

The Association and Relation of ABO Blood Group with the Breast Cancer in Kirkuk Governorate

Sahar Mohammed Zaki (MBChB, MSc)¹, Fatehiya Fathullah Hasan (Ph.D.)², Kmaran
Mahmud Saydoka (MBChB)³ and Nyaz Amed Amin (MBChB)⁴

Abstract

Background: Cancer is common; it is the second most common cause of death in the Western worlds, Breast cancer accounts for around 20-25% of all female cancers in both India and UK world. There are differences between the percentages of patients with various malignant tumors in our country and those in the Western world. ABO blood groups are a stable feature of a population and they differ among various socioeconomic, geographical and ethnic groups and many risk factors are associated with the development of breast cancer. It is mentioned that bloods type has an influence on susceptibility and outcomes

Objectives: The aims of this study are:

1. To found any association between breast cancer and ABO blood group.
2. To know what is the frequency of each blood group in relation to patients with breast cancer.

Materials and patients: This study has been carried in Azady teaching hospital in Kirkuk on 250 patients with breast cancer and classified according to their blood group.

The control sample was 300 healthy donors from Kirkuk blood bank and classified according to their ABO group and frequency of each sample estimated statistically and compared with each other.

Results: This study shows the distribution ABO blood groups among patients with breast cancer were as follow: blood group type (A) 64% (160) , blood group type (O) 18% (45) , (B) 9.6% (24) , and (AB) 8.4% (21)

For the donors healthy control, ABO blood groups percentage were as follow: type (O) 36 % (108) type (A) 29.4% (88), type (B) 20.6% (62), and type (AB) 14% (42). The distribution of blood group among the patients with breast cancer and the donors from normal population that the result is highly significant ($p < 0.000$).

Conclusions: The study shows a strong correlation between the ABO group type and breast cancer and the highest frequency and percentage of patients with breast cancer was in blood group type (A).

Key words: cancer, breast cancer, blood group.

^{1,3}Immunity Kurdistan Council for Medical Specialist - Ministry of Higher Education - Iraq.

² Medical College - Hawler Medical University (HMU) - Iraq.

⁴ Head of Oncology Department - Azadi Teaching Hospital - Iraq.

Introduction

Cancer is common; it is the second most common cause of death in the Western world, after cardiovascular disease. However, there is significant variation with age, sex and geography in the incidence of the various malignancies. Breast cancer accounts for around 20-25% of all female cancers in both India and UK [1].

The first suggestion of an association between ABO blood group antigens and malignancy was made almost 100 years ago, yet the role of the ABO blood group in cancer risk and prognosis remains controversial [2].

Since the discovery of an association between stomach cancer and blood type A by Arid and Bentall in 1953, there have been several studies on possible relationship of blood types to certain diseases [3].

ABO blood groups are a stable feature of a population and they differ among various socioeconomic, geographical and ethnic groups. In Europe, highest frequency is of allele a, increasing to allele B from West to East [4].

There are differences between the percentages of patients with various malignant tumors in our country and those in the Western world. Cancer is a disease on which lot of work has been done in comparison to other diseases [5].

Many risk factors are associated with the development of breast cancer, it is seldom mentioned that blood type has an influence on susceptibility and outcomes. In fact, some researchers have even gone so far as to say that "blood groups were shown to possess a predictive value independent of other known prognostic factors" when discussing breast cancer. Other researchers have actually suggested that a degree of the susceptibility to breast cancer, from a gene perspective, might be a result of a breast cancer-

susceptibility locus linked to the ABO locus located on band q34 of chromosome 9[6].

Human malignancies such as colon, breast and prostate cancer as the blood group carbohydrates expressed on cell surface of metastasis cancer cells function as cell adhesion molecules. The loss or presence of blood group antigens can increase cellular motility or facilitate the interaction between tumor cells and endothelial cells [7].

The huge interest in blood type stems from the developing awareness that blood type antigens are incredibly important components in the process of cell maturation and control; for example the appearance or disappearance of blood type antigens is a hallmark of malignancy in many common cancers [8, 9].

Several 'tumor antigens' or 'tumor markers' are the known product of certain blood type precursors. Many of these tumor antigens are 'A-like' which helps in part to explain the striking number of associations with blood type A and AB. On the contrary, auto-immune disorders tend to be associated with blood type O [10].

Aims of this study are to found any association between breast cancer and ABO blood group and what is the frequency of each blood group in relation to patients with breast cancer.

Materials and patients

This study has been carried in Azady teaching hospital in Kirkuk on 250 patients with breast cancer and classified according to their blood group.

The control sample was 300 healthy donors from Kirkuk blood bank and classified according to their ABO group and frequency of each sample estimated statistically, then compared with each other.

Results

This study shows the distribution ABO blood groups among patients with breast cancer were as follow: blood group type (A)

64% (160) , blood group type (O) 18% (45) , (B) 9.6% (24) , and AB 8.4% (21) as shown in table (1) and Fig(1).

Table (1): the distribution of blood group among patients with breast cancer.

Blood group	frequency	percentage
A	160	64
O	45	18
B	24	9.6
AB	21	8.4
	250	100

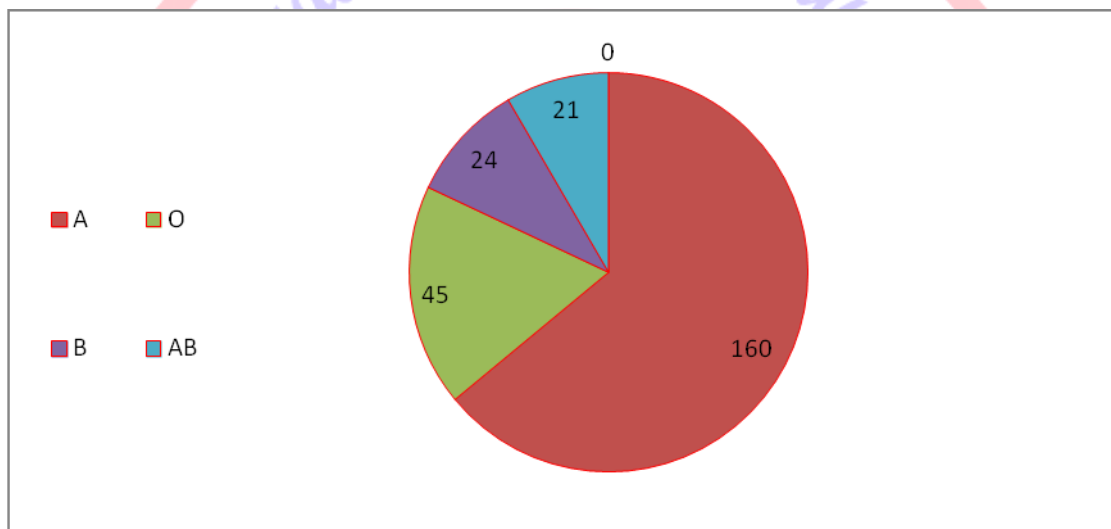


Figure (1): The distribution of blood group among patients with breast cancer.

For the donors healthy control , ABO blood groups percentage were as follow: type (A)29.4% (88) , type (O)36 % (108) ,type(B) 20.6% (62), and type (AB) 14% (42) as shown in table(2) and figure(2).

Table (2): the distribution of blood group among donors of health control.

Blood group	frequency	percentage
A	88	29.4
O	108	36
B	62	20.6
AB	42	14
	300	100

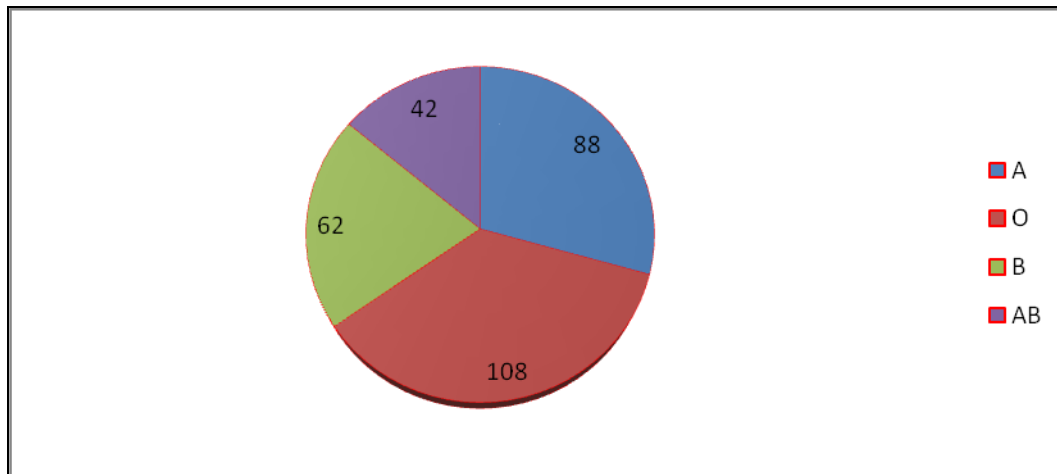


Figure (2): distribution of blood group among normal population.

When we compare the distribution of blood group among the patients with breast cancer and the donors from normal

population that the result is highly significant as shown in table (3) and fig (3) by using chi test.

Table (3): the distribution of blood groups between patients with breast cancer and normal population.

Blood group	Patients with breast cancer		Normal population		P value	
	frequency	percentage	frequency	percentage		
A	160	64	88	29.4	0.000	Hs
O	45	18	108	36	0.000	Hs
B	24	9.6	62	20.6	0.000	Hs
AB	21	8.4	42	14	0.000	Hs
	250	100	300	100		

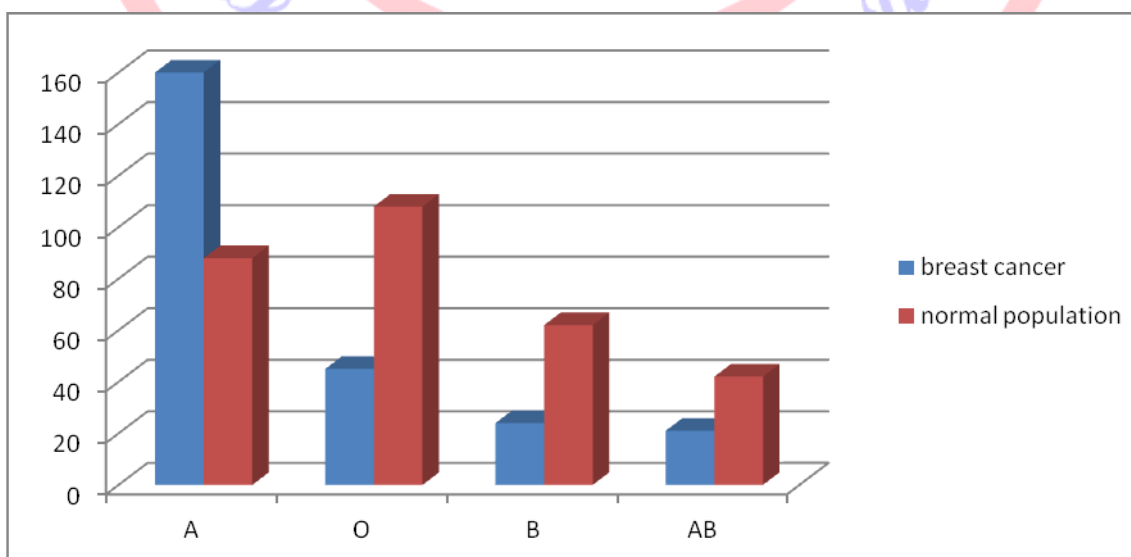


Figure (3): the distribution of blood groups between patients with breast cancer and normal population.

Discussion

In this study, the incidence of a group was higher in breast and cancer patients, followed by O group, whereas in controls, O and A groups were in higher frequency with highly significant difference (Hs) statistically.

The result of this study agree with study done in India which showed a significant relation between blood group A and breast cancer [11].

A study of rapidly progressive breast cancer in Tunisian women found a slightly increased risk of a positive diagnosis in blood type A. In breast cancer patients, high frequency of blood group a (35.7%), followed by group O (28.5%), group B (19.0%) and group AB (16.6%) was seen [12].

ABO blood group was highly correlation with breast cancer and the majority of patient with a blood group followed by O blood group in AL-Nassyiria governorate – Iraq [13].

According to a study done in Iran. The association of breast cancer and the blood type has had different degrees in various studies. For example, it has been reported that A-blood group is more frequent in patients with breast cancer in comparison with O-blood group [14].

With the exception of bladder cancer, there is a statistical association between increased risk of cancer and people with blood type A. This includes colon cancer, ovarian and breast cancer, liver and pancreatic cancer, prostate cancer and brain tumors. That is not to say people of other blood types don't get cancer. It simply means that blood type (A), people have less defense against it. It seems that cancer cells have certain type (A) qualities that make it almost invisible to the immune system in blood type (A) people [15].

The blood group type is one of the genetic factors which affect the risk of different cancers. Studies of associations between tumors outcome and the patients' ABO blood groups have shown increased relative risks for some of blood groups [16].

Many observations has been showed that blood type A women have a generalized tendency to worse outcomes and a more rapid progression with this cancer. Research indicates that blood type a women are over-represented among breast cancer patients, and that this trend occurs even among women thought to be at low risk for cancer [17].

One of the most significant risk factors for a rapidly progressing breast cancer is also blood type A, and blood type a women have been observed to have poorer outcomes once they are diagnosed with breast cancer [18].

The results of a study done by Holdsworth suggested that the effect of blood type A on breast cancer development was capable of being masked by the effect of breast cancer susceptibility genes and/or that the inherited or non-inherited types involve different etiologic mechanisms[19].

Conclusions

1. There was a strong relation between breast cancer and ABO blood group.
2. The highest percentage of patients with breast cancer was in the blood group (A) and followed by blood group type (O).
3. The blood group could be consider as risk factor for prognosis and development of breast cancer.

References

- [1] Boon NA, Colledge NR, Walker BR (eds). Oncology. Davidson,s principles &practice of Medicine. 20th edition; 2006:253-272.
- [2] Rummel S, Shriver CD, Ellsworth RE. Relationships between the ABO blood group SNP rs505922 and breast cancer phenotypes:

- a genotype-phenotype correlation study. *BioMed Central Medical Genetics* 2012; 13:41.
- [3] Arid, I.; Bentall, H. H. and Fraser, Roberts, J. A.. A relation between cancer of the stomach and ABO blood groups. *Br. Med. J.* 1983; 1:799-801.
- [4] Sharma G, Choudhary R and Bharti D. Studies Showing the Relationship between ABO Blood Groups and Major Types of Cancers. *Asian J. Exp. Sci.* 2007; Vol. 21, No. 1, 129-132.
- [5] Beardmore, J.A. and Karimi-Booshehri, F.: ABO genes are differently distributed socio-economic groups in England. *Nature* 1983; 303: 522-524.
- [6] Costantini M, Fassio T, Canobbio L. Role of blood groups as prognostic factors in primary breast cancer. *Oncology* 1990; 47(4):308-12.
- [7] Barua, S. Human. Genetics: Anthropological Perspective. *Classique Books, Kolkata*; 2002.
- [8] Simoneau, M., La Rue, H., Aboukassim, T.O., Meyer, F., Moore, L. and Fradet, Y. Chromosome 9 deletions and recurrence of superficial bladder cancer: identification of four regions of prognostic interest. *Oncogene* 2000; 19: 6317-6323.
- [9] Zitzelsberger, H., Engert, D., Walch, A., Kulka, U., Aubele, M., Hofler, H., Bauchinger, M. and Werner, M. (2001). Chromosomal changes during development and progression of prostrate adenocarcinoma. *Br. J. Cancer*. 2001; 84: 202-208.
- [10] Garratty G. Association of blood groups and disease: do blood group antigens and antibodies have a biological role? *Pubbl Stn Zool Napoli [II]* 1996; 18(3):321-44.
- [11] Guleria K, Singh HP, Kaur H and Sambyal V. ABO Blood Groups in Gastrointestinal Tract (GIT) and Breast Carcinoma Patients. *Anthropologist* 2005; 7(3): 189-192.
- [12] Mourali, N., Muenz, L.R., Tabbane, F., Belhassen, S., Bahi, J. and Levine, P.H. Epidemiologic features of rapidly progressing breast cancer in Tunisia. *Cancer*. 1980; 46: 2741- 2746.
- [13] Mehdi L M., Saleh H S, Al-Fartosi K G, Mubarak H R, Addai Z R, Idres, M. Relationship between ABO blood group and breast cancer at AL-Nassyria city / Iraq. *Journal of Thi-Qar science* 2008; 1: (1).
- [14] Amini M., Fatah SH, Kalantari M. ABO blood groups and prognosis of breast cancer: a case-control study in Arak/Iran. *IJBC* 2011; 1: 155-159.
- [15] Rolfe KJ, Nieto JJ, Reid WM, Perre" CW, MacLean AB (2002). Is there a link between vulvar cancer and blood group? *Eur J Gynaecol Oncol*, 23(2): 111-2.
- [16] Sharara AL, Abdul-Baki H, ElHajj I, Kreidieh N, Kfoury-Baz EM. Association of gastroduodenal disease phenotype with ABO blood group and *Helicobacter pylori* virulence-specific serotypes, *Dig Liver Dis*, 2006; 38: 829-33.
- [17] Rosen PP, Schwartz MK, Menezes-Botet CJ. Blood groups and response to therapy for mammary cancer. *Am J Clin Pathol*. 1977; 67:504-5.
- [18] Anderson DE, Haas C. Blood type A and familial breast cancer. *Cancer Nov* 1984; 14(9):1845-1849.
- [19] Holdsworth PJ, Thorogood J, Benson EA, Clayden AD. Blood group as a prognostic indicator in breast cancer. *British Medical Journal (Clin Res Ed)* 1985 March; 2; 290(6469):671-3.