Research Article
Genetic Association of ABO Blood Group and Prostate Cancer in South-South Nigeria

[2]E.O. Afolabi, [1]G.S. Oladipo, [2]O.N. Ekeke and [2]J.E. Raphael
[1]Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences,
[2]Department of Surgery, University of Port Harcourt, Teaching Hospital Port Harcourt, Nigeria

Abstract: A retrospective study carried out between 2006 and 2008 to establish a genetic association between ABO blood group system and prostate cancer in selected cities of the South- South geographical region, Port Harcourt and Benin city. Data were collected from the medical record folders in University of Benin Teaching Hospital. A sample size of 120 was used and control size of 740. For the data analysis, χ^2 test and odd ratio and confidence interval were used and the control was obtained according to date, PSA value and hospital matched. From the result, 25 patients were blood type A, 11 blood type B, 1 blood type AB and 83 were blood type O, prostate cancer case. For control, 144 patients were blood type A, 78 blood type B, 19 blood type AB and 499 were blood type O. Statistically analyzing the result, mainly for type A and O that have greater frequencies in disease than in control. For type A blood, odd ratio = 1.0894 and 95% confidence interval of (OR) = 0.5622 to 1.6516. For type O blood, odd ratio = 1.0834 and 95% confidence interval of (OR) = 0.4968 to1.500. This study will be of immense use to clinical haematologist, genetic and clinical anthropologist and medical doctors in the treatment and diagnosis of prostate cancer among the south-south Nigerian population.

Keywords: ABO blood group, genetic association, prostate cancer

INTRODUCTION

Several works have been done in the past in other to investigate whether certain diseases were less frequent in members of one blood group than in members of other blood groups. Not even one of these studies provided an evidence to convince people of their findings (Vioquel and Walker, 1991; Tryggvadottir et al., 1988).

Until in 1958 when Arid Bentall and Roberts J.A Fraser found and reported significant Associations between ABO blood groups and several diseases there was no convincing evidence (Aird et al., 1960). In the studies that have produced these findings a large number of patience suffering from a specific diseases were classified according to the blood group, the percentages were compared with those among a control group of persons not affected by the disease; for persons with congenital defect such as hydrocephalus harelip, cleft palate and lip, appendicitis, kidney stones etc. The blood groups frequencies were not significantly different from those for the control but with certain other diseases there were significant differences.

Risk factors for cancer have been assessed over the years and many strong associations have been discovered. Blood type is an easily accessible factor in patients' genetic makeup. Gastric cancer appears to show some correlation with blood type A. In one Taiwanese study, patients with gastric cancer were compared with control. Each group was separated into blood type A or Non-A. The gastric cancer group had an increased likelihood of being type A (OR 1.61 p<0.01) (Lee et al., 1990).

A Japanese study compared 1,233 gastric cancer patience to 2,200 patience with begin gastrodudenal disease. A higher frequency of blood type A was seen in gastric cancer patients with a positive family history of cancer (Oishi et al., 1989).

Pancreatic cancer also seems to be associated with blood type. A study in Serbia Yugoslavia compared 100 pancreatic cancer patients to hospital controls matched for age, sex and place of residence. There was an increase prevalence of blood type A in the pancreatic cancer (OR 2.70, p<0.01). There was a decrease prevalence of blood type ORh+ in the experimental group compared to controls (OR 0.25, p<0.00027) (Kokic et al., 1996).

Corresponding Author: E.O. Afolabi, Department of Surgery, University of Port Harcourt, Teaching Hospital Portharcourt, Nigeria, GSM: +2348060553917

In a study published in the BMJ, Aird *et al.* (1960) found an association between type A and pancreatic cancer. 46.0% of the pancreatic cancer patients were blood type A as compared to 40.1% of control. The Author postulated that this may be due to an increased rate of diabetic patients being blood type A and diabetes is a risk factor for pancreatic cancer.

A Chinese study investigated risk factor for epithelial ovarian cancer. Blood type A was found to be one of the high risk factors of the disease (Zhang *et al.*, 1997). A 1995 study compared correlation of ABO blood type to gynaecologic tumors in terms of risk and survival rates. Endometrial and ovarian cancers occurred more frequently in females with type A than those with other blood types. In the same tumors, type A was associated with poor prognosis (Marinaccio, 1995). Breast cancer and blood types has shown variable results in the literature. Anderson and Haas (1984) found sister pedigrees with breast cancer to have an increased rate of type A compared to type O. One of the two facilities in the study found the risk ratio A: 0 = 2.11 (p<0.01). The other facility found A: O = 2.36 (p<0.01). The Authors propose that based on this and previous studies, there is a small association between blood type A and breast cancer development. They also suggested that in a consecutive series of patients an excess of 7-20% type A would be found.

A 1995 Japanese study, risk factor for bladder cancer were assessed in 303 males and control. A significant lower control adjusted or for bladder cancer in males was associated with blood group O (Nakata *et al.*, 1995) .Generally, it appears that stomach and pancreatic cancer have strongest association with blood type. Type A seems to have an increased risk in both. Breast cancer may have an association with blood group, but different blood groups are associated with different manifestations of the diseases. Other cancers show various risk or lack of risk associated with blood group. Type a individuals appear to be at a moderately increased risk for many cancers.

The information on blood type as a risk factor for cancer is one of many tools nature may use when creating plan for preventative medicine with their patients. The study seems to show a fairly consistent modest correlation between several cancers and ABO types.

Having, gone through some of these articles, it is evidently clear that a person can be predisposed to certain sickness because of the individuals blood group and as well confer some kind of resistance to some certain sickness. For example blood group A individuals have been reported to have high levels of cortical predisposing them to hypertension, gastric cancer and high incidence of cerebral malaria (Marinaccio, 1995; Asano *et al.*, 1987; Kvist *et al.*, 1988; Lee *et al.*, 1990; Roberts *et al.*, 1988).

Thus the aim of this study is to demonstrate the genetic association of the ABO blood group with prostate cancer in south-south Nigeria.

MATERIALS AND METHODS

The survey pool consists of the medical records of the prostate cancer patients between 2006-2008 at the University of Port Harcourt Teaching Hospital (UPTH) and those of prostate cancer patience between 2006-2008 in the University of Benin Teaching Hospital (UBTH) Nigeria.

In the study, a total number of 120 case notes of prostate cancer patients were used out of which 76 folders were taken from the health records department of the UPTH Port Harcourt and the remaining 44 were taken from the archive of the UBTH Benin-City. They folders of patients in UPTH and UBTH contained admission date, Age, Hospital, PSA value matched. Total number 740 subjects were used as control. All subjects were Nigerians by both parents and grand parents.

All measurement were processed using the (χ^2) test, Odds ratio and confidence interval.

RESULTS

The results of the study is presented in Table 1 to 5 and Fig. 1 and 2. From the tables and figures, Blood group O had the highest occurrence of prostate cancer.

Table 1: Number of individual with prostate cancer with respect to their blood group

A	B	AB	O
25	11	1	83

n = 120

Table 2: Blood group distribution of control group

A	B	AB	O
144	78	19	499

n = 740

Table 3: Blood groups with respect to cancer incidence and its percentage.m

Blood group	Cancer incidence	Control incidence	Cancer percentage	Control percentage
O	83	499	69.17%	67.43%
A	25	144	20.83%	19.46%
B	11	78	9.17%	10.54%
AB	1	19	0.83%	2.57%
Total	120	740	100%	100%

Table 4: The risk factors of blood type A with respect to cancer cases

Risk factor	Cap cases	Health control	Total
Type A blood	25	144	169
Non type A blood	95	596	691
Total	120	740	860

Table 5: The risk factors of blood type O with respect to cancer cases

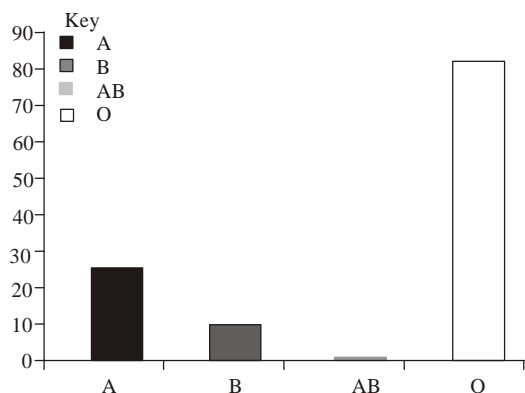| Risk factor	Cap cases	Healthy control	Total
Type O blood	83	499	582
Non-type O blood	37	241	278
Total	120	740	860

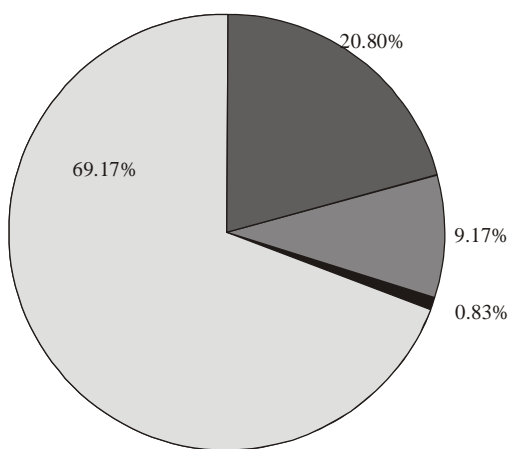Fig. 1: Bar chart of the blood type distribution in prostate cancer [Evulation2]

Fig. 2: Pie chart of the blood type distribution in prostate cancer

DISCUSSION

Type a blood: From the statistical analysis, the calculated X^2 value for blood group A was 0.12 and the degree of freedom also for group A was used to ascertain the theoretical value of X^2 which was found to be 3.84 ($p<0.05$).

After the calculation of the Odds Ratio (OR) and confidence interval (CI) we obtained the following results for blood type A: Odds Ratio = 1.0894; Confidence interval = 0.5622-1.6516. We can then interpret the result by saying that the proposed risk factor, type A blood, does not act as a significant risk to disease if the OR is greater than 1 and the lower bound of CI goes below 1.

Type o blood: From the statistical analysis, the calculated X^2 value for blood type O was 0.14, the calculated degree of freedom for blood type O was 1. Using the degree for freedom to ascertain the theoretical X^2 value which was found to be 3.84 ($p<0.05$).

Thus, Odds Ratio and confidence interval for blood type O was found to be 1.0834 and 0.4968-1.500,

respectively. This can be interpreted by saying that the proposed risk factor, type P blood, does not act as a significant risk to disease if the OR is greater than 1 and the lower bound if CI goes below 1.

In the course of studying the medical records of the patients with Prostate Cancer (CAP) the following were observed in addition to the blood groups:

Packed cell volume (PCV%) of these patients was reduced and the degree of reduction varies directly (in most cases) to the severity of the cancer. This may be explained as below: the cancer of the prostate occurs (in a very high percentage) in elderly men who are 50 years and above and at this age, the marrows of the bones in the pelvic region are actively involved in Haemopoetic activities. The cancer cell in the prostate (in some to most case) tends to metastasize to the Haemopoetic cells. The rapid division of the Haemopoetic cells is taken over by the cancer cells and this eventually reduces the division of the Haemopeotic cells which directly reduces the packed cell volume (%).

Prostate specific antigen (PSAng/mL) value of these patients is always higher than normal. The normal PSA value is 0-4 ng/mL but in the cases of CAP, there is an increase beyond 4ng/ml which may reach 80 ng/mL-100 ng/mL in very severe cases of CAP. Although in prostates (inflammation of the prostate) or benign prostatic Hyperplasia the PSA value may also be increase above normal but a very high increase in PSA may entail CAP. Prostate specific Antigen is a protein produced by the prostate gland that keeps semen in liquid form. Blood Pressure (BP) of these patients is always high. This may not have anything to do with the clinical condition (cancer of the prostate) but many are as a result of the fact that these patients are very old. The increased Blood pressure (Bp) may also be related to family History and Genetic factor of these patients.

The affected prostate is larger than normal. The prostate measures approximately 3 cm long, 4 cm wide and 2 cm in the anterior perpetrator dept. this gives an average/Approximate volume of 24.00 cm. It was observed that the affected prostate is always larger than 24.00 cm to up to 100-200 cm. at this stage the prostate may occlude the prostatic urethra and there may be difficulty in passing urine and/or urine retention.

CONCLUSION

From the present study, the incidence of blood types B and AB are lower in disease (prostate cancer) sample than in the control and thus were not consider to have an association with prostate cancer.

Blood types A and O are higher in disease sample than in the control and thus were considered that they may be associated with prostate cancer. Statistical analysis, however showed there was no significant relative risk for ABO type with prostate cancer. In other words there is no genetic association between ABO blood types and prostate cancer. We recommend that

further investigation using larger sample size is necessary to further confirm this finding.

REFERENCES

Aird, I., D.R. Lee and J.A. Fraser Roberts, 1960. ABO blood groups and caner of oesophayus, cancer of the pancrease and pituitary adenoma. Brit. Med. J., 1(1580): 1163-1166.

Anderson, D.E. and C. Haas, 1984. Blood type A and familial breast cancer. Cancer, 54(9): 1845-1849.

Asano, A., S. Mizuno, R. Sasaki and K. Aoki, 1987. Family study of cancer among gastrectomized patients. Gan No Rinsho, 33(5 Suppl.): 463-478.

Kokic, N.Z., J.B. Adanja, D.H. Vlajinac, P.J. Marinkovic, B.R. Colovic and S.M. Jarebinski, 1996. Case-control study of pancreatic cancer in Serbia, Yugoslavia. Neoplasma, 43(5): 353-356.

Kvist, E., A.F. Lauritzen, J. Bredesen and M. Luke, 1988. Relationship between blood groups and tumors of the upper urinary tract. Scand. J. Urol. Nephrol., 22(4): 289-291.

Lee, H.H., H.Y. Wu, Y.C. Chuang, A.S. Chang, H.H. Chao, K.Y. Chen, H.K. Chen, G.M. Lai, H.H. Huang and C.J. Chen, 1990. Epidemiologic characteristics and multiple risk factors of stomach cancer in Taiwans. Anticancer Res., 10(4): 875-881.

Marinaccio, M., A. Traversa, E. Carioggia, L. Valentino, M. Coviello, S. Salamanna, D.C. Dragone and L. Marinaccio, 1995. Blood groups of the ABO system and survival rate in gynecologic tumors. Minerva Ginecol., 47(3): 69-76.

Nakata, S., J. Sato, N. Ohtake, K. Imai and H. Yamanaka, 1995. Epidemiological study of risk factors for bladder cancer. Hinyokika Kiyo, 41(12): 969-977.

Oishi, K., K. Okada, O. Yoshida, H. Yamabe, Y. Ohno, R.B. Hayes and F.H. Schroeder, 1989. Case-control study of prostatic cancer in Kyoto, Japan: Demographic and some lifestyle risk factors. Biomedicine, 14(2): 117-122.

Roberts, T.E., P. Hasleton, R. Swindell and R. Lawson, 1988. Blood groups and lung cancer. Brit. J. Cancer, 58(2): 278.

Tryggvadottir, L., H. Tulinius and J.M. Robertson, 1988. Familial and sporadic breast cancer cases in Iceland: A comparison related to ABO blood groups and risk of bilateral breast cancer. Int. J. Cancer, 42(4): 499-501.

Vioque, J. and A.M. Walker, 1991. Pancreatic cancer and ABO blood types: A study of cases and control. Med. Clin.-Barcelona, 96(20): 761-764.

Zhang, G., S. Jiang and F. Zhang, 1997. Influence factors in etiology of epithelial ovarian cancer. Zhonghua Fu Chan Ke Za Zhi, 31(6): 357-360.