychological pressure through communication, seeking help or using other positive coping methods^[9].
- (2) Low social support. Social support includes emotional support, practical help and information support from family, friends, colleagues and the medical team. The negative impact of low social support on patients' mental health is mainly due to the following reasons:
 - (a) Firstly, the understanding and support of family members, friends and the medical team can effectively alleviate patients' anxiety and depression and enhance their confidence and courage to overcome the disease. However, when patients perceive inadequate social support, feelings of loneliness and helplessness increase significantly, leading to a higher risk of psychological imbalance.
 - (b) Second, patients with low social support lack the necessary help and resources to cope with the life changes and challenges brought by the disease. The physical and psychological burdens associated with modified radical mastectomy and chemotherapy for breast cancer require continuous care and support, and the lack of a social support system makes it more difficult for patients to cope with the treatment process and multiplies their psychological stress as a result.
 - (c) Thirdly, good social support can provide emotional comfort and also help patients in practical

life, such as taking care of their families and coordinating medical resources. Inadequate social support makes patients feel great pressure when facing these practical problems, thus affecting their psychological health.

- (3) Self-perceived burden. Higher self-perceived burden is another independent risk factor for psychological imbalance in chemotherapy patients after modified radical mastectomy because of the following reasons:
- (a) Patients have a higher self-perceived burden due to the fear of the disease, the worry about the side effects of the treatment, and the uncertainty of their future life, and the long-term psychological stress will lead to mood fluctuations and increase the risk of anxiety and depression ^[10].
 - (b) Patients may feel multiple pressures from family, economy and society. For example, the high cost of treatment may lead to financial pressure, while the expectations of family members and the burden of caring for the patient may also increase the patient's psychological pressure. When the pressure exceeds the patient's tolerance, it is easy to trigger psychological imbalance.
 - (c) Patients with the heavy burden of self-feeling may have negative psychological reactions, such as self-doubt and loss of confidence when facing the treatment process. These negative emotions will not only affect patients' psychological health but also reduce their treatment compliance and effectiveness, forming a vicious circle.

In conclusion, the high incidence of psychological imbalance in chemotherapy patients after modified radical surgery for breast cancer was not significantly associated with the results of univariate comparisons of factors such as place of residence, family history, age, marital status, and family income. However, the educational level of high school and below, low social support, and having a self-perceived burden were all independent risk factors influencing the occurrence of psychological imbalance in chemotherapy patients after modified radical surgery for breast cancer. Follow-up studies should further expand the sample size to more comprehensively reveal the specific causes affecting psychological imbalance in breast cancer patients, thus providing stronger support for clinical practice.

Disclosure statement

The author declares no conflict of interest.

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