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Assessment of Association Between ABO Blood Groups and Laryngeal Cancer Among Iranian Population

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There is and controversial evidence regarding the association of ABO blood groups with laryngeal cancers worldwide. There has been no published study containing information on the association between ABO blood groups and laryngeal cancers among Iranian population. Sixty-sex patients with laryngeal cancer in Ahvaz Imam-Khomeini Hospital (Ahvaz, Iran) during 2003 to 2013 were studied as compared to 148 healthy individuals regarding their ABO/Rh blood groups. ABO blood groups and laryngeal cancer were not significantly associated ($c^2=3.78$, $p=0.278$). The power of our study was 99.37% and 76.89% for ABO and Rh blood groups, respectively. Therefore, we do not report significant relationship between ABO/Rh blood groups and laryngeal cancer in Iranian population.

Key words: Iranian Population, ABO blood Groups, Laryngeal Cancers, Association.

Cancer has become a leading death cause in Iran, which its incidence and mortality rates are increasing. More exactly cancer mortality rate is estimated to be as high as 76.3 per 100,000 in Iran[1]. Unregulated cell growth, marked as uncontrollable cellular division and growth, culminates in malignant tumors which usually invade nearby parts of the body[2]. Genetic factors and hereditary has a pivotal role in this unregulated cell growth[3].Laryngeal cancer is the second most prevalent malignancy of upper respiratory cancers worldwide[4]; which includes tumors of the larynx or any of its parts as the glottis, epiglottis, laryngeal cartilages, laryngeal muscles, and vocal cords[5]. Despite the possible variations in histopathological nature of laryngeal cancer, squamous cell carcinoma (SCC) is demonstrated to be the most prevalent pathology[4, 6]. Laryngeal neoplasms are the most common malignancies of the head and neck region among Iranian population[7], which stand for more than 44% of head and neck cancers in Iran[8, 9].

ABO blood groups are considered as genetic factors that might play a role in the pathogenesis of various diseases e.g. neoplastic ones[10]. Blood Group A has been reportedly higher among various cancers including neurologic tumors, salivary gland, colon, uterus, ovary, pancreas, kidney, bladder, and cervix. Moreover, O blood group is demonstrated to be associated with skin and melanoma[2].

Evidence regarding the associations between ABO blood groups and laryngeal cancers is controversial in various ethnicities. Moreover,

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there is no study addressing this important issue among Iranian population. The present study aimed to investigate the associations of laryngeal cancers and their TNM stage with ABO blood groups southwest of Iran.

Patients and Methods

Data of all patients with laryngeal cancer referred to Ahvaz Imam-Khomeini Hospital (Ahvaz, Iran) during 2003 to 2013 were studied. Demographic information, ABO blood groups and cancer stages were recorded after obtaining ethical clearance. This study was approved by the ethics committee of Jundishapur University of Medical Sciences. Ethnical, age, and sex matched control subjects were obtained from healthy blood donors.

Statistical Analysis

Continuous variables are reported as mean ± SD. Categorical data are expressed as frequencies and percentages with 95% confidence intervals, and were analyzed by IBM™ SPSS version 20. Chi-square, Fisher's exact, and Monte Carlo exact tests were conducted were needed. Binary logistic regression was performed to elucidate the risk of each blood group for laryngeal cancer. P-values less than 0.05 were considered statistically significant.

RESULTS

Sixty-six patients with laryngeal cancer with mean age of 61.7 years (SD = ± 12.42 years) were enrolled. Fifty nine patients were male (89.39%) and the other female. One-hundred and forty eight healthy individuals were studied as controls.

Table 1 shows the frequencies of blood groups among laryngeal cancer patients and healthy controls. No significant association was found between ABO blood groups and laryngeal cancer (χ^2=3.78, p=0.278). In addition, we did not observe a significant association between laryngeal cancer and Rh blood groups (χ^2=1.198, p=0.351).To assess whether sufficient sample size is obtained, we calculated the observed power. We found 99.37% and 76.89% power for ABO and Rh blood groups, respectively. Furthermore, we found no significant association between TNM staging levels and blood groups.

Table 1. The frequencies of blood groups between cases of laryngeal cancer and healthy controls

Blood Groups ABO groups	Healthy Controls Count (%)	Laryngeal Cancer Count (%)	p-value	power†	OR (95% CI)
A	37 (25.0%)	19 (31.1%)	0.986	99.37%	1.006 (0.483-2.096)
B	44 (29.7%)	13 (21.3%)	0.172		0.579 (0.264-1.268)
AB	18 (12.2%)	4 (6.6%)	0.169		0.436 (0.133-1.426)
O	49 (33.1%)	25 (41.0%)	referent		1
Rh groups					
Rh-	10 (6.8%)	2 (3.0%)	referent	76.89%	1
Rh+	138 (93.2%)	64 (97.0%)	0.287		2.319 (0.494-10.891)

OR, Odds Ratio; CI, Confidence Interval;

† we used the formula $power = 1 - \chi'^2_{df,\lambda}$ where $\chi'^2_{df,\lambda}$ is a left-tail non-central Chi-square distribution with degree of freedom (df) and non-centrality parameter $\lambda = Nw^2 = N \times \left(\sum_{i=1}^{m} ((p_{0i} - p_{1i})^2 / p_{0i})\right)$; performed by IBM™ SPSS version 20 compute variable formula (1-NCDF.CHISQ (quant, df, nc).

DISCUSSION

This is the first study assessing the associations of ABO/Rh blood groups and laryngeal cancer in Iranian population. This case-control study with sufficient sample size does not show a significant association between ABO/Rh blood groups and laryngeal cancer.

Evidence regarding the associations between ABO blood groups and laryngeal cancer has been controversial among populations. While Singh et al found that laryngeal cancer is more prevalent in blood group B in Indian population[2], Adam et al reported a higher prevalence of laryngeal

cancer among patients with blood Group A [6]. No specific reasons have been proposed for such associations. However, the overall higher prevalence of blood group A in head and neck cancers justified to be associated with the precursor H antigen which is converted to A and B antigen[2, 3]. Actually H antigen has been demonstrated to be protective factor for oral cancers, which is in its higher amounts among O blood group[2, 3]. However this association has not been confirmed as an etiological relationship considering the fact that it might be due to genes closely associated with blood groups, like p56 gene mutation which is found to be associated with higher risk of oral cancer[11]. Another study in Poland showed that A2B blood group was significantly more prevalent among patients with epiglottis cancer and laryngeal cancer compared to 22,422 healthy individuals living in South Poland[12]. However, a more recent study in Poland reported no significant associations between ABO blood groups and laryngeal cancer, as compared to 5168 blood donors living in South Poland[13]. We believe such controversies can be attributed to non-homogenous population selection and their various statistical power mainly due to different sample sizes of control group.

In this study we faced some limitations as we could not perform genetic mapping of the subjects. More prospective and large scale studies might be helpful to confirm the findings of this study.

In summary, we do not report significant associations between ABO/Rh blood groups and laryngeal cancer in Iranian population, obtained by this case control study with high statistical power.

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