



The Relationship Between Blood Group and Colon Cancer in Shiraz Namazi Hospital During 2002 - 2011

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Abstract

Background: Cancer is the second cause of death in the world and the third in Iran. Colorectal cancer is the third fatal cancer in the world.

Objectives: Blood group and its RH are among the genetic factors that can be associated with colon cancer. This study was performed with the aim of investigating the relationship between blood group and colon cancer.

Methods: This study was undertaken in cases of colon cancer that referred to Namazi hospital from 2002 to 2011. The required data were gathered using a checklist, entered into SPSS software, and analyzed with descriptive statistical methods and Chi-square test.

Results: The results showed that the highest frequencies among 223 patients with colon cancer were related to blood group O+ (48.7 percent), RH+ (90.4 percent), male patients (60.4 percent), and married people (72.2 percent). The mean age of the patients was 60.09 ± 16.04 . Blood group and colon cancer showed a statistically significant relationship ($P < 0.05$).

Conclusions: The findings showed that there is a statistically significant relationship between blood group and colon cancer. Conducting extensive studies to find risk factors of the disease, particularly the role of genetic factors and disease prevention, in susceptible people is recommended.

Keywords: Blood Group, Colon Cancer, Relationship

1. Background

Cancer is defined as a condition in which some cells begin to multiply in particular conditions out of natural processes (1). In recent years, major causes of death in humans have shifted from infectious diseases towards non-communicable ones and cancer is known as the third leading cause of death after heart disease and accidents in Iran (2). Today, nearly 7 million cancer deaths occur annually in the world (13 percent of all deaths) and 10.5 million new cases of cancer become malignant. In Iran, according to the state records, 86.6 and 56.1 percent of cancer cases in 2003 and 2004, respectively, occurred in males and 43.3 and 43.9 percent were in females (3). At the beginning of the present century, the major causes of lethal cancers were lung, stomach, liver, colon, breast, and esophagus, in sequence. In 2005, lung, stomach, liver, colon, and breast cancers were responsible for 1.3, 1, 0.66, 0.65, and 0.5 million deaths, respectively (4). The reports of the world health organization in 2000 and 2005 show that stomach,

esophagus, and colon cancers were among the six cancers with highest mortality rates (5). Colorectal cancer is the third most common cancer in men and the second most common cancer in women, and more than 1.2 million new cases are diagnosed every year in the world (6). The cause of cancer is not a single disease, but a set of factors (environmental, hereditary, and genetic factors) act together to cause cancer (1). Colon cancer is the most common gastrointestinal cancer and is the second leading cause of death in America and other developed countries (7). Etiology of colon and rectum cancer is unknown like other cancers (8-10). However, it is known today that genetic factors and gene abnormalities play a role especially at young ages (11-15). One of the most important and immutable factors in this regard is blood type and genetic background of individuals. Blood is a marker of identity and is part of an individual's personality and individuality. That is because blood group affects behaviors and plays a role in mental health and illness. Today, the effect of blood group on some diseases including gastrointestinal diseases and

some cancers is recognized. For example, the incidence of duodenal ulcer in men with blood group O, gastric cancer in people with blood group A, and schizophrenia in people with blood group O is higher (1). A better understanding of the genetic and environmental factors affecting colorectal cancer can improve the treatment and recovery process. Studies have shown that there is a relationship between blood groups and some abnormalities including gastric (16), skin (17), and breast cancer (18).

According to the previous research, blood group, as a major genetic factor, has an important role in the incidence and prevalence of cancer. Research conducted in this area shows that blood group A and AB play a significant role in the incidence of tumor cells and their malignancy (1). Although blood alone is not a risk factor for colon cancer, colon cancer is a disease that has a significant relationship with blood RH. Preliminary studies show that there is a significant relationship between cancer of the colon and blood group A (1). Given all the above as well as taking into account the growing importance of colon cancer and advances in genetics and its relationship with various diseases, examining this relationship can help us prevent different cancers including colon cancer. In addition, if a meaningful relationship is found, people with high-risk blood groups can be advised and encouraged to behave well in health care.

2. Methods

This cross-sectional study examined the relationship between blood group and colon cancer. The population included all patients with colon cancer who referred to Namazi hospital in Shiraz during 2002 to 2011. It should be noted that the majority of patients with colon cancer refer to Namazi hospital; therefore, this hospital was chosen to select the target population. Records of 223 patients with colon cancer were randomly chosen and investigated.

The number of participants was determined using the following formula with a significance level of 5%, Beta of 0.2, and an estimated correlation coefficient of 0.155.

$$N = \frac{\left(Z_{\frac{\alpha}{2}} + Z_{1-\beta} \right)^2}{\frac{1}{4} \left[\log_e \left(\frac{1+r}{1-r} \right) \right]} + 3 \quad (1)$$

The inclusion criteria were having colon cancer and a complete record. The data related to age, sex, marital status, blood group, and patients' RH were collected from their records and entered into a prepared checklist. The checklists did not require the name and surname of the individuals, and all measures related to the confidentiality of information were noticed.

The data collected were analyzed by SPSS using descriptive statistics and Chi-square test. The results of the study were compared with those of the general population (Fars blood transfusion organization) (19), which showed a significant difference ($P < 0.05$).

2.1. Ethical Consideration

The research was approved by the ethics committee of Shiraz University of Medical Sciences (ID number: 5463).

3. Results

Of 223 patients under study, 134 patients (60.4%) were male and 88 (39.6%) were female. The mean age of the patients was 60.09 ± 16.04 . The highest rate of colon cancer was in the age group 49 - 75 (55.6 percent). Regarding marital status, 122 patients (72.2 percent) were married and 47 (27.8%) were single (Table 1).

Table 1. Distribution of Demographic Features of Colon Cancer Patients

Demographic Information	Number	Percent
Age group		
23 - 49	56	25.1
49 - 75	124	55.6
≥ 75	43	19.3
Gender		
Female	88	39.6
Male	134	60.4
Marital status		
Married	122	72.2
Single	47	27.8

The results of the study showed that among subjects with colon cancer, the most frequent blood groups were O+ (48.7%) and B+ (26.9 percent). 141 patients (90.4%) had positive RH and 15 patients (9.6%) had negative RH (Table 2). A significant association was found between blood groups and colon cancer ($P = 0.001$). There was no significant relationship between RH and colon cancer ($P > 0.05$).

4. Discussion

This study aimed to investigate the relationship between blood groups of patients and colon cancer in Shiraz Namazi hospital. The mean age of the patients was 60.09 ± 16.04 . The highest rate of colon cancer was in the age group 49 - 75 (55.6 percent). The results are consistent with those of Babai et al. entitled "Survey of cancer incidence during

Table 2. Frequency of Blood Groups in the General Population and in the Colon Cancer Group

Blood Groups	Percentage in the Colon Cancer Group	Percentage in the General Population
O+	48.7	37.2
B+	26.9	22.4
A+	10.3	26.6
AB+	4.5	6.1
A-	3.8	2.2
O-	2.6	3.2
B-	1.9	1.8
AB-	1.3	0.5

a 5-year (1998 - 2002) period in Semnan province based on record results of cancer in society" (mean age of people diagnosed with cancer in the first visit was 59.41 ± 19.08 (2). They are also consistent with the results of Derakhshanfar et al. study entitled "epidemiological study of colorectal cancer at Ekbatan and Besat hospitals of Hamadan during ten years (1998 - 2008)". (Patients' mean age was 58.67 ± 14.31 , and 50.3 percent of patients were in the age group 40 to 65 years) (20). Our results also confirm the results of Esna-Ashari et al. study entitled "colorectal cancer prevalence according to survival data in Iran in 2007" (the mean age of patients with colorectal cancer was 58.13 ± 14.74) (21).

The fact that most cases of this disease are in the age range of 49 - 75 years shows the disease is clearly associated with age so that the number of cases with the disease increases with age. Higher rates of colon cancer in the age group 23 - 49 years (25.1%) compared to the age group 75 years (19.3 percent) can be attributed to the fact that Iranian society is younger than Western societies. The increase in harmful habits inducing cancer in the young population can be another possible cause of colon cancer in Iran's young population. It is also possible that the current older generation has been exposed to less environmental risk factors. The highest rate of colon cancer was observed in men (60.4%). This is consistent with the results of the study by Ghadir et al. entitled "colonoscopic diagnostic findings in patients undergoing colonoscopy in Qom Hazrat-e-Masoom hospital during 2007 - 2008" (279 patients, 55.8 percent were male) (22). This also confirms the results of Esna-Ashari et al. study (26.2 percent were females and 73.8 percent were males) (21).

According to the results of the present study, the most cases of colon cancer were seen in men. The difference can be attributed to men's environmental conditions, nutrition, occupation, physiological status, and social and cul-

tural conditions. Iranian statistics show that women have a bigger population than men, so this difference shows that men are more prone to clone cancer than women are. Most colon cancer cases in this study were married (72.2 percent). This can be related to problems that expose the married group to stresses and make them prone to many diseases including cancers.

The results of the present study showed that the highest frequency of colon cancer was observed in cases with blood group O+ (47.8%) and B+ (26.9%). Compared to the frequency in the general population, this shows a significant increase. The analyses showed a significant relationship between blood group and colon cancer. ($P = 0.001$). The most patients with colon cancer (90.4%) had a positive Rh, which is almost in line with the Rh-positive frequency in the general population (92.3 percent). The results of the study showed no significant relationship between RH and colon cancer ($P > 0.05$).

Khalili's study showed that there is a borderline significant association between blood group B and overall risk of colon cancer. However, there is no clear biological mechanism that would explain the differential association of group B compared to group A antigen with cancer. Taken together with the lack of similar associations between blood group AB and overall risk of colon cancer, these findings for blood group B are likely due to chance. Lastly, these results do not support an association between ABO blood group and risk of colorectal cancer (23).

The role of genetic factors in the etiology of many diseases including cancer has been investigated and determined in many studies (11-15). One of the genetic factors is blood group. The results of this study showed a higher frequency for cancer cases in blood group O+ than in other groups, and a significant relationship between colon cancer and blood group of subjects. These show that blood group, as a genetic factor, can cause mental health and illness. This is consistent with the Framingham's study that found people with blood group A were more prone to coronary heart disease (24). It also confirms the results of Abdollahi et al. entitled "Association between ABO blood groups and cardiovascular risk factors in general population of Golestan province, Iran" that showed that "blood group O was most frequent among subjects, and people with blood group A had a family history of heart disease more frequently than people with other blood groups" (25). Wolpin BM separately examined the relationship between ABO blood type and the risk of pancreatic cancer incidence in two large, independent, prospective cohort studies (the nurses' health study and health professionals follow-up study). In the two large, independent populations, ABO blood type was significantly associated with the risk of pancreatic cancer (26). Xie J used two large co-

horts in the US to examine the relationship between ABO blood type and the incidence of skin cancers, including melanoma, squamous cell carcinoma (SCC), and basal cell carcinoma (BCC). The result showed in the two large independent populations, non-O blood group was associated with a decreased risk of skin cancer. The association was statistically significant for non-melanoma skin cancer (17). The X Cao study showed that the blood group AB is an optimal predictor of colon cancer (27). The role of genetic factors as the cause of the prevalence of diseases, including cancers, has been studied in many studies and their relationship with each other has been proven. One of the genetic factors is blood groups. Based on the results of the present study showing the high prevalence of O+ blood group compared to other blood groups and a statistically significant association between blood groups and colon cancer, it is confirmed that blood group can be considered as one of the genetic factors in people's mental health and illness. For example, according to the Framingham study, "People with blood group A are more susceptible to coronary artery disease" (25). In addition, in the study of Ali Akbar Abdollahi et al. to determine the relationship between ABO blood groups and the main risk factors for cardiovascular disease in the general population of Golestan province, it was shown that "blood group O has the highest frequency and blood group A has a more family history of heart disease compared to other blood groups" (25). In a study by Bjorkholm, the results indicated a difference between blood groups A and O (28). The Sezik's study showed that 48% of the patients with HELLP syndrome had a negative blood type O and RH and they were at a greater risk for the syndrome (29). Min Su et al. showed that blood group B has a correlation with heart disease in males and cancer in the upper third of the esophagus (30). The study by Engin et al. showed that blood group A was more common in patients with pancreatic cancer and the blood group seems to be a protective agent against pancreatic cancer. In addition, people with blood group O had a higher survival compared to people with other blood groups (31). The results obtained by Henderson et al. showed that, compared to other blood groups, the frequency of blood group A was higher in women with ovarian cancer (32).

All these studies indicate the relationship between blood groups and certain diseases and support the hypothesis that blood group can play a role in the incidence and prevalence of some diseases.

Nowadays, prevention methods are of higher priority than treatment ones. The increasing development of genetics can help us identify the factors making people prone to diseases (33).

4.1. Conclusions

The findings showed that there is a statistically significant relationship between blood groups and colon cancer.

Extensive studies are necessary for identification of the role of genetic risk factors such as blood groups in the incidence of colon cancer. Measures such as controlling environmental risk factors and providing hygiene training can prevent the prevalence of this disease and gradually reduce its incidence and morbidity and mortality rates.

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Footnotes

Authors' Contribution: Seyyed Mansour Kashfi, Mohammad-Rafi Bazrafshan, Ali Khani Jeihooni and Seyyed Hannan Kashfi designed the study, contributed to the literature review and writing the manuscript. All the authors read and approved the final manuscript.

Conflict of Interest: The authors have no conflict of interest in this article.

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