Histopathologic Patterns of Breast Lesions in Northern Saudi Arabia

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ABSTRACT

Objective: *The aim of this study was to find out the prevalence rates of common types of breast cancer in Northern Saudi Arabia.* **Methodology:** *A retrospective cohort study was carried out over a five-year period in two referral hospitals. In this study 257 files were retrieved from departments of Surgery from different hospitals in Hail region, Kingdom of Saudi Arabia (KSA).* **Results:** *Of the 257 samples diagnosed using Fine Needle Aspiration Cytology (FNAC), histopathological diagnosis was confirmed for 158 patients. Of the 158 diagnosed samples, 46/158 (23.2%) were ductal carcinoma, 7/158 (4.4%) were lobular carcinoma, 3/158 (1.9%) were mixed tumours, and 102/158 (64.6) were fibroadenoma.* **Conclusion:** *Fibroadenoma and ductal carcinoma are the prevalent breast lesions in Hail Region of Saudi Arabia.*

Keywords: Breast cancer, Saudi Arabia, Ductal carcinoma, Lobular carcinoma, Fibroadenoma

Abbreviations: KSA: Kingdom of Saudi Arabia; FNAC: Fine Needle Aspiration Cytology; SPSS: Statistical Package for Social Sciences; FNA: Fine Needle Aspiration; WHO: World Health Organization

INTRODUCTION

The incidence of cancer has increased from 12.7 million in 2008 to 14.1 million in 2012, and this development is likely to continue in the future. The most frequently identified cancers were lung (1.82 million) and breast (1.67 million) [1,2]. Epidemiological studies have indicated an increased breast cancer incidence among women actively contributing to social and professional life. This necessitates the need for conducting multidirectional studies in order to find risk factors associated with the aetiology of breast cancer. Previous studies have showed that 20-30% of newly diagnosed breast cancer cases may be caused by various risk factors actively initiating or modifying the process of neoplastic transformation. The most common risk factors are age over 40, history of mammary gland diseases, history of cancer in first-degree relatives, early menarche and late childbearing (after 35 years of age), woman's age and others [3,4]. Continuous research in different dimensions can help in reducing the overall breast cancer burden, and detects cancer in the early stage and enable the possibility of treatment [5,6].

In the Kingdom of Saudi Arabia (KSA) breast cancer accounted for about 23% of all the newly diagnosed female cancers [7]. Notably there is an increasing in the incidence among younger population, frequently presents as higher histological grades and in advanced clinical stages [8,9]. However, there is a lack of literature regarding the prevalence rates of different breast cancer subtypes from KSA. Therefore, the aim of the present study was to determine the prevalence rates and pattern of breast cancer in Northern Saudi Arabia.

METHODS

Study design and data sources

This is a descriptive retrospective study conducted at Hail and King Khalid hospitals, department of Surgery, in the

period from January 2016 to April 2016. Sample size represents a full coverage of received samples for 5 years (2011 to 2015 inclusive). Any patient underwent Fine Needle Aspiration (FNA) or/and biopsy due to the presence of breast lesion for the purpose of diagnosis was included. Of the 1250 retrieved files, 257 were found to be referring to breast lumps patients. All information of the patients was retrieved from the concerned hospitals. All 257 patients were initially diagnosed using Fine Needle Aspiration Cytology (FNAC). However, 158 patients were further confirmed by conventional histopathology.

FNAC was assessed adopting criteria described by elsewhere [10,11]. Conventional histopathology was re-assessed. The histological examination of biopsy specimens was done to achieve the assessment process role, by giving a pathology category classification (types of malignant and benign lesions).

Statistical analysis

Data managing was completed by using the Statistical Package for Social Sciences (SPSS version 16; SPSS Inc, Chicago, IL). SPSS was used for analysis and to do Fisher exact test for statistical significance ($p < 0.05$ was considered significant). The 95% confidence level and confidence intervals were applied.

<div align="center">RESULTS</div>

This study investigated 257 women with breast lesions, their ages ranging from 17 to 98 years with a mean age of 36 years old. All patients were presented during the period from 2011 to 2015 inclusive. The great majority of patients were admitted to the surgery units in the year 2015 represented 64 patients followed 2014, 2012, 2013 and 2011 constituting 59, 57, 45 and 31 respectively as shown in Figure 1.
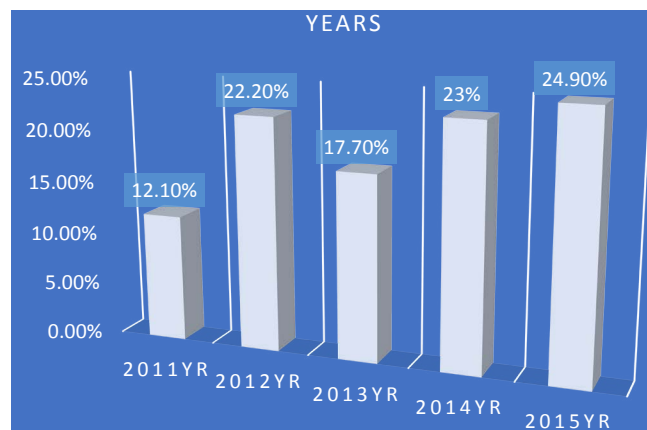
<div align="center">Figure 1 Proportions of patients per different years</div>

Of the 257 patients, 206/257 (80.2%) were Saudi civilian and 51/257 (19.8%) were non-Saudi. Lesion site was available for 247 patients, of whom 105/247 (42.5%) were right, 113/247 (45.5%) were left and 29/247 (11.7) were bilateral, as shown in Figure 2.
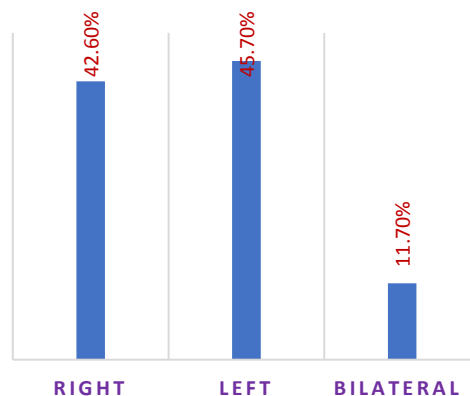
<div align="center">Figure 2 Patients by lesion site</div>
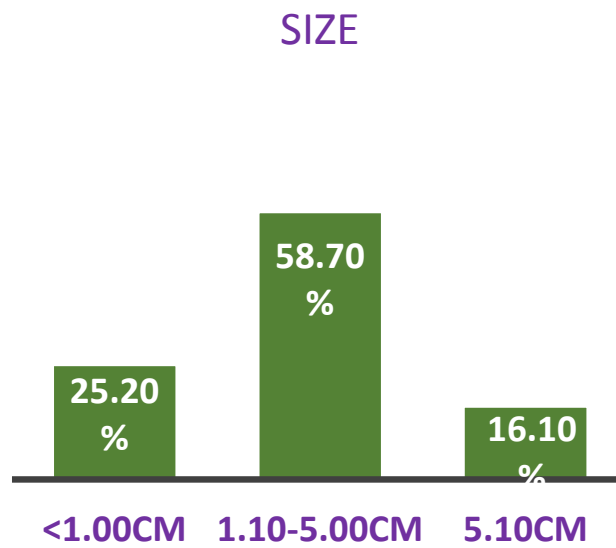
SIZE

Figure 3 Patients by lesion size

In regard to the lump size, 64/254 (25.2%) were identified with lump size less than 1.00 cm, 149/254 (58.7%) were identified with 1.10 to 5.00 cm and 41/254 (16.1%) with more than 5.10 cm, as shown in Figure 3.
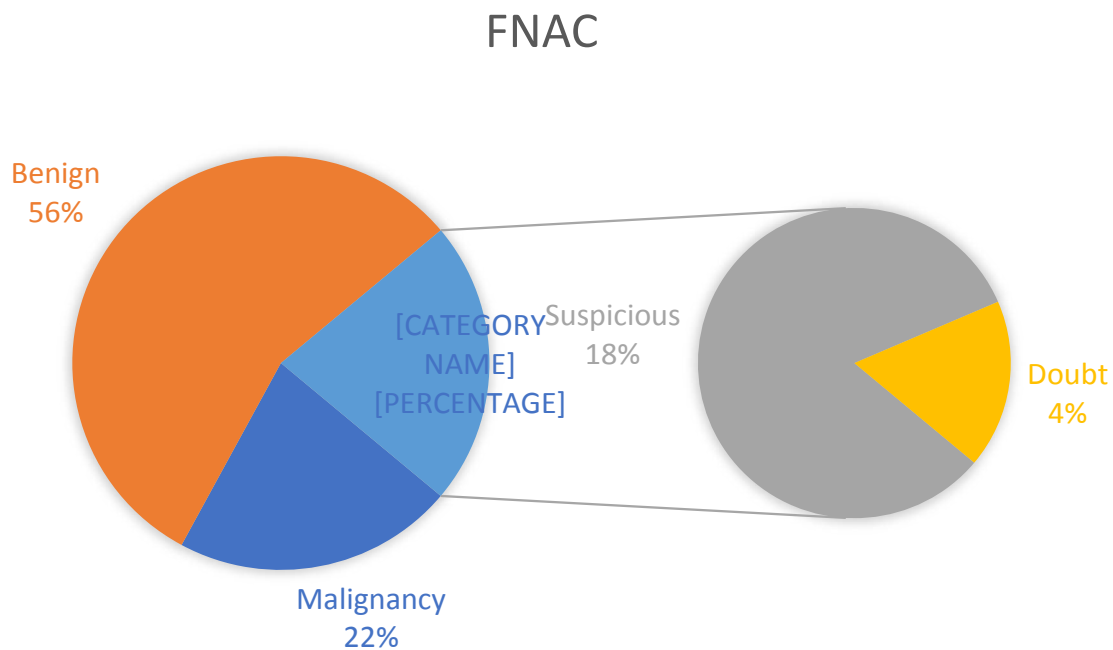
FNAC

Figure 4 FNAC diagnosis

The initial diagnosis was done using fine needle aspiration cytology (FNAC), then 158/257 (64.6%) were confirmed using conventional histopathology. Of the 257 specimens diagnosed using FNAC, 56/257 (21.8%) were malignant conditions, 144/257 (56%) were benign conditions, 47/257 (18.3%) were suspicious cases and the remaining 10/257 (3.9%) were doubt, as shown in Figure 4. Accordingly, the prevalence of breast cancer in Hail Region (KSA) was 21.8%. When confirming FNAC diagnosis in 158 cases using conventional histopathology, 46/158 (29.1%) were identified with ductal carcinoma, 7/158 (4.4%) with lobular carcinoma, 3/158 (1.9%) were mixed carcinomas and 102/158 (64.6%) were fibro-adenoma, as shown in Figure 5. Accordingly, the prevalence of ductal carcinoma and lobular carcinoma was 29.1% and 4.4%, in this order.

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Table 1 Distribution of the study subjects by demographical characteristics

| Variable	Category	Malignancy	Benign	Suspicious	Doubt	Total
Age	<30 years	1	93	12	2	108
	31-40	17	30	18	5	70
	41-50	19	15	11	1	46
	51-60	13	4	6	0	23
	61+	6	2	0	2	10
	Total	56	144	47	10	257
Nationality	Saudi	39	123	35	9	206
	Non-Saudi	17	21	12	1	51
	Total	56	144	47	10	257
Family root	Shammari	16	62	16	6	100
	Rashidi	3	9	3	1	16
	Anezy	5	14	4	1	24
	Tamimi	1	1	1	0	3
	Harbi	1	2	1	0	4
	Others	30	56	22	2	110
	Total	56	144	47	10	257
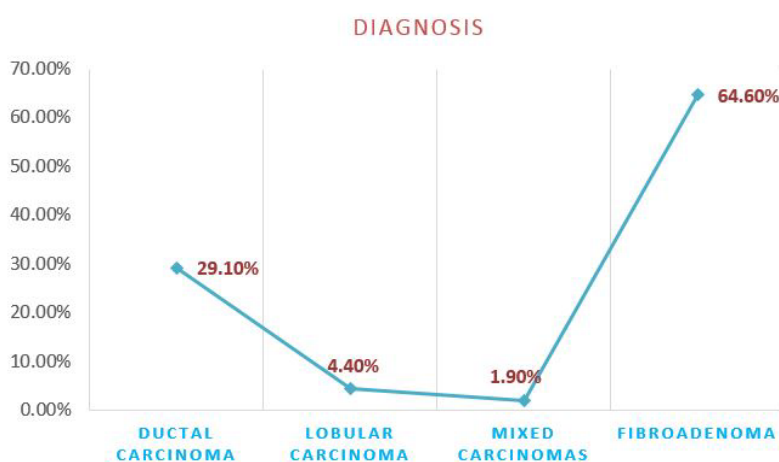
Figure 5 Confirmed histo-pathological diagnosis

Table 1 summarized the distribution of the breast lesion diagnosis by age, nationality, and family root. In regard to the age, most of the malignant conditions were identified among age group 41-50 constituting 19/56 (33.9%) followed by age rages, 31-40, 51-60 and 61+ representing 17/56 (30.3%), 13/56 (30.4%) and 6/56 (10.7%), respectively. When comparing the malignant and benign conditions, malignancy was significantly increasing with increase of age (p<0.05), since benign condition was significantly decrease with increasing of age (p<0.01), as shown in Figure 6. In regard to nationality the prevalence of breast cancer among Saudi was 18.9%, since among non-Saudi was 33.3%. According to family roots, most patients were from Al-Shammri, Followed by Anezy and Rashidi, representing 100/206 (48.5%), 24/206 (11.6%) and 16/206 (7.8%) patients respectively.

Table 2 Distribution of the study subjects by admissions' year, lesion site and size

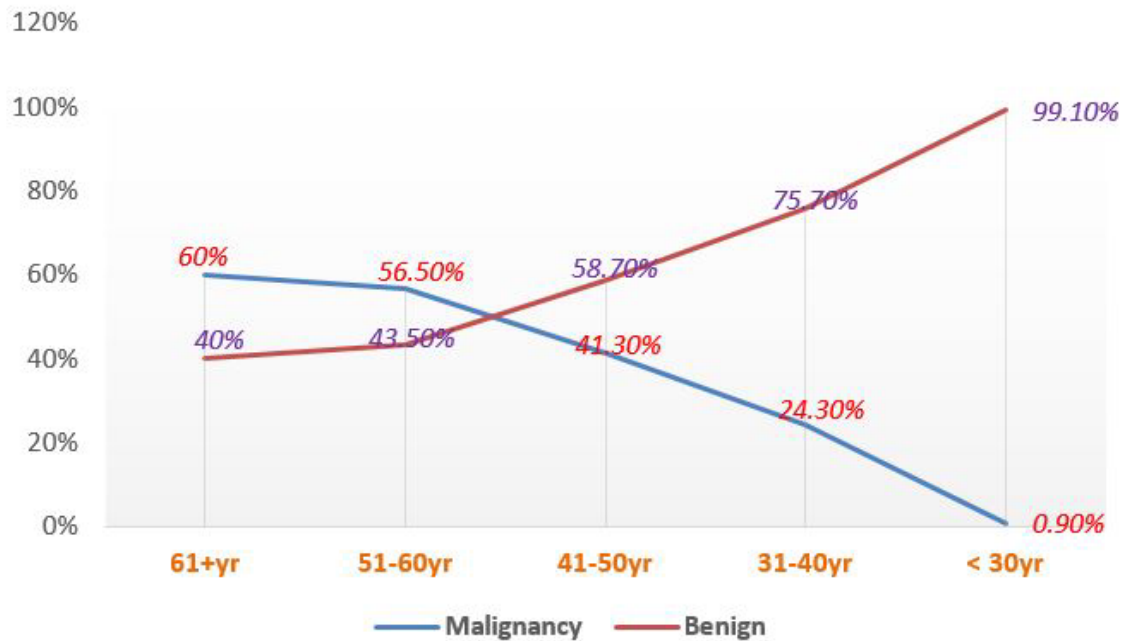| Variable	Category	Malignancy	Benign	Suspicious	Doubt	Total
Admission Year	2011	6	20	4	1	31
	2012	4	40	11	2	57
	2013	13	24	8	1	46
	2014	15	27	13	4	59
	2015	18	33	11	2	64
	Total	56	144	47	10	257
Site	Right	24	59	19	3	105
	Left	31	59	18	5	113
	Bilateral	1	18	9	1	29
	Total	56	136	46	9	247
Size	<1.00	18	27	18	1	64
	1.10-5.00	20	101	20	8	149
	>5.10	18	13	9	1	41
	Total	56	141	47	10	254

Figure 6 Description of malignant and benign conditions by age

In regard to the frequency of patients' admission by year, the great majority of patients were admitted in 2015 constituting 64/257 (24.9%), followed by 2014, 2012, 2013 and 2011, representing 59/257 (23%), 57/257 (22.2%), 46/257 (17.9%) and 31/257 (12%), respectively, as indicated in Table 2. When calculating the prevalence of breast cancer with each year, the highest prevalence was in 2013 followed by 2015 as shown in Figure 7.
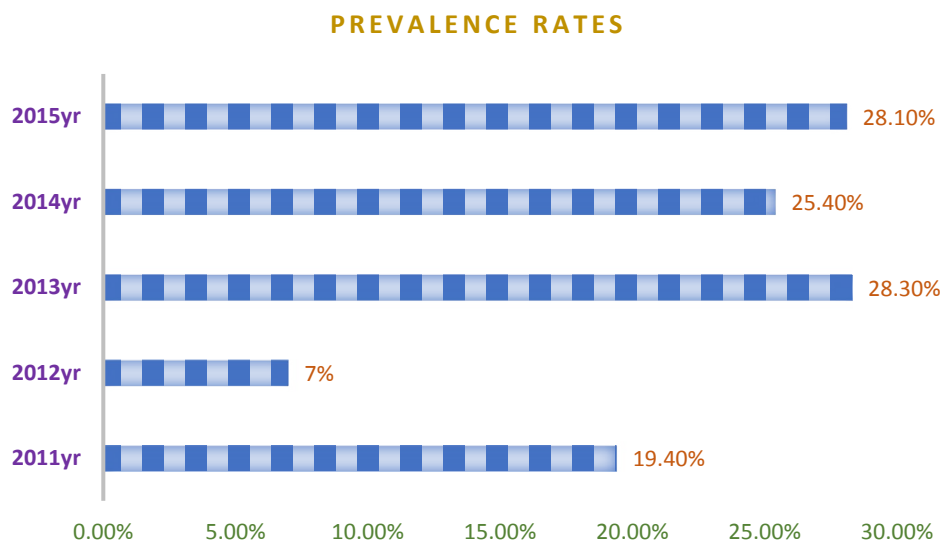
PREVALENCE RATES

Year	Rate
2015yr	28.10%
2014yr	25.40%
2013yr	28.30%
2012yr	7%
2011yr	19.40%

Figure 7 Prevalence rates of breast cancer in 5 years

In regard to the lesion site, most cases were presenting with left breast side constituting 113/257 (44%), followed by right side and bilateral representing 105/257 (40.8%) and 29/257 (11.2%), respectively.

Regarding the size of the lesion most of the patients presented with size range of 1.10 to 5.00 cm, as indicated in Table 2.

Table 3 Distribution of breast lesion types by demographical characteristics

Variable	Category	Ductal	Lobular	Mixed	Fibroadenoma	Total
Age	<30 years	1	1	0	77	79
	31-40	15	3	0	17	35
	41-50	13	2	3	7	25
	51-60	12	1	0	1	14
	61+	5	0	0	0	5
	Total	46	7	3	102	158
Nationality	Saudi	30	7	3	93	133
	Non-Saudi	16	0	0	9	25
	Total	46	7	3	102	158
Family root	Shammari	9	6	2	47	64
	Rashidi	3	0	0	4	7
	Anezy	4	0	1	13	18
	Tamimi	1	0	0	1	2
	Harbi	1	0	0	2	3
	Others	28	1	0	35	64

Table 3 summarized the distribution of breast lesion types by demographical characteristics. For ductal carcinoma, most of cases were identified among age range 31-40 years, followed by 41-50, and 51-60 constituting 15/46 (32.6%), 13/46 (28.2%) and 12/46 (26%), respectively. For lobular carcinoma most of the cases were also identified among age group 31-40 representing 3/7 (42.8%) followed by 41-50 representing 2/7 (28.6%). All cases of mixed carcinomas were found in age group 41-50. The great majority of cases of fibroadenoma were found among age range <30 years followed by 31-40, representing 77/102 (75.5%) and 17/102 (16.7%), in this order. For Saudi civilian, the prevalence rates for ductal carcinoma, lobular carcinoma, mixed carcinoma and fibroadenoma were 30/133 (22.5%), 7/133 (5.3%), 3/133 (2.2%) and 93/133 (70%), respectively. Hence for Non-Saudi the prevalence rates for ductal carcinoma, lobular carcinoma, mixed carcinoma and fibroadenoma were 16/25 (64%), 0%, 0% and 9/25 (36%), respectively, as indicated in Figure 8.
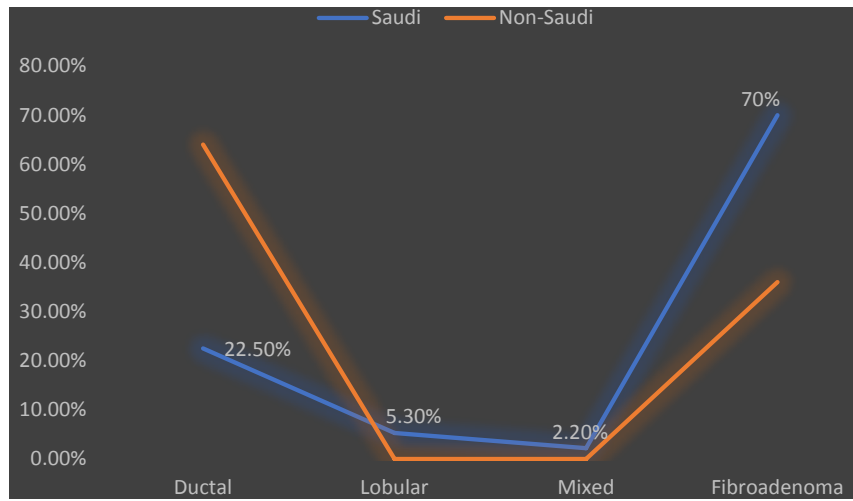
Figure 8 Breast lesion types by nationality

In regard to the family roots, in general Al-Shammri represent the majority of cases followed by Anezy, but when we calculated the breast cancer type with each family group when noticed some variations, as shown in Figure 9.

Table 4 Distribution of the breast lesion types by admissions' year, lesion site and size

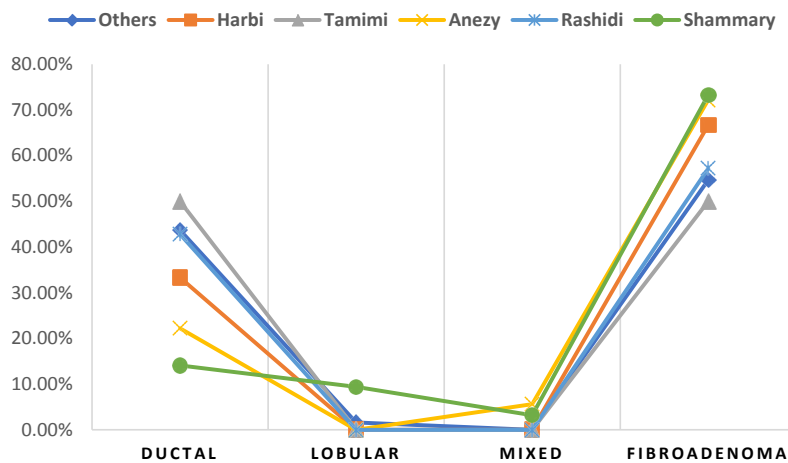| Variable	Category	Ductal	Lobular	Mixed	Fibroadenoma	Total
Admission Year	2011	5	2	0	13	20
	2012	3	1	0	35	39
	2013	11	2	0	18	31
	2014	11	1	2	16	30
	2015	16	1	1	20	38
	Total	46	7	3	102	158
Site (cm)	Right	19	3	3	42	67
	Left	27	2	0	43	72
	Bilateral	0	1	0	12	13
	Total	46	6	3	97	152
Size	<1.00	13	3	1	16	33
	1.10-5.00	19	1	1	79	100
	>5.10	14	2	1	5	22
	Total	46	6	3	100	155

Figure 9 Breast lesion types by family roots

Table 4 summarizes the distribution of the breast lesion types by admissions' year, lesion site and size. Regarding year of admission and prevalence within specific breast cancer type, the highest prevalence rates of ductal carcinomas were reported in in 2015, followed by (2014 and 2013) and 2011 representing 16/46 (35%), 11/46 (23.8%), 5/46 (10.9%) and 3/46 (6.5%), respectively. The highest prevalence rates of lobular carcinomas were similarly reported in 2011 and 2013 representing 2/7 (28.6%), hence, the highest prevalence rates of mixed carcinomas were reported in 2014, representing 2/3 (66.7%), as shown in Figure 10.
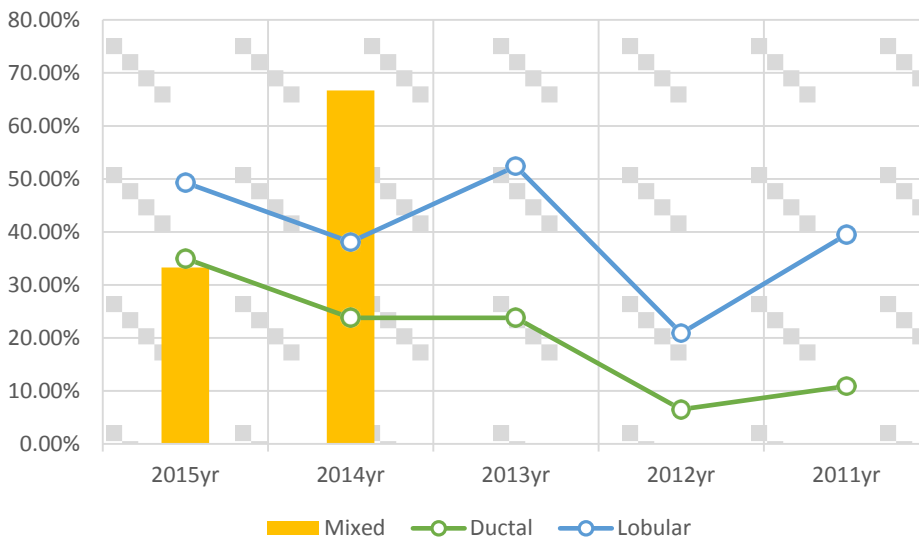

Figure 10 Prevalence within specific breast cancer type by year of admission

In regard to the lesion site, most of ductal carcinomas were reported in left side representing 27/46 (58.7%), hence, most of lobular carcinoma was reported in the right side representing 3/7 (42.8%). All cases of mixed carcinomas were reported in the right side. Of the 13 cases reported as bilateral, 12/13 (92.3%) were adenocarcinoma and 1/13 (7.7%) was lobular carcinoma. For the lesion size, most of lobular carcinomas were found with lump size ranging from 1.1 to 5 cm, as well as adenocarcinoma, hence, most lobular carcinoma resented with less than 1.00 cm, as indicated in Table 4.

DISCUSSION

Breast cancer is the most common females' cancer in KSA. According to Saudi Ministry of Health, it accounts for approximately 9.9% of all new females' cancers [12]. However, there is a lack of literature regarding epidemiologic patterns of breast cancer from KSA in general and from Northern KSA (Hail Region). Hail is a region of KSA, located in the north of the country. It has an area of 103,887 km² and a population of 527,033 (2004) census). Its capital is Haʾil [13].

To the best of our knowledge, this is the first report in this context from Hail Region. The determined prevalence of breast cancer (21.8%) in the present study is relatively higher than that reported by Saudi Ministry of Health, but it is similar to that reported by World Health Organization (WHO) in 2012 reports, representing about 22.9% [14,15]. Incidence rates have significant global variation from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe. In majority of the developing countries the incidence rates are under 40 per 100,000 (GLOBOCAN 2008). The lowest incidence rates are found in most African regions but there, breast cancer incidence rates are also growing [16].

However, the reported prevalence in the present study is much lower than some studies from other regions in Saudi Arabia. A study from KSA found a prevalence of breast cancer representing 31.5% with predominance of ductal carcinoma. This in addition of high frequency of fibroadenoma among benign lesion [17], which is in-line with our findings. A study from neighbouring (Al-Jouf, KSA), reported higher prevalence of breast cancer (48.9%). The study reviewed samples over an 8-year period (June 1994 and June 2002) [18]. Although the study was carried out before too long time, but it might be an indicator of moving toward lowering of breast cancer. Another comprehensive study carried out over 10 years (2001 to 2010) in Riyadh, KSA has reported a prevalence of 34.2% [19], which is also higher

than our findings. Since breast cancer shows geographical variation, even within areas of ethnic homogeneity. KSA has witnessed a rise in incidence of breast cancer in its unexplored ethnic populations over the past few years. The variations might result from exposure to certain environmental carcinogens; variable lifestyle, reproductive pattern; dietary and cultural practices of Saudi women that requires more research [20]. A recent study from KSA revealed that breast cancer categorized as first among females accounting for 27.4% of all newly diagnosed female cancers (5378) in the year 2010 [21]. These also indicate a reduction towards better control.

Nevertheless, the majority of cases of breast cancer in the present study were reported in year 2015 constituting 35% followed by both 2014 and 2013 representing 23.8%. These findings may take us to an initiation of new escalation in the incidence of breast cancer. A study from Riyadh, Saudi Arabia, reported that, the annual incidence of breast cancer progressively increased by 4.8%, from an annual rate of 23.5% in 2000 to 47.2% in 2007 [19].

The most common patterns of breast cancer in the present study was ductal carcinoma representing 29.1%, followed by lobular carcinoma representing 4.4% and mixed (1.9%). Similar findings have been reported from a recent study from KSA. The study found that ductal carcinomas with a variety of histological grades constituted the majority of cases followed by lobular carcinomas (4%) and mixed (2%) form of ductal and lobular types [22].

In the current study, breast cancer mostly found among elderly patient (more than 41 years), but their considerable percentage among middle age patients (less than 40 years) representing more than 30%). Similar findings were previously reported from KAS; breast cancer was 18% in patients younger than 40 years and 63.2% in patients older than 60 years with a mean age of onset of 48.6 years [19,21]. It was reported that average age at presentation of breast cancer in Arab countries is 48 years, which is earlier than in western countries [23]. The median age of onset of breast cancer among Saudi women is 46 years [24].

As indicated by size of the lump in the results, most patients presenting with large sizes which may indicate an advance stage of the disease in most cases. However, we did not find study from Saudi Arabia reporting staging of the breast cancer.

The strengths of this study include; the addition of more evidence to the existing literature from north of KSA, which might not be touched before. This in addition to notification of the health provider to the gaps in this context as well as. Stimulating future research to fill gaps in this context in Hail area.

The study has some limitations, such as, the nature of the collected data; information regarding breast lesions were collected from patients' files, absent of detailed data regarding staging and grading of breast cancer and subsequent patients' management.

CONCLUSION

We report the lowest prevalence rates of breast cancer in Hail region comparing with other regions in KSA. The present study results are in line with the cancer diagnosis being made in younger age group, and advanced stages. The findings of the present study are extremely important, as providing baseline information of breast cancer in Hail region; consequently, will play a major role in the future of breast cancer epidemiology and researches. Further epidemiological studies along with educational campaigns and screening programs are highly recommended to address the increasing breast cancer burden in Hail region.

DECLARATIONS

Ethics approval and consent

The protocol of the present study was approved by the ethical committee at College of Medicine, University of Hail. The informed consent was agreed about by Surgery Department at King Khalid Hospital. All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Availability of data and materials

All data were retrieved from Surgery Department at King Khalid Hospital, Hail city, KSA.

Conflict of interest

The authors declare that, they have no conflict of interest.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

HGA: Contributed to the design of the study, data analyses, interpretation of results, and draft and approval of manuscript. KJA: Contributed to the data analyses, interpretation of results, draft and approval of manuscript. AGA: Contributed to the concept and design of the study, data analyses, interpretation of results, and draft and approval of manuscript. SAA: Contributed to the concept and design of the study, data analyses, and draft and approval of manuscript. LSS: Contributed to the concept and design of the study, interpretation of results, and draft and approval of manuscript. IMA: Consulted the overall contents. All authors have read and approved the final manuscript.

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