

Original Research

The effects of cosmetic care on body image, social avoidance and distress in young Chinese breast cancer patients receiving chemotherapy

Shengqun Hou^{1,2}, Zhenqi Lu^{1,2,*}, Jiajia Qiu^{1,2}, Xiaoju Zhang^{1,2}, Jialing Huang^{1,2}, Yun Li^{1,2}, Cuixia Fu^{1,2}

¹Department of Nursing, Fudan University Shanghai Cancer Center, 200032 Shanghai, China

²Department of Oncology, Shanghai Medical College, Fudan University, 20032 Shanghai, China

*Correspondence: hulibu_nursing@163.com; lu_zhenqi@fudan.edu.cn (Zhenqi Lu)

Academic Editor: Michael H. Dahan

Submitted: 1 January 2021 Revised: 5 February 2021 Accepted: 8 February 2021 Published: 6 January 2022

Abstract

Background: This study aimed to explore the effects of cosmetic care on body image (BI), and social avoidance and distress (SAD) in young Chinese breast cancer patients, aged 18–40 years old, receiving adjuvant chemotherapy. **Methods:** This was a 2-arm quasi-experimental study based on a single-center. A convenience sample of 76 hospitalized young female breast cancer patients, stage 0-III breast cancer diagnosis was recruited. The control group received usual care, while cosmetic care was added to the intervention group. The primary outcomes were BI and SAD accompanying chemotherapy, and the secondary outcome was the appearance satisfaction. It was registered at Clinical Trials.gov, no. NCT04733482. **Results:** There were significant differences in patients' body image, and social avoidance and distress scores from the pre-discharge (T0) to at the end of the chemotherapy cycle (T2) between two groups ($P < 0.05$). However, the intervention did not significantly change the appearance satisfaction at T2 ($P > 0.05$). Logistic regression suggested there were no confounding demographic factors influencing the intervention. **Conclusions:** The present study indicated that cosmetic care improved BI and reduced SAD in young Chinese breast cancer patients during adjuvant chemotherapy. However, a randomized study should be undertaken to confirm our results.

Keywords: Body image; Cosmetic care; Psychosocial support; Social avoidance and distress; Young breast cancer

1. Introduction

Breast cancer is the most common cancer among women all over the world [1]. China is undergoing the cancer transition stage, and the burden of breast cancer rapidly increases. In China, breast cancer cases accounted for 12.2% of all newly diagnosed breast cancer patients and 9.6% of all deaths from breast cancer worldwide [2]. It is expected that by 2021 there will be a total of 2.5 million cases totally in China [3]. With the advancement of medical technologies, the survival rate of breast cancer patients has significantly improved [4], but the diagnosis and treatment of this disease may still bring severe psychological trauma to women [5]. First, breasts are the symbolic representation of women, and also play an important role in women's sexual attractiveness [6]. Mastectomy may induce changes to appearance, leaving a scar to the breast area. Second, chemotherapy may lead to hair loss, which has been regarded as the most distressing side effects of chemotherapy [7]. Furthermore, chemotherapy may result in pigmentation of face [8,9], nail change [10] and weight gain [11]. All these physical changes are challenging for females. They have a long-term negative effect on patients' body image (BI) [12] and social function [13–15]. This condition occurs more frequently in young breast cancer patients [14,16].

Cosmetic care is an effective measure to enhance patients' psychosocial functioning, which can help cancer patients cope with disfigurement-related adverse effects [17,18]. It includes moisturizing skin, applying make-up and wearing wigs. In America, a non-governmental organization called "Look good, feel better" provided cosmetic care to cancer patients, which was confirmed to improve patients' mood and attractiveness [19]. Nevertheless, in China, the appearance-related psychological problems are not paid much attention in comparison to the medical problems [20]. Consequently, in this study, we intended to know the effects of cosmetic care on the BI and social functions in young Chinese breast cancer patients receiving adjuvant chemotherapy.

This study aimed to evaluate the psychosocial effects of cosmetic care on young Chinese breast cancer patients receiving adjuvant chemotherapy. The primary outcome was BI and social avoidance and distress (SAD) accompanying chemotherapy, and the secondary outcome was appearance satisfaction at the end of chemotherapy. We hypothesized that cosmetic care would improve BI and appearance satisfaction, reduce SAD in young Chinese breast cancer patients during adjuvant chemotherapy.



2. Methods

2.1 Study design

This was a prospective, 2-arm quasi-experimental study, comprising two groups: the controlled group and the interventional group. In order to avoid interference, the two groups of participants were recruited at different periods. The control group was recruited from Jan 2015 to Mar 2015, and the intervention group was recruited from January 2016 to September 2017. All participants came from the department of a breast surgery in Shanghai, China.

2.2 Participants

A convenience sample of 76 hospitalized young female breast cancer patients, stage 0-III breast cancer diagnosis was recruited. The inclusion criteria were: (a) primary breast cancer patients, aged 18–40 years old, who received surgery and adjuvant chemotherapy in our department, (b) no prior neoadjuvant chemotherapy, (c) being available to communicate by the novel social application “Wechat”. The exclusion criteria were: (a) diagnosis of psychiatric or intellectual impairment, (b) having a history of neoadjuvant therapy, (c) having distant metastasis, (d) ECOG <2. Besides, if the patient’s chemotherapy regimen was changed due to her willingness or progression of disease, she was eliminated from the study. Recruitment flyers were handed out in the breast surgery department. The primary nurses explained the study to eligible patients briefly; if the patients intended to participate, they would inform the research nurse. The research nurse confirmed the patients’ eligibility, explained the purposes and methods of this study, and got written informed consent forms signed by the patients. The sample size was calculated according to the formula of repeated measurement design, aiming to differentiate the difference of the primary outcome (BI) between the two groups. In the formula, $\alpha = 0.05$, power = 80%, and standard deviation σ was calculated according to a cross sectional study of body image conducted by one of the researchers before this study. During long term follow-up of this study, some patients withdrew from the study cohort, and therefore data of these patients couldn’t be used for further analysis. The calculation yielded an ideal sample size of 43 in each group. However, in consideration of the study time, finally 38 participants were included in each group.

2.3 Data collection

To measure the effects of cosmetic care, participants were assessed with questionnaires at three different times: before discharge from the hospital (T0), prior to the end of the middle chemotherapy cycle (T1), and at the end of the chemotherapy cycle (T2). Data were collected face to face or via “Wechat” and email.

2.4 Control condition: usual care

Participants in the control group received usual care during adjuvant chemotherapy. The usual care consisted of written information and verbal guidance on the adverse effects of chemotherapy and related psychological reactions. They were delivered by nurses in the hospital.

2.5 Intervention: cosmetic care in addition to usual care

Participants in the intervention group received cosmetic care in combination with usual care. The cosmetic care was a 3-hour, free-of-charge beauty activity, including face moisturizing steps, make-up, wigs, and breast prostheses wearing. It was provided by professional cosmeticians at a cosmetic training base before the patients finished half of their chemotherapy cycle. The activity was held five times. Every time 7–8 participants were invited. A set of cosmetics and cosmetic equipment were provided, including clearing lotion, moisturizing lotion, powder, cotton pads, and brushes. Different hairstyles of wigs and breast prostheses were also made available to the participants.

In the activity, first, a professional cosmetician showed participants the process of face moisturizing through PowerPoint slides. After that, she demonstrated the procedure on a volunteer step by step. Second, a specialized wig consultant taught participants how to choose the appropriate wig, ensure its maintenance, and identify its advantages and disadvantages. Third, a rehabilitation consultant demonstrated the benefits of wearing breast prostheses after mastectomy, and elaborated on how to choose and clean prostheses. After all the steps were finished, the patients were invited to take pictures of themselves, and discuss their experiences about this activity, specifically sharing about the changes in their appearance.

2.6 Ethical considerations

Ethical approval of this study was obtained from the ethical committee of a cancer center in Shanghai. The approval number was 1403132-2. Informed consent was explained to the participants and the forms were signed by them. Considering ethical bias, participants in the control group were also invited to participate in the cosmetic session after the study.

2.7 Data analyses

The Statistical Package for the Social Sciences (SPSS) 22.0 (IBM Corp., Armonk, NY, USA) was used to analyze all the data. An independent samples *t* test was used to compare means of normally distributed variables of the two groups, while Mann-Whitney U tests were employed to analyze the difference of means for variables that were not normally distributed for the two groups. The frequencies of categorical variables of the two groups were compared using Mann-Whitney U test, Pearson’s χ^2 , or Fisher’s exact test. Repeated-measures analysis of variance (ANOVA) was performed to compare the longitudinal trend of change

between the two groups. Finally, logistic regression was used to find out the confounding factors influencing the intervention. A value of $P < 0.05$ was considered significant.

2.8 Measurements

2.8.1 BI scale

BI was assessed using the BI scale, which has been developed by Hopwood [21]. S Y Fang (Taiwan, China) has translated it into Chinese, and its Cronbach's α is 0.90 [22]. It is a 10-item self-assessment scale, measuring cancer patients' perception of their appearance. Five items concern general BI: feeling self-conscious, dissatisfied with appearance when distressed, having difficulty looking at naked body, avoidance from people because of appearance, and dissatisfied with body; the other five concern cancer related BI: less physically attractive, less feminine, less sexually attractive, body less whole, and dissatisfied with scar. The scale is rated on a scale of 0 to 3 (0 = not at all; 3 = very much). A higher score signifies a worse BI.

2.8.2 SAD scale

The isolation behavior and distress in social contact was evaluated with the SAD scale, which contains 28 items. The reliability coefficient of its social avoidance subscale and social distress subscale is 0.87 and 0.85 respectively [23]. Its Chinese edition was used in this study. Half of the items (No. 2, 4, 8, 9, 13, 17, 18, 19, 21, 22, 24, 25, 26, 27) were used to measure social avoidance, and the other half were used to measure social distress. Its items were rated as either a "Yes" or a "No". The total score in the scale ranges from 0 to 28. A higher score means greater SAD.

2.8.3 Appearance satisfaction questionnaire

The appearance satisfaction questionnaire was designed by the researchers of this study, and aimed to assess whether the several BI-related side effects of treatments would affect patients' appearance satisfaction. It involved six aspects: hair loss, facial skin pigmentation, acne skin, breast loss, weight gain, and fatigue. The answers included either a "Yes" or a "No". This questionnaire was developed based on three rationales: the multidimensional understanding of BI [24], the side effects of breast cancer treatments [25], and the experience of clinical nurses.

2.8.4 Demographic and clinical variables

The demographic questionnaire was designed by the researchers of this study. It included details regarding the patients' age, years of marriage, education, personal monthly income, marital status, type of surgery, tumor histopathological grading, permanent residence, and main caregiver.

3. Results

3.1 Study population

In the phase of recruitment, there were 38 and 42 participants in the control group and intervention group respectively. However, 4 of the participants from the intervention group did not attend the cosmetic care, so they were not included in the analysis. As for the demographic and clinical variables, we found no significant differences between the control group and the intervention group except for the level of education and personal monthly income ($P < 0.05$) (Table 1).

3.1.1 Primary outcome

There was no significant difference in the baseline BI (T0) and baseline SAD (T0) between the two groups. But we found a significant positive effect of cosmetic care on patients' BI ($F = 9.22$, $df = 1$, $P < 0.05$) and SAD ($F = 14.13$, $df = 1$, $P < 0.05$) from T0 to T2 (Table 2) (Figs. 1,2).

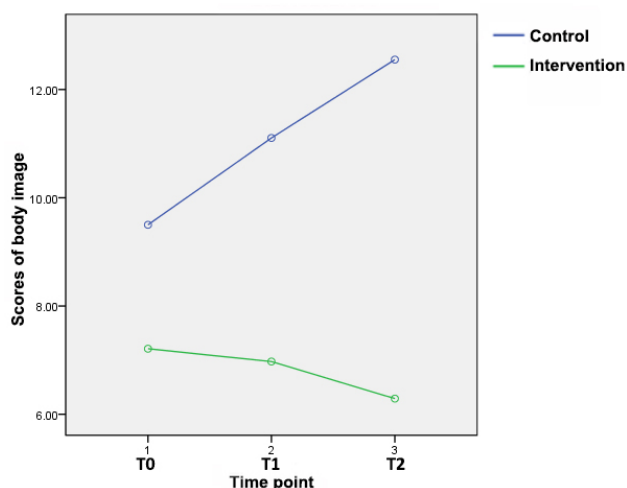


Fig. 1. Scores of body image between the two groups. The horizontal axis signified the time point of assessment: T0 signified before discharge from the hospital; T1 signified prior to the end of the middle chemotherapy cycle; T2 signified at the end of the chemotherapy cycle. The vertical axis signified the scores of body image (BI) in the two groups. The blue line and the green line meant the longitudinal variation trend of BI respectively. The BI (T0) in the control group and intervention group were 9.50 ± 6.45 and 7.21 ± 5.50 (mean \pm SD) respectively. The statistical analysis showed there was no significant difference between them. In the control group: from T0 to T1, BI increased, and from T1 to T2, BI decreased a little. In the intervention group: from T0 to T2, BI decreased all the time. There were significant differences in BI between the two groups from T0 to T2.

Table 1. Demographic and Clinical Variables of the Participants.

Variables	Total (n = 76)	Control (n = 38)	Intervention (n = 38)	Z or χ^2 Value	P value
Age, mean (SD), y	35.07 (3.62)	35.53 (3.58)	34.61 (3.65)	-1.274 ^a	0.203
Years of marriage, mean (SD)	8.78 (4.94)	9.71 (5.07)	7.86 (4.68)	-1.335 ^a	0.182
	n (%)	n (%)	n (%)		
Education				-3.535 ^a	0.000*
Primary school	1 (1.3)	1 (2.6)	0 (0)		
Junior and senior high school	21 (27.6)	17 (44.7)	4 (10.5)		
Senior college or above	54 (71.1)	20 (52.6)	34 (89.5)		
Personal monthly income				-2.563 ^a	0.01*
<3000 CNY/month	13 (17.1)	10 (26.3)	3 (7.9)		
3000–4999 CNY/month	23 (30.3)	13 (34.2)	10 (26.3)		
5000–7999 CNY/month	19 (25)	8 (21.1)	11 (28.9)		
≥8000 CNY/month	21 (27.6)	7 (18.4)	14 (36.8)		
Marital status				0.000 ^b	1
Married	68 (89.5)	34 (89.5)	34 (89.5)		
Single	8 (10.5)	4 (10.5)	4 (10.5)		
Type of surgery				5.575 ^b	0.062
Breast preservation (breast conserving treatment)	27 (35.5)	11 (28.9)	16 (42.1)		
Mastectomy	30 (39.5)	20 (52.6)	10 (26.3)		
Reconstructive surgery	19 (25)	7 (18.4)	12 (31.6)		
Breast preservation				2.105 ^b	0.147
Yes	26 (34.2)	10 (38.5)	16 (42.1)		
No	50 (65.8)	28 (56)	22 (57.9)		
Axillary lymph node dissection				0.216 ^b	0.642
Yes	32 (42.1)	15 (39.5)	17 (44.7)		
No	44 (57.9)	23 (60.5)	21 (55.3)		
Tumor histopathological grading				1.339 ^b	0.247
II	43 (56.6)	19 (50)	24 (63.2)		
III	33 (42.1)	19 (50)	14 (36.8)		
Permanent residence				0.852 ^b	0.356
Shanghai	34 (42.1)	15 (39.5)	19 (50)		
Other provinces	42 (57.9)	23 (60.5)	19 (50)		
Main care giver				2.741 ^b	0.254
Parents	20 (26.3)	12 (31.6)	8 (21.1)		
Husband	25 (32.9)	14 (36.8)	11 (28.9)		
Parents and husbands	31 (40.8)	12 (31.6)	19 (50)		

Abbreviations: CNY, Chinese Yuan; SD, standard deviation. a: The comparison between the 2 arms was conducted using Mann-Whitney U test. b: The comparison between the 2 arms was conducted using Pearson's χ^2 or Fisher's exact test. * The statistic value of the statistical tests are presented as $P < 0.05$.

3.2 Secondary outcomes

After the completion of chemotherapy (T2), hair loss brought the greatest influence to patients' appearance satisfaction in both the control group (97.4%) and the intervention group (86.8%). However, there was no significant effect on appearance satisfaction for breast cancer patients between the two groups at T2 ($P > 0.05$).

3.3 Logistic regression analysis

The comparison of demographic and clinical variables between the two groups showed that there were significant differences in the participants' education level and personal monthly income ($P < 0.05$) (Table 1). Therefore, in order to recognize whether they were confounding factors influencing the intervention, we separately combined them with the intervention (group) into the logistic regression of BI and SAD scores at T2. Before performing logistic regression, BI and SAD scores were transformed into categorical

Table 2. Results of BI and SAD.

	T0	T1	T2	F ^a	P value
Items	Mean (SD)	Mean (SD)	Mean (SD)		
BI				15.072	0.000*
Control (n = 38)	9.50 ± 6.45	11.11 ± 6.52	12.55 ± 5.35		
Intervention (n = 38)	7.21 ± 5.50	6.97 ± 4.86	6.29 ± 5.56		
Between arms ^b (z, p)	-1.594, 0.111	-2.991, 0.003*	-4.721, 0.000*		
SAD				14.61	0.000*
Control (n = 38)	10.05 ± 7.79	10.11 ± 7.04	12.16 ± 6.14		
Intervention (n = 38)	7.71 ± 6.62	4.95 ± 4.85	5.39 ± 6.82		
Between arms ^b (z, p)	-1.276, 0.202	-3.594, 0.000*	-4.404, 0.001*		

The horizontal axis signified the time point of assessment: T0 signified before discharge from the hospital; T1 signified prior to the end of the middle chemotherapy cycle; T2 signified at the end of the chemotherapy cycle. BI, body image; and SAD, social avoidance and distress; SD, standard deviation. a: The comparison between the two groups was conducted using ANOVA. b: The comparison of the two groups at each time point was conducted with an Mann-Whitney U test. * The statistic value of the statistical tests are presented as $P < 0.05$.

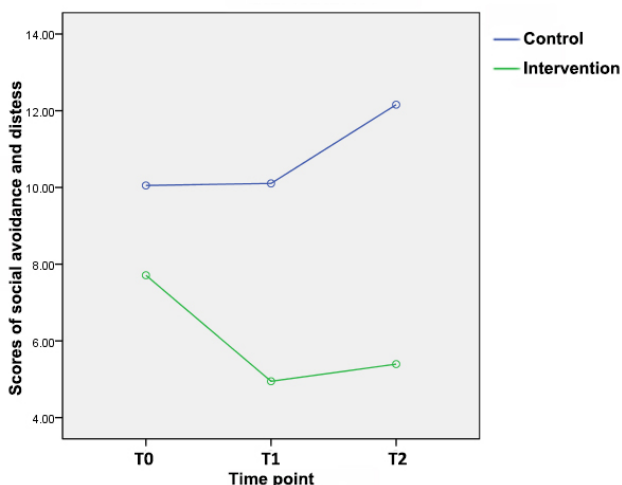


Fig. 2. Scores of social avoidance and distress between the two groups. The horizontal axis signified the time point of assessment: T0 signified before discharge from the hospital; T1 signified prior to the end of the middle chemotherapy cycle; T2 signified at the end of the chemotherapy cycle. The vertical axis signified the scores of social avoidance and distress (SAD) in the two groups. The blue line and the green line meant the longitudinal variation trend of SAD respectively. The SAD (T0) in the control group and intervention group were 10.05 ± 7.79 and 7.71 ± 6.62 (mean \pm SD) respectively. The statistical analysis showed there was no significant difference between them. In the control group: from T0 to T1, SAD increased, and from T1 to T2, SAD decreased. In the intervention group: from T0 to T2, SAD decreased a lot, and from T1 to T2, SAD increased. There were significant differences in SAD between the two groups from T0 to T2.

variables according to their mean values at T2.

The mean value of BI scores at T2 was 9, therefore 1 meant the scores were ≤ 9 , while 0 meant the scores were > 9 . Equally, the mean value of SAD at T2 was 8, therefore 1 meant scores were ≤ 8 , while 0 meant the scores were > 8 . Eventually, the results showed that only the intervention (group) made a significant difference to BI scores ($P < 0.05$) and SAD scores at T2 ($P < 0.05$), indicating that cosmetic care independently affected BI and SAD.

4. Discussion

In this study, the results suggest that cosmetic care decreased BI and SAD scores in the experimental group from T0 to T2, which means it brought positive psychosocial effects to young Chinese breast cancer patients receiving chemotherapy. This finding is consistent with other studies. A study in France showed that cosmetic care improved BI in breast cancer patients who underwent surgeries three months later [26]. Another study showed that cosmetic rehabilitation improved oral cancer patients' BI, helped cover the disfigurement, and make it less noticeable. Patients were, thus, satisfied with their appearance and what people thought about them [27]. In a third study, physical attractiveness increased patients' confidence and femininity, which, in turn, benefitted their social function [28]. A study in Korea identified the good effects of cosmetic care on relieving distress and avoidance of breast cancer patients, who had undergone mastectomy in the past 2 years and were undergoing chemotherapy or radiotherapy [29]. In the current study, cosmetic care brought about positive effects by hiding the physical signs of illness and treatments in cancer patients, rather than eliminating the actual body deterioration.

Notwithstanding the positive effects of cosmetic care on BI and SAD in breast cancer patients during adjuvant chemotherapy, there was no significant difference in patients' appearance satisfaction between the two groups at T2. This could be explained by the contribution of two factors: ways of asking questions in the appearance satisfaction questionnaire and the multidimensional concept of BI. First, the questions in the questionnaire were close-ended, such as, "Does the hair loss affect your appearance satisfaction?" instead of being open-ended, such as, "How hair loss has affected your appearance satisfaction?" Furthermore, the answers were either a "Yes" or a "No". These questions were unable to capture the quantitative extent or the qualitative nuance of the patients' appearance satisfaction. Therefore, when these physical changes existed objectively, the answers would be "Yes" in both the groups. Second, there was no conflict between nonsignificant appearance satisfaction and significant BI at T2. As BI was a multidimensional concept in this study, it could have been influenced by both: ones' investment in appearance and self-evaluation [13]. Investment in appearance signified how important the patient considered her appearance, and self-evaluation denoted the discrepancy between realistic appearance and ideal beauty [30]. Appearance satisfaction is a form of self-evaluation of one's body, therefore, it was only one part of BI. Additionally, the improvement of BI in the intervention group was not only due to patients' appearance changes, but also the psychological care and social support they perceived in the activity. Just as it was reported in Linda R. Taggart's study, patients felt comfortable to remove wigs and put on make-up in the cosmetic class, because all of them were in the same condition [31].

This was the first study on cosmetic care conducted in China mainland to improve BI and reduce SAD in young breast cancer patients undergoing chemotherapy. In the usual care method, guidance on the side effects of chemotherapy is offered to the patients verbally or in writing. However, the cosmetic care method made the patients together, and taught them how to tackle their problems in reality, which also offered a chance for the patients to communicate with each other. In this study, cosmetic care was comprehensive. It covered the appearance-related issues faced in the perioperative and adjuvant chemotherapy period, which was more overall than other studies. Furthermore, through this intervention, patients were shown that they should hold a dialectical opinion on cosmetics. Although a study has shown that some ingredients, such as parabens, found in cosmetics might make their way into the breasts, the source of parabens was unclear [32]. It was, thus, concluded that these ingredients should not be regarded as the cause of breast cancer [33]. In order to establish clarity on this issue, more epidemiologic studies are needed [34].

4.1 Study limitations

This was a single-center study, which would affect the sample representativeness and generalizability of the results. The sample size was small and had a risk of enrollment bias because it was a quasi-experimental study. The control group was recruited in 2015, whereas the intervention group was recruited starting in 2017. This kind of design was dominant in avoiding interference between the two groups. Although two groups of patients were recruited with a long interval, the side effects of breast cancer treatments remained unchanged, and no other changes in surgical or postoperative care occurred between the two time periods. Furthermore, attrition throughout the study may have influenced the results. The attrition was caused by some objective reasons. The traditional opinion of Chinese patients in emphasizing disease and treatment, rather than the quality of life has prevailed in. This led to the difficulty of enrollment, which may have influenced the generalizability of cosmetic care. Another limitation in this study was the design of questions in the appearance satisfaction questionnaire. In subsequent research, the responses should be changed into a five-grade format, rather than including ratings of only "Yes" or "No".

5. Conclusions

Cosmetic care can be used with young Chinese breast cancer patients to improve their BI and reduce their SAD during adjuvant chemotherapy, but a randomized study should be undertaken to confirm the results. In this study, cosmetic care provided psychological and social support to cancer patients, and made them feel cared for. Hospitals can hold this activity regularly in the coming days, and invite professional cosmeticians to demonstrate make-up routines for the patients.

Author contributions

SQH, ZQL, JJQ, XJZ and JLH contributed to study conception and designed the experiments; YL and CXF collected the data; SQH analyzed and interpreted the data; SQH drafted the article; SQH and ZQL made critical revision of the article. All authors were involved in presented cases and contributed to the final report.

Ethics approval and consent to participate

This study was approved by the ethics committee of Fudan University Shanghai Cancer Center (approval number: 1403132-2). All the participants provided the informed consent.

Acknowledgment

We appreciate the contribution of the patients and the cosmeticians to this study. We also thank our colleagues for their contribution to the statistical analysis. Before starting the study, we consulted the Chief Executive Officer of On-

cology Nursing Society, Brenda Nevidjon. We appreciated the advice she offers to us.

Funding

This research was funded by Nursing Research Fund of Fudan University, and the fund number is FNF201413.

Conflict of interest

The authors declare no conflict of interest.

References

- [1] Fitzmaurice C, Allen C, Barber RM, Barregard L, Bhutta ZA, Brenner H, *et al.* Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: a systematic analysis for the global burden of disease study. *JAMA Oncology*. 2017; 3: 524–548.
- [2] Fan L, Strasser-Weippl K, Li J, St Louis J, Finkelstein DM, Yu K, *et al.* Breast cancer in China. *Lancet Oncology*. 2014; 15: e279–e289.
- [3] Linos E, Spanos D, Rosner BA, Linos K, Hesketh T, Qu JD, *et al.* Effects of reproductive and demographic changes on breast cancer incidence in China: a modeling analysis. *Journal of the National Cancer Institute*. 2008; 100: 1352–1360.
- [4] Merino Bonilla JA, Torres Tabanera M, Ros Mendoza LH. Breast cancer in the 21st century: from early detection to new therapies. *Radiología*. 2017; 59: 368–379.
- [5] Tojal C, Costa R. Depressive symptoms and mental adjustment in women with breast cancer. *Psycho-Oncology*. 2015; 24: 1060–1065.
- [6] Ljungman L, Ahlgren J, Petersson L, Flynn KE, Weinfurt K, Gorman JR, *et al.* Sexual dysfunction and reproductive concerns in young women with breast cancer: type, prevalence, and predictors of problems. *Psycho-Oncology*. 2018; 27: 2770–2777.
- [7] Trusson D, Pilnick A. The role of hair loss in cancer identity: perceptions of chemotherapy - induced alopecia among women treated for early-stage breast cancer or ductal carcinoma *in situ*. *Cancer Nursing*. 2017; 40: E9–E16.
- [8] Whitmer K, Barford B, Turner M, Sullivan D, Sommers M. Digital image analysis of facial erythema over time in persons with varied skin pigmentation. *Skin Research and Technology*. 2011; 17: 348–352.
- [9] Elalami I, Ichou M. Generic docetaxel chemotherapy induced skin toxicities in breast cancer patient. *Pan African Medical Journal*. 2016; 24: 164.
- [10] Kim IS, Lee JW, Park KY, Li K, Seo SJ, Hong CK. Nail change after chemotherapy: simultaneous development of Beau's lines and Mees' lines. *Annals of Dermatology*. 2012; 24: 238–239.
- [11] Liu L, Wen F, Miaskowski C, Lin Y, Wang J, Jeng C, *et al.* Weight change trajectory in women with breast cancer receiving chemotherapy and the effect of different regimens. *Journal of Clinical Nursing*. 2014; 23: 2757–2768.
- [12] Herring B, Paraskeva N, Tollow P, Harcourt D. Women's initial experiences of their appearance after mastectomy and/or breast reconstruction: a qualitative study. *Psycho-Oncology*. 2019; 28: 2076–2082.
- [13] Sherman KA, Woon S, French J, Elder E. Body image and psychological distress in nipple-sparing mastectomy: the roles of self-compassion and appearance investment. *Psycho-Oncology*. 2017; 26: 337–345.
- [14] Gómez-Campelo P, Bragado-Álvarez C, Hernández-Lloreda MJ. Psychological distress in women with breast and gynecological cancer treated with radical surgery. *Psycho-Oncology*. 2014; 23: 459–466.
- [15] Brandão T, Schulz MS, Matos PM. Psychological adjustment after breast cancer: a systematic review of longitudinal studies. *Psycho-Oncology*. 2017; 26: 917–926.
- [16] Rosenberg SM, Tamimi RM, Gelber S, Ruddy KJ, Kereakoglow S, Borges VF, *et al.* Body image in recently diagnosed young women with early breast cancer. *Psycho-Oncology*. 2013; 22: 1849–1855.
- [17] Crane K. Looking good during cancer treatments. *Journal of the National Cancer Institute*. 2012; 104: 1852–1853.
- [18] Zhang QY, Li Y, Wu T, Wei T, Yan L. Effects of cosmetic interventions on breast cancer patients undergoing chemotherapy. *Chinese Nursing Management*. 2020; 20: 588–592.
- [19] Manne SL, Girasek D, Ambrosino J. An evaluation of the impact of a cosmetics class on breast cancer patients. *Journal of Psychosocial Oncology*. 1994; 12: 83–99.
- [20] Chen JJ, Sun CP, Chen LX, Ruan YY, Liu S. SCL-90 score and its influencing factors in breast cancer patients undergoing chemotherapy. *Chinese Journal of Clinical Research*. 2019; 32: 184–189.
- [21] Hopwood P, Fletcher I, Lee A, Al Ghazal S. A body image scale for use with cancer patients. *European Journal of Cancer*. 2001; 37: 189–197.
- [22] Fang S, Chang H, Shu B. Objectified body consciousness, body image discomfort, and depressive symptoms among breast cancer survivors in Taiwan. *Psychology of Women Quarterly*. 2014; 38: 563–574.
- [23] Leary MR, Knight PD, Johnson KA. Social anxiety and dyadic conversation: a verbal response analysis. *Journal of Social and Clinical Psychology*. 1987; 5: 34–50.
- [24] White CA. Body image dimensions and cancer: a heuristic cognitive behavioural model. *Psycho-Oncology*. 2000; 9: 183–192.
- [25] Odle TG. Adverse effects of breast cancer treatment. *Radiologic Technology*. 2014; 85: 297M–319M.
- [26] Quintard B, Lakdja F. Assessing the effect of beauty treatments on psychological distress, body image, and coping: a longitudinal study of patients undergoing surgical procedures for breast cancer. *Psycho-Oncology*. 2008; 17: 1032–1038.
- [27] Huang S, Liu H. Effectiveness of cosmetic rehabilitation on the body image of oral cancer patients in Taiwan. *Supportive Care in Cancer*. 2008; 16: 981–986.
- [28] Cash TF, Cash DW. Women's use of cosmetics: psychosocial correlates and consequences. *International Journal of Cosmetic Science*. 1982; 4: 1–14.
- [29] Park HY, Kim JH, Choi S, Kang E, Oh S, Kim JY, *et al.* Psychological effects of a cosmetic education programme in patients with breast cancer. *European Journal of Cancer Care*. 2015; 24: 493–502.
- [30] Cash TF, Melnyk SE, Hrabosky JI. The assessment of body image investment: an extensive revision of the appearance schemas inventory. *International Journal of Eating Disorders*. 2004; 35: 305–316.
- [31] Taggart L, Ozolins L, Hardie H, Nyhof-Young J. Look good feel better workshops: a “big lift” for women with cancer. *Journal of Cancer Education*. 2009; 24: 94–99.
- [32] Harvey PW, Everett DJ. Parabens detection in different zones of the human breast: consideration of source and implications of findings. *Journal of Applied Toxicology*. 2012; 32: 305–309.
- [33] Barr L, Metaxas G, Harbach CAJ, Savoy LA, Darbre PD. Measurement of paraben concentrations in human breast tissue at serial locations across the breast from axilla to sternum. *Journal of Applied Toxicology*. 2012; 32: 219–232.
- [34] Konduracka E, Krzemieniecki K, Gajos G. Relationship between everyday use cosmetics and female breast cancer. *Polish Archives of Internal Medicine*. 2014; 124: 264–269.