Preoperative Cancer Markers in Carcinoma Breast - A Case Control Study

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Abstract

Background

Keeping in view the intricacy of carcinoma breast patient's various tumor marks as CEA, C.A125, C.A15.3, C.A 724 and ferritin(FER) were put into use for the management of breast cancer in all the cases pathology was kept in mind 80 patients with breast mass were enrolled along with 100 healthy controls.

Methods

Total of 80 patients with breast mass were taken along with 120 patients of healthy controls were taken. The interaction of all these cases was calculated along with each other.

Results

Among the above 80 patients 35 were identified as malignant and 45 as benign, CEA, CA15.3 and Ferritin were found to be as compare to controls and benign cases. C.A 15.3 was related with size, status and TNM stage. No significance was observed in all these 5 tumor markers.

Conclusion

Levels of CEA, CA15.3 and FER were more accurate in the initial stages .CA15.3 is related with tumor size so has more prognostic value.

Keyword

Breast cancer, molecular subtype, pathological feature, prognosis, tumor marker

Introduction

Breast cancer is the most frequent cancer in the women. Its survival depends upon stage of cancer. Recently imaging examination is done for this purpose. Serum marks are of immense help in the

diagnosis and prognosis of CA breast. CA15.3 and CEA have and upper edged in management of breast cancer. Recently done studies showed in consistent results. Wu et al found was that CEA level is lowest than the other 4. While fang et al found CA125 most frequent so the limited knowledge of the relationship between single tumor markers has made no value for diagnosis of breast cancer. We performed a study to compare 5 tumor markers including CEA, CA125, CA15.3, CA724, FER among the carcinoma breast patients with benign diseases and healthy volunteers. The diagnostic accuracy of the tumor marker was evaluated with different level of malignancy so as to help patients helping the diagnosis in clinical practice

Materials and Methods

Total of 80 patients with CA breast coming to the O.P.D and admitted in I.P.D of MM Institute of Medical Sciences & Research were taken from Nov 2021 to Nov 2022. The inclusion criteria were:
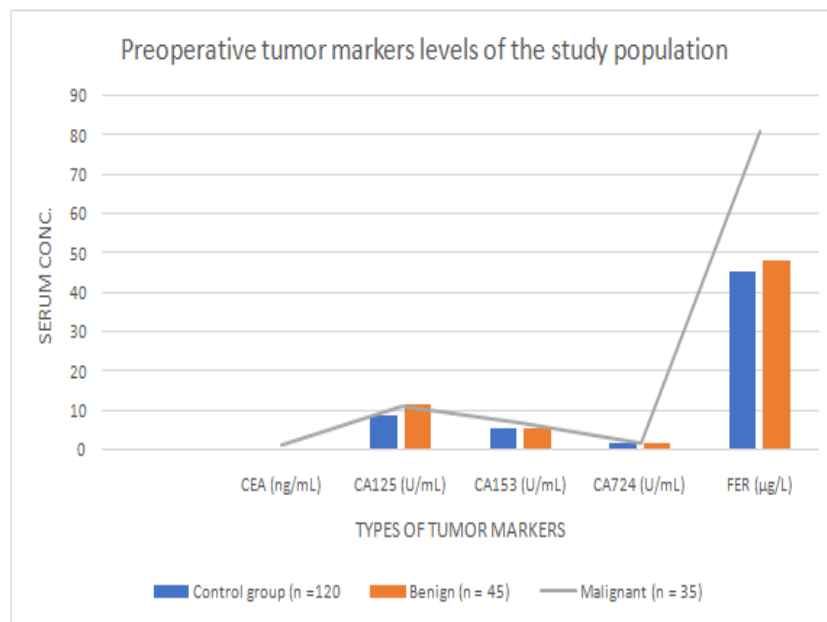

Figure1: Preoperative tumor markers levels of the study population

1) With no H\O cancer
2) Complete medical record
3) The estimation of tumor marker 2 weeks prior to surgery
4) No radio /No chemo/ No Endocrine therapy before surgery

120 healthy controls were enrolled as healthy volunteer group. Written consent form was obtained from all subjects. 3cc/3ml venous blood was collected from these subjects. After centrifugation all the parameters were measured using chemiluminescence immune system. Cut off value was 5ngm (CEA), 35 unit/ml (CA125), 32.4 units/ml (CA15.3), 8.2 unit/ml (CA724) and 291.0 µg/L. value of FER was as per recommended by manufacturer. The breast tumor was classified into 4 subtypes according to St. Gallen Expert Consensus. TNM stage was marked by American joint committee on cancer (AJCC).
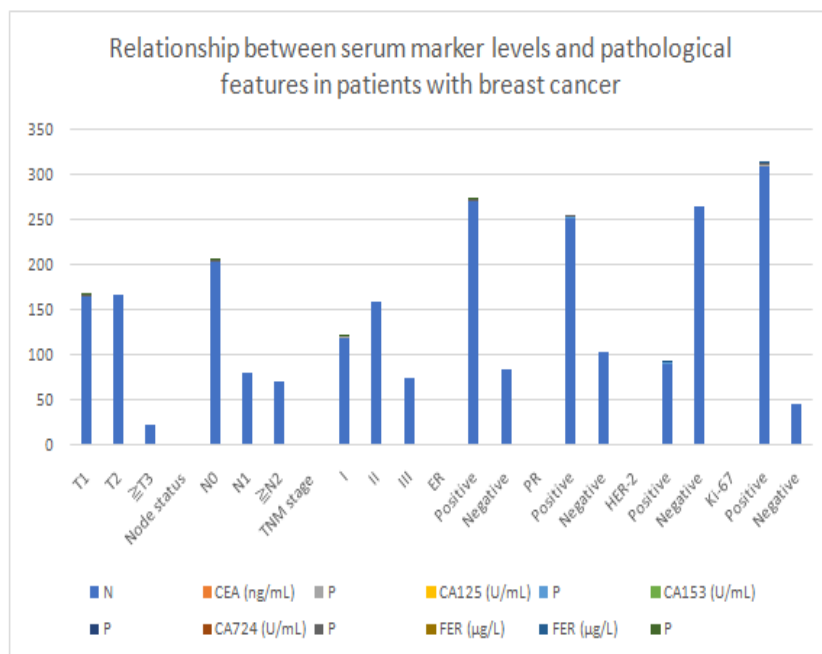
Results

According to inclusion and exclusion 80 patients were enrolled. These included 55 cases of breast cancer and 45 benign cases. 120 healthy volunteers were enrolled as healthy group. The median age was 44 years (21-79 years) and 45 years (22-70 years) in patients breast mass and healthy volunteers. Invasive ductal carcinoma was the most common amounting to more then 75 years. The serum levels of tumor markers in different groups are presented in table 1.
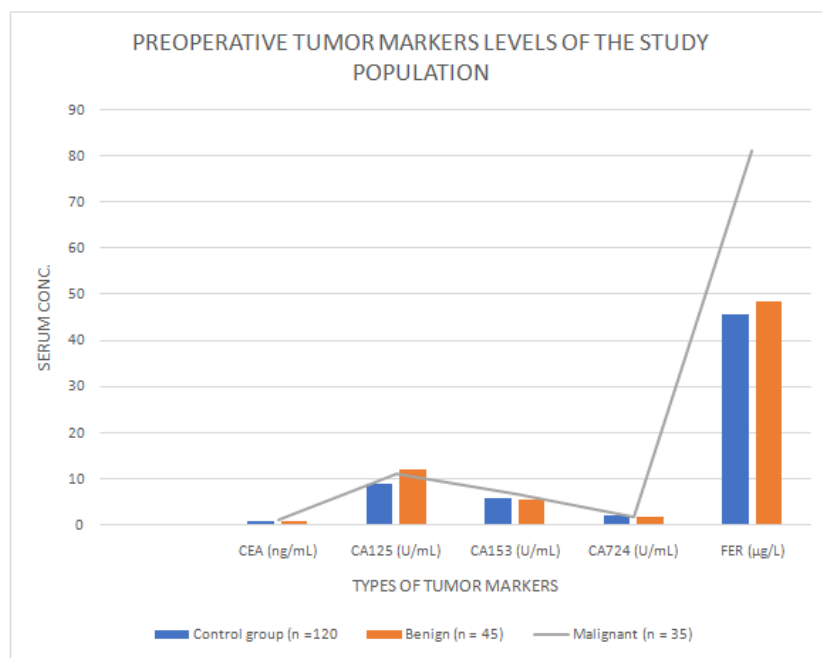
Figure 3: Preoperative Tumor Markers Levels of the Study Population

CEA, CA15.3 and Fer of patients with Ca breast were high than those of healthy group (p>0.05). There was no significant difference in CA724 among the three groups in addition positive rates of tumor markers in three group were are shown in table 2. To evaluate the diagnostic accuracy of CEA, CA15.3 and Fer were as shown in figure 1. The area under the curve of CEA, CA15.3 and Fer for separate patient of Ca breast with healthy group were 0.078, 0.652 and 0.595. Serum markers and PNM stage as shown in table 3 and figure 2, the serum levels of CA15.3 had a rise along the development of tumor. Among patients' level of CA15.3 was associated with tumor size.

Patients with (more than T3) had high level of CA15.3 than both patients with T2 and both patients of T1. Patients with T2 had high CA15.3 level than T1. As per the spread of lymphoid the levels of CA15.3 Were significant in both patients with N1 and more than N2 (p>0.05).Levels of CA15.3 were significant in both stage 2 and stage 3 patients (p value<0.05). Statistical difference of CA125 was found among the three groups of nodes. As in table 3 the CEA and Fer were significantly elevated in PR negative group when compared to PR positive (p>0.05). levels of CA15.3, CA125. CA724 and Fer showed no statistical differences among four (p>0.05).

Fig 5: CA 15-3 and CEA according to the epidemiological characteristics of patients.

| Parameter	Characteristics	CA-15-3 Mean U/mL	CEA Mean ng/l
Age	<45 Years (n=9)	43.98±9.89	1.87±0.87
Age BMI	>45 Years(n=6)	234±5.80	29.98±29.87
	Normal (n=11)	187±54	9.09±5.43
BMI	High (n=10)	156±65	17.65±12
PH of Breast Ca	Yes (n=14)	38.98±8.07	1.76±6.11
PH of Breast Ca	No (n=66)	187.909±78	18.45±21
FH of Breast Ca	Yes (n=8)	34±31	3.98±0.65
FH of Breast Ca	No (n=32)	176±80	14.87±4.5

Discussion

Clinical application of serum markers is of great significance. We explored the association between the 5 tumor markers and pathological features of breast cancer patients. In our study Fer was elevated in patients. Fer is increased in multiple human malignancies. elevated CEA, CA15.3. and FER were increased in CA breast, there diagnostic

accuracy was analyzed. As reported by Wangs group serum CEA, CA125 and CA15.3 were found to be higher in CA breast with metastasis thus, we can only conclude that CEA, CA15.3 and FER had low diagnostic accuracy for early stage of CA breast. Previously researchers found that tumor markers CEA, CA125, and CA15.3 were associated with

tumor burdened indicators including tumor size.CA15.3 was increase with the progress of CA breasts. Suggesting its prognostic value. Tampellini et al reported that CA 15.3 levels were increased or elevated in CA breast with liver metastasis, so the higher levels of CA 15.3 are important in cases of liver metastasis. In CA125 was found to be associated with axillary lymph node status. In our study, only CA 15-3 shared the similar results. Serum CA 15-3 found to be increased with tumor growth along with metastasis suggesting it's prognostic value. Tempellini et al reported raised levels of CA 15-3 in liver metastasis which resembled our findings. So, CA 15-3 needs more attention. Further CA125 was elevated in our study in cases of axillary lymph nodes. We couldn't observe any association between CAE/CA724/FER and tumor burden. Both ER and PR are tumor markers that can emphasize the hormonal response. HER-2 has been proposed to guide prognosis and treatment.
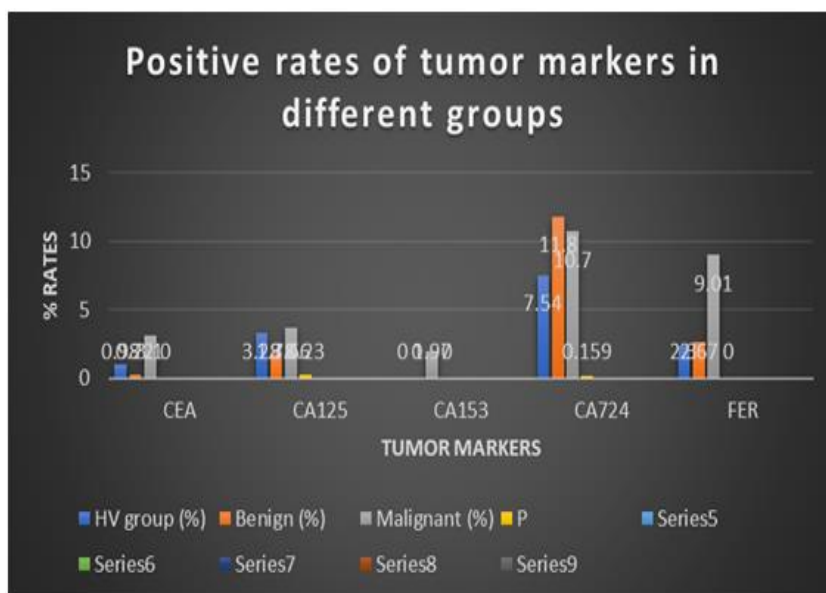
Figure 4: positive rate of tumor marker in different groups

So molecular subtypes based on ER, PR, HER-2 and Ki-67. Fang didn't find that CEA and CA15-3 correlation with molecular subtypes. As for metastatic breast cancer, Geng et al concluded that rise in CA 15-3 and CEA levels were found to be associated with molecular subtypes. In addition, Wu6 and his colleagues reported that CEA levels were lower in Ca Breast with other subtypes, and CA15-3 didn't correlate with molecular subtypes. So, the serum tumor markers and subtypes are not conclusive, further big studies required. Consistent with Imamura's results, they also found the elevated CEA was more positive in PR-negative group than positive ones. Level of tumor markers may be affected by factors like age, region, BMI, lifestyle and environment. It was also found that small sample size should be acknowledged. In our study inclusion and exclusion criteria were hardly lacking. As a whole five tumor markers were analyzed. Each marker has been strictly studied with molecular subtype.

Summary and Conclusion

In our study we found elevated levels of CEA, CA15-3 and FER were not much observed in Ca breast cases making them least accurate. CA-15-3 may exhibit tumor size and burden and stage advance in tumor size. There was found to be no association of tumor marker with its molecular subtypes. A larger size should be proposed and better tumor markers should be found out to clarify diagnosis and prognosis.

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