

Chemotherapy induced alopecia in breast cancer patients: A monocentric prospective study

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Abstract.

INTRODUCTION: Alopecia is one of the main adverse events of chemotherapy in breast cancer. However, its impact is often ignored and underestimated by clinicians. Our aim was to evaluate the quality of life of breast cancer patients with chemotherapy induced alopecia.

METHODS: We conducted a prospective study including 72 breast cancer patients who developed alopecia on or after stopping chemotherapy in the last 6 months. Clinical information and characteristics of alopecia were assessed using a self-prepared questionnaire. DLQI score was used to evaluate patients' quality of life.

RESULTS: We interviewed a total of 72 women with a mean age of 53.5 ± 6 years. Alopecia appeared soon after the first course in 62.5%. All patients actively tried to hide induced hair fall (either by a hat in 6.9% or by a headscarf in 93.1%). Quality of life was impacted in 97.2% of patients with a median DLQI score of 6.5. Women who did not undergo mastectomy were significantly more bothered by hair loss than those who had radical surgery (78.1% vs 55%, $p = 0.04$). Working status was a significant predictor factor of a bad quality of life due to alopecia (100% in working women vs 58.3% in homemaker or retired patients, $p = 0.006$).

CONCLUSION: Chemotherapy induced alopecia had a negative impact on quality of life of patients with breast cancer, especially in working women and those who did not have radical surgery. Prior wearing of headscarves did not impact significantly the DLQI score.

Keywords: Chemotherapy induced alopecia, breast cancer, quality of life

1. Introduction

Alopecia is a wide common side effect of chemotherapy. The estimated incidence of chemotherapy-induced hair loss is 65% [1]. Drugs used in breast cancer such as anthracyclines are the most commonly incriminated agents in causing hair loss in more than 90% [1]. Chemotherapy combination, mainly cyclophosphamide and anthracyclines, increases the risk of alopecia compared to single agents [1,2]. Hair loss is the most frequently reported skin side effect induced by anti-cancer treatment, accounting for 91.9% of patients with breast cancer [3]. The use of preventative strategies against chemotherapy induced alopecia

vary across the globe such as the uptake of scalp cooling. Vasoconstriction leads to reduced blood flow to the hair follicles.

Despite its high prevalence, alopecia is often neglected by clinicians who are more interested by the treatment response [4]. Thus, its impact on quality of life is underestimated leading to a lack of supportive care strategies.

We aimed to detect patients with breast cancer at higher risk of distress after chemotherapy induced alopecia.

2. Methods

This prospective study investigated quality of life in women with alopecia induced by chemotherapy for breast cancer. Patients were recruited from the department of medical oncology at Habib Bourguiba Hospital in Sfax, Tunisia.

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Patients with breast cancer patients who developed alopecia on or after stopping chemotherapy in the last 6 months were included. We collected data of patients with breast cancer (regardless of stage) suffering from chemotherapy induced alopecia during the month of October 2023. Regardless of stage: it could be M0 or M1. Patients with preexistent alopecia or mental illnesses and those who finished chemotherapy since more than 6 months were excluded from our study. No patient refuse to take part for the study.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and the national research committee of Habib Bourguiba hospital and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. We used our own questionnaire to determine data about age, sex, education, professional activity, marital status, family history of breast cancer and menopausal status. Moreover, background information, including cancer stage and treatment was also collected for each subject. The interview was semi structured. Patients were asked (The questionnaire was transcribed during face to face consultations) about the onset of hair loss, its pattern, prior wearing of headscarves before diagnosis due to cultural or religious reasons and the associated symptoms. All the patients were totally bald. We asked about scalp skin problems such as: itchy scalp, scalp tenderness, tingling scalp.

The severity of alopecia was graded according to WHO classification: grade 0 for none, grade 1 for mild, grade 2 for moderate, and grade 3 for complete alopecia. We asked the patients about prior wearing of headscarves and options used to disguise hair loss. The Dermatology Life Quality Index (DLQI) was used to evaluate patients' quality of life [5]. We used the validated Arabic version. The questionnaire consists of 10 items rated on a four-point Likert scale (scores range from 0 to 30). The scale is divided into 5 ranges: no effect (0–1 points), small effect (2–5 points), moderate effect (6–10 points), very large effect (11–20 points) and extremely large effect on patient's life (21–30 points). The score evaluated quality of life in 6 fields: symptoms and feelings, daily activities, leisure, work, personal relationships and treatment. Clinician graded the WHO score. We calculated the number of subjects needed for the study using the biostatgv web.

Statistical analysis was performed using SPSS version 20. Descriptive statistics were used for patient

demographics, cancer stage and alopecia's characteristics. Pearson's chi-square test and Fisher's test were used to compare DLQI score between specific groups. *P*-values were considered statistically significant if they were <0.05.

3. Results

Between November 2021 and March 2022, we interviewed a total of 72 women with a mean age of 35.5 ± 6 years. Clinical characteristics are summarized in Table 1. Fifty-five patients were on active chemotherapy at the time of the study (of which 61.8% had received more than 3 cycles of the defined protocol). We looked up specific types of chemotherapeutic agents used according to cancer stage. None of the patients was offered a scalp cooling to prevent alopecia (this technique was unavailable in our country). Forty-five (62.5%) women manifested grade 2 alopecia following the first course of chemotherapy. Hair loss occurred after the second and the third course respectively in 30.6% (grade 2 in 27.3% and grade 3 in 72.7%) and 6.9% (grade 2 in 20% and grade 3 in 80%). After the third course all patients were totally bald.

Median time between the onset and the date of the questionnaire was 2.5 months. Characteristics of alopecia and its associated symptoms are summarized in Table 2. All patients actively tried to hide induced hair fall (either by a hat in 6.9% or by a headscarf in 93.1%).

No patients in the study had undergone any form of cosmetic treatment with the intention of preventing or delaying the loss of their hair.

According to DLQI scale, quality of life was impacted in 97.2% of patients (small effect in 31.9%; moderate effect in 50% and very large effect in 15.3%). Median DLQI score was 6.5. The main affected fields were "symptoms and feelings" with a score $\geq 2/6$ in 58.4%; "daily activities" with a score $\geq 2/6$ in 58.3% and "treatment" with a score $\geq 1/3$ in 70.9%. None of the patients had a severely altered quality of life with a score ≥ 21 .

We analyzed risk factors associated with an impact on quality of life (DLQI ≥ 6). Women who did not underwent mastectomy were significantly more bothered by hair loss than those who had radical surgery (78.1% vs 55%, $p = 0.04$). Working status was a significant predictor factor of a bad quality of life due to alopecia (100% in working women vs 58.3% in homemaker or retired patients, $p = 0.006$) (Table 3).

Table 1
Patients' characteristics

	N (%)
Marital status:	
• Single	8 (11.1)
• Married	55 (76.4)
• Widow	4 (5.6)
• Divorced	5 (6.9)
Residence:	
• City	49 (68.1)
• Rural	23 (31.9)
Working status:	
• Homemaker	60 (83.3)
• Worker	12 (16.7)
Educational status:	
• Illiterate	18 (25)
• Primary school	28 (38.9)
• Secondary school	17 (23.6)
• High school	9 (12.5)
Level of income:	
• Low	28 (38.9)
• Moderate	44 (61.1)
• High	0 (0)
No metastasis	36 (50)
Metastases	36 (50)
Metastases:	36 (50)
• Synchronous	24/36
• Metachronous	12/36
Prior wearing of headscarf	60 (83.3)
Chemotherapy:	
• Active	55 (76.4)
• Stopped since ≤ 6 months	17 (23.6)
Mastectomy	40 (55.6)
Lumpectomy	22 (44.4)
Endocrine therapy	
• No	50 (69.4)
• Aromatase inhibitor	15 (20.8)
• Tamoxifen	7 (9.7)
Brain radiation	2 (2.8)
Chemotherapeutic agents	
• Combination of cyclophosphamide, and epirubicin + taxanes	37 (51.3)
• Combination of cyclophosphamide and epirubicin	12 (16.6)
• Taxanes	20 (27.7)
• Combination of cyclophosphamide and epirubicin + Carboplatin + paclitaxel	2 (2.7)
• Gemcitabin	1 (1.3)

4. Discussion

Our study highlighted the negative impact of hair loss on quality of life. Working women and those

Table 2
Alopecia' characteristics

	N (%)
Alopecia pattern:	
• Patchy	7 (9,7)
• Diffuse	65 (90,3)
WHO Grade:	
• 1	0
• 2	12 (16,7)
• 3	60 (83,3)
Associated symptoms:	
• Itchy scalp	43 (59,7)
• Loss of eyebrows	40 (55,6)
• Scalp tenderness	18 (25)
• Tingling scalp	1 (1,4)
Options used to disguise hair loss:	
• Headscarf	67 (93,1)
• Hat	5 (6,9)
• Wig	0
• None	0

without radical surgery were at a significant higher risk of distress.

A literature review on women with breast cancer found that alopecia was considered among the most disturbing adverse events of chemotherapy [6]. It was responsible for a high psychological distress in about 55 to 58% of breast cancer patients [7,8]. These results are similar to those found in our study (high DLQI ≥ 6 in 65.3%).

Breast cancer patients with chemotherapy induced alopecia suffered from difficulties in daily activities and were uncomfortable when going out in public [7,9]. Patients who developed alopecia stated that they felt shame and that they try to camouflage it by wearing hats, scarves, and wigs, to hide their cancer. Our findings are consistent with the literature, as daily activities were the second most common affected field by alopecia (score $\geq 2/6$ in 58.3%).

In a Korean study, patients on active treatment and those with severe alopecia were significantly more distressed [7]. Choi et al. reported no impact of the type of breast cancer's surgery, marital and working status on distress caused by alopecia [7]. Whereas, in our cohort, negative impact of hair loss was significantly more pronounced in the group of patients without mastectomy and in the group of working women. No significant distress was found in other subgroups.

Lee et al. reported that, among all skin side effects induced by anti-cancer treatment, only hair loss was not

Table 3
Factors associated with an impact on quality of life

	N (%)	<i>p</i> -value
Marital status:		0.09
• Single	8 (11.1)	
• Married	55 (76.4)	
• Widow	4 (5.6)	
• Divorced	5 (6.9)	
Residence:		0.07
• City	49 (68.1)	
• Rural	23 (31.9)	
Working status:		0.006
• Homemaker	60 (83.3)	
• Worker	12 (16.7)	
Educational status:		0.08
• Illiterate	18 (25)	
• Primary school	28 (38.9)	
• Secondary school	17 (23.6)	
• High school	9 (12.5)	
Level of income:		0.2
• Low	28 (38.9)	
• Moderate	44 (61.1)	
• High	0 (0)	
No metastasis	36 (50)	0.3
Metastases	36 (50)	
Metastases:	36 (50)	0.22
• Synchronous	24/36	
• Metachronous	12/36	
Prior wearing of headscarf	60 (83.3)	0.15
No headscarf	12 (16.7)	
Mastectomy	40 (55.6)	0.04
Lumpectomy	22 (44.4)	
Chemotherapy:		0.1
• Active	55 (76.4)	
• Stopped since ≤ 6 months	17 (23.6)	

p significant if <0.05.

significantly associated with a higher DLQI score [3]. It was found that alopecia by itself did not lead to a distraction of the quality of life unless it was associated with other skin problems such as itching or pain. However, in our study, we demonstrated that hair loss was responsible for a high DLQI score regardless of associated symptoms.

A literature review found that women wearing headscarves were at higher risk of distress due to chemotherapy induced alopecia despite having their head covered [10]. Whereas, in our study, prior wearing of headscarves did not impact significantly the DLQI score. Saraswat et al. reported that 20.6% of patients had used

active strategies to disguise hair loss [2]. In our cohort, all patients tried to hide alopecia.

Several studies demonstrated that hair loss was not only responsible for a bad quality of life, but also strongly associated with a lower body image and self-esteem, a psychological distress, a bad compliance to treatment and a loss of attractiveness and sexuality inside the couple leading to depression and anxiety [2,6,7,11].

Social support and mainly partner's support is of utmost importance to help women cope up with alopecia. Clinicians can also encourage patients to gain self-confidence. Ikeda et al. demonstrated the effectiveness of the appearance care program in improving coping skills to maintain a better quality of life [12]. Along with psychological and emotional counselling, recent studies validated the efficacy of the scalp cooling system in preventing chemotherapy induced alopecia in breast cancer patients [13,14]. This device is of limited use due to its cost.

Our study has some limitations with a relatively small sample size and the heterogeneity in patient's. However, our study highlighted the negative impact of hair loss on quality of life especially in working women and those without radical surgery were at a significant higher risk of distress.

Clinicians should be aware of this disturbing experience in order to provide pretreatment information to help patients cope up with alopecia. New strategies to prevent chemotherapy induced alopecia should be integrated into clinical practice. Multicenter prospective studies are needed to confirm our results.

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Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and the national research committee of Habib Bourguiba hospital and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent for publication

Consent obtained directly from patient(s).

Conflict of interest

None.

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Author contributions

W.B.K. idea, conception, analysis, writing, O.B. data collection, analysis, writing, N.T. revision, A.K. supervision, revision.

All the authors reviewed the manuscript.

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