Dentistry Section

Relative Risk of Various Head and Neck Cancers among Different Blood Groups: An Analytical Study

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ABSTRACT

Background: Cancer is a unique disease characterized by abnormal growth of cells which have the ability to invade the adjacent tissues and sometimes even distant organs. The limited and contrasting evidence regarding the association of ABO blood groups with the different types of head and neck cancers in the Indian population warrants the need for the present study.

Aim and Objective: To assess the relative risk of various Head & Neck cancers among different blood groups.

Materials and Method: Three hundred sixty two diagnosed cases of different type of head and neck cancers and 400 controls were selected from four hospitals of New Delhi, India. The information regarding the type of head and neck cancer was obtained from the case sheets of the patients regarding their socio demographic profile, dietary history using a structured performa. The information regarding type of cancer (cases only), ABO blood group was collected.

Statistical Tests: The data was analysed using the SPSS 19 version. Chi square test and odds ratio were calculated. The level of significance was fixed at 5%.

Results: The O blood group was found to be most prevalent followed by B, A and AB among the cases as well as the controls. Maximum number of oral cancer patients belonged to blood group O followed by B, A and AB. Significant pattern of distribution was seen among the patients of esophageal cancer, laryngeal cancer and salivary gland cancer as well (p=0.003, p=0.000 p=0.112) respectively.

Conclusion: The present study reveals that there is an inherited element in the susceptibility or protection against different types of head and neck cancers. Blood group A was found to be a potential risk factor for the development of oral cancers, esophageal cancers and salivary gland cancers while blood group B was found to be a potential risk factor for laryngeal cancers.

INTRODUCTION

Cancer, known medically as a malignant neoplasm, is a broad group of diseases involving unregulated cell growth wherein cells divide and grow uncontrollably, forming malignant tumors, and invading nearby parts of the body. If the cancer has progressed beyond the stage that it can be successfully removed, it may even result in death of the individual. Cancer in all forms accounts for around 18% of the deaths throughout the world [1].

In India, cancer has become one of the leading death causes. It is estimated that there are nearly 1.5 to 2 million cancer cases at any given point of time. Data from population-based registries under National Cancer Registry Programme indicate that the leading sites of cancer are oral cavity followed by lungs, oesophagus and stomach amongst men and cervix, breast and oral cavity amongst women. Cancers namely those of oral and lungs in males, and cervix and breast in females account for over 50% of all cancer deaths in India [2,3,4,5]. The increasing number of cancer related morbidity and mortality has been related to its multifactorial etiology, particularly lifestyle factors such as chronic use of tobacco, spicy food, alcohol and smoking [6,7].

In addition to these lifestyle factors, the role of genetics and heredity in the etiology of the cancer cannot be overemphasized. The ABO blood group is one of such genetic factor that has been hypothesized in the etiology of various chronic diseases. The possibility of association between ABO blood groups and malignancy was first explored by Anderson DE & Haas C [8]. High incidence of blood Group A in various cancers, including neurologic tumours, salivary gland, colon, uterus, ovary, pancreas, kidney, bladder and cervix; with consistent relation to O blood group in skin and melanoma have been reported in many studies [9,10].

ABO blood group genes are mapped at 9q region in which genetic alteration is common in many cancers [11]. Thus, blood group antigen expression may be affected by genetic change of tumor. A correlation of blood group antigen expression in tumor has been reported for various human malignancies, such as colon, breast and prostate cancer as the blood group carbohydrates expressed on cell surface of metastatic cancer cells function as cell adhesion molecules [12,13].

In India, head and neck cancers are one of the leading causes of mortality, accounting for about 40% of all cancers of the body and affecting large number of population Along with the lifestyle related factors, the genetic and hereditary influences have been implicated in the etiology of head and neck cancers particularly oral cancer. The ABO blood groups is one such genetic factor that have been studied to be associated with the oral cancer [14]. Studies done by Gupta, Nayak, Baruah and Gogoi have shown that individuals with blood group A have predisposition for oral cancer [14-16]. Raghavan et al., who studied the incidence of ABO blood groups in oral cancer cases of South Kanara district of India, found increased susceptibility of oral cancer among people with blood Group A [17]. Hakomori documented decreased expression of histo-blood-Group antigens A and B in the patients of oral carcinomas [18].

The documented association between blood groups and head and neck cancer have been limited to oral cancer particularly in India and there has been limited documentary evidence regarding association between other types of head and neck cancers viz salivary tumours, oesophageal tumours and blood groups. Hence, the present study aimed to assess the relative risk of various head and neck cancers among different blood groups of patients attending oncology department of multi-speciality hospitals in Delhi, India.

MATERIALS AND METHOD

The present analytical study was conducted in Oncology ward of four multi-specialty hospitals over a period of 6 months (January to June 2013), after obtaining ethical clearance from the institutional review board and permission from the concerned authorities of the various multispeciality hospitals in Delhi, India.

The city of Delhi was divided for the study purpose into four zones namely North, South, East and West and stratified random sampling method was employed to select one multispecialty hospital from each zone. A total of 362 head and neck cancer patients (cases) and 400 controls were included from the four selected hospitals based on following inclusion and exclusion criteria.

Inclusion Criterion
- Subjects histopathologically diagnosed for head and neck cancer
- Subjects who gave informed consent

Exclusion Criterion
- Patients with in situ carcinoma but with no histopathological confirmation
- Patients with some other type of carcinoma along with head and neck cancer
- Patients with genetic disorder

The control group comprised of 400 healthy subjects who visited the oncology department along with the cancer patients. The information was collected from the study subjects (cases=362 and controls=400) regarding their socio demographic profile, dietary history and personal history using a structured Performa. The information regarding the type of head and neck cancer was obtained from the case sheets of the patients. The blood group of the cases and controls was collected by a single trained and calibrated investigator using finger prick method and blood typing done by tube method.

Statistical Analysis

The data was entered in the Microsoft Excel and processed using the SPSS 19 version. The descriptive statistics included calculation of frequency of patients and healthy subjects with different type of blood groups. The association between different type of head and neck cancers and blood groups was analyzed using Chi-square test and calculation of Odds ratio. The level of significance was fixed at 5%.

RESULTS

The present analytical study was conducted on a total of 762 study subjects, out of which 362 were head and neck cancer patients and 400 were controls in the age group of 20-65 years. The mean age of the patients was 53.97 ± 13.65 and of controls was 46.01 ± 8.01 irrespective of the blood groups. The analysis of the blood group distribution among the patients and controls has been shown in

Blood Group	A (%)	B (%)	AB (%)	O(%)
Cases	75 (20.72)	119 (32.87)	31 (8.56)	137 (37.85)
Controls	51 (12.75)	142 (35.5)	47 (11.75)	160 (40)
p-value	0.04	0.15	0.07	0.18

[Table/Fig-1]: Blood group distribution between cases and control

Type of cancer	Oral Cancer	Esophageal cancer	Laryngeal cancer	Salivary gland cancer
Blood Group A	1.84	1.8	1.14	2.105
Blood Group B	1.81	0.79	1.50	0.55
Blood Group AB	0.73	0.80	0.18	1.00
Blood Group O	0.87	0.29	0.92	1.05

[Table/Fig-3]: Odds Ratio

[Table/Fig-1] where the difference among the distribution between the cases and controls was statistically significant in blood group A(P=0.04).

The analysis of blood group distribution among the various types of head and neck cancer patients revealed that the most prevalent blood group among the patients was blood group O followed by B, A and AB(p=0.000). A similar significant pattern of distribution was seen among the patients of esophageal cancer, laryngeal cancer and salivary gland cancer as well (p= 0.003, p=0.001 p=0.112 respectively) [Table/Fig-2].

The strength of association between ABO blood groups and individual head and neck cancers was assessed by odds ratio [Table/Fig-3]. It was found that blood Group A had 1.84 times higher risk of developing oral cancer compared to people of other blood groups.

DISCUSSION

The blood group is a genetic factor that has established correlation with different cancers particularly gastric and esophageal cancer although its role in oral cancer is still unclear.

Blood Group O was found to be maximum among the study population owing to the generalized prevalence of O blood group in Indian population followed by blood Group B, A and AB resulting in a similar pattern of blood group distribution among cancer patients as well. This is in agreement with the study done by Sharma G et al., [19].

Assessing the potential risks of the ABO blood groups for the development of various head and neck cancers through odds ratio, it was found that blood group A had highest potential of developing Oral cancer (OR=1.84 P<0.05). These findings are in agreement with the study conducted by Jaleel B [14]. The probable reason behind this could be that in people belonging to A and B blood Groups, the precursor H antigen is converted to A and B antigen increasing the risk for the development of oral cancer since H antigen have been found to be protective factor for oral cancer. In O blood group individuals, it remains in original form and thus, people with blood group O have highest amount of H antigen which affords protection against oral cancer. Another genetic factor found consistently associated with oral cancers is the p56 gene mutation [14]. The altered antigen pattern on the surface is a tumor- associated change resulting in malignancy. It is also possible that the observed associations are not due to the blood group antigens themselves, but to the effects of genes closely associated with them [20].

Esophageal cancer was also found more in patients of A blood Group which is similar to a study done by Guleria et al., 2005, Pinkston JA et al., Nozoe T et al., [21-23] whereas contradictory results were found by Aminien A et al., [24] which shows the

Type of cancer	Blood Group A (%)	Blood Group B (%)	Blood Group AB (%)	Blood Group O (%)	Total N (%)	P-Value
Oral cancer	46(21.49)	70(32.71)	19(8.87)	79(36.93)	214(59.11)	0.000
Esophageal cancer	15(20.83)	22(30.55)	7(9.74)	28(38.88)	72(20)	0.003
Laryngeal cancer	06(14.29)	19(45.24)	1(2.38)	16(38.09)	42(11.60)	0.000
Salivary gland cancer	8(23.53)	8(23.53)	4(11.74)	14(41.2)	34(9.29)	0.112

[Table/Fig-2]: Blood group and type of cancer

presence of esophageal cancer more in blood group B followed by A (0.027). For salivary gland cancer patients also, blood group A was found in majority of the patients which is contrary to the results of Garrett JV et al., in which no significant relation was found between blood group and salivary cancer [25]. However, Laryngeal cancer was found to be more in blood Group B which is contradictory to the results by Adam SI et al., who showed a higher prevalence among patients with blood Group A [26]. No specific reason has been documented so far for the prevalence of specific blood groups among various head and neck cancers.

Hence, the present study reveals a strong association of Blood Group A with most of the head and neck cancer patients, though the actual reason of association of oral cancer with a particular blood group still remains unknown as H antigen is present in all the individuals irrespective of the blood group types. Additionally, it might have nothing to do with molecular mechanisms or genetics [27,28]. However, the limitation of the study lies in the lack of genetic mapping of the subjects. Genetic mapping is required to ascertain the proposed hypothesis. Thus, further longitudinal studies on blood groups in large series are needed to elucidate and confirm the relationship between blood groups and head and neck cancers.

Thus, study results indicate susceptibility of different blood groups for specific head and neck cancers which creates a need to spread awareness among the mass for the same. Early and regular Cancer screening should be advised to the patients of susceptible blood groups if any known etiologic factor like tobacco or alcohol abuse is noticed or if any sign or symptom of head and neck cancer is suspected. They should be trained for self examination and be encouraged for early referral of cancer screening if in doubt [29]. Public health professionals should work towards awareness, advocacy and action on health through tobacco cessation programmes, collaborating with other institutions and organizations and meeting the nutritional needs of patients of cancer, other diseases as well as malnourished/undernourished people which are all risk factors for development of cancer. Area Volunteers or health workers can be utilized as a part of various outreach programmes who can aid in bringing awareness about the cancer and its preventive methods to people at the local level within their areas, continuous self-monitoring and screening of susceptible individuals as well as regular health education can be reinforced as a preventive measure [30].

Blood donation camps can be utilized as a platform wherein when the blood is collected and blood group is recorded, the donors with susceptible blood groups can be counseled and regular cancer screening can be planned for such individuals. Oncology and dental teams should work hand in hand for early detection of cancers. Also, lifestyle modification for giving up tobacco habits and alcohol abuse, if present, needs to be initiated for these individuals. Hence, a comprehensive team effort is required to utilize the opportunities for prevention of the occurrence of cancer in susceptible blood groups [30].

CONCLUSION

The results of the present study conducted in various hospitals in Delhi indicated that Blood Group A is a potential risk factor for the development of oral cancers, esophageal cancers and salivary gland cancers while blood Group B was a potential risk factor for laryngeal cancers. It appears that different blood groups are associated with different manifestations of the disease. From this correlation of blood groups and various cancers, it follows that there is an inherited element in the susceptibility or protection against different types of cancers; and the racial and ethnic distribution of blood groups is an

important factor for predicting the cancer risk. The identification of genetic and environmental factors among racial and ethnic groups should offer some insights into the observed epidemiological data and advance opportunities to better understand the control and development of cancer.

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