Evaluation of Demographic Data and Associated Costs of Inflammatory Breast Cancer In A Cohort Of Mexican Women From A Public Health Institute

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Background: Inflammatory Breast Cancer (IBC) is an aggressive type of locally advanced breast cancer, characterized by the appearance of redness, edema and *peau d'orange* skin, young age at diagnosis, and poor overall survival compared with other breast cancer types. This study was aimed to describe IBC in women who attended a Mexican public health Institute.

Methods: We retrospectively evaluated medical charts of IBC patients treated in the Breast Cancer Foundation (FUCAM) Institute during the period between 2011 to 2015 (n=197 of 4525 evaluated charts). The study includes patients' demographics, clinical characteristics, and treatment agents received as well as costs associated to them. Descriptive statistics were used, showing mean and standard deviation (SD) for continuous variables; number of patients (n) and percentage (%) for categorical variables.

Results: IBC was identified in 197 Patients**.** The mean age was 48 years; the subtypes were: Luminal A in 13.7% ; Luminal B in 23.9%; Luminal B-like in 13.2% ; HER2 positive in 18.2% and 30.9% were triple negative. 72.6% of them were overweight or obese (BMI greater than 25). The most frequent chemotherapy agents were anthracyclines (95.9% of all patients), followed by taxanes (94.3%), and cyclophosphamides (93.3%). The average cost per treatment was $25,622.5 USD (± $19,012.94). Considering the different subtypes, patients with higher costs were Luminal B-like (Her-2 positive) and Her2 enriched patients with $41,684.39 and $34,755.26 on average, respectively.

Conclusion: This is the first descriptive study of IBC in the Mexican population. Characteristics of IBC patients in our study showed similarities with those reported in the literature such as young age at diagnosis and a high percentage of triple negative tumors.

BACKGROUND

Inflammatory Breast Cancer (IBC) is an aggressive type of locally advanced breast cancer characterized by rapid progression, young age at diagnosis, aggressive tumor features such as high nuclear grade, high metastatic potential, and poor overall survival (OS) compared with breast cancers other than IBC (non-IBC), with a 10-year OS of 30%. Despite aggressive multidisciplinary management, patients with IBC have a high risk of developing central nervous system (CNS) metastases.

Some IBC risk factors suggested by epidemiologic studies are menarche at younger age, younger age of first live birth, African American ethnicity, and lower socioeconomic status. Obesity has also been linked to a higher IBC risk than other non-IBC in both pre-and postmenopausal women, as well as those tumors with positive Estrogen Receptor (ER). All these risk factors has been identified and described in the literature in the Mexican population, and together with lack of availability and effective treatments, rises as an important matter to attend in development countries as Mexico.

The annual incidence of breast cancer in Mexico is 29,929 cases (GLOBOCAN 2020). The proportion of Inflammatory Breast Cancer varies between 1% and 5%, so, it is estimated that between 299 and 598 new cases are diagnosed annually.

METHODS

This was a non-interventional, retrospective, single-center database/chart review study. This study included a cohort of women >18 years of age diagnosed with IBC between January 1, 2011, and December 31, 2015 (5 years) who had been treated at FUCAM Institute in Mexico City, Mexico. The criteria required for the diagnosis of IBC rapid onset of breast erythema, edema and/or *peau d'orange*, and/or warm breast, with or without an underlying palpable mass during at least six months. Overall Survival, and Progression Free Survival (PFS) were estimated based on the follow up period available in the clinical charts. Molecular sub type were made according St. Gallen criteria.

Descriptive statistics were used, showing mean and standard deviation (SD) for continuous variables; number of patients (n) and percentage (%) for categorical variables. Costs were taken from FUCAM's procedures and medicine acquisition costs catalogue. For the clinical section, the statistical analysis was developed using SPSS, while Stata and Microsoft Excel were used to describe the use of resources and costs. The exchange rate was $1USD= $19MXN.

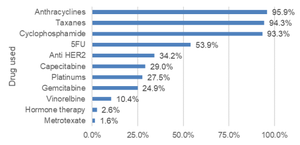
RESULTS

For this study 4,525 clinical charts from Breast Cancer patients treated at FUCAM between 2011 to 2015 were reviewed; from them,197 (4.63 %) met the diagnostic criteria.
The mean age was 48.7 (±11.4) years old at the first visit to FUCAM, clinical and molecular subtypes found in this study are described in table 1.

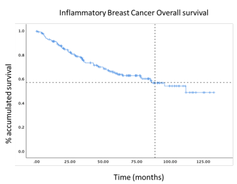
Table 1. Clinical Characteristics and molecular subtypes found in the FUCAM IBC patients

Clinical Characteristic	Number of patients (n)	Percentage (%)
Breast Cancer family history	31	15.7
Premenopausal Status	107	54.3
Type 2 Diabetes	34	17.3
Tumor located in right breast	94	47.7
Tumor located in right breast	98	49.7
Bilateral tumor	5	2.5
Stage III	121	61.4
Stage IV	50	24.4
Invasive Canalicular	188	95.9%
Molecular subtype		
Luminal A	27	13.7
Luminal B	47	23.9
Luminal B-like	26	13.2
HER2 enriched	36	18.7
Triple Negative	61	30.9

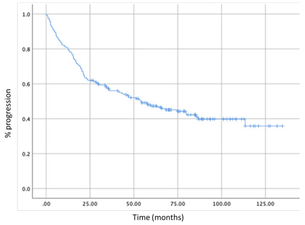
The most frequent antineoplastic agents used are described in Graph 1.
Evaluated patients showed a mean survival time of 88.7 months (IC95% 80.5-97), with a maximum of 125 months follow-up from diagnosis, 40% of the patients persisted alive at the moment of this analysis (Graph 2).
Disease progression was registered in 55.8% (n=110) patients during the study period. Median time to progression was 54.1 months (95%CI 32.81, 75.38) (Graph 3).



Graph 1. Chemotherapy treatments used in IBC women treated at the Breast Cancer Foundation – FUCAM institute between 2011 - 2015 (N=197).



Graph 2. accumulative survival in percentage



Graph 3. Progression-free survival of patients with Inflammatory Breast Cancer

Comparisons between proportion of IBC molecular subtypes found in FUCAM versus data reported on literature are shown in table 2.

Table 2. Comparison between hormone receptor and HER2 status with previously published study

Molecular Subtype	Receptor Status	FUCAM % (n)	Wu et al. (%)
Luminal A	ER+, PR+, HER2-	13.70% (27)	36.7
Luminal B	ER+, HER2-	23.85 (47)	
Luminal B-like	ER+, PR±, HER2+	13.19 (26)	17.6
HER2 enriched	ER-, PR-, HER2+	18.27 (36)	18.1
Triple Negative	ER-, PR-, HER2-	30.96 (61)	27.6

Average cost per case was $25,622.5 (±. $19,013.9) presented in Table 3.

Table 3. Cost per patient (USD)

	Mean	S.D.
Diagnostic tests	$1,713.52	$816.23
Laboratory tests	$293.26	$197.28
Hospitalization	$408.66	$542.18
Outpatient visits	$3,788.57	$2,196.96
Inpatient drug administration	$7,796.34	$7,507.24
Surgical procedures	$748.10	$1,032.36
Radiotherapy	$221.61	$160.01
Pharmacologic antineoplastic therapy	$10,649.88	$14,021.20
Total	$25,622.50	$19,013.95

Costs are presented in USD, S.D.= Standard deviation

Regarding costs per molecular subtypes higher costs were seen in Luminal B-like and HER2 enriched patients with $41,684.39 and $34,755.26, respectively. Luminal B and triple negative had lower costs with $19,894.33 and $18,288.81 respectively. The average cost for Luminal A patients was $24,518.44

Table 3. Distribution of costs by molecular subtype

	Luminal A	Luminal B	Luminal B-like	HER2 enriched	Triple negative
Mean	$24,518.44	$19,894.33	$41,684.39	$34,755.26	$ 18,288.81
S.D.	$17,315.71	$14,451.71	$20,668.71	$12,387.70	$ 17,737.66
Min	$6,208.96	$5,060.00	$2,174.47	$4,373.99	$ 1,142.14
Max	$85,273.08	$72,354.18	$83,632.68	$61,282.83	$ 129,294.88

SUMMARY AND CONCLUSIONS

- It should be noted that in this study, it was found that triple negatives were the most common (30.9%), followed by HER2 positive (18.3%), and luminal A (13.7%).
- The most used chemotherapy agents were anthracyclines (95.9%), taxanes (94.3%), and cyclophosphamides (93.3%).
- The average cost per patient was $25,622.50 USD, driven by antineoplastic.
- This study provides perspective on the distribution, demographic characteristics, resource utilization, and costs associated with IBC, categorized by molecular subtype(s) within the Mexican population.
- This is the first study on demographics, resource utilization and costs associated to IBC treatment in the Mexican population.

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