Chapter (4)
Results

Chapter [4]

Statistical Analysis

Table 4-1: class intervals and frequencies for age group

Age (year)	No of patients
< 20	0
21 – 30	15
31 – 40	35
41 – 50	30
51 – 60	13
61 – 70	6
71 – 80	0
> 81	1
Total	**100**

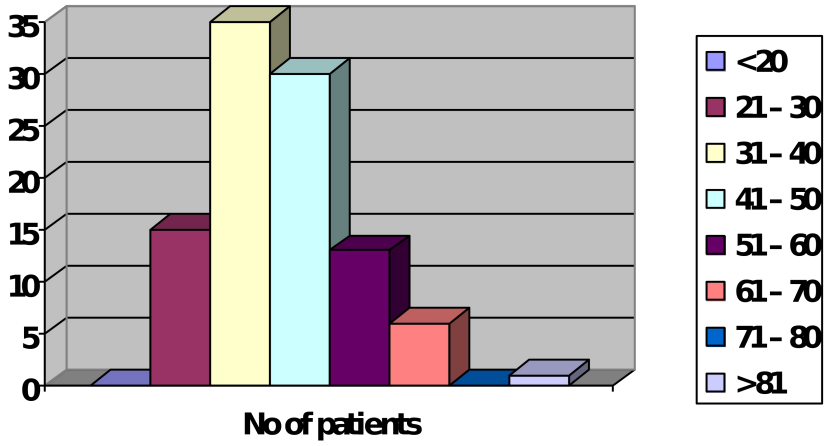

Table & Graph 4-1: age distribution indicates the highest number is between 31-40

Table (4-1) shows the age distribution by using the class intervals and frequencies who participated in the research study, the interval between 31- 40 with frequency of 35 participant, the proportion of values between this age group is calculated by dividing the frequency that is 35 by the total number of the sample which is 100, thus the proportional value is 35%, so the highest percentage of the age group was between 31- 40.

Table 4-2: Histopathological findings:

Histopathological findings	No. of cases	%
Invasive ductal carcinoma	56	56
Malignant phylloid tumor	2	2
Intraductal carcinoma in situ	5	5
Papillary carcinoma	10	10

Fibroadenoma	14	14
Fibrocystic changes	6	6
Lymphoid hyperplasia	7	7
Total	100	100

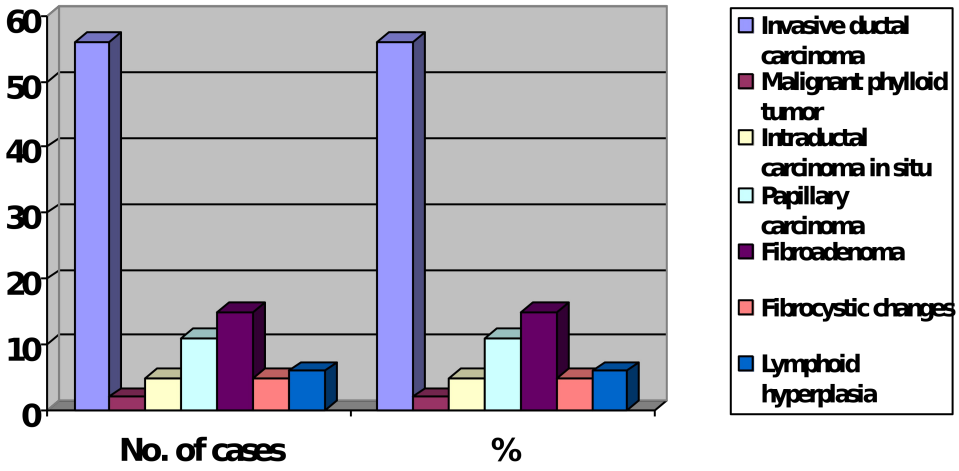

Table & Graph 4-2: breast masses: The highest percentage of patients in this finding reflects 56% of the samples are having invasive ductal carcinoma.

Table (4-2) reflects the result obtained from histopathological findings.

According to histopathology, 73 cases were classified as malignant tumors. The histologic types of malignancy included; invasive ductal carcinoma (T=56); high grade invasive ductal carcinoma (n = 16) and grade Π invasive ductal carcinoma (n = 40); malignant phylloid tumor (n =2); ductal carcinoma in situ (DCIS) (n = 5); papillary carcinoma (n = 10). The 27 benign lesions included lymphoid hyperplasia (n = 7); fibroadenoma (n = 14); fibrocystic changes (n =6)

Table 4-3: Crosstabs histopathology and ADC

		ADC			Total
		> 1.5 (definitely benign)	(≥1–<1.5) (borderline)	< 1 (malignant)	
histopathology	Negative	18	8	1	27
	Positive	4	6	63	73
Total		22	14	64	100

DWI	Score
Specificity	96%
Sensitivity	86%
Accuracy	89%

Table (4-3) and (4-4) show the characterization of DWI for the 100 breast lesions. Among the 27 benign tumor ; 8 cases has shown overlap between benign and malignant, while (one case) was false positive (lower ADC value). For diagnosis of malignant lesions (T=73); 4 cases were misdiagnosed (false negative) with (ADC value > 1.5), while 6 cases were borderline (≥1–<1.5). The diagnostic specificity, sensitivity and accuracy of DWI for the 100 lesions were; 96%, 86% and 89% respectively.

Table 4-4: **Breast masses * histopathology and ADC Crosstabulation**

Count

ADC			histopathology		
			Negative	Positive	Total
> 1.5 (definitely benign)	Breast masses	Invasive ductal carcinoma	1	0	1
		Fibroadinoma	8	0	8
		Fibrocystic	4	0	4
		Papillary ca.	0	4	4
		Lymphoid hyperplasia	5	0	5
	Total		18	4	22
>=1 and < 1.5 (borderline)	Breast masses	Invasive ductal carcinoma	0	2	2
		Fibroadinoma	6	0	6
		Fibrocystic	1	0	1
		Papillary ca.	0	1	1
		Intraductal carcinoma in situ	0	3	3
		Lymphoid hyperplasia	1	0	1
	Total		8	6	14
< 1 (malignant)	Breast masses	Invasive ductal carcinoma	0	54	54
		Papillary ca.	0	6	6
		Intraductal carcinoma in situ	0	2	2
		Malignant Phylloid tumors	1	0	1
	Total		1	63	63

Table 4-5: Crosstabs histopathology * Coline peak Crosstabulation

		Coline peak		Total
		No peak	with peak	
histopathology	Negative	27	0	27
	Positive	7	66	73
Total		34	66	100

MRS	Score
Specificity	100 %
Sensitivity	90 %
Accuracy	93 %

Table (4-5) and (4-6) :) show the characterization of MRS for the 100 breast mass lesions. From the table we notice that all benign lesions (T n = 27) were correctly diagnosed by MR spectroscopy, while 7 cases out of 73 malignant tumor were misdiagnosed (false negative). The diagnostic specificity, sensitivity and accuracy of DWI for the 100 lesions were; 100%, 90% and 93% respectively.

Table 4-6: Breast masses * histopathology and choline peak

Coline peak			Histopathology		Total
			Negative	Positive	
No peak	Breast masses	Invasive ductal carcinoma	1	1	2
		Fibroadinoma	14	0	14
		Fibrocystic ca	5	0	5
		Papillary carcinoma	0	1	1
		Intraductal carcinoma in situ	0	5	5
		Lymphoid hyperplasia	6	0	6
		Malignant Phylloid tumors	1	0	1
	Total		27	7	33
with peak	Breast masses	Invasive ductal carcinoma		55	55
		Papillary carcinoma		10	10
		Malignant Phylloid tumors		1	1
	Total			66	66

Table 4-7: Crosstabs histopathology and type of tumor

		Type of tumour		Total
		Benign	Malignant	
histopathology	Negative	25	2	27
	Positive	3	70	73
Total		28	72	100

	Score
Sensitivity	96 %
Specificity	92%
Accuracy	95 %

Table (4-7) describes types of tumors and the major of sensitivity, specificity and accuracy of DWI and MRS in characterizing tumor types. 27 tumors were proved histopathologically to be benign, investigated by DWI and MRS, the findings revealed that 25 cases was diagnosed correctly as benign, while 2 cases was misdiagnosed as malignant. Among 73 case pathologically confirmed as malignant, 70cases was correctly diagnosed as malignant tumors and only 3 cases was misdiagnosed as benign tumor with sensitivity of 96% , specificity of 92% and accuracy of 95%.

Table 4-8: Crosstabs histopathology and signal

		Signal		
		homogenously (hyperintense)	heterogeneously (hyperintense)	Total
histopathology	Negative	22	5	27
	Positive	0	73	73
Total		22	78	100

	Score
Sensitivity	100 %
Specificity	81 %
Accuracy	95 %

Tables (4-8) and (4-9) describe signal intensity of breast masses on T2 weighted images. The findings revealed that among the 27 benign tumors (homogenously hyperintense); only 5 cases were heterogeneously hyperintense. The 73 malignant lesions all were heterogeneously hyperintense, with sensitivity of 100%, specificity of 81% and accuracy of 95%.

Table 4-9: Crosstabs Breast masses * histopathology and signal

Signal			histopathology		Total
			Negative	Positive	
homogenously hyperintense	Breast masses	Invasive ductal carcinoma	1		1
		Fibroadinoma	11		11
		Fibrocystic changes	5		5
		Lymphoid hyperplasia	5		5
	Total		22		22
heterogeneously hyperintense	Breast masses	Invasive ductal carcinoma	0	56	56
		Fibroadinoma	3	0	3
		Papillary carcinoma	0	10	10
		Intraductal carcinoma in situ	0	5	5
		Lymphoid hyperplasia	2	0	2
		Malignant Phylloid tumors	1	1	2
	Total		6	72	78

Table 4-10: Crosstabs histopathology and shape

		shape			Total
		Oval	round	irregular	
histopathology	Negative	11	13	3	27
	Positive	1	10	62	73
Total		12	23	65	100

	Score
Sensitivity	85 %
Specificity	88.8 %
Accuracy	86 %

Table (4-10) describes the tumor shape on MRI screening. The findings revealed that among the 27 benign tumors; 3 tumors showed irregular shape, 13cases showed round shape and 11 appeared in oval shape. Among the 73 malignant tumors; one case showed oval shape, 10 with round shape while 62 lesions were irregular in shapes. with sensitivity of 85%, specificity of 88% and accuracy of 86% .

Classification

Table (4-11): Classification Function Coefficients

Variables	Histopathology	
	Negative	Positive
ADC	-7.400	-11.130
Coline + peak	18.470	34.210
type of tumour	26.515	46.437
signal	25.502	40.699
(Constant)	-34.286	-103.817

Fisher's linear discriminant functions

Table (4-12): Classification Results

Histopathology		Predicted Group Membership		Total
		Negative	Positive	
Original	Negative	24	2	26
	Positive	0	73	73
	Negative	92.3%	7.7%	100.0%
	Positive	.0	100.0%	100.0%

a. 98.0% of original grouped cases correctly classified

(Table (4-10) & (4-11) show: the classification function coefficients and classification result according to Fisher’s linear discriminant functions

Total accuracy, sensitivity and specificity was calculated according to the following equation

*Negative = (-7.4*ADC) + (18.5*coline) + (type of tumor*26.5) + (signal*25.5)-34.2*

*Positive = (-11.13*ADC) + 34.2*coline) + 46.4type of tumor) +) signal*40.7)-103.8*

Total Accuracy = 98%* - *Sensitivity = 100%* - *Specificity = 92.3%