ASSOCIATION OF ABO BLOOD GROUP AND BREAST CARCINOMA AMONG CASES ATTENDING A TERTIARY CARE HOSPITAL, KOLKATA

Pathology

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ABSTRACT

INTRODUCTION: Breast cancer is a worldwide malignant disease. Over one million new cases of breast cancer are diagnosed every year. Cancer of Breast, the most prevalent cancers in the developing country like India, is the highest registry of cancer among Indian women and important cause of morbidity and mortality ABO Blood Groups also has been associated with risk and survival of several malignancies, including pancreas cancer and stomach cancer, the mechanism is complex and yet unclear. **AIMS AND OBJECTIVE:** To study histo-pathological type and grades of Breast Carcinoma. To find out ABO and Rh antigen expression in blood (ABO Blood Group) of respective Breast Carcinoma patients. To assess association between ABO Blood Groups and Breast Carcinoma. **MATERIAL AND METHODS:** It is an Observational, Descriptive and Cross sectional study. The study will be carried out in the Department of Pathology with collaboration of Department of General Surgery, Blood Bank and Record Section of R.G. Kar Medical College and Hospital, Kolkata, over a period of 18 months. Over a period of 18 months. (After ethics committee clearance and acceptance from the West Bengal University of Health Sciences) sample size 114. **RESULT AND ANALYSIS:** Among 114 cases, 18 were of Grade I while Grade II and Grade III comprised 46 and 50 cases respectively. 18 Grade I cases, 72.2% (n=13) were Invasive Breast Carcinoma and 27.8% (n=5) were Lobular Carcinoma cases. Among 46 Grade II cases, 82.6% (n=38) were Invasive Breast Carcinoma, 10.9% (n=5) were Lobular Carcinoma, 4.3% (n=2) were Medullary Carcinoma and 2.2% (n=1) were Metaplastic Carcinoma cases and in 50 Grade III cases, 90% (n=45) were Invasive Breast Carcinoma, 8% (n=4) were Lobular Carcinoma and 2% (n=1) were Pleomorphic Carcinoma cases.

KEYWORDS

ABO Blood Group And Breast Carcinoma

INTRODUCTION

Breast cancer is a worldwide malignant disease. Over one million new cases of breast cancer are diagnosed every year. Cancer of Breast, the most prevalent cancers in the developing country like India, is the highest registry of cancer among Indian women¹ and important cause of morbidity and mortality ABO Blood Groups also has been associated with risk and survival of several malignancies, including pancreas cancer and stomach cancer,¹³ the mechanism is complex and yet unclear. It may be due to influence of Blood Group antigens on systemic inflammatory response which has been associated with the malignancies. In some tumors, alteration of ABO/Lewis-related antigens is associated with malignant transformation. Since the first report by Aird et al (1953)² showing an association between blood group A and gastric cancer, numerous other reports have documented the relation between susceptibility to cancer and Blood Group. High incidence of blood group B in various cancers, including Buccal Mucosa, Lung, Uterus and Cervix and consistent relation to O Blood Group in Skin cancer of non-melanoma type been reported.

ABO Blood Group genes are mapped at 9q34.2 region in which genetic alteration is common in many cancers. The present study is an attempt to find association of ABO Blood Groups with Breast Cancer that is to identify a probable specific ABO Blood Group related to Breast Carcinoma. In future this may act as a preclinical predictor for Breast Carcinoma. Thus, the objectives of this study is to detect ABO Blood Group of patients suffering from Breast Carcinoma and to determine the association of the malignancy with the specific ABO Blood Group in a tertiary care hospital as R.G. Kar Medical College and Hospital, Kolkata.

According to the population based National Cancer Registry (India), Breast Cancer is one of the major cancers in Indian females.¹ The ABO Blood Group may have correlation as a predictive factor of breast carcinoma. Breast carcinoma is second most common cancer in world and most common cancer in women both developed and developing countries. In India, there is gradually increase in incidence of breast carcinoma due to urbanization and changes in lifestyle. In

spite of enormous development, there are wide discrepancies regarding availability of good quality of laboratory and treatment facilities. In India, a significant portion of breast carcinoma patients either do not have access to or cannot afford modern multispecialty management.

Breast carcinoma ranks as 5th cause of death from cancer overall, 522000 deaths. It is most frequent cause of cancer death in women in less developed country and second cause of death in more developed regions. Mortality rate varies from 6 per 100000 female populations in Eastern Asia to 20 per 100000 female populations in Western Africa.³

Embryology Of Breast

Development of the human mammary gland begins during the fifth week of gestation, as thickening of the ectoderm on the ventral surface of the fetus, called mammary ridges, which extend in curvilinear convex pattern from the axilla to the groin. The ridges disappear except for a small area in the pectoral region, where mammary glands develop. The earliest stages of breast development are largely independent of sex steroid hormones.⁴

Histology Of Breast

The epithelium throughout the ductal-lobular system is bi-layered, consisting of a luminal epithelial cell layer and a basal myoepithelial cell layer. It is one of the main guides used to distinguish benign from malignant lesions.⁵ The luminal epithelial cells of the resting breast ducts and lobules are cuboidal to columnar and typically have pale eosinophilic cytoplasm and relatively uniform oval nuclei. These epithelial cells express a variety of low-molecular-weight cytokeratins, including CK7, CK8, CK18, and Ck19.⁵

Clinical Presentation Of Breast Diseases

The most common symptoms reported by women with disorders of the breast are pain, and palpable mass, 'lumpiness' (without a discrete mass), or nipple discharge. The most common palpable lesions are cysts, fibro adenoma and invasive carcinomas.

AIMS AND OBJECTIVE**Objective Of Research**

- To study histo-pathological type and grades of Breast Carcinoma.
- To find out ABO and Rh antigen expression in blood (ABO Blood Group) of respective Breast Carcinoma patients.
- To assess association between ABO Blood Groups and Breast Carcinoma.

MATERIAL AND METHODS

Study Design/experiment Design: It is an Observational, Descriptive and Cross sectional study.

Study Setting And Timelines: The study will be carried out in the Department of Pathology with collaboration of Department of General Surgery, Blood Bank and Record Section of R.G. Kar Medical College and Hospital, Kolkata, over a period of 18 months.

Period Of Study: Over a period of 18 months. (After ethics committee clearance and acceptance from the West Bengal University of Health Sciences)

Study Population: Specimens of breast tissue received by the Department of Pathology for Histopathological Examination from patients with suspected malignancy undergoing mastectomy in the Department of General Surgery and later confirmed to be breast carcinoma during data collection and reporting period in R.G. Kar Medical College and Hospital.

Exclusion Criteria

- H/O previous chemo/radiotherapy for other type of cancer.
- H/O neo-adjuvant chemotherapy or radiotherapy for Breast Carcinoma.
- History of any other stromal tumor.
- Breast Carcinoma in male patients

Sample Size

114

Sampling Design

From the past 3 year records, maintained in the Department of Pathology, R.G Kar Medical College and Hospital, Kolkata, it is seen that on an average 81 specimens of breast are received per year from Department of General Surgery, confirmed later to be breast carcinoma.

As the calculated sample size of 114 is more than the expected available number specimens (108), all specimens with characteristic mentioned in study population meeting exclusion criteria (i.e. H/O previous chemo/radiotherapy for other type of cancer, H/O neo-adjuvant chemotherapy or radiotherapy for Breast Carcinoma, History of any other stromal tumor, Breast Carcinoma in male patients) will be included as study units.

Study Tools

- Case records form
- Histopathological data record form
- Binocular light microscope
- Digital Camera

RESULT AND ANALYSIS

We found that out of the total 114 cases, 17.5% (n=20) gave a positive history of tobacco smoking. In which 20 cases with positive history of smoking, 80% (n=16) were suffering from Invasive breast carcinoma, 15% (n=3) from Lobular carcinoma and 5% (n=1) from Metaplastic carcinoma. Out of the total 114 cases, breast feeding history was positive in 89.5% (n=102) cases and 12 cases with negative history of breast feeding, 83.33% (n=10) were suffering from Invasive breast carcinoma, 8.33% (n=1) from Lobular carcinoma and 8.33% (n=1) from Medullary carcinoma. Showing history of HRT among the cases Out of the total 114 cases, history of HRT was positive in 16.7% (n=19) cases.

We showed among 114 cases, 18 were of Grade I while Grade II and Grade III comprised 46 and 50 cases respectively. 18 Grade I cases, 72.2% (n=13) were Invasive Breast Carcinoma and 27.8% (n=5) were Lobular Carcinoma cases. Among 46 Grade II cases, 82.6% (n=38) were Invasive Breast Carcinoma, 10.9% (n=5) were Lobular Carcinoma, 4.3% (n=2) were Medullary Carcinoma and 2.2% (n=1)

were Metaplastic Carcinoma cases and in 50 Grade III cases, 90% (n=45) were Invasive Breast Carcinoma, 8% (n=4) were Lobular Carcinoma and 2% (n=1) were Pleomorphic Carcinoma cases. Among 96 Invasive Breast Carcinoma cases, 13 belong to Grade I, 38 to Grade II and 45 cases to Grade III. Among 14 Lobular Carcinoma cases, 5 belong to Grade I, 5 to Grade II and 4 cases to Grade III. All the cases of Medullary and Metaplastic Carcinoma belong to Grade II, while the solitary case of Pleomorphic Carcinoma was Grade III.

In our study found that a cross tabulation of all Blood Groups against the outcome of Grade of Malignancy was done assuming the Null Hypothesis of no difference amongst the Grades of Malignancy diagnosed amongst study subjects having different Blood Groups. Chi square test showing relation between grade of cancer and ABO Blood group Pearson Chi-square test produced a p value of <0.05 the Null hypothesis of assuming equal distribution of Grades of Breast Malignancy amongst various Blood Groups was rejected and the alternate hypothesis of difference of Grades of Malignancy in various blood groups amongst study subjects were accepted.

DISCUSSION

Chaithanya Babu B et al⁶ have found a mean age of diagnosis 47.8 years and most common group being 40-49 years (30.69%) followed by 50-59 years (25.93%) and 30-39 years (22.76%).

Karp et al⁷ found in their studies that about 80% of women with breast cancer are over 50 years. It is important to note that neither the expected incidence nor the projected number of deaths in last three years have risen despite a high screening rate and resulted in a rapid and sustained rate in breast cancer detection and diagnosis. In the present study it is concordant with these studies as most of cases belongs to this age group (i.e below 50 years) and mean age 48.02 years.

infiltrating ductal carcinoma of no specific type (NST) as the most common types per WHO Classification of Tumours of the Breast, 4th Edition (2012)⁸ invasive breast carcinoma of no special type (IBC-NST) commonly known as ductal carcinoma NST comprise the largest group of invasive breast cancer and comprising between 40% to 70% cases in published series.

Chaithanya Babu B et al⁹ observed infiltrating ductal carcinoma of no specific type as the most common type.

This study corroborate with that and found that infiltrating ductal carcinoma of no specific type were the highest occurrence cases, out of 114 cases 96 were infiltrating ductal carcinoma of no specific type which comprise of 84.2%.

ABO blood group and Rh Blood group with breast cancer risk, overall literature is inconsistent. Majority of huge studies published to date observed no association with Rh blood group of ABO Blood group and breast carcinoma with different ABO Blood group. Among these studies Blood group A is significantly associated, higher number of cases in blood group B. **With Rh(D) Blood group Torti RA. et al¹⁰** (1963) found no association with Rh(D) Blood group.

This study corroborate that, as there were no such association Rh(D) Blood group and breast carcinoma. A with ductal breast cancer (49.6%), in contrast to the other Blood Groups and particularly to Blood Group AB (3.6%). Blood Group A and, particularly, A (-) is the worst prognosis of all association between Blood Groups A with breast cancer in sample population. In this study there is no association found with Blood group A nor with Rhesus Blood group.

Kamlesh et al¹¹ Found in there study found that B and A blood groups were significantly higher than other Blood Group in breast cancer and oesophagus cancer patients respectively and concluded that The randomly selected breast cancer patient is found to be more in B blood group (37%), than O blood group (32%), B blood group (23%), AB Blood group (8%) and result shows no significant difference. ABO Blood Groups in breast cancer, the frequency of blood group O (34.92%) is highest, followed by B (28.57%), A (24.60%) and AB (11.91%). **David E et al¹²** in their study mentioned that individuals with Blood Group O were in excess then Blood Group A in their study population of familial Breast Cancer. In this study no such significant association noted.

P. J. Holdsworth et al¹³ in there study they found significant

association with AB Blood group and in this study it is found that there are no such association but the grade of cancer that is high grade (grade-III) carcinoma have significant association with AB Blood group. Association with breast carcinoma and any of the blood group, in this study it is found that no significant association with any type of breast carcinoma with any of the ABO and Rhesus blood group.

Gusterson BA et al¹⁴ with their immunohistological study of the human breast and the rodent breast (from inbred Ludwig/Wistar/Olac rats) which was conducted with the use of a murine monoclonal antibody, which reacts with the common acute lymphoblastic antigen, a glycosylated polypeptide of a molecular weight of 100,000. Matrix metalloproteinases (MMPs) concluded that Matrix metalloproteinases (MMPs) are endopeptidases that contribute to growth, development and wound healing as well as to pathologies such as arthritis and cancer. Recently, it has been thought that MMPs participate in these processes simply by degrading extracellular matrix (ECM) molecules.

Agarwal G and Ramakant P et al¹⁵ found in their studies that almost 50% of patients present with locally advanced disease. In the study population of 32 cases they found that 68.75% cases (22 cases) were Stage III and 31.25% cases (10 cases) were Stage II. There were no Stage I cases. In this study significant association between ABO Blood group and breast carcinoma of grade-3 noted which can be further enlightened by further large scale cohort study.

CONCLUSION

1. In this study, there were no significant association between ABO Blood group and type of breast carcinoma.
2. Rhesus Blood group (D-group) is not associated with the any type or grade of breast carcinoma.
3. There were no significant association between ABO Blood group with age, weight, parity, number of children, addiction and hormone replacement therapy
4. AB Blood group found significant association with high grade (BR grade-III) breast carcinoma.

TABLE: Table showing relation between the type of Cancer and Addiction to Smoking

Type of Cancer	Addiction to Smoking	
	Present	Absent
IBC-NST	16	80
Lobular Carcinoma	3	11
Medullary Carcinoma	0	2
Metaplastic Carcinoma	1	0
Pleomorphic Carcinoma	0	1

TABLE: Table showing relation between the type of Cancer and history of Breast feeding

Type of cancer	Breast feeding done	No Breast feeding done
IBC-NST	86	10
Lobular Carcinoma	13	1
Medullary Carcinoma	1	1
Metaplastic Carcinoma	1	0
Pleomorphic Carcinoma	1	0

TABLE: Showing relation between grades of cancer and type of cancer

Type of carcinoma	Grade I	Grade II	Grade III	Total
IBC-NST	13	38	45	96
Lobular Carcinoma	5	5	4	14
Medullary Carcinoma	0	2	0	02
Metaplastic Carcinoma	0	1	0	01
Pleomorphic Carcinoma	0	0	1	01

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