Evaluating the relationship between environmental elements and geographical distribution of inflammatory bowel disease (IBD) in Gilan province

Evaluación de la relación entre los elementos ambientales y la distribución geográfica de la enfermedad inflamatoria intestinal (EII) en la provincia de Gilan

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Abstract

Introduction: Inflammatory bowel disease is among the most common diseases increasing rapidly in some countries and Iran, especially in Gilan. Approximately 30000 cases of IBD have been recorded at Gilan Gastroenterology and Liver Research Center. It seems that genetic and environmental factors to be involved in this disease. The objective of this study is to investigate the relationship between environmental factors and the geographical distribution of inflammatory bowel disease (IBD) in Gilan province.

Materials and Methods: This study is an applied study in terms of objective and a library-field study in terms of data collection tools. The sample size was 10-year data of Gilan Meteorological Department from 2006 to 2016 and 10-year data of IBD disease frequency recorded in Gastroenterology and Liver Research Center of Razi Hospital of Rasht in Gilan province from 2006-2016.

Results: Demographic characteristics, living place, types of inflammatory bowel disease, including Crohn's disease (CD) and ulcerative colitis (UC), gender, climatic factors (humidity, temperature, pressure, and precipitation) were considered as independent variables and IBD disease was considered as the dependent variable. Descriptive statistics and Chi-square test were used by means of SPSS software for data analysis at the significant level of $p < 0.05$.

Conclusion: According to the Chi-Square test, there was no significant difference between demographic characteristics and Crohn's disease and ulcerative colitis. There was a significant difference between gender, living place, Crohn's disease, and ulcerative colitis. In 6 cities, there was no significant correlation between the total number of patients, male and female patients and climatic factors, including humidity, temperature, pressure, and precipitation.

Keywords: Environmental Factors, Geographical Distribution, Inflammatory Bowel Disease (IBD), Gilan Province

Resumen

Introducción: la enfermedad inflamatoria intestinal se encuentra entre las enfermedades más comunes que aumentan rápidamente en algunos países e Irán, especialmente en Gilan. Se han registrado aproximadamente 30000 casos de EII en el Centro de Investigación de Gastroenterología e Hígado de Gilan. Parece que los factores genéticos y ambientales están involucrados en esta enfermedad. El objetivo de este estudio es investigar la relación entre los factores ambientales y la distribución geográfica de la enfermedad inflamatoria intestinal (EII) en la provincia de Gilan.

Materiales y métodos: este estudio es un estudio aplicado en términos de objetivo y un estudio de campo de biblioteca en términos de herramientas de recopilación de datos. El tamaño de la muestra fue datos de 10 años del Departamento Meteorológico de Gilan de 2006 a 2016 y datos de 10 años de frecuencia de enfermedad de EII registrados en el Centro de Investigación de Gastroenterología e Hígado del Hospital Razi de Rasht en la provincia de Gilan de 2006-2016.

Resultados: las características demográficas, el lugar de vida, los tipos de enfermedad inflamatoria intestinal, incluida la enfermedad de Crohn (EC) y la colitis ulcerosa (CU), el género, los factores climáticos (humedad, temperatura, presión y precipitación) se consideraron como variables independientes y se consideró la enfermedad de la EII. considerada como la variable dependiente. La estadística descriptiva y la prueba de Chi-cuadrado se utilizaron a través del software SPSS para el análisis de datos en el nivel significativo de $p < 0.05$.

Conclusión: Según la prueba de Chi-Square, no hubo diferencias significativas entre las características demográficas y la enfermedad de Crohn y la colitis ulcerosa. Hubo una diferencia significativa entre género, lugar de vida,

enfermedad de Crohn y colitis ulcerosa. En 6 ciudades, no hubo una correlación significativa entre el número total de pacientes, pacientes masculinos y femeninos y factores climáticos, incluida la humedad, la temperatura, la presión y la precipitación.

Palabras clave: Factores ambientales, distribución geográfica, enfermedad inflamatoria intestinal (EII), provincia de Gilan.

Introduction

The effects of an environmental factor on a person depend on characteristics such as age, gender, and physical state and the individual characteristics that change the effects of environmental factors, including genetic factors, personality, nutrition. Thus, the cause of any disease is either environmental factors or genetic factors. Inflammatory bowel diseases (IBD), including Crohn's disease (CD) and ulcerative colitis (UC), are a spectrum of chronic inflammatory diseases with unknown causes that have affected the gastrointestinal tract of millions of people and their quality of life around the world. Ulcerative colitis, characterized by chronic inflammation of the mucosal surface and rectum, occurs in most cases with diarrhea, abdominal pain, urgent excretion, rectal bleeding, and mucus excretion. Crohn's disease can affect any part of the gastrointestinal tract and is often discontinuous. Inflammation takes up the entire thickness of the intestinal wall and causes abscess, fistula, and stenosis. It has two age peaks. The first peak is between the second and fourth decades of life and the second peak is around the sixth decade of life. Its prevalence is equal in both genders. Both diseases often cause symptoms at a young age. Its cause is not clear. Environmental factors and genetic susceptibility are involved in the disease. These two factors stimulate the immune system to become overactive and damaged. Both diseases have extra-gastrointestinal manifestations, arthritis, skin lesions, and sclerosing cholangitis. IBD was first considered as mental illness. Centuries later, around the middle of the 19th century, clinical manifestations of the disease were identified as intestinal inflammation3. Simultaneous with other diseases, a continuous increase was seen in the number of patients with IBD7. The family pattern and the influence of environmental factors on IBD in the 20th century have been also proven Based on the epidemiological models, the influence of environmental factors in increasing the number of IBD patients was shown in the twentieth century[4].

According to the hypothesis, IBD is caused in genetically susceptible individuals in environmental exposures with abnormal immune responses. Several environmental factors have been raised in this regard, but there are many conflicting views regarding the role of these potential factors1. One of the convincing and consistent results is an increase in the incidence of both CD and UC in the northern latitudes relative to the southern latitudes[7]. Despite the presence of a great number of quantifiable and unknown variables that are potentially related to these Geographical regions it is difficult to find the causal relationships of these special factors. However, there are several hypotheses to justify the differences in its incidence in different slopes, including differences in geographic environment, socioeconomic factors, temperature variability, and exposure to sunlight[8,9]. Other studies conducted in the United States concluded that increased exposure to UV light was associated with a reduced rate of hospital admissions for both types of IBD patients. It was also associated with reduced surgery cases in hospitalized CD patients[10,11]. One of the potential justifications for these findings is related to differences in serum levels of vitamin D. Exposure to sunlight in the northern latitudes is limited, because inclined radiation of sunlight and cooler temperatures limit UV light exposure to the skin. The UVB sun ray transforms 7-dehydroxycholesterol of the skin to vitamin D3, which is metabolized to vitamin D3 [25 (OH) D]. 25 (OH) D is also metabolized to 1.25 dihydroxyvitamin D (1.25 (OH) 2D3). In vitro and animal studies have shown that it suppresses inflammation[12-14].

According to previous studies, serum levels of vitamin D have been associated with a reduced risk of IBD and reduced severity of symptoms[15,16]. Although vitamin D levels are inversely associated with disease activity in IBD, the relationship between disease activity and the north-south transverse slope has not yet been identified[4,17]. Also, studies conducted on the effect of seasonal variations on disease incidence have provided contradictory findings, even though vitamin D levels fluctuate with seasonal variations[17–23]. It indicates that long-term changes in sunlight exposure might play an effective role in the incidence of IBD, but the short-term effect of seasonal changes in sunlight exposure on the symptoms of the disease is still unclear. However, many of the cases mentioned in the above studies have not had a geographically-controlled investigation on the role of seasonal variation in symptoms of IBD. Exposure to sunlight has a significant seasonal variation with increasing latitude. In this regard, comparing two regions with different latitudes and controlling seasonal variations allow us to have an accurate investigation of the effect of long-term exposure to the sunlight. Also, the changes in the activity of the disease can be better examined by investigating other environmental differences between the northern and southern regions. Semnani et al (2008) conducted a study on 104 UC patients and 4 CD patients in northeastern Iran (Golestan) and found that IBD was more common in females and 65.7% of patients were living in urban areas. They also found that the rate of more severe forms of IBD is higher than that of studies conducted in Europe (the difference between urban and rural areas in terms of climate conditions)[24]. Sonnenberg (2009) investigated IBD patients admitted to UK hospitals in 1997-2006 and reported that there was no relationship

between variations in season, month, and year of birth in and IBD, but it varied from one month to another, but seasonal variations made no difference[25-27].

A group of physicians investigated the role of environmental factors in inflammatory bowel disease in 8 countries of Asia and Australia between the years of 2011 and 2013. They showed that there was no difference between countries in the age of the infection and its rate was higher in smoker people and Asian countries. A study conducted by Stein et al. (2016) evaluated the effect of geographic location, season, and UV exposure on disease severity by assessing hospital discharge rates of IBD patients at the national level. Using the national inpatient sample (NIS), the IBD patients discharged from 2001 to 2007 were identified. Those patients were included in the study that had been discharged from states with geographic coordinates above 40 (north) or below 35 (south). They discharge time was also winter (January, February, and March) or summer (July, August, and September). The patients' groups were examined and compared based on north and south regions in each season and summer to winter in each region. The UV index was recorded from the National Meteorological Service and data and monthly discharge rates were compared. The results showed a consistent pattern of an increase in IBD hospitalization in the northern states compared to the southern states for both groups of ulcerative colitis and Crohn's disease patients. However, there was no uniform difference between the rates of hospitalization in IBD based on the season versus the years of study. The UV index was inversely correlated with it, but no association was seen between the rate of discharge in both Crohn's and ulcerative colitis diseases[8, 28, 29].

The link between climate and human life is to the extent that human has always made most of his or her efforts to reconcile with climate issues since the day he has identified himself or herself. The factors affecting human health include physiological, biological, chemical, physical factors that the level of their effect on each person depends on its characteristics such as age, gender, type of nutrition, physical state and so on. According to most geographers and sociologists, climate influences the nature of life in general and human life in particular more than other environmental factors. Inflammatory bowel disease is among the most common diseases that affect the gastrointestinal tract of millions of people around the world. In some countries and Iran, and especially in Gilan, it is increasing rapidly. 25-30% of the inflammatory diseases include IBD, which makes life difficult for the patients. Timely diagnosis and treatment can increase the life expectancy of patients. The cause of an increase in this disease is not known in Gilan province, although genetic and environmental factors might be involved in this regard. About 30000 cases of IBD have been recorded at the Gilan Gastroenterology and Liver Research Center. The main objective of this study is to investigate the relationship between environmental factors and the geographical distribution of IBD in Gilan province. The following hypotheses were presented in this regard:

- The frequency of demographic characteristics varies according to the types of IBD diseases in patients studied.
- There is a significant relationship between the living place of patients and IBD according to the types of IBD disease and gender.
- There is a significant relationship between climatic elements (humidity, temperature, pressure, and precipitation) and the number of IBD patients in Astara city.

Materials and methods

This research is an applied study in terms of objective. Applied studies are used to meet greater needs and to optimize methods, models, and tools to enhance the well-being of human beings. It is also a library-field study in terms of the data collection method. The sample size was 10-year data of the Guilan Meteorological Department from 2006 to 2016 and 10-year data of IBD disease frequency recorded in Gastroenterology and Liver Research Center of Razi Hospital of Rasht in Gilan province from 2006-2016. Demographic characteristics based on types of IBD disease, living place of IBD patients based on different types of inflammatory bowel disease, including ulcerative colitis and Crohn's disease, gender, climatic factors (humidity, temperature, pressure, and precipitation) were considered as the independent variable and IBD disease was considered as the dependent variable. A form was used for transferring of statistical and non-statistical information and texts, and tables and charts were used for presenting and comparing information and results, observation card and questionnaire were used for recording the observations related to disease, GIS was used for the disease zoning and spatial distribution and estimating the probability of its occurrence in other regions. Descriptive statistics (frequency and percentage) and the Chi-Square test were used through SPSS and EXCELL software at the significant level of p <5% to enter the data and perform the statistical analyses (Tables 1-10).

Table 1. Frequency of IBD patients

Year	Crohn's disease F (%)	Ulcerative colitis F (%)	Sum
2016	(17)24	(83)117	(100)141
2011	(20)9	(80)36	(100)45
2006	(25)1	(75)3	(100)4

Table 2. Frequency of IBD patients based on living place

Living place	Crohn's disease F (%)	Ulcerative colitis F (%)
Astara	(5.9) 2	(3.2) 5
Anzali	(23.5) 8	(7.7) 12
Rasht	(38.2) 13	(60.3) 94
Roodsar	(17.6) 6	(8.3) 13
Talesh	(8.8) 3	(9.6) 15
Lahijan	(5.9)2	(10.9) 17
Sum	(100) 34	(100) 156

Table 3. Comparing the frequency of demographic characteristics based on types of IBD disease in the studied patients

Age groups		Crohn's disease F (%)	Ulcerative colitis F (%)	P-Value
Age	Below 30	(24) 12	(76) 38	0.1
	30-50	(19.1) 17	(80.9) 72	
	50-70	(7) 3	(93) 40	
	Over 70	(14.3) 1	(58.7) 6	
Gender	Female	(17.3) 17	(82.7) 81	0.4
	Male	(18.5) 17	(81.5) 75	

Table 4. Comparing the living place of patients with IBD according to the types of IBD disease and gender in the studied patients

Disease	Female		P-Value	Male		P-Value
City	Crohn's disease F (%)	Ulcerative colitis F (%)		Crohn's disease F (%)	Ulcerative colitis F (%)	
Astara	(100)2	(60) 3	0.003	(0) 0	(40) 2	0.4
Anzali	(62.5)5	(75) 9		(37.5)3	(25) 3	
Rasht	(38.5) 5	(52.1) 49		(61.5) 8	(47.9) 45	
Roodsar	(66.7)4	(23.1) 3		(33.3) 2	(76.9) 10	
Talesh	(33.3) 1	(66.7) 10		(66.7) 2	(33.3) 5	
Lahijan	(0) 0	(41.2) 7		(100) 2	(58.5) 10	

Table 5. Relationship between climate elements and number of IBD patients in Astara

Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Min	Mean	Max	Min
April	(0) 0	(0) 0	(0) 0	2	1015.9	12.3	31.6	0.4	78	100	8
May	(0) 0	(0) 0	(0) 0	5.1	1019.1	17.3	30.8	4.8	80	100	27
Jun	(0) 0	(0) 0	(0) 0	1.2	1015.8	22.9	33.2	13	74	100	15
July	(0) 0	(0) 0	(0) 0	0.5	1013.4	25.9	36.2	15.7	69	100	22
August	(100)1	(100)1	(0) 0	2.1	1009.4	26.4	36.2	16.8	68	98	22
September	(100)1	(100)1	(0) 0	6.5	1017.5	23.8	35.4	15.4	78	100	30
October	(100)1	(100)1	(0) 0	6.7	1022.1	19.4	35.6	9.2	84	100	17
November	(100)1	(100)1	(0) 0	9.1	1026.8	13.6	28.7	17.6	85	100	29
December	(0) 0	(0) 0	(0) 0	4	1026.5	9.3	26.8	1.2-	81	100	16
January	(100)1	(0) 0	(100)1	2.6	1026.5	7.1	26.6	2.4-	81	100	13
February	(100)2	(50) 1	(50) 1	2.8	1024.5	6.3	23.8	7.6-	83	100	17
March	(0) 0	(0) 0	(0) 0	3.4	1024.1	8.1	32	2.4-	82	100	14

Pvalue = 0.4

Table 6. Relationship between climate elements and number of IBD patients in Anzali

Anzali											
Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Min	Mean	Max	Min
April	(0) 0	(0) 0	(0) 0	1.6	1021.2	12.8	36	2	84	100	12
May	(100)1	(0) 0	(100)1	1.2	1019.7	17.9	2.88	6.8	85	100	33
Jun	(100)2	(0) 0	(100)2	0.9	1016.4	23.8	32.6	1.45	79	100	24
July	(100)2	(0) 0	(100)2	3/2	1013.9	26.6	35	17.8	76	100	28
August	(100)7	(7/85)6	(14.3)1	8/3	1014.6	27.1	34.8	19.4	76	100	38
September	(100)5	(60)3	(40)2	6.6	1018	24.6	32.8	16	82	100	47
October	(0) 0	(0) 0	(0) 0	9.3	1022.5	20.5	31.4	10.6	85	100	42
November	(0) 0	(0) 0	(0) 0	13	1027	15.1	29	4.4	87	100	29
December	(0) 0	(0) 0	(0) 0	7.5	1026.7	11.3	27	1.2	85	100	24
January	(100)2	(0) 0	(100)2	5.4	928.7	9.1	27.6	0	86	100	17
February	(100)1	(0) 0	(100)1	4.4	877.8	7.6	27.8	5.6-	89	100	18
March	(0) 0	(0) 0	(0) 0	3.5	1019.5	8.9	30.4	0.4	87	100	15

P_value = 0.1

Table 7. Relationship between climate elements and number of IBD patients in Rasht

Rasht											
Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Min	Mean	Max	Min
April	(100)5	(100)5	(0) 0	3/2	1020.7	13.7	37.4	1-	79	100	11
May	(100)2	(50)1	(50)1	1.6	1019.1	18.7	32.6	3.2	80	100	26
Jun	(100)6	(66.7)4	(23.3)2	1	1015.8	23.6	34.4	13.8	77	100	22
July	(100)1	(0) 0	(100)1	1.5	1013.7	25.8	35.6	15.8	77	100	31
August	(100)24	(50)12	(50)12	1.7	1014.1	26.5	37.2	16.6	76	100	23
September	(100)31	(48.4)15	(51.6)16	6/3	1017.4	24.2	38.2	14	82	100	26
October	(100)1	(0) 0	(100)1	7.1	1022	20.1	37.2	8.2	84	100	15
November	(100)4	(50)2	(50)2	8.8	1026.6	14.2	29.8	1.4	87	100	24
December	(100)7	(42.9)3	(57.1)4	4.9	1025	10.3	28.6	2-	83	100	20
January	(100)14	(35.7)5	(64.3)9	3.7	1046.3	8.2	27.2	17	83	100	13
February	(100)9	(55.6)5	(44.4)4	3.7	1046.3	7.3	28	5.8-	86	100	16
March	(100)3	(66.7)2	(33.3)1	3.9	1049	9.1	31	3.6-	84	100	15

P_value = 0.5

Table 8. Relationship between climate elements and number of IBD patients in Roodsar

Roodsar											
Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Mean	Max	Mean	Max
April	(0)0	(0)0	(0)0	0.2	1020.8	12.5	36.6	0	82	100	8
May	(100)1	(0)0	(100)1	0.4	1019.4	17.6	29.2	5.4	83	100	31
Jun	(0)0	(0)0	(0)0	1.8	1016.1	23.5	33.2	13.8	77	98	19
July	(0)0	(0)0	(0)0	2.4	1013.6	26.2	36.6	12	74	98	23
August	(100)6	(66.7)4	(33.3)2	8/1	1014.4	26.7	35.6	18.4	73	98	28
September	(100)7	(14.3)1	(85.7)6	3.4	1017.7	24.4	35.4	14	80	100	37
October	(0)0	(0)0	(0)0	8.1	1022.1	20.3	31.2	9.8	83	100	47
November	(100)2	(50)1	(50)1	7.1	1026.5	14.7	31	2/2	84	100	22
December	(0)0	(0)0	(0)0	4.9	1026.5	10.5	27	0	82	100	18
January	(100)1	(0)0	(100)1	2.9	1026.3	8.5	28.8	1.4-	81	100	13
February	(100)2	(50)1	(50)1	3.8	1024	7.7	25.2	5-	84	100	22
March	(0)0	(0)0	(0)0	3.2	1024	9	30.6	2-	84	100	14

P_value = 0.3

Table 9. Relationship between climate elements and number of IBD patients in Lahijan

Lahijan											
Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Mean	Max	Mean	Max
April	(100)2	(100)2	(0)0	2.2	1022.2	13.2	36.6	1.4-	77	100	9
May	(100)1	(100)1	(0)0	1.7	1020	17.9	32.4	2	79	100	24
Jun	(100)1	(100)1	(0)0	1.1	1018.5	22.8	34.6	11.8	75	100	18
July	(0)0	(0)0	(0)0	2.2	1016.4	25.3	35.8	15	74	98	28
August	(100)4	(50)2	(50)2	2.4	1017.1	26.2	37	16	73	100	27
September	(100)6	(7/16)1	(83.3)5	3.3	1020.1	24.1	37.2	13	80	98	28
October	(0)0	(0)0	(0)0	8.8	1024.1	20	35.6	9	83	100	21
November	(0)0	(0)0	(0)0	8.2	1028.4	14.3	30	1	85	100	30
December	(0)0	(0)0	(0)0	4.9	1027.9	10.2	29	1-	82	100	18
January	(100)1	(0)0	(100)1	3.6	1027.8	8.4	28.2	3-	81	100	17
February	(100)2	(0)0	(100)2	4.2	1025.6	7.6	29.2	5.6-	84	100	18
March	(100)2	(0)0	(100)2	4.3	1025.3	9.2	35	4.6-	82	100	17

P_value = 0.1

Table 10. Relationship between climate elements and number of IBD patients in Talesh

Talesh											
Month	Total frequency (%)	Female frequency (%)	Male frequency (%)	Mean precipitation	Mean pressure	Temperature			Humidity		
						Mean	Max	Mean	Max	Mea	Max
April	(100)1	0(0)	(100)1	2.2	1018.9	12.7	35	0	78	100	12
May	(100)2	(100)2	0(0)	1.9	1017.6	17.6	30.6	6.6	79	100	32
Jun	0(0)	0(0)	0(0)	1.4	1014.3	22.8	34	12	73	100	26
July	0(0)	0(0)	0(0)	1.2	1011.9	25.4	33.8	16	71	100	35
August	(100)5	(60)3	(40)2	2.6	1012.6	26.2	35.2	18.8	68	100	27
September	(100)7	(71.4)5	(28.6)2	4	1015.9	23.8	35.4	15.4	78.1	100	37
October	0(0)	0(0)	0(0)	6.4	1020.4	19.9	37	10	82.7	100	21
November	0(0)	0(0)	0(0)	5.7	1024.9	14.3	28.8	2	84.4	100	30
December	(100)1	0(0)	(100)1	2.7	1024.7	10.3	27.8	0.8-	80.8	100	19
January	(100)1	0(0)	(100)1	1.7	1024.7	8.2	26.6	1-	80.1	100	17
February	(100)1	(100)1	0(0)	2.1	1022.6	7	28	4.2-	82.5	100	15
March	0(0)	0(0)	0(0)	3.2	1022.2	8.5	31.6	1.6-	80	100	15

P_value = 0.3

Results

According to the Chi-Square test, there was no significant difference between demographic characteristics and Crohn's disease and ulcerative colitis (P-Value <0.05).

According to the Chi-Square test, there was a significant difference between gender, living place and Crohn's disease and ulcerative colitis (P-Value <0.05).

Finally, to investigate the relationship between climatic elements and disease according to the statistics of the patients, meteorological data of 6 cities were selected and examined. In these 6 cities, there was no significant association between the total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure, and precipitation (p-value=0.4).

Conclusions

The results of this study are as follows: The total number of patients with inflammatory bowel disease was 190, in which 34 (17.9%) had Crohn's disease and 156 (82.1%) had ulcerative colitis. The highest number of patients with inflammatory bowel disease was 141 people in 2016 and the lowest was 4 people in 2018, accounting for 74.1% and 2.1% of the population, respectively. Crohn's disease with 24 people in 2016 and ulcerative colitis with 117 people had the highest number of patients, accounting for 17% and 83% of the population, respectively. Out of 190 patients with inflammatory bowel disease, the highest number of patients (n=107 or 98.5%) were living in Rasht and the lowest number of them (n=7 or 9.15%) were living in Astara. In terms of Crohn's disease, the highest number of patients (n=13 or 38.2%) were living in Rasht, and in terms of colitis disease, the highest number of patients (n= 94 or 60.3%) were living in Rasht. In terms of Crohn's disease, the lowest number of patients (n=2 or 5.9%) were living in Astara, and in terms of colitis disease, the highest number of patients (n=5 or 3.2%) were living in Astara. According to the Chi-Square test, there was a statistically significant difference between gender and living place and Crohn's disease and ulcerative colitis at P-value <0.05. To investigate the relationship between climatic elements and disease according to the statistics of patients, meteorological data of 6 cities were finally selected and examined. There was no significant relationship between the total number of patients, male patients and female patients and climatic factors, including humidity, temperature, pressure, and precipitation (p-value=0.4). In Anzali, there was no significant relationship between the total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure and precipitation (p-value=0.1). In Rasht, there was no significant association between the total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure, and, precipitation (p-value=0.5). In Roodsar, there was no significant association between total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure, and precipitation (p value=0.3). In Lahijan, there was no significant association between the total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure and precipitation (p-value=0.1). In Talesh, there was no significant association between the total number of patients, male patients and female patients and climatic elements, including humidity, temperature, pressure, and precipitation (p-value=0.3).

According to previous studies, the rate of this disease in females is higher than that of males. It was also confirmed in this study. The number of afflicted people in Rasht is higher than that of other cities, which is consistent with the results of previous studies. It might be due to the higher urban population in this city. With regard to the age, like previous studies, no significant relationship was seen between the age and rate of this disease. Due to the lack of significant association between climatic elements and the number of patients with inflammatory bowel disease, the disease zoning in Gilan province and the probability of its overtaken in other cities or other years are not reliable and have no statistical significance.

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