

## A Study of Association of ABO Blood Group types with Cancer Risk

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### ABSTRACT

More than 30 blood group systems have been recognized by International Society of Blood Transfusion (ISBT). ABO blood group is one of the most studied blood group system. ABO blood group system consist of three alleles A, B and O, out which A and B are co- dominant and O is recessive. Many researchers and investigators have found association between ABO blood group and cancer risk. It was found from the recent data that blood group A and AB is associated with increased pancreatic and gastric cancer risk. In the present study data of ABO blood group of 243 patients, both males and females, with confirmed cases of cancer was obtained from Sir Sunderlal hospital, Institute of Medical Science (IMS), Banaras Hindu University (BHU) and Apex hospital, DLW Road, Varanasi. 250 Samples of both males and females were taken as control. Out of 243 cancer patients 117 were males and 126 were females. In 243 cases enrolled in present study, highest number of cases were of breast cancer among women and lowest were rectal cancer. It was found that A blood group was associated with breast cancer, oral cancer, liver cancer and ovarian cancer as compared to other blood group and blood group O was associated with lung cancer, gastric cancer, colon cancer, skin cancer and endometrial cancer.

### Introduction

ABO blood group system contains three antigens (i.e. A, B and H) and is clinically most important blood group system among 33 blood group systems (1). Blood groups classification refers to the antigens present or absent on the red blood cells (RBCs) surface. The gene for ABO is located on chromosome 9 at 9p34.1-q34.2. ABO gene has 7 exons. ABO locus has three main allelic forms A, B and O. The frequency of A and B blood groups differs among the population of the world (2, 3, 4). Several studies have been carried out to find the frequency and association of ABO blood groups with different types of diseases in different population of the world (5-34)

**Table.1: Association of ABO Blood Group with Different Type of Cancer-**

S.N.	Cancer	Sample Size	Blood Group Association	Country and State	References/ study
1	Breast Cancer	1713	A	Korea	Park et. al., 2017
2	Breast Cancer	206	A	Rajasthan	Saxena et. al., 2015
3	Breast Cancer	166	A	Greece	Meo et. al., 2017
4	Breast Cancer	197	A	Iran	Shiryazadi et. al., 2015
5	Pancreatic Cancer	166	A	Germany	Pelzer et. al., 2013
6	Pancreatic Cancer	633	A	Turkey	Engin et. al., 2012
7	Pancreatic Cancer	627	A	Germany	Rahbari et. al., 2012
8	Pancreatic Cancer	274	A	U.S	Greer et. al., 2010
9	Liver Cancer	88	A	Bangladesh	Hosen et. al, 2018
10	Gastric Cancer	1412	A	China	Xu et. al., 2016
11	Gastric Cancer	1045	A	China	Wang et. al., 2012
12	Gastric Cancer	3245	A	Korea	Song et. al., 2013
13	Colorectal Cancer	1620	A	Turkey	Urun et. al., 2012
14	Esophageal Cancer	480	A	India	Kumar et al., 2014
15	Lung Cancer	307	A	Turkey	Oguz et. al., 2013
16	Lung Cancer	2044	A	Turkey	Urun et. al., 2013
17	Lung Cancer	458	A	Jordan	Alqudah et al., 2018

## Data Collection

Data was collected from Sir Sunderlal Hospital, IMS, BHU, Varanasi and Apex Hospital, Varanasi. Out of 243 confirmed diagnosed cancer patients, 117 were males and 126 were females. Out of which 57 sample were patients suffering from breast cancer, 17 were patients suffering from kidney cancer, 29 were patients suffering from lung cancer, 27 were patients suffering from oral cancer, 9 were patients suffering from liver cancer, 21 were patients suffering from blood cancer, 6 were patients suffering from brain tumor, 3 were patients suffering from prostate cancer, 10 were patients suffering from endometrial cancer, 17 were patients suffering from ovarian cancer, 18 were patients suffering from gastric and stomach cancer, 17 were patients suffering from colorectal and colon cancer, 2 were patients suffering from Rectal and anal canal node and 10 were patients suffering from skin cancer. Data of 250 Samples were taken as control. Out of which 160 were male and 90 were female.

## Results

Blood group A was highest among the total 243 cancer patients. The distribution of ABO blood groups among the patients suffering with breast cancer were blood group type A(49.12 %), blood group type B(15.78 %), blood group type AB (8.77 %) and blood group type O (26.31%). Blood group A was found more in patients suffering from breast cancer as compared to the other blood groups (P value 0.0005).

**Table.2: Distribution of ABO Blood Group in Cancer Patients (n=243).**

Blood Group	Number	Percentage
A	86	35.39
B	55	22.63
AB	25	10.28
O	77	31.68
Total	243	100

**Figure 1. Distribution of ABO Blood Group in Cancer Patients(n=243).**

**Table 3. Distribution of ABO blood group in normal population.**

Blood Group	Number	Percentage
A	45	18
B	94	37.6
AB	25	10
O	86	34.4
Total	250	100

**Figure 2. Distribution of ABO blood group in normal population (Control n=250).**

**Table 4. Distribution of ABO blood group in breast cancer patients.**

Blood Group	Number	Percentage	P-Value
A	28	49.12	0.0005
B	9	15.78	0.015
AB	5	8.77	0.89
O	15	26.31	0.382
Total	57	100	

### Figure 3. Distribution of ABO blood group in breast cancer patients.

#### Discussion

This study aimed to investigate the association between ABO blood groups and risk of cancer. In the present study, data from 243 number of cases and 250 controls, we found significant associations of blood group A with increased risk of Cancer in Eastern (U.P.). Studies across the world has shown association of blood group A with, Breast Cancer (18-21), pancreatic cancer (22-25), liver Cancer (26) gastric and lung Cancer (27,28,29,32,33,34) risk. Data from a these studies have shown that blood group A is associated with breast cancer, liver and pancreatic cancer, and lung cancer risk.

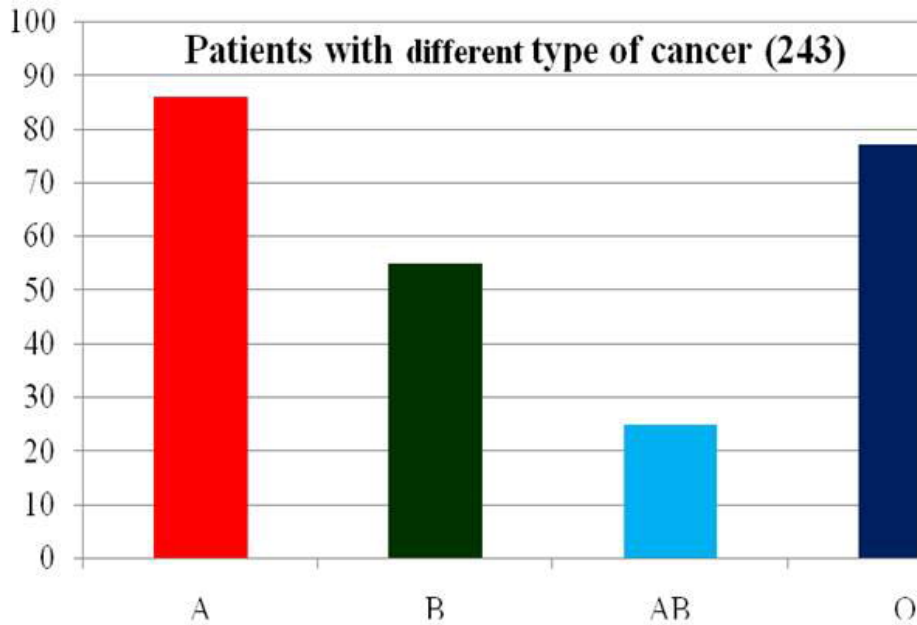
#### Conclusion

In conclusion, is found that different ABO blood groups are associated with different type of diseases. Our study also showed that blood type A was more associated to cancer patients and blood type AB having least association and risk of cancer patients.

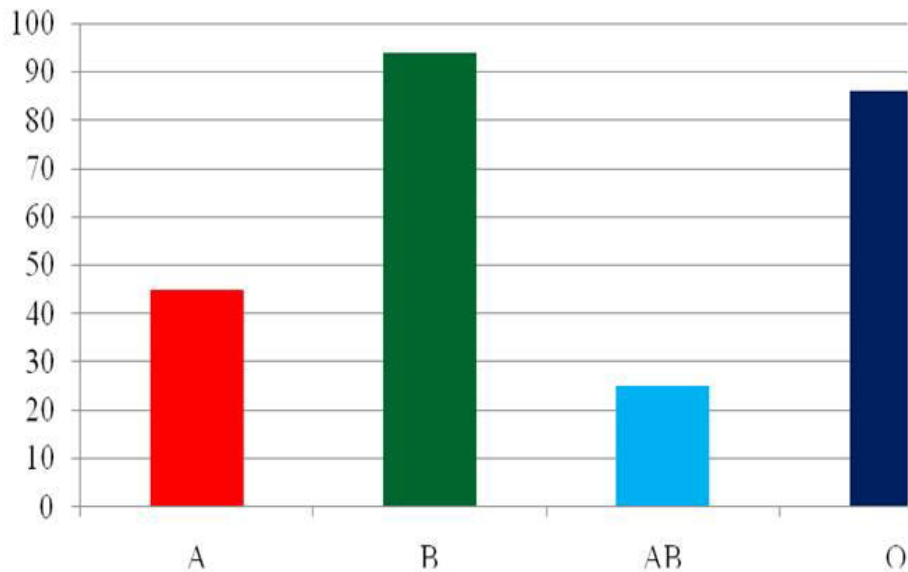
#### References

1. Mitra, R., Mishra, N., Rath, G., P.: Blood group Systems. Indian J Anaesth 58(5), 524-528(2014)
2. Anstee, D.J.:The relationships between blood groups and disease. Blood 115(23), 4635-4643(2010).
3. Hirszfeld, L., Hirszfeld, H.: Serological differences between the blood of different races. Lancet 197, 675-679(1919).
4. Mourant, A., E, Kopec, A., C.,Domaniewska-Sobczak, K.: Blood groups and diseases.Oxford, United Kingdom:Oxford University Press(1978).
5. Kumar, P., Yadav, M., Rai, V.: ABO and Rh(D) blood groups among yadav of District Jaunpur. Pb. Univ. Res. J. Sci. 58, 79-81(2008).
6. Kumar, P., Singh, V., K., Rai, V.: Study of ABO and Rh(D) blood groups in Kshatriya (Rajput) of Jaunpur district, Uttar Pradesh. Anthropologist. 11, 303-304(2009).
7. Kumar, P., Maurya, S., Rai,V.: Distribution of ABO and Rh(D) Blood Groups among Koari (Backward Caste) Population of Jaunpur District. Anthropologist. 11, 309-310 (2009).
8. Kumar, P., Saima, Rai, V.: Study of ABO and Rh(D) blood groups in Sunni muslims of Jaunpur district. Anthropologist. 12: 225-226 (2010).
9. Rai, V., Kumar, P.: The Incidence of ABO Blood Group in Muslim Population of Uttar Pradesh, India. J. Appl. Biosci. 36, 191-195(2010).
10. Rai, V., and Kumar, P.: Genetic Analysis of ABO and Rh Blood Groups in Backward Caste Population of Uttar Pradesh, India. Not Sci Biol. 3, 07-14 (2011).
11. Rai, V., Jahan, S., Kumar, P.: "Demographic study of ABO and Rh (D) Blood Groups among Muslim Population of Jaunpur District (U P)" Asian Jr. Microbiol. Biotech. Env. Sc. 12, 429-432 (2010).
12. Rai, V., Maurya, S., K., Kumar, P.: ABO and Rh(D) Blood Groups Distribution Among Khatik (Scheduled Caste) Population of Jaunpur District (U P). Pb. Univ. Res. J. Sci. 59, 107-109 (2009).
13. Rai, V., Patel, RP., Kumar, P., Study of ABO and Rh(D) blood groups in Scheduled Caste of Jaunpur district. Anthropologist. 11, 151-152(2009).
14. Rai, V., Verma, A., K., Kumar, P.: A study of ABO and Rh(D) blood groups among Kurmi (Backward caste) of Jaunpur district. Anthropologist. 11, 305-306(2009).
15. Kumar, P., Kumar, P., Rai, V.: Distribution of ABO Blood Groups in malaria patients belonging to OBC population of eastern Uttar Pradesh. J.Exp.Zoo.India 18(1), 31-33(2015).
16. Kumar, P., Maurya, A.K., Rai, V.: ABO and Rh(D) blood groups among maurya(backward caste) population of Jaunpur District(UP), India. Asian Jr. Microbiol. Biotech. Env. Sc. 11(4), 723-726(2009)
17. Kumar, P., Rai, V.: Red blood cell antigen distribution in Scheduled Caste population of Uttar Pradesh India. Asian Jr. Microbiol. Biotech. Env. Sc. 14(2), 217-222(2012).

18. Park, S., Kim, KS., Kim, JS., et al.: Prognostic value of ABO blood types in young patients with breast cancer; A nationwide study in Korean Breast Cancer Society. *Med Oncol.* 346, 118(2017).
19. Saxena, S., Chawla, VK., Gupta, KK., Gaur, KL.: Association of ABO blood group and breast cancer in Jodhpur. *Indian J Physiol Pharmacol.* 591, 63-68(2015).
20. Meo, S, A., Suraya, F., Jamil, B.: Association of ABO and Rh blood groups with breast cancer; *Saudi J Biol Sci.* 247, 1609-1613 (2017).
21. Shiryazadi, S., M, Kargar, S., Dehghan, M., A, Nematzadeh, H., Jahromi, M., A.: Frequency distribution of ABO/Rh blood group systems in breast cancer, Yazd. 2007–2013. *Zahedan J. Res. Med. Sci.* 17-8 (2015).
22. Pelzer, U., Klein, F., Bahra, M., et al.: Blood group determinates incidence for pancreatic cancer in Germany. *Front Physiol.* 24, 118 (2013).
23. Engin, H., Bilir, C., Ustun, H., Gokmen A.: ABO blood group and risk of pancreatic cancer in a Turkish population in Western Blacksea region. *Asian Pac J Cancer Prev.* 13,131–3 (2012).
24. Rahbari, N,N., Bork, U., Hinz, U., Leo, A., Kirchberg, J., Koch, M., et al.: ABO blood group and prognosis in patients with pancreatic cancer. *BMC Cancer* 12, 319 (2012).
25. Greer, JB., Yazer, MH., Raval, JS., et al.:Significant association between abo blood group and pancreatic cancer. *World J Gastroenterol.* 16, 5588-91(2010).
26. Hosen, S,M ,Yusuff., S, Barua., A, Chowdhury.: ABO Blood Type and threat of git cancer and liver cancer in Bangladeshi populations; *jmbas.* 10, 15520-105(2018).
27. Xu, YQ., Jiang, TW., Cui, YH., Zhao, YL., Qiu, LQ.: Prognostic value of ABO blood group in patients with gastric cancer. *J Surg Res.* 201, 188–95 (2016).
28. Wang, Z., Liu, L., Ji, J., et al.: ABO blood group system and gastric cancer: a case-control study and meta-analysis *Int J Mol Sci.* 13, 13308-21(2012).
29. Song, HR., Shin, MH., Kim, HN., et al.: Gender-specific differences in the association between ABO genotype and gastric cancer risk in a Korean population. *Gastric Cancer.* 16, 254–60. (2013).
30. Urun, Y., Ozdemir, NY., Utkan, G., et al.: ABO and Rh blood groups and risk of colorectal adenocarcinoma . *Asian Pac J Cancer Prev.* 13, 6097-6100(2012).
31. Kumar, N., Kapoor, A., Kalwar, A., Narayan, S., Singhal, MK., Kumar, A., et al.: Allele frequency of ABO blood group antigen and the risk of esophageal cancer. *Biomed Res Int.* 28, 6810(2014).
32. Oguz, A., Unal, D., Tasdemir, A., et al.: Lack of any Association between Blood Groups and Lung Cancer Independent of Histology. *Asian Pac J Cancer Prev.* 14, 453-6(2013).
33. Urun, Y., Utkan, G., Cangir, AK., Oksuzoglu, OB., Ozdemir, N., Oztuna, DG., et al.: Association of ABO blood group and risk of lung cancer in a multicenter study in Turkey. *Asian Pac J Cancer Prev.* 145, 2801–3(2013).
34. Alqudah, M., Allouh, M., Hamouri, S., Zaitoun, A., Ghamdi, N, A., et al.: Is. Rh Positivity a Possible Risk Factor for Lung Cancer. *Jordan J. Biol. Sc* 11, 281-284(2018).



**Control Blood Group**



Breast Cancer Patients (57)

