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Correlation of ultrasound BI-RADS reporting and breast cancer clinical measures

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BI-RAD reporting is essential for early detection and prediction of breast cancer. Consequently, the present study aimed to evaluate the correlation between ultrasound BI-RADS reporting and breast cancer clinical measures. In the current analysis, the information pertaining to breast biopsies was recovered from the Department of Pathology at King Salman Hospital, Ha'il, Northern Saudi Arabia. The study included data concerning breast cancer biopsies (included 48 females and two males) diagnosed during the period from November 2019 to November 2020. Results: The present study included 50 patients with breast cancer, 45 ductal carcinoma, three lobular carcinoma, and two papillary carcinomas. About 48/50(96%) were diagnosed with invasive carcinomas. The mean age of the patients was 48 years. Only one ductal carcinoma was reported with BI-RADS III, 19/30(63.3%) and 10/30(33.3%) were reported with scores IV and V, in that order. Conclusion: Late presentation of patients with breast cancer is prevalent in Northern Saudi Arabia. Although BI-RAD reporting is essential for early detection of breast cancer, it does not correlate with breast cancer patients' clinical measures. Implementation of the mammography screening program is urgently needed in Northern Regions of Saudi Arabia, as most cases were detected with invasive breast carcinoma.

Keywords: BI-RAD, breast cancer, mammography, ductal carcinoma, Saudi Arabia

INTRODUCTION

The growing burden of cancer continues to afflict health-care systems all over the globe. The Kingdom of Saudi Arabia is one of the countries facing challenging cancer-related health problems all over kingdom regions. In Saudi Arabia, many cancers increased several folds in recent years, which are attributed to the rapid changes in individual's lifestyle pattern, increasing of sedentary life, prevalent of overweight and obesity (Alqahtani et al. 2020; Ahmed et al. 2020; Benammar et al. 2020).

Breast cancer is the 2nd leading cause of cancer-related death worldwide and ranks as the 9th leading cause of morbidity in Saudi Arabia

(Ashareef et al. 2020). Recent studies from Saudi Arabia reported increased prevalence rates, particularly in Northern Saudi Arabia, with increasing frequency of patients attending advanced stages of the disease (Ahmed et al. 2017). It was found that many women with breast lesions were spotted during breast self-examination surveys, which is attributed to the low levels of breast cancer awareness (Elsbali et al. 2019).

BI-RAD stands for breast imaging-reporting and data system, which is used universally to standardize suspicious breast cancer reporting applying seven assessment categories. BI-RAD 4 the frequent category used for the assessment

and usually suggestive for malignancy (Leithner et al. 2017). BI-RAD 3 has a <2% suspicious malignancy rate (Berg et al. 2020). Most malignant tumors diagnosed at follow-up of BI-RAD 3 are in early stages and can assist in its subsequent management (Edmonds et al. 2020). However, the present study aimed to evaluate the correlation of ultrasound BI-RADS reporting and breast cancer clinical measures.

MATERIALS AND METHODS

In the current analysis, the information pertains to breast biopsies were recovered from the Department of Pathology at King Salman Hospital, Hai'l, Northern Saudi Arabia. The study included data concerning breast cancer biopsies patients (contained 48 females and two males) diagnosed during the period from November 2019 to November 2020. The diagnosis of breast lesions was confirmed by conventional histopathology. The re-evaluation of the histopathological diagnosis of the tissue samples was done to verify the prior diagnosis.

Statistical analysis:

Recovered data collections were entered into computer software, Statistical Package for Social Sciences (SPSS version 16; SPSS Inc, Chicago, IL). Chi square test was employed to statistical significance (P < 0.05 was considered significant).

Ethical consent:

The protocol of this study was established agreeing with the 2013 Declaration of

Helsinki and this study was approved by the ethics committee of the College of Medicine, University of Hail, Saudi Arabia.

RESULTS

The present study included 50 patients with breast cancer, including 45 ductal carcinomas, three lobular carcinoma, and two papillary carcinomas. Out of the 50 patients, 48/50(96%) were females, and 2/50(4%) were males. One male was aged 55 years, and the other was aged 56 years. Both males were with invasive ductal carcinoma. About 48/50(96%) were diagnosed with invasive carcinomas. The mean age of the patients was 48 years. About 23/50(46%) were aged less than 50 years, as indicated in Table 1, Fig1.

Table 1 : Distribution of the patients by breast cancer histopathological pattern and age and gender

Age group	Ductal carcinoma	Lobular carcinoma	Papillary carcinoma	Total
≤30 years	1	0	0	1
31-40	12	1	1	14
41-50	8	0	0	8
51-60	14	2	1	17
≥61	10	0	0	10
Total	45	3	2	50

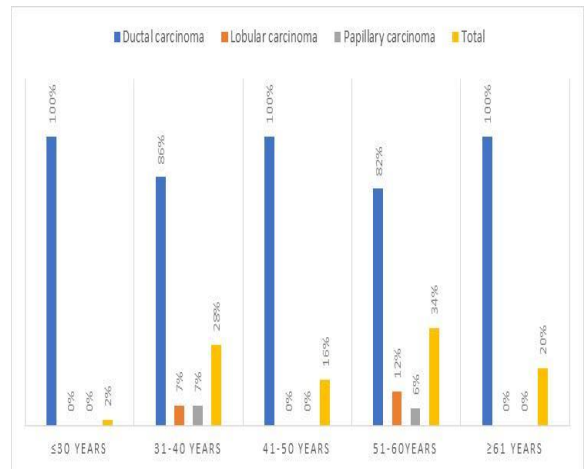


Figure 1: Description of the patients by breast cancer histopathological pattern and age

Figure 2 describing the association between BI-RADS score reporting and age. BI-RAD score III was reported at the age of 38-40 years. Both (score IV & V) were appeared younger, then decreased in the middle age then increased in the older generation, particularly Score V.

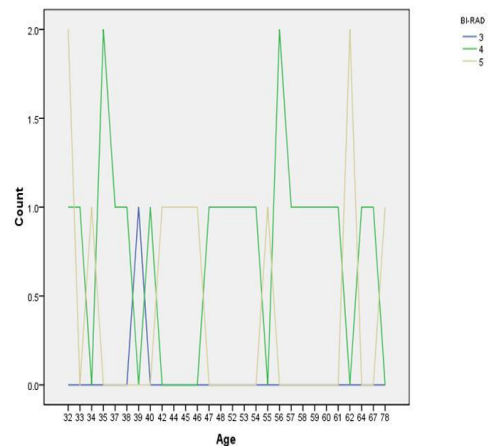


Figure 2: Description of BI-RAD Scoring by age

Table 2, Fig 3 summarized the distribution of breast cancer histopathological pattern and age and gender by ultrasound IB-RAD reporting. Only one ductal carcinoma was reported with BI-RADS III, 19/30(63.3%) and 10/30(33.3%) were reported with scores IV and V, in that order. BI-RAD scoring was available for one male with a score IV. No significant difference in BI-RADS scores and age, though it seemed increased score correlated with advanced age.

Table 2: Distribution of breast cancer histopathological pattern and age and gender by ultrasound IB-RAD reporting

Variable	BI-RAD			Total
	Score III	Score IV	Score V	
Carcinoma				
Ductal Carcinoma	1	19	10	30
Lobular Carcinoma	0	1	0	1
Papillary Carcinoma	0	1	1	2
Total	1	21	11	33
Gender				
Males	0	1	0	1
Females	1	20	11	32
Total	1	21	11	33
Age				
≤30 years	1	0	0	1
31-40	0	7	3	10
41-50	0	2	4	6
51-60	0	9	1	10
≥61	0	3	3	6
Total	1	21	11	33

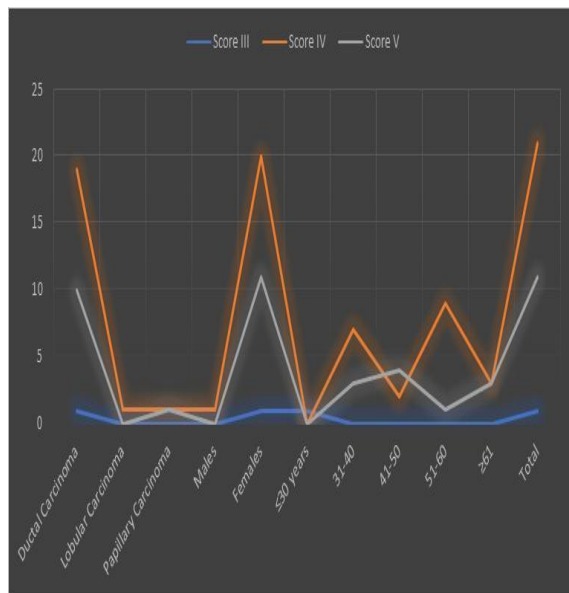


Figure 3: IB-RAD reporting by gender, carcinoma subtype, and age

The distributions of breast cancer clinical measures by ultrasound IB-RAD reporting were summarized in Table 3, Fig 4. Out of the 23 left site lesions, 15/23(65.2%) were IB-RAD score IV, and 8/23(34.8%) were score V, whereas, of the ten right site lesions, 6/10(60%) were IB_RAD score V and 3/10(30%) score V and 1/10(10%) score III. Out of 15 cases with upper outer quadrant, 10/15(67%) were BI-RADS score IV, and 4/15(27%) score V. Out of 7 with retro-areolar quadrant, 5/7(71.4%) score IV, and 2/7(28.6%) score V. Lower outer quadrant commonly with score IV. Lower inner commonly with score V and upper inner commonly with score IV. The lesion size was not affecting the BI-RAD score. Positive lymph node more frequent correlating with BI-RADS score IV representing 11/17(65%). For provisional grade, 28/32(87.5%) patients were with Grade II, of whom 17/28(61%) were categorized as BI-RAD score IV.

Table 3: Distribution of breast cancer clinical measures by ultrasound IB-RAD reporting

Variable	BI-RAD			Total
	Score III	Score IV	Score V	
Lesion site				
Left	0	15	8	23
Right	1	6	3	10
Total	1	21	11	33
Quadrant				
upper outer	1	10	4	15
retro-areolar	0	5	2	7
lower outer	0	3	1	4
lower inner	0	1	2	3
upper inner	0	2	1	3
Total	1	21	10	32
Lesion Size				
≤2 cm	1	10	5	16
>2 cm	0	9	5	14
Total	1	19	10	30
Lymph node metastasis				
Positive	0	11	6	17
Provisional grade				
Grade I	0	2	1	3
Grade II	1	17	10	28
Grade III	0	1	0	1
Total	1	20	11	32

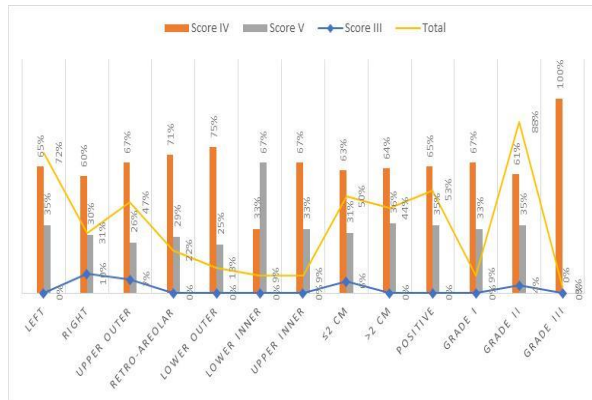


Figure 4: Breast cancer clinical measures by ultrasound IB-RAD reporting

DISCUSSION

Screening for early detection of cancer represents the cornerstone for ultimate cancer management better outcomes. Several programs have been designed for early detection of breast cancer, including breast self-examination and mammography. Therefore, the present study evaluated the correlation between ultrasound BI-RADS reporting and breast cancer clinical measures.

As 96% of the present study patients were diagnosed with invasive carcinomas, this indicates that most patients still attending with late stages of breast cancer. Such findings were previously published from the Northern regions of Saudi Arabia (Ahmed et al. 2017). Moreover, presenting with late stages of the diseases may be linked to lack of sustainable screening programs, absence of preventive measures, and shortage of cancer education and awareness programs, which were widely reported from most parts of the country (Albeshan et al. 2020; Alsareii et al. 2020). Notably, breast cancer cases were relatively younger compared to cases reported from western countries (Rudat et al. 2012). However, in the present study, BI-RAD 3 was seen in the age 38-40 years, whereas, both (score 4 & 5) were displayed in younger then fell in the middle age then soared in the older generation, mainly score 5.

In the present study, ultrasound, BI-RAD reporting was performed for 33 patients, of whom only 1/33(3%) was reported as BI-RAD 3. However, most cases were reported with BI-RAD 4. BI-RAD 4 category has a wide variety of malignancy likelihood ranging from 2-95% (Honda et al. 2020). As more than 95% of the present study cases were with invasive breast carcinomas, we expected most patients to be with BI-RAD 5 and beyond.

Although most patients presented with left site lesions, the BI-RAD category seemed similar for both sites. It was suggested that left-sided breast cancers are more aggressive with a higher pathological grade, which necessitates more assertive treatment (Yara et al. 2019).

According to the quadrant, most cases with upper outer and retro-areolar patterns and more frequently were BI-RAD 4. Although most of the patients were with invasive carcinoma, many were added with lesion size ≤ 2 cm, and most were with BI-RAD 4. This may justify why most cases with BI-RAD 4. The positive lymph node was detected in 17 cases of which 11 patients were with BI-RAD 4. This may indicate that the BI-RAD category is not suggestive for invasion and metastasis, which is rarely reported.

Provisional grade II was the most encountered grade and more frequently associated with BI-RAD category 4. This may be associated with small lesion sizes and their broadly categorized BI-RAD 4.

CONCLUSION

The late presentation of patients with breast cancer is prevalent in Northern Saudi Arabia. Although BI-RAD reporting is essential for early detection of breast cancer, it does not correlate with breast cancer patients' clinical measures. Implementation of the mammography screening program is urgently needed in Northern Regions of Saudi Arabia, as most cases were detected with invasive breast carcinoma.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

ALY and ELA conceived of the presented idea, investigate and supervised the findings of this work. ALY and ELA wrote the manuscript. ELA supervised the project ALY developed the theoretical formalism, performed the analytic calculations and performed the numerical simulations. ALY and ELA worked out almost all of the technical details, and performed the numerical calculations for the suggested study. ALY worked out the bound for quantum

mechanics, and ELA verified the numerical results. ALY and ELA discussed the results and commented on the manuscript, contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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