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ORIGINAL ARTICLE

The effect of seasonal variation on developing common biliary diseases among adult patients in King Fahad Hospital, Al-Baha, Saudi Arabia

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ABSTRACT

Background: Despite gastroenterological diseases and their seasonal etiological patterns reported in several studies, the seasonal fluctuation mechanisms related to conditions are still not clearly understood. Thereby, this study aimed to determine the effect of seasonal variations on developing common biliary diseases among adult patients at King Fahad Hospital, Al-Baha, Saudi Arabia.

Methodology: A retrospective study was conducted among 912 patients at King Fahad Hospital, who were admitted for common biliary diseases. The study was conducted from January 2014 to December 2016 at King Fahd Hospital.

Results: Out of the total 912 patients, 26.1% of the participants were male, while 73.9% were female. 73.9% of the participants had chronic cholecystitis, and laparoscopic cholecystectomy was carried out among 97.9%. The current results showed no seasonal variations, and there was a marked decline in June and July, which are the months with high temperatures.

Conclusion: Biliary diseases were distributed among the months of the year without significant seasonal variations.

Keywords: Biliary diseases, seasonal variation, King Fahad Hospital, Saudi Arabia.

Introduction

Weather changes create an essential factor that affects human health, particularly the transmission of pathogens [1]. Seasons have clear links with the epidemiology of many diseases. Although gastrointestinal disorders were documented throughout the year, higher incidences are associated with particular months [2]. Seasonal fluctuation mechanisms related to diseases are still not clearly understood. Several heterogeneous extrinsic factors, such as gastrointestinal infection [3,4], air pollution [5], and dietary habits [6,7], might play a role in the higher incidence of these diseases. Other predisposing factors such as age, sex, genetic, and microbial activities associated with humidity changes are also being suggested by some researchers [1]. Cholesterol gallstone disease is a common condition with a multifactorial aspect, including the interaction of genetic and environmental factors [8]. Gastroenterological illnesses and their seasonal etiological patterns have been reported in several studies [9]. Seasonal variations of alcoholic but not biliary pancreatitis have also been reported [10]. Upon reviewing the evidence, the seasonal peaks of peptic ulcer diseases are most prominent in colder months. On the contrary, the risk of Crohn's disease's incidence rate is most common during the spring and summer seasons. However, seasonal trends in the onset

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of acute pancreatitis exhibit a summer peak in some countries [1]. Thereby, this study aimed to determine the effect of seasonal variations on developing common biliary diseases among adult patients at King Fahad Hospital, Al-Baha, Saudi Arabia.

Subjects and Methods

This retrospective and population-based study was conducted from January 2014 to December 2016 at King Fahd Hospital, Al-Baha, Kingdom of Saudi Arabia. All files of the patients with a definite diagnosis of acute cholecystitis, chronic cholecystitis, and acute biliary pancreatitis were reviewed for age, gender, date, and treatment method in relation to the corresponding months. Data were entered and analyzed using Statistical Package for Social Sciences, version 21. Variables were described as frequency, percentage, means, and standard deviation (SD). Pearson's chi-squared and Spearman's correlation were used to identifying the relationships. A value of $p < 0.05$ was considered significant.

Results

A total of 912 patients who had a hospital admission for cholecystectomy procedures were recruited, out of which 26.1% of the participants were male, while 73.9% were female. 82.6% of the patients had chronic cholecystitis, and laparoscopic cholecystectomy was carried out in 97.9% of the participants. It was found that the highest numbers of patients (192, 21.1%) were in the age range of 26-30 years with a mean age of 42 years (Tables 1 and 2).

The results demonstrated that the highest number of diagnosed patients had chronic cholecystitis (753, 82.6%), followed by acute cholecystitis (134, 14.7%), and the lowest number of patients were diagnosed with acute biliary pancreatitis (25, 2.7%). Regarding types of surgeries, laparoscopic cholecystectomy was performed for 893 patients (97.9%), and laparoscopic cholecystectomy converted to open surgery was performed for only 19 (2.1%) patients (Table 3).

The results illustrated that 2015 was the year with the highest number of patients (322, 35.3%). However, there was no significant difference between 2014 and 2016 in the frequency of patients. The results also illustrated the frequency of patients in each month of the year. It was noted that the lower frequency of patients were in June (54, 5.9%) and July (38, 4.2%) (Table 4).

The results also showed the cases' distribution was during the months from January to November (Figure 1).

Table 1. *Frequency and percentage analysis according to gender and age group (n = 912).*

Gender		
Variables	**Frequency**	**Percentage**
Males	238	26.1
Females	674	73.9
Age grouping		
15-25	28	3.1
26-30	192	21.1
31-35	132	14.5
36-40	134	14.7
41-45	102	11.1
46-50	97	10.6
51-55	56	6.1
56-60	56	6.1
61-65	27	3.0
Above 65	88	9.6

Table 2. *Descriptive analysis of the age (n = 912).*

	Minimum	Maximum	Mean ± SD
Age	15	100	42 ± 16

Table 3. *Frequency and percentage analysis according to gender and age group (n = 912).*

Diagnosis		
Variables	**Frequency**	**Percentage**
Acute cholecystitis	134	14.7
Chronic cholecystitis	753	82.6
Acute biliary pancreatitis	25	2.7
Types of surgical operations		
Laparoscopic cholecystectomy	893	97.9
Laparoscopic cholecystectomy converted to open surgery	19	2.1

Table 4. *Frequency and percentage analysis of cases per year and month (n = 912).*

Frequency of cases per year		
Variables	**Frequency**	**Percentage**
2014	294	32.2
2015	322	35.3
2016	296	32.5
Frequency of cases per month		
January	87	9.5
February	81	8.9
March	89	9.8
April	76	8.3
May	78	8.6
June	54	5.9
July	38	4.2
August	74	8.1
September	67	7.3
October	89	9.8
November	100	11.0
December	79	8.7

Furthermore, the frequency of patients with three different types of biliary disease diagnosis, including acute and chronic cholecystitis and acute biliary pancreatitis, was also shown concerning their distribution among the months (Figure 2).

The results showed no statistical significance or correlations between the seasons and the number of cases (Table 5).

Discussion

The study of seasonal variations in the occurrence of medical illnesses has an excellent impact on assisting healthcare administrators in allocating resources accordingly [11]. The current results showed some degree of seasonal variations, with a marked decline in June and July, which are the months with the highest temperature. The current results are justified by looking at the climate in Al-Baha, which is mild, with temperatures ranging between 20/6 and 32/20°C. Because of its location at 2,500 m above sea level, the climate ranged between moderate in summer and cold in winter. Jeddah, a western city, overlooks the Red Sea coast and is characterized by a relatively hot and humid weather. Reda et al. [12] did a cross-sectional study which included all emergent patients with gallstone-induced cholecystitis admitted at King Abdulaziz University Hospital during the period between 2005 and 2014; it was found that the summer

Table 5. *Correlations between the number of cases and the months of the year (n = 912).*

Tests	*p* values
Pearson's chi-square	0.178
Spearman's correlation	0.949

Significant at $p < 0.05$.

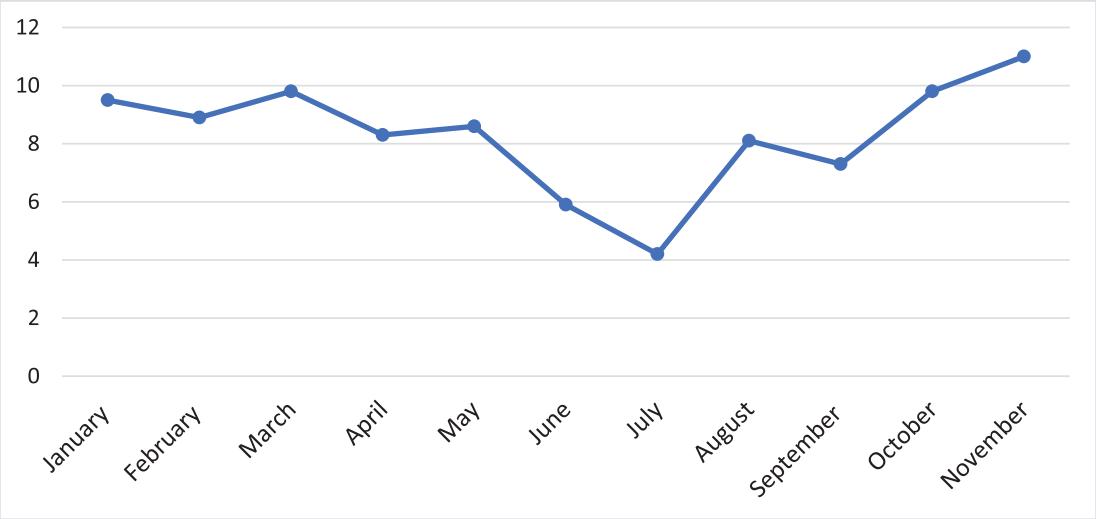

Figure 1. *The percentage distribution of cases among the months (n = 912).*

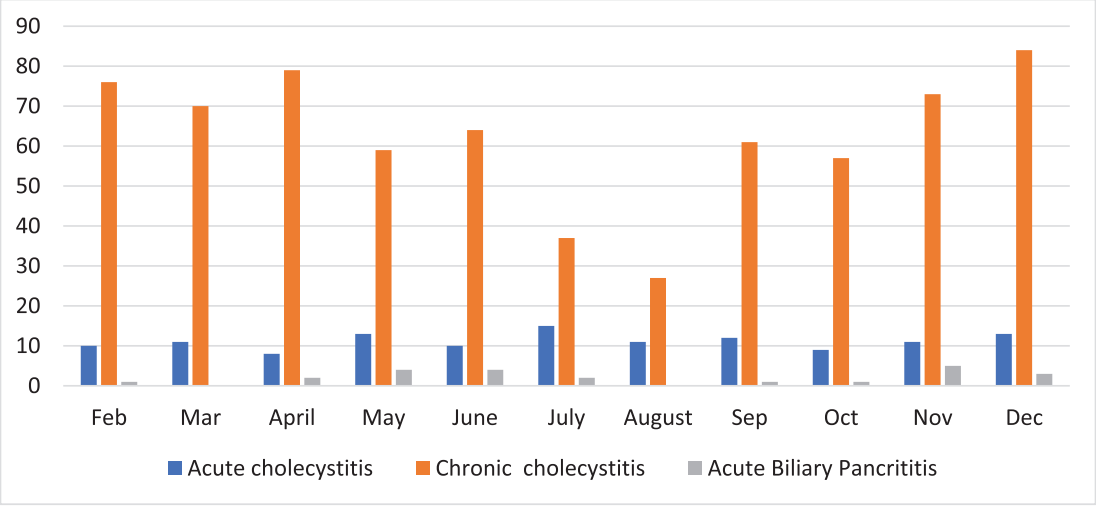

Figure 2. *The frequency of the diagnosis among the months (n = 912).*

season showed the highest percentage of occurrence of emergent, acute cholecystitis (38.13%); followed by winter (22.50%), spring (21.88%), and fall (17.5%); it was concluded that the summer season is a significant aggravating factor for acute cholecystitis. The frequency and severity were significantly higher during summer than other seasons of the year [12]. Khan et al. [11] conducted a retrospective analysis of cholecystectomy patients for acute cholecystitis from January 1998 to December 2018. The findings confirmed seasonal variations in the occurrence of most acute cholecystitis cases, with the summer season and the winter season encountering the least patients with acute cholecystitis [11]. Regarding acute pancreatitis, the current results revealed a normal distribution of cases among the months of the year. The current results agree with a study conducted by Lankisch et al. [13] in a German hospital on 263 patients who were observed for 9 years. No correlation between admissions and a specific months or seasons was found [13]. However, the studies conducted in Finland reported a higher frequency of events during the summer and autumn seasons [10,14]. Gallerani *et al. [9]*, in Italy, observed a different seasonal peak, wherein they found the higher frequency in the spring season [9]. Furthermore, seasonal variations in the secretion of pancreatic enzymes, biliary acids, and oxygen-free radicals were proposed by some authors [1].

Conclusion

Biliary diseases were commonly distributed among the months of the year without significant seasonal variations, but there was a low frequency of cases in summer compared with the winter season, because in Al-Baha the variations might be related to the temperature and humidity degree rather than the season.

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List of Abbreviations
SD Standard deviation

Conflict of interest
The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate
Consent was obtained from all the participants.

Ethical approval
Ethical approval was obtained from the Scientific Research Committee, King Fahad Hospital with letter number: 204 and dated: 1-10-2016.

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