

## Diagnostic and therapeutic profile of patients treated for breast cancer in a radiotherapy unit: case of Dalal Jamm Hospital, Senegal

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### Abstract

**Objective:** Describe the epidemiological, diagnostic and therapeutic profile of breast cancer in Senegal.

**Patients and Methods:** One hundred and sixty patients with histological confirmation of breast cancer, treated consecutively between June 2018 and December 2020, were retrospectively included. Predefined clinical data were extracted from medical records containing patient demographic information, medical history, diagnostic features, and different treatment types. Data were collected, entered and analyzed using SPSS version 23.0 software.

**Results:** The median age of the participants was 48 years with extremes of 27 and 81 years. The average consultation time was 4 ( $\pm$  2.6) months. Breast cancer was mainly discovered to clinical signs (91.3%). Screening mammography revealed only 5% of cases. The vast majority of patients had a tumor larger than 3 cm (78.2%). Molecular characterization by immunohistochemistry was studied in 87 patients (54.3%) with a predominance of the triple negative profile (36.8%). Neoadjuvant chemotherapy was performed in 111 patients (74%). One hundred and thirty-five patients (92.5%) had undergone a mastectomy with modified Patey type dissection and only 11 patients (7.5%) had conservative treatment. The histological complete response rate after neoadjuvant chemotherapy was 17.1%. The median time between surgery and radiotherapy was 6 months. All patients in the series received radiotherapy. It was adjuvant in 142 patients and exclusive for palliative purposes in 18 patients. It was moderately hypofractionated in 105 patients (65.6%); classic in 52 patients (32.5%). Acute toxicities of radiotherapy were mainly represented by grade 1 radiodermatitis (22.5%).

**Conclusion:** The descriptive analysis of these results shows the young age of the patients, the late diagnosis of breast cancer in our context and a treatment which is essentially based on neo-adjuvant chemotherapy and radical mastectomy.

**Keywords:** Breast cancer; Diagnostic; Treatment; Radiotherapy; Senegal.

### 1. Introduction

Breast cancer has become the most commonly diagnosed cancer worldwide. According to GLOBOCAN 2020 estimates, 2.3 million new breast cancers were diagnosed worldwide in 2020. A 47% increase in cases of new cancers worldwide is expected between 2020 and 2040 [1] It is estimated that One in 11 women will develop breast cancer during their lifetime [2]. In Senegal, it constitutes respectively the second (16.1%) and third cancer in terms of incidence and

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mortality [3]. It is responsible for heavy morbidity and mortality due to late diagnosis and inaccessibility to the best treatments [6]. In Senegal, recent years have been marked by a better structuring of multidisciplinary consultation involving all stakeholders in care as well as an increase in the radiotherapy offer with the successful transition from two-dimensional radiotherapy to three-dimensional conformal radiotherapy or volumetric. The aim of this study is to describe the epidemiological, diagnostic and therapeutic profile of breast cancer in the radiotherapy department of Dalal Jamm Hospital in Senegal.

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## 2. Patients and methods

This is a retrospective study which involved 160 patients treated in the radiotherapy department of Dalal Jamm Hospital for breast cancer between June 2018 and December 2020. Predefined clinical data were extracted from medical files containing patient demographic information, medical history, diagnostic features, and different types of treatment.

Patients who presented the following characteristics were included:

- Histologically confirmed breast cancer
- Female gender

Have a medical file including all epidemiological data (age, risk factors, menarche, age of first pregnancy, notion of taking or not taking contraceptives, gestational age and parity, family history of cancer), clinical data (time and reason for consultation, circumstances of discovery, average tumor size and TNM classification);

- Having received the treatment
- Contain information on the entire therapeutic sequence
- We excluded patients with incomplete medical records, particularly regarding therapeutic data or without histology.
- We used the TNM Classification (TNM) of the 8th edition of the Union for International Cancer Control (UICC) for the classification of tumor size, lymphadenopathy and metastases. General condition was assessed according to the World Health Organization (WHO) classification.

The response rate to neoadjuvant chemotherapy was evaluated based on the extent of tumor regression on clinical examination (before the first course, after the third course and at the end of chemotherapy) and according to the RECIST criteria.

Radiotherapy toxicities were assessed using Common Terminology Criteria for Adverse Events (CTCAE) v4.03 Data were collected, entered, and analyzed with SPSS version 23.0 software. Quantitative variables were analyzed by determining the maximum, minimum, mean and standard deviation; and for qualitative variables by determining the relative frequency and percentage.

This retrospective study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments.

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## 3. Results

The median age was 48 years with extremes of 27 and 81 years. The most represented age group was 40-49 years old, i.e. 57 patients (35.4%). The median age at menarche was 13 years with extremes of 10 and 16 years. And that of menopause of 41 years with extremes of 35 and 50 years. The first pregnancy occurred at a median age of 24 years with extremes of 17 and 35 years. The main epidemiological characteristics of the patients are summarized in Table I.

The average consultation time was 4 ( $\pm$  2.6) months. Breast cancer was mainly discovered thanks to clinical signs (91.3%). Screening mammography revealed only 5% of cases. Diagnostic mammography was performed in all patients and found an ACR 4 and 5 lesion in 89% of cases. No breast MRI was performed.

**Table 1** Epidemiological characteristics of patients in our series

Settings	Number (n)	Percentage (%)
Age		
≤ 40 years old	33	20.9
40-49	57	35.4
50-59	43	26.6
≥ 60 years old	27	17.1
Menopause		
Yes	90	56.4
No	70	43.5
Parity		
Nulliparous	10	6.3
Paupiciparous (1-4)	120	75.3
Multiparous (>5)	30	18.3
Smoking		
Yes	6	3.8
No	154	96.2
Alcoholism		
Yes	10	6.3
No	150	93.7
Concept of Contraception		
Yes	77	48.1
No	83	51.9
Practicing physical activity		
Yes	21	13.1
No	139	86.9
HT	12	7.5
Diabetes	7	4.4
Personal history of breast cancer	2	1.2
Family history of breast cancer	7	4.4

Submolecular characterization in immunohistochemistry was studied in 87 patients (54.3%). We note a predominance of the triple negative (36.8%). The main clinical, paraclinical and histo-immunohistochemical data of the patients in our series are summarized in Table II.

**Table 2** Clinical, paraclinical and histo-immunohistochemical characteristics of the patients in our series.

Settings	Number (n)	Percentage (%)
Reason for consultation		
Breast lump	124	77.5
Flow	4	2.5
Mastodynia	22	13.7
Skin abnormalities	10	6.2
TNM classification		
Tx/T1/T2/T3/T4	1/3/36/26/81	0.7/2/24.5/17.7/55.1
Nx/N0/N+	2/29/116	1.4/19.7/78.9
M+	33	22.4
Not specified	13	8.1
Histological type		
Infiltrating ductal carcinoma (IDC)	105	68.1
Infiltrating lobular carcinoma (ILC)	16	10.3
Ductal Carcinoma in Situ (DIC)	19	12.3
Medullary carcinoma	7	4.5
Other histological types	7	4.5
Undifferentiated carcinoma	6	3.7
SBR grade		
Grade I	18	11.2
Grade II	42	26.2
Grade III	78	48.7
Grade Not specified	22	13.7
Molecular subtype (n = 87)		
Triple negative	32	36.8
HER 2+	22	25.3
Luminal A	9	10.3
Luminal B	24	27.6

Therapeutically, neoadjuvant chemotherapy was carried out in 111 patients (74%), including 98% in the form of polychemotherapy and 2% in the form of single chemotherapy. We noted a total response in 54 patients (48.6%), a partial response in 41 patients (36.9%), progression in 12 patients (10.8%) and a zero response observed in 4 patients (3.6%). The complete response was mainly observed with the sequential protocols AC60 + Docetaxel (60%) and FEC + Docetaxel (55.2%). One hundred and forty-six patients had undergone surgery. The trend was most often radical, 135 patients (92.5%) had undergone a mastectomy with modified Patey type dissection and only 11 patients (7.5%) had conservative treatment. No patient in the series benefited from an immediate breast reconstruction procedure or the sentinel lymph node technique. The surgical excision margins were invaded in 6 patients (3.7%). Tumor emboli were present in 29 patients (18.1%). The histological complete response rate after neoadjuvant chemotherapy was 17.1%. Axillary dissection was positive in 51 patients (34.9%), including 20 cases (13.7%) with capsular rupture. Twenty-five patients had a complication from surgery including 3 cases of lymphedema and 17 cases of prolonged stiffness of the

upper limb. Thirty-one percent of the operated patients had received adjuvant chemotherapy and 8 patients had chemotherapy concomitant with radiotherapy. The median time between surgery and radiotherapy was 6 months with extremes between 1 month and 14 months. All patients in the series received radiotherapy. It was adjuvant in 142 patients and exclusive for palliative or local control purposes in 18 patients. In terms of dose; it was moderately hypofractionated 42 Gy in 15 fractions in 105 patients (65.6%); classic 50 Gy in 25 fractions in 52 patients (32.5%) and palliative 20 Gy in 5 fractions in 3 patients (1.9%). Acute toxicities of radiotherapy were mainly represented by radiodermatitis (22.5%) of grade 1. No acute toxicity of grade III was observed.

## 4. Discussion

### 4.1. Epidemiological aspects

The incidence of breast cancer continues to increase worldwide even if mortality remains stable due to increasingly innovative therapies. In 2020; it was estimated that 2.3 million new cases of breast cancer would be diagnosed, with an increase of around 47% in 2040 [1]. In Africa; it is estimated that there are almost 200,000 new cases of breast cancer per year with mortality around 50%; It represents the leading cancer in terms of incidence (16.8%) and mortality (12.1%) [4]. In Senegal, it constitutes respectively the second (16.1%) and third cancer in terms of incidence and mortality [3]. These figures are probably underestimated due to the lack of reliable cancer registries in many sub-Saharan African countries. This heavy burden in Africa is mainly linked to the absence of early detection policies; to the often late diagnosis and the insufficiency of the medical platform for therapeutic care. Breast cancer in our context affects young people because the most representative age group in our series was 40-49 years (35.5%) with a median of 48 years. These epidemiological data are consistent with those in the African literature [5,6]. The age pyramid shows that our patients are 10 to 20 years younger than patients in Europe and the USA where more than half of cases occur around age 65 and the average age at diagnosis is around 60 years [7, 8]. Classically in Western literature, the previously well-known risk factors are clearly described (age, deleterious genetic mutations, relative hyperestrogenism). However, in Senegal as in the majority of sub-Saharan African countries, the authors describe a different risk profile in patients with breast cancer [5,6,9]. As an example in our series; 90 patients (56.3%) were under 50 years old, the average age of menarche was estimated at 13 years; age at first pregnancy 24 years. The vast majority of our patients were multiparous (more than 3 pregnancies). In addition, breastfeeding is widely practiced in Senegal between 70 and 90% and that few postmenopausal women resort to hormone replacement therapy [10]. This profile questions the real risk factors for breast cancer in sub-Saharan Africa in general and particularly in Senegal with the consequence of the adaptability of awareness and prevention measures which can prove difficult.

### 4.2. Diagnostic aspects

In our series the average consultation time is 4 ( $\pm$  2.6) months and less than 10% of cancers are discovered through screening. This situation is largely linked to the absence of a coherent early detection policy and even to the weakness of the healthcare offer in terms of quality human resources and a medical platform accessible at lower cost. The discovery of a skin mass; mastodynia or skin abnormalities are the main clinical signs of discovery of the disease. These diagnostic data are similar to those found in the African continent [6,11] and contrast with those in the West where diagnosis is rather early [8,12]. For example in France, the participation rate in the organized mass screening program for breast cancer for the period 2019-2020 was around 45.6% [13]. This diagnostic delay partly explains the locally advanced stage of the disease in our context because 55.1% of the lesions were classified T4. and 78.9% of patients had clinical axillary lymph node involvement. In the West, the literature data is more in favor of a predominance of T1 lesions [14,15] and this is thanks to early detection. At the end of the assessment of the extent of the disease; 22.4% of our patients were metastatic whereas in the West approximately 5 to 10% of patients are immediately metastatic at diagnosis [19,20]. This results in part from the late diagnosis in our context but also from the long delays in therapeutic care. This rate is probably underestimated in Africa because the spread remains minimal, as evidenced by the absence of PET scanning in forms of inflammatory breast cancer or even classic bone scintigraphy in locally advanced T4.

Histologically; non-specific infiltrating ductal carcinoma was the most common in our series (68.1%); which was consistent with all the data in the literature. On the molecular level; despite the low level of immunohistochemical study (54.3%) in our series; the triple negative profile was the most common (36.8%). This is consistent with available data on the predominance of triple negative breast cancers in this African population of relatively young women [16–18].

### 4.3. Therapeutic aspects

Given the locally advanced stages in our series, 74% of patients underwent neoadjuvant chemotherapy. The AC60 + Docetaxel sequence was the protocol most commonly found in first-line settings and the one that gave the most complete response. Neoadjuvant chemotherapy has become the standard treatment for locally advanced breast cancer.

It helps reduce tumor size and offers a better chance for conservative treatment in patients initially candidates for mastectomy or inoperable [21].

The treatment of breast cancer is multidisciplinary, Surgery occupies a preponderant place in local treatments and, for example, it can cure 80% of stage I breast cancers [22]. In our context where the disease is discovered late with locally advanced stages (72.8%); surgery is most often radical (92.5%) despite neoadjuvant chemotherapy. In our series the rate of conservative surgery is 7.5% whereas it is greater than 70% in Western series [23]. This can be explained by the late diagnosis and the long delays in radiotherapy which do not favor the conservation strategy. Radiotherapy plays an essential role in the treatment of breast cancer. Its role has been demonstrated by several meta-analyses. So after mastectomy; it reduces the risk of locoregional relapse and the risk of specific mortality by 75% [24]. The meta-analysis of the Early Breast Cancer Trialists' Collaborative Group (EBCTCG), published in the Lancet in 2011, endorsed the fundamental role of adjuvant radiotherapy in the conservative treatment of breast cancer by demonstrating better local control as well as an improvement in specific and overall survival [25]. It remains systematically indicated after any conservative treatment of infiltrating breast carcinoma. Adjuvant radiotherapy for breast cancer has evolved from classic fractionation delivering a total dose of 50Gy in 25 fractions to shorter fractionation delivering a total dose of 40Gy in 15 fractions over 3 weeks [26,27].

In our context where radiotherapy times are generally long; the adoption of this type of fractionation has made it possible to increase the number of patients who benefit from this treatment. In our series, 65.5% of cases had hypofractionated radiotherapy with or without lymph node irradiation. Despite the increase in the availability of radiotherapy in recent years; this remains insufficient given the increase in the incidence of breast cancer in our context. It must be accompanied by the improvement of radiotherapy techniques which can open the way to treatments with extreme fractionation such as Fast Forward [28,29].

The main limitation of this study remains its retrospective nature with its attendant biases and the small sample size of the study for epidemiological aspects.

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## 5. Conclusion

The descriptive analysis of its results thus confirms the following data reported in the literature: the young age of the patients and the often late diagnosis of the disease. Treatment suffers from long delays and poor oncological care provision. It is urgent to put in place a real cancer care policy with a screening and early diagnosis program and to strengthen resources in terms of financial accessibility and raising the medical level.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

The authors declare no conflict of interest.

### *Author contributions*

Mouhamadou Bachir Ba: analysis and interpretation of the results, writing the manuscript.

Alioune Badara Diagne: data collection

- Rachidou Hamadou, Fatimatou Néné Sarr, Pape Massamba Diene, Kanta Ka: revision of the manuscript.
- Lamine Gueye, Doudou Diouf and Pape Macoumba Gaye: revision and final approval of the version to be published.

All authors have read and approved the final version of this manuscript.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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