

Breast Cancer among Young Women in Douala, Cameroon: Epidemiological, Clinical, Behavioral Characteristics and Risk Factors

ABSTRACT

Aims: This study aimed at determining epidemiological, clinical, behavioral and risk factors for breast cancer (BC) in young women living in Cameroon.

Study design: Cross-sectional case-control study.

Place and Duration of Study: The study took place at the Oncology departments of two reference hospitals in Douala (Littoral Region, Cameroon), from July 2020 to July 2021.

Methodology: An ad hoc questionnaire form was administered to collect sociodemographic, clinical and behavioral data. Anthropometric and bioimpedance parameters were measured. The data were keyed, coded, verified for consistency, and analyzed using StatView v5.0 and GraphPad Prism v5.03. Statistical significance was set at $P < .05$.

Results: Of the 276 women initially approached, 176 (88 cases and 88 controls) were finally recruited. They were mainly aged 41-45 years old, with higher proportion in controls (40.9% vs 45.4%, $P = .0029$). The proportion of women having had their menarche at advanced age was higher in cases (40.9% vs 12.5%, $P < .0001$). Visceral adipose tissue was significantly higher in cases (8.72 ± 3.04 vs 7.43 ± 2.64 , $P = .003$). Most of the patients were diagnosed at advanced stage, especially at stage 3 (46.6%), with more than one third of them had metastasis. The risk of BC was reduced by 84% (AOR = 0.16, $P = .001$) in patients having had their menarche after 14 years of age, and 71% (AOR = 0.29, $P = .01$) in those always consuming fruits/vegetables. In contrast, BC risk was increased in women with familial history of BC (AOR = 3.19, $P = .04$). Early and late diagnosed women had similar characteristics, except for age, stillbirth and body mass index.

Conclusion: BC is prevalent and detected in young women at advanced stage, with protective role of fruits/vegetables consumption and late age of menarche.

Keywords: Breast cancer; young woman; epidemiology; determinants; Cameroon.

1. INTRODUCTION

Breast cancer (BC) is now accounts for over half of global cancer cases and outreaches lung cancer as first cancer cause worldwide [1]. It is a major public health concern, in women around the globe with global incidence of 11.7% during the year 2020 [1]. In its latest report, the World Health organization (WHO) reported that BC was responsible for ~685000 deaths in 2020 [2]. Several risk factors of BC have been identified these last decades and these include mainly early puberty, late menopause, familial history, obesity and parity [3]. Hereditary transmission occurs in 5-10% and is due to carriage of the breast cancer 1 and 2 genes [3].

In developed countries, early detection of BC and its infra-clinical lesions have been greatly improved with the advent of new diagnostic methods. In contrast, such achievements are still challenging in developed countries, especially those in Africa such as Cameroon where a study reported 2.38% and 52.76% of BC were diagnosed at stages I and III, respectively [4]. One of the highest BC rates is seen in Africa where increasingly young women are diagnosed at advanced stage and constitute a significant fraction of deaths [5]. In Cameroon, 39906 cases were newly diagnosed these last five years with 34.1% of them reported in 2020 [6].

In young women (i.e., ≤ 45 years old), BC exhibits specific epidemiologic features including high frequency of advanced clinical forms and more unfavorable prognostic [7]. Data on BC in young women are still greatly lacking in Africa,

especially in Cameroon where the disease is a cause of concern. Previous reports addressed BC, but these were mainly conducted in the Central region of the country and did not exhaustively address BC in young women [8-10]. We therefore conducted the present study to determine epidemiological, clinical, behavioral and risk factors of BC, with emphasis of the epidemiology in young women living in the town of Douala, Cameroon.

2. MATERIAL AND METHODS

2.1 Study Sites

The study took place from July 2020 to July 2021 at the Oncology departments of two reference hospitals in the town of Douala (Littoral Region, Cameroon) namely Douala General hospital (DGH) and Bonassama District hospital (BDH). These hospitals were selected owing to their strategic location, quality of BC management services and high skills of the medical staff. The two hospitals are two of the main centers for diagnosis and management of cancer patients from Cameroon and other countries of Central Africa.

2.2 Study Populations

The study populations were made up of Cameroonian women, aged ≤ 45 years old, in premenopausal period (woman who reported having seen her menses within the last month, pregnant or breastfeeding was considered premenopausal), and willing to take part in the study. Several studies defined different age threshold for young women (i.e., 30, 35, 40 and 45 years old) [11]. In this context, we defined young women as those aged ≤ 45 years old. Cases were women diagnosed with BC irrespective of their anti-cancer therapeutic status while controls were recruited among women attending the hospitals or accompanying cases, aged ≤ 45 years, in premenopausal period, no early menopause, with no history of cancer, and having accepted to participate in the study. Women aged 45 years old, diagnosed with early menopause, and diagnosed with concurrent cancers were excluded.

2.3 Study Design

This was an unmatched case-control study conducted at two health facilities in Douala, Cameroon. Convenient sampling was used to recruit cases and controls who were approached at the Clinical Biology laboratory, and Oncology wards of the two hospitals, and thereafter aims and objectives of the study were explained to them. Questionnaire was administered to women willing to participate in the study to collect data of interest. Anthropometric measurements were made on each participant. Medical records of the BC patients were also reviewed.

2.4 Data Collection

A structured pre-tested questionnaire was used to document characteristics of the participants. The first section of the questionnaire captured sociodemographic information included age, level of education, marital status, employment, age at menarche, and parity. The second part was designed to collect behavioral characteristics (alcohol consumption, smoking, fruits/vegetable consumption, physical activity, breastfeeding, usage of contraception). Anthropometric parameters were (body mass index – BMI, muscle mass, body and visceral adipose tissues) were measured and reported in the third part of the questionnaire. In the last part, clinical characteristics of the BC including familial history, breast site, stage, type of anti-cancer therapy, and presence of metastasis.

2.5 Body Mass Index Assessment and Categorization

Weight (W) and height (H) were measured using a digital scale and a standard measuring tape, respectively. The BMI (Kg/m^2) was determined using the Quetelet's formula: $\text{BMI} = W/H^2$, and then used for categorizing women as underweight ($<18.5 \text{ Kg}/\text{m}^2$), normal ($18.5 - 24.9 \text{ Kg}/\text{m}^2$), overweight ($25.0 - 29.9 \text{ Kg}/\text{m}^2$), obese ($30.0 - 34.9 \text{ Kg}/\text{m}^2$), and morbid obese ($\geq 35 \text{ Kg}/\text{m}^2$) as described elsewhere [12].

2.6 Bioelectrical Impedance Analysis

Bioimpedance parameters (lean body mass, body fat and Visceral adipose tissue) were measured using a smart wireless digital bathroom scale bio-impedance meter and an Android 11.1.1 smartphone. Each patient took off their shoes, then climbed on the bio-impedance meter and the device measured the body composition parameters by sending a current of

low intensity and low frequency (10-100 KHz) which measures the resistance of tissues. Results were transferred to the smartphone for analysis using New iwellness version 3.0 application.

2.7 Ethical Statements

This study was carried out according to the guidelines for human experimental models in clinical research as stated by the Cameroon Ministry of Public Health. Again, ethical and administrative clearances were issued by the institutional review boards of the University of Douala (N° 2198CEI-UDo/02/2020/M) and Douala General Hospital (N° 254 AR/MINSANTE/HGD/DM/07/2020). The aim and objectives of the study were explained to participants in the language they understood best (French or English), and their questions were answered. Only women who signed an informed consent form for their participation were enrolled. Participation in the study was strictly voluntary and women were free to decline answering any question or totally withdraw if they so wished at any time. Furthermore, there was no difference in the cancer related care provided to women who accepted to participate in the study and those who did not. Each woman received sensitization on prevention of BC.

2.8 Statistical Analysis

Data were keyed in an Excel spreadsheet, coded, verified for consistency and then exported to the StatView v5.0 (SAS Institute, Chicago, Inc., IL, USA) and GraphPad v5.03 (GraphPad PRISM, San Diego, Inc., CA, USA) for statistical analysis. Variables were summarized as mean \pm standard deviation (SD) and percentages with 95% confidence intervals (95%CI). Pearson's chi square and Fisher's exact tests were used to compare proportions while Student, Mann-Whitney, and Kruskal-Wallis tests were used to compare mean values between groups. Univariate and multivariate logistic regression analyses were used to identify factors associated with BC and its early detection through determination of crude and adjusted odds ratio (COR and AOR) and their 95%CIs. Statistical significance was set at $P < 0.05$.

3. RESULTS

3.1 Selection Process of the Study Populations

A total of 276 women were approached at the DGH and BDH during the study. One hundred women were excluded based on the exclusion criteria (i.e., age > 45 years, early menopause). Finally, 176 women, 88 cases and 88 controls, were included (Figure 1).

Comment [P41]: Add apoptosis related data also.

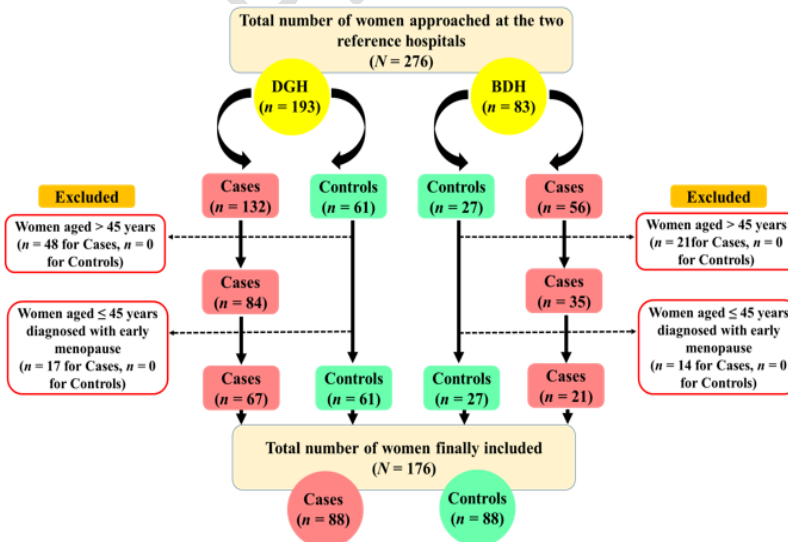


Fig. 1. Flow diagram depicting the selection of cases and controls

3.2 Sociodemographic Characteristics of the Populations

Table 1 summarizes sociodemographic information of the study populations. Participants of the both groups were greatly represented by those aged 41-45 years old, with significantly higher proportion in controls (40.9% vs 45.4%, $P = .0029$). Again, cancer patients were significantly older than controls (38.4 ± 5.3 years vs 36.5 ± 7.4 years, $P = .045$). The proportion of women having completed primary studies was higher in cases than controls, and the difference was statistically significant (19.3% vs 8%, $P = .0019$). No significance was found for the rest of sociodemographic variables (Table 1). Patients were coming from the 10 regions of the country for BC diagnosis and receiving cares (Figure 2).

Table 1. Sociodemographic information of the study populations

Variables	Cases (N = 88)		Controls (N = 88)		Total (N = 176)		χ^2 (df)	P
	n	%	n	%	N	%		
Age (years)								
[20-25]	2	2.3	5	5.7	7	4.0	16.1 (4)	.0029*
[26-30]	7	8.0	18	20.5	25	14.2		
[31-35]	15	17.0	16	18.2	31	17.6		
[36-40]	28	31.8	9	10.2	37	21.0		
[41-45]	36	40.9	40	45.4	76	43.2		
Mean age (years)	38.4 ± 5.3		36.5 ± 7.4		37.5 ± 6.5		2.01	.045*
Level of education								
Primary	17	19.3	7	8.0	24	13.7	12.31 (3)	.0019*
Secondary	43	48.9	31	35.2	74	42.0		
University	28	31.8	52	56.8	78	44.3		
Marital status								
Married	49	55.7	34	38.6	3	47.2	7.57 (3)	.05
Single	31	35.3	49	55.7	80	45.5		
Divorced	4	4.5	2	2.3	6	3.4		
Widow	4	4.5	3	3.4	7	4.0		
Stable occupation								
No	42	47.7	48	54.5	90	51.1	-	.45 [#]
Yes	46	52.3	40	45.5	86	48.9		
Occupation sector								
Formal	16	18.2	22	25.0	38	21.6	5.59 (2)	.06
Informal	39	44.3	24	27.3	63	35.8		
Unemployed	33	37.5	42	47.7	75	42.6		

df = Degree of freedom

Data are presented as frequency and percentage (%)

Pearson's independence chi square test was used to compare percentage

[#]Fisher's exact test was used as alternative

*Statistically significant at $P < .05$

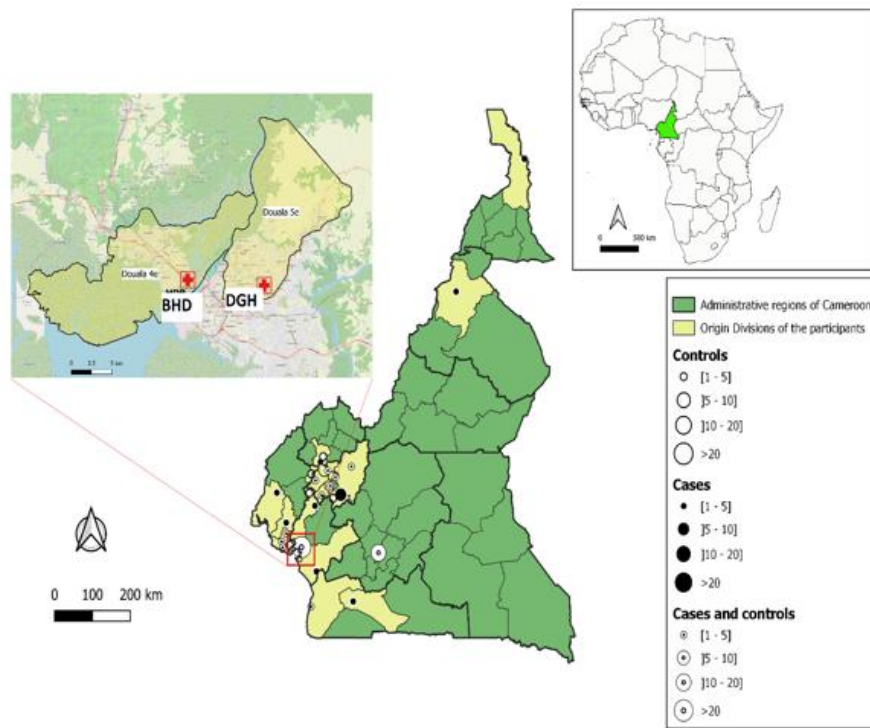


Fig. 2. Study sites and geographical distribution of the participants in Cameroon

Map was created using the QGIS software v3.10

The circles correspond to towns where cancer cases and controls were living permanently

BHD: Bonassama District Hospital, DGH: Douala General Hospital

3.3 Gynecological, Obstetrical and Clinical Characteristics

The proportion of women having had their menarche at advanced age was significantly higher in cases (40.9% vs 12.5%, $P < .0001$). Likewise, BC patients have reported more frequently attending hospitals for fertility problems compared to controls (34.1% vs 19.3%, $P = .02$) (Table 2). In contrast, the proportion of women currently under contraceptive methods was lower in cases compared to controls (3.4% vs 15.9%, $P = .0089$).

Table 2. Distribution of study populations by gynecological, obstetrical and clinical parameters

Variables	Cases (N = 88)		Controls (N = 88)		Total (N = 176)		χ^2 (df)	P
	n	%	n	%	N	%		
Age at menarche								
≤ 14 years	52	59.1	77	87.5	129	73.3	18.1 (1)	< .0001*
> 14 years	36	40.9	11	12.5	47	26.7		

Parity								
≤ 4	64	78.0	56	84.8	120	81.1	-	.39 [#]
> 4	18	22.0	10	15.2	28	18.9		
Miscarriage								
≤ 2	75	90.4	61	92.4	136	91.3	-	.77 [#]
> 2	8	9.6	5	7.6	13	8.7		
Breastfeeding								
No	23	26.1	32	36.8	56	31.4	-	.14 [#]
Yes	65	73.9	55	63.2	120	68.6		
Breastfeeding duration								
3 - 6 months	3	4.6	2	3.6	5	4.1	0.90 (2)	.63
6 - 12 months	31	47.7	31	56.4	62	51.7		
12+ months	31	47.7	22	40.0	53	44.2		
Consultation for fertility problems								
No	58	65.9	71	80.7	129	73.3	4.90 (1)	.02 [*]
Yes	30	34.1	17	19.3	47	26.7		
If Yes, Why?								
None	13	43.3	1	5.9	14	29.8	13.81 (6)	.03 [*]
Chlamydia	1	3.3	0	0.0	1	2.1		
Difficulty (Infertility)	9	30.0	8	47.0	17	36.1		
Cyst	0	0.0	2	11.8	2	4.3		
Myoma	2	6.7	0	0.0	2	4.3		
Early disruption of menstruations	0	0.0	1	5.9	1	2.1		
Obstruction of fallopian tubes	5	16.7	5	29.4	10	21.3		
Uptake of drugs for having babies								
No	58	65.9	65	73.9	123	69.9	-	.32 [#]
Yes	30	34.1	23	26.1	53	30.1		
Type of drugs								
Chemical	9	30.0	4	17.4	13	24.5	2.64 (2)	.26
Chemical and traditional	15	50.0	10	43.5	25	47.2		
Traditional	6	20.0	9	39.1	15	28.3		
Contraception								
No	63	71.6	57	64.8	120	68.2	-	.41 [#]
Yes	25	28.4	31	35.2	56	31.8		
Type of contraception								
Implant	0	0.0	2	14.3	2	11.8	-	-
Norplan	1	33.3	4	28.6	5	29.4		
Norvelo	0	0.0	2	14.3	2	11.0		
Pill	1	33.3	4	28.6	5	29.4		
Intrauterine device	1	33.3	2	14.3	3	17.6		
Contraception duration								
≤ 5 years	17	68.0	26	83.9	43	76.8	-	.21 [#]
> 5 years	8	32.0	5	16.1	13	23.2		
Contraception nature								

Hormonal	16	64.0	18	58.1	34	60.7	-	.78 [#]
Mechanical	9	36.0	13	41.9	22	39.3		
Contraception mode								
Continued	16	64.0	13	41.9	29	51.8	-	.11 [#]
Discontinued	9	36.0	18	58.1	27	48.2		
Currently under contraception?								
No	85	96.6	74	84.1	159	90.3	-	.0089 ^{#*}
Yes	3	3.4	14	15.9	17	9.7		
Medical history								
Hypertension, Yes	8	9.1	7	7.9	15	8.5	0.07 (1)	.78
Diabetes, Yes	2	2.3	4	4.5	6	3.4	-	.68 [#]
Renal impairment, Yes	0	0.0	0	0.0	0	0.0	-	-

df = Degree of freedom

Data are presented as frequency and percentage (%)

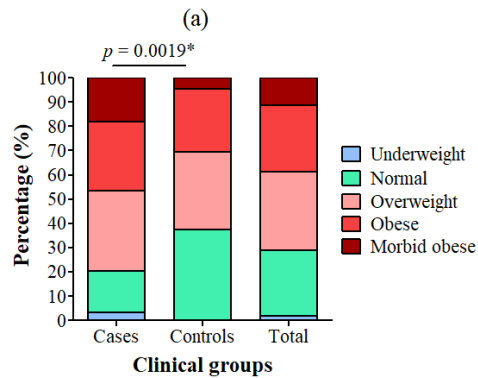
Pearson's independence chi square test was used to compare percentage

[#]Fisher's exact test was used as alternative

*Statistically significant at $P < .05$

3.4 Anthropometric Characteristics of the Women

The analysis of anthropometric parameters is presented in Figure 3. Higher proportions of overweight, obese and morbid obese were found in cancer patients ($P = .0019$) (Figure 3a). No difference was found between the clinical groups for lean and body fat ($P > .05$) (Figure 3b & 3c), but in contrast, visceral adipose tissue was significantly higher in cases (8.72 ± 3.04 Kg vs 7.43 ± 2.64 Kg, $P = .003$) (Figure 3d).



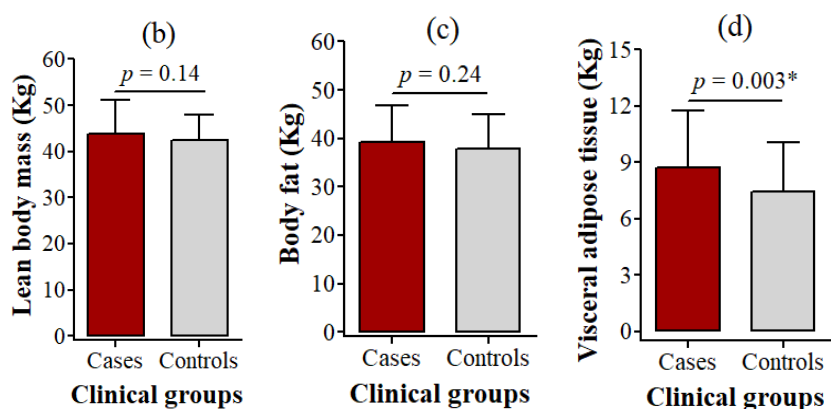


Fig. 3. Comparison of anthropometric parameters between cases and controls. (a) Body mass index, (b) Lean body mass, (c) Body fat, and (d) Visceral adipose tissue

Pearson's independence chi square and Student tests were used

[#]Fisher's exact test was used as alternative

*Statistically significant at $P < .05$

3.5 Behavioural Characteristics of the Populations

Behavior of participants regarding smoking, physical activity, and uptake of fruit/vegetable and alcohol is summarized in Table 3. Nearly 50% of the total participants were always consumed fruits and vegetables, with higher proportion in BC patients (55.7% vs 36.4%, $P = .01$). No significant difference as found for the remaining behavioural variables (Table 3).

Table 3. Behavioral information of the study populations

Variables	Cases (N = 88)		Controls (N = 88)		Total (N = 176)		χ^2 (df)	P
	n	%	n	%	N	%		
Fruit/Vegetable uptake								
Rarely	20	22.7	20	22.7	40	22.7	8.82 (2)	.01*
Occasionally	19	21.6	36	40.9	55	31.3		
Always	49	55.7	32	36.4	81	46.0		
Alcoholic beverage uptake								
No	22	25.0	23	26.1	45	25.6	-	.91 [#]
Yes	66	75.0	65	73.9	131	74.4		
Smoking								
Never	85	96.6	81	92.0	166	94.3	1.71 (2)	.42
Rarely	2	2.3	5	5.7	7	4.0		
Regularly	1	1.1	2	2.3	3	1.7		
Smoking by relatives								
No	50	56.8	62	70.5	112	63.6	-	.08 [#]
Yes	38	43.2	26	29.5	64	36.4		

Physical activity

Low	18	20.5	27	30.7	45	25.5	3.07 (2)	.21
Moderate	25	28.4	26	29.5	51	29.0		
Intense	45	51.1	35	39.8	80	45.5		

df = Degree of freedom

Data are presented as frequency and percentage (%)

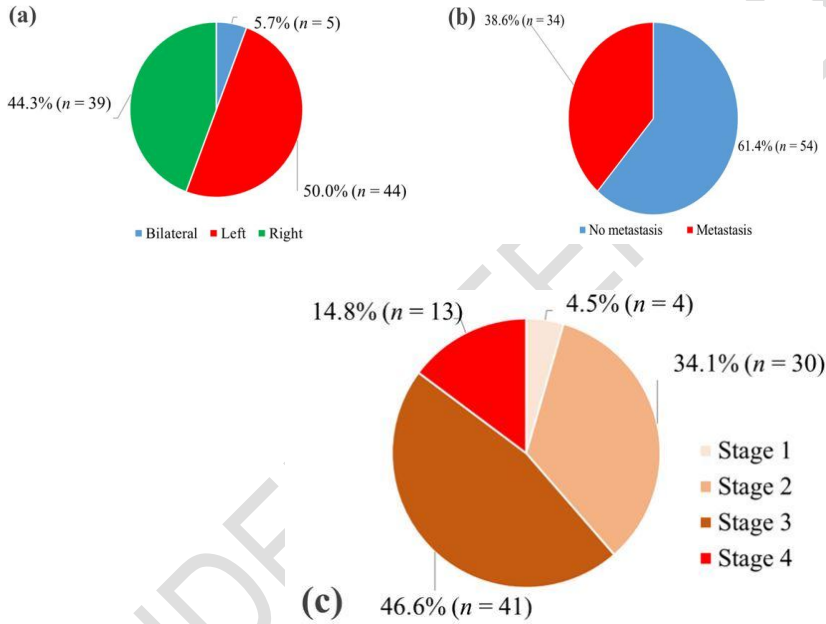
Pearson's independence chi square test was used to compare percentage

#Fisher's exact test was used as alternative

*Statistically significant at $P < .05$

3.6 Characteristics of the Breast Cancer Disease

On analysis, 50% of the cases had tumor located in the left breast (Figure 4a). Most of the patients were diagnosed at advanced stage of the disease, especially at stage 3 (46.6%), with more than one third of them had metastasis associated with their cancer (Figures 4b & 4c). Seventy percent of the patients were under anti-cancer therapy which was mainly represented by chemotherapy (50%) and radiotherapy (6.8%) (Figure 4d).



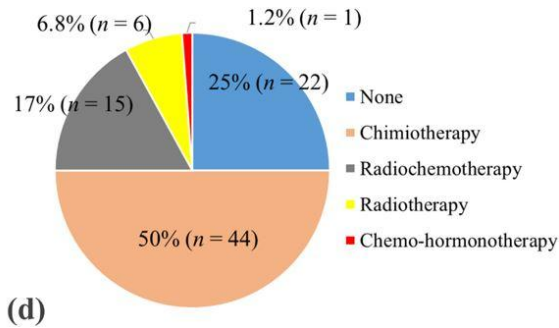


Fig. 4. Location of breast cancer (a), presence of metastasis (b), clinical stage of the disease (c), and anti-cancer therapy (d).

3.7 Impact of Staging and Therapy on Lean Body Mass, Muscle Fat and Visceral Adipose Tissue

We evaluated the effect of severity of the BC disease and anti-cancer therapy on lean body mass, muscle fat and visceral adipose tissue. No statistically significant difference was found as presented in Figure 5.

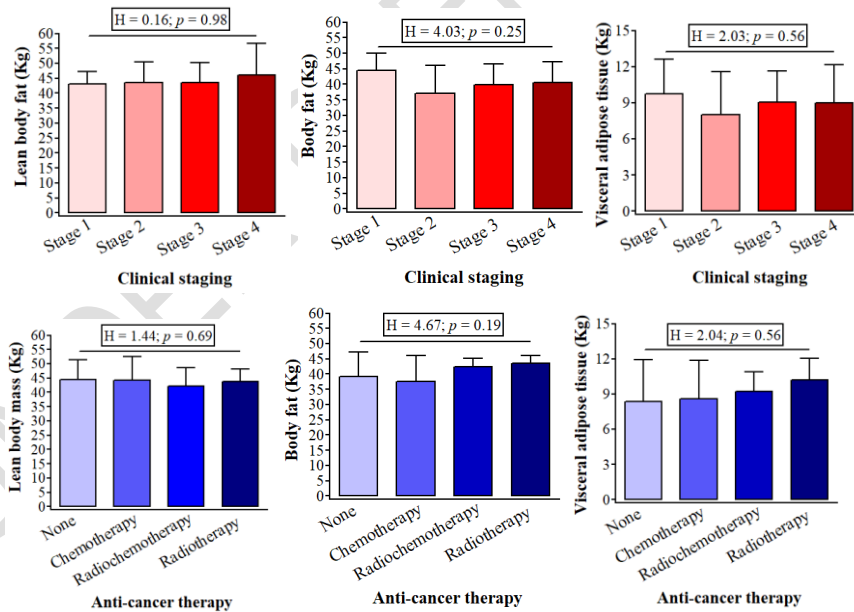


Fig. 5. Variation of lean body mass, muscle fat and visceral adipose tissue with respect to disease staging and anti-cancer therapy

Each bar represents mean with standard deviation
Kruskal-Wallis test was used to compare mean between groups

Statistical significance was set at $P < .05$

3.8 Determinants of Breast Cancer Disease

A total of three factors were found associated the risk of BC namely age at menarche, familial history of BC, and fruit/vegetable uptake (Table 4). Based on multivariate analysis results, the risk of BC was reduced by 84% (AOR = 0.16, 95%CI 0.05 – 0.47, $P = .001$) in patients having had their menarche after 14 years of age compared to their counterparts in whom menarche happened more early. Women consuming fruits and vegetables regularly had 0.29 times less chances to develop BC compared to those consuming them rarely (95%CI 0.10 – 0.82, $P = .01$). In contrast, the odds of BC were 3.19 times (95%CI 1.03 – 9.83, $P = .04$) higher in women with familial history of BC (Table 4).

Table 4. Univariate and multivariate logistic analysis of the determinants of breast cancer disease among the study populations

Factors	Univariate analysis		Multivariate analysis	
	COR (95%CI)	P	AOR (95%CI)	P
Age at menarche				
≤ 14 years	1		1	
> 14 years	0.21 (0.10 - 0.44)	.0001*	0.16 (0.05 - 0.47)	.001*
Stable occupation				
No	1		1	
Yes	0.76 (0.42 – 1.38)	.36	0.65 (0.26 – 1.60)	.34
Mean BMI (Kg/m²)	0.95 (0.90 - 1.00)	.03*	0.95 (0.88 - 1.03)	.20
Number of stillbirth				
0	1		1	
1	2.14 (0.96 – 4.75)	.06	2.88 (0.99 – 2.37)	.05
2+	0.68 (0.30 – 1.51)	.36	1.13 (0.38 – 3.38)	.83
Parity				
0	1		1	
1	0.37 (0.09 – 1.57)	.17	0.13 (0.01 – 1.23)	.07
2	0.62 (0.14 – 2.66)	.51	0.27 (0.02 – 3.45)	.31
3	0.53 (0.13 – 2.22)	.38	0.16 (0.01 – 2.12)	.16
4	0.37 (0.09 – 1.57)	.17	0.14 (0.01 – 1.53)	.10
5+	0.32 (0.07 – 1.36)	.12	0.10 (0.01 – 1.18)	.06
Familial BC history				
No	1		1	
Yes	1.62 (0.78 - 3.39)	.19	3.19 (1.03 - 9.83)	.04*
Fruit/Vegetable uptake				
Rarely	1		1	
Occasionally	0.53 (0.23 - 1.21)	.13	0.45 (0.14 - 1.49)	.19
Always	0.34 (0.17 - 0.70)	.003*	0.29 (0.10 - 0.82)	.01*
Alcoholic beverage uptake				
No	1		1	
Yes	0.94 (0.48 - 1.85)	.86	1.19 (0.41 - 3.43)	.74
Smoking				
Never	1		1	
Rarely	2.62 (0.49 - 13.91)	.25	0.52 (0.03 - 8.12)	.64

Regularly	2.10 (0.19 - 23.60)	.54	4.10 (0.24 - 69.58)	.32
Smoking by relatives				
No	1		1	
Yes	0.55 (0.30 - 1.03)	.06	0.49 (0.22 - 1.07)	.07
Contraception				
No	1		1	
Yes	1.37 (0.72 - 2.59)	.33	2.10 (0.79 - 5.54)	.13
Taking drugs for having babies?				
No	1		1	
Yes	0.68 (0.36 - 1.31)	.25	2.71 (0.38 - 25.33)	.36
Uptake of drugs for having babies				
No	1		1	
Yes	0.68 (0.36 - 1.31)	.25	0.70 (0.32 - 1.53)	.37
Breastfeeding				
No	1		1	
Yes	0.61 (0.32 - 1.16)	.13	1.94 (0.41 - 9.09)	.40
Difficulties during breastfeeding				
No	1		1	
Yes	0.59 (0.21 - 1.71)	.33	1.31 (0.31 - 5.51)	.71
Consultation for fertility issues?				
No	1		1	
Yes	0.46 (0.23 - 0.92)	.02*	0.12 (0.01 - 1.27)	.07
Physical activity				
Low	1		1	
Moderate	0.69 (0.31 - 1.56)	.37	0.70 (0.22 - 2.22)	.54
Intense	0.52 (0.25 - 1.09)	.08	0.43 (0.16 - 1.16)	.09

95%CI: Confidence interval at 95%, AOR: Adjusted odds ratio, COR: Crude odds ratio, BMI: Body mass index, BC: Breast cancer
Univariate and multivariate logistic regression analysis was used to identify associated factors
*Statistically significant at $P < .05$

3.9 Proportion and Factors Associated with Early Detected BC Cancers

During the study, we found BC patients diagnosed at early stage of the disease, and the proportion was 33% (29/59, 95%CI 24.0 - 43.3%). By comparing their characteristics with those of women diagnosed at late stage, roughly, we found similar characteristics with the exception of age, stillbirth and BMI (Table 5). Indeed, higher proportion of the different age groups were found in women diagnosed lately ($P = .002$). The proportion of stillbirths was significantly higher in early diagnosed women (23.1% vs 3.5%, $P = .0051$). contrasted observations were found for BMI, as proportion of overweight women was higher in early diagnosed patients (13.8% vs 42.3%, $P = .03$), but conversely, the proportion of women with morbid obesity was higher in early diagnosed patients (24.1% vs 15.3%, $P = .03$) (Table 5).

Table 5. Comparison of patients with respect to timing of breast cancer detection

Variables	Early diagnosis (N = 29)		Late diagnosis (N = 59)		Decision	P
	n	%	n	%		

Sociodemographic factors						
Age (years)						
[20-25]	0	0.0	2	3.4	16.1 (4)	.002 ^{†*}
[26-30]	7	24.1	0	0.0		
[31-35]	3	10.3	12	20.3		
[36-40]	9	31.0	19	32.2		
[41-45]	10	34.6	26	44.1		
Mean age (years)	37.3 ± 6.1		39.1 ± 4.9		1.41	.16 [‡]
Level of education, <i>University</i>	11	37.9	17	28.8	2.1 (2)	.35 [‡]
Matrimonial status, <i>Single</i>	10	34.5	21	35.6	3.4 (3)	.32 [‡]
Stable occupation, <i>No</i>	14	48.3	28	47.5	-	.94 [#]
Gynecological, obstetrical and clinical factors						
Early age of menarche, <i>Yes</i>	20	69.0	32	54.2	-	.24 [#]
Stillbirth, <i>More than 2</i>	6	23.1	2	3.5	7.8 (1)	.0051 ^{†*}
Breastfeeding, <i>Yes</i>	19	66.5	46	78.0	1.5 (1)	.21 [‡]
Under contraception, <i>Yes</i>	0	0.0	3	5.1	-	.54 [#]
Hypertension, <i>Yes</i>	1	3.4	7	11.9	-	.26 [#]
Diabetes, <i>Yes</i>	0	0.0	2	3.4	-	.31 [#]
Behavioral factors						
Fruit/Vegetable uptake, <i>Always</i>	4	13.8	15	25.4	3.2 (2)	0.21 [‡]
Alcohol uptake, <i>Yes</i>	22	75.9	44	74.6	0.2 (1)	0.89 [‡]
Smoking, <i>Yes</i>	0	0.0	2	3.4	0.8 (1)	0.69 [‡]
Physical activity, <i>Intense</i>	12	41.4	33	55.9	3.7 (2)	0.17 [‡]
Clinical and management patterns of the breast cancer disease						
Breast location of the cancer						
Bilateral	2	6.9	3	5.1	0.14 (2)	.93 [‡]
Right	13	44.0	26	44.1		
Left	14	48.3	30	50.8		
Anti-cancer therapy						
None	8	27.6	14	24.2	4.67 (3)	.19 [‡]
Chemotherapy	18	62.1	26	44.8		
Radiochemotherapy	2	6.9	13	22.4		
Radiotherapy	1	3.4	5	8.6		
Anthropometric factors						
BMI (Kg/m²)						
Underweight	2	6.9	1	1.7	10.0 (4)	.03 ^{†*}
Normal	8	27.6	7	11.9		
Overweight	4	13.8	25	42.3		
Obesity	8	27.6	17	28.8		
Morbid obesity	7	24.1	9	15.3		
Mean BMI (Kg/m²)	29.3 ± 7.8		29.8 ± 5.5		0.35	.72 [‡]
Lean body mass (Kg)	44.1 ± 6.7		43.8 ± 7.7		1.79	.85 [‡]
Muscle fat (Kg)	37.3 ± 9.6		40.2 ± 6.3		1.73	.08 [‡]

Visceral adipose tissue (Kg)	8.1 ± 3.8	9.1 ± 2.6	1.43	.15 [‡]
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BMI = Body mass index

Data are presented as frequency (percentage) and mean ± standard deviation

Pearson's independence chi square (†), Fisher's exact test (#) and Mann-Whitney test (‡) were used to compare percentages and mean values between groups

[#]Fisher's exact test was used as alternative

^{*}Statistically significant at $P < .05$

4. DISCUSSION

Breast cancer is a public health concern in Cameroon, especially in young women in whom its burden has increased over these last years, but data on the topic are still greatly needed. In this regard, the present study aimed at determined epidemiological, clinical, behavioral and risk factors of BC among Cameroonian young women living in Douala, Cameroon.

The bulk of cancer patients were aged 41-45 years old and this is consistent with findings from previous studies in the town of Yaoundé, Cameroon [13]. In contrast, our results are different from other reports in Cameroon and Morocco [14-16]. This discrepancy could be likely attributable to several factors such as study design and area. We purposely interested in younger BC women while some of these studies were conducted on BC women irrespective of their age.

Sarcopenia has recently appeared as independent factor worsening the prognostic of cancer patients. We therefore analyzed the impact of changes in body composition with the aim to improve management of cancer patients. On analysis, no statistically significant difference was found for lean body mass and muscle fat results between cases and controls, and this is in line with works of Nathalie et al. [17] in Switzerland. In contrast, visceral adipose tissue percentage was significantly higher in cancer patients compared to their control group counterparts. This finding supports that reported earlier in The United Kingdom Hannah et al. [18], and could be due to unbalanced alimentation and lack of physical activity. However, we did not find variation in physical activity level between the two clinical groups. In addition, we did not evaluate the nutritional practices of the participants, and thus it is difficult to agree with these reasons given by these authors.

A large proportion of patients (67%) were diagnosed at advanced stage of the cancer disease. This fact is extensively reported in the literature, especially in Asia and Africa countries [9, 19, 20]. In these areas, a cocktail of reasons including predominantly poorly awareness on the disease, lack of financial resources and limited access to high standard care health facilities [19]. This assertion is supported by the fact most of the BC participants in this study had insecure occupations and were coming from various regions of the country.

In this study, the mean age of menarche was 14 years, and this is in line with previous results in Cameroon [21]. We found that late age of menarche was associated with reduced risk of BC. This is consistent with finding of a meta-analysis of 117 studies which pointed out a 1-unit reduction of the age at first menstruations was associated with an increase in BC risk by 1.05 [22]. The production of estrogens by ovaries starts at around the time of menarche. In this context, the breast epithelium of women having experienced late menarche is less long exposed to estrogens, and this could explain why the risk of BC is reduced in these women [23].

Similarly, fruit/vegetable consumption was associated with reduced risk of BC. The same observation was found in European countries [24], Canada [25] and The USA [26]. In contrast, our observations do not support that of a recent systematic review and meta-analysis which did not find any association between high total fruit and vegetable consumption and BC risk [27]. Fruits and vegetables are diverse in their nutritional composition, and again we did not evaluate the food behavior of the participants regarding fruits/vegetables. This represents a limitations of the stud which is not frequently addressed in epidemiological studies on BC. This point should be evaluated in further studies in our context.

Finally, this study supports the role of genetic factors in the risk of BC as we found an increase in the BC risk by more than three times in women with familial history of the cancer disease. Our finding is consistent with earlier reports in other settings [28, 29]. Carriage of the breast cancer genes 1 and 2 is well known increased the risk of BC [30, 31].

Besides, factors were previously identified as reducing the risk of BC by other authors (e.g., breastfeeding, parity) [32, 33]. In the present study, we did not find any statistically significant association with BC risk, and this could be due to diverse reasons including mainly low sample size that made difficult to do stratification with regard to confounding parameters (e.g., anti-cancer therapy).

We did not find notable difference between BC women after stratification by timing of the diagnosis, except for few variables such as stillbirth. The link between BC risk and stillbirth is still elusive as the findings of available studies are contradictory [34]. More epidemiological studies are required to investigate this aspect.

5. CONCLUSION

Comment [P42]: Add in detail conclusion.

This study was designed to determine socio-demographic, clinical, behavioral and risk factors for BC in young women in Cameroon. The study outlines BC is prevalent and mainly diagnosed at advanced stage in this population. Roughly, no difference was found between patients after stratification for timing of BC diagnosis, with the exception for BMI, age and stillbirth. The study also emphasized the protective role of fruits/vegetables consumption and advanced age of menarche against BC risk.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

This study was carried out according to the guidelines for human experimental models in clinical research as stated by the Cameroon Ministry of Public Health. Again, ethical and administrative clearances were issued by the institutional review boards of the University of Douala (N° 2198CEI-UDo/02/2020/M) and Douala General Hospital (N° 254 AR/MINSANTE/HGD/DM/07/2020). The aim and objectives of the study were explained to participants in the language they understood best (French or English), and their questions were answered. Only women who signed an informed consent form for their participation were enrolled. Participation in the study was strictly voluntary and women were free to decline answering any question or totally withdraw if they so wished at any time. Furthermore, there was no difference in the cancer related care provided to women who accepted to participate in the study and those who did not. Each woman received sensitization on prevention of BC.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

AOR: Adjusted odds ratio
BDH: Bonassama District hospital
BMI: Body mass index
CI: Confidence interval
COR: Crude odds ratio
df: Degree of freedom
DGH: Douala General hospital
BC: Breast cancer
SD: Standard deviation
WHO: World Health Organization