

## Seasonal Variation in Peptic Ulcer related Upper Gastrointestinal Bleed: Ten Years Experience from Northern India

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### Abstract

**Introduction:** Available literature has shown a seasonal variation with contradictory results in the occurrence of peptic ulcer bleed. Data on this issue is lacking from this part of the world. **Objectives:** The aim of this study was to see whether frequency of the peptic ulcer bleed varies with the monthly and seasonal climatic changes during the year in our setting. Additionally whether can we define a particular time of the year as high risk for peptic ulcer bleed. **Materials and Methods:** Data of all the patients with diagnosis of peptic ulcer bleed who presented to our endoscopy centre from January 2010 to December 2019 was retrieved and analysed. The demographic data, clinical presentations, and seasonal and monthly variation was analyzed. **Results:** A total of 4811 patients were diagnosed as peptic ulcer bleed out of a total of 10800 patients presenting with upper gastrointestinal bleed. Mean age of the patients was  $44.5 \pm 17.2$  years with more males (58 %) than females (42 %). The majority of peptic ulcer bleed patients (48.5%) were seen between April to June months of the year. Spring season had the maximum number of peptic ulcer bleed patients. **Conclusion:** There is a definite variation in the occurrence of peptic ulcer related UGI bleed but the pattern we found is unique and different to the literature reported.

**Keywords:** UGI Bleed: Upper gastrointestinal tract bleed, PUD: Peptic ulcer disease, EGD: Esophagogastroduodenoscopy, Seasonal variation

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### Introduction

Peptic ulcer disease (PUD) is a major global public health problem with significant impact on the cost of hospitalization, morbidity and mortality. PUD is estimated to affect about six million individuals per year in the US, contributing fairly to increased healthcare costs[1]. The overall mortality of upper GI bleeding has remained relatively constant at about 10% during the past few decades as improvements in management of UGI bleed almost been balanced by a population with an increasing life expectancy and associated comorbidities. Although seasonality is a well-known phenomenon in the epidemiology of many diseases including gastrointestinal diseases where some particular months are associated with higher incidences. Various mechanism implicated are gastrointestinal infection, air pollution, dietary habits, genetic pre-disposition, parallel changes in humidity, vascular disorders, stressful life[2-6]. Most of the literature has found higher frequency of peptic ulcer disease and its complications like GI bleed occurring during winter months, late autumn and early spring season[7-11]. A study from Mersin[12] has found higher frequency in spring season while one study[13] has shown no correlation between GI bleed and monthly or seasonal variations. A large study from India found increased admissions for PUD in winter and spring[14]. To our knowledge not recent data is available from our country to address this issue. The aim of this study is to assess whether climatic factors throughout the 12 months and 4 seasons of the year have an influence on the incidence of peptic ulcer bleeding. Anticipation of such variations in

the incidence of (AUGIB) during a particular time or season of the year might allow primary medical care centers and hospitals to adopt some interventions so as to have a favorable impact on management of patients.

#### Materials and Methods

This was a retrospective observational study carried out in the Department of Gastroenterology Superspecialty hospital which is a tertiary care hospital associated with Government Medical College Srinagar over a period of ten years between January 2010 to December 2019. The hospital runs 24 x 7 emergency endoscopy services with round the clock availability of an experienced endoscopy staff.

**Inclusion criteria:** Adult patients (>18 years) of either gender with diagnosis of Peptic ulcer bleed after UGI endoscopy were included in the study. We included patients who had Duodenal ulcer, Gastric ulcer, both gastric and duodenal ulcers, Erosins (gastric and duodenal). In all patients UGI endoscopy was performed within 24 hours of admission. Informed consent for endoscopy was obtained by the endoscopy staff before the procedure. EGD was performed perorally in a standard manner with the patient in the left lateral position after topical xylocaine spray/jelly. Majority of the procedures were done using intravenous midazolam. Intravenous propofol was used in few cases. Video endoscope used was GIF Q 150 Olympus optical Co., Ltd., Tokyo, Japan were used. Data extracted from their records included gender, age, patients' demographic and clinical characteristic, the date of admission, Endoscopic findings. Patients were categorized into twelve 1-month intervals and into four 3-month intervals (seasons): Winter was defined as January-March, Spring as April-June, Summer as July-September, and Autumn as October-December. The data were analyzed according to month and season.

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**Statistical Analysis:** Collected data was compiled and entered in spread sheet Microsoft excel and exported to Data editor of SPSS computer software, version 20 (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean ± standard deviation and categorical variables were summarized as frequency and percentage.

**Results**

**Patients’ Demographic Characteristics:**A total of 10200 patients presented with diagnosis of UGI Bleed to our endoscopy centre between January 2010 to December 2019.Out of them 4811 patients were diagnosed as Peptic ulcer bleed.

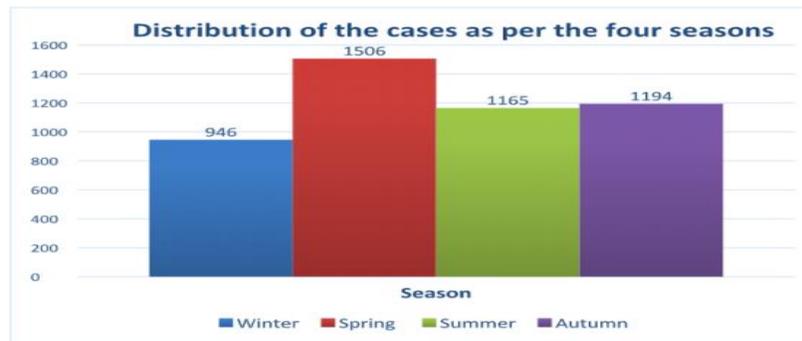
There were 2790 males (58%) and 2021 females (42%) in our study. The mean age was 46.5±12.7 years

**Table 1 : Patient characteristics**

<b>Total population studied (Peptic ulcer bleed)</b>		<b>N=4811</b>
Gender ( Male : Female) %		56 : 44
Age in years (mean ±SD)		44.5 ± 17.2
<b>Clinical presentation</b>	Melena	76 %
	Hematemesis	19 %
	Melena + Hematemesis	5 %
<b>Endoscopy findings</b>	Duodenal ulcer	54.8 %
	Gastric ulcer	26.6 %
	Erosions	14.7 %
	Gastroduodenal ulcers	3.8 %

**Table 2 : Distribution of the cases as per the four seasons**

	<b>Total</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>
<b>Frequency (n)</b>	<b>4811</b>	946	1506	1165	1194
<b>Percentage (%)</b>	<b>100</b>	19.66	31.30	24.21	24.19



**Fig 1 : Distribution of the cases as per the four seasons**

**Table 3: Distribution of the cases on monthly basis**

	<b>Frequency (n =)</b>	<b>Percentage (%)</b>
January	305	6.34
February	319	6.63
March	322	6.70
April	467	9.70
May	480	9.98
June	559	11.62
July	399	8.3
August	463	9.62
September	303	6.3
October	411	8.55
November	399	8.3
December	384	7.98
<b>Total</b>	<b>4811</b>	<b>100</b>

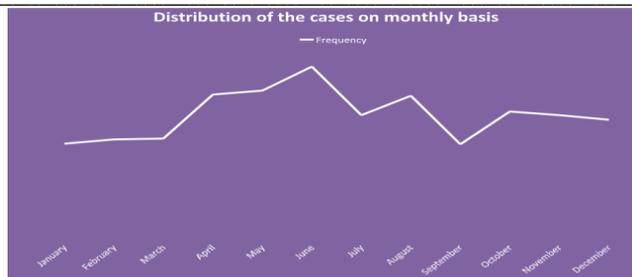


Fig 2:Distribution of the cases on monthly basis

**Discussion**

The term ‘peptic ulcer disease’ (PUD) is used to include ulcerations and erosions in the stomach and duodenum from a variety of causes. An ulcer in the GI tract has been defined as a mucosal break of 5 mm or larger with appreciable depth at endoscopy or with histologic evidence of submucosal extension[15].An erosion is a break less than 5 mm. PUD, a major cause for UGI bleed globally is caused by a multitude of causes like *H pylori* infection, NSAIDs, smoking.The seasonal variation in the occurrence of ulcer disease and related complications has been described numerous times previously in other countries, with most studies describing highest number of cases in winter and relatively lower number of cases of PUD and PUD related GI bleed in summer[16-18].Some studies showed two peaks in spring and autumn whereas a large scale study in Italy by Roberto Manfredini et al[7] described three peaks in spring, autumn and winter. Seasonal variation has been noted in presentation of various other diseases like myocardial infarction, cerebrovascular accident and congestive heart failure[19-21].Fares, et al[22]in their study suggest that winter months had a higher incidence of PUD when observed globally. Similar findings were seen in other studies [23,12] and highest number of cases of PUD and related complications were noted from October to March. So there is strong theory of winter being the peak seasons for peptic ulcers. One large study from USA[9] showed that the incidence of PUD admissions in the US started to rise in the winter but peaked in the spring and reached a nadir in the fall.The reasons for a seasonal pattern of incidence of duodenal ulcer are still obscure. Some studies in humans and laboratory animals have shown that the volume and acidity of gastric secretion are higher in spring and autumn[24,25]. However a study in the Hong Kong Chinese[26] revealed that the acid peaks did not coincide with the ulcer occurrence peak, and the peaks were widely separated.Xirasagar, et al[27] have discussed the complex relation of temperature and humidity with the occurrence of duodenal ulcers. They also stated that there is an adverse independent relationship of humidity with older patients and that the seasonality of duodenal ulcers could be generalized in older age groups. Liu, et al [28] in their study in Nanning, China concluded that there existed a relationship between the meteorological factors and the onset of peptic ulcers such that the winter and the spring season were predominant over summer and fall, supporting our study. Another study concluded that hemorrhages due to gastric ulcers were largely seen in winter months when the mean temperature and mean vapor pressure were low, while the mean atmospheric pressure was high, contrary to summer when there was a high mean temperature and mean vapor pressure, while the mean atmospheric pressure was low, thus lower incidence[11].Environmental stress is also a risk factor to PUD. During the colder months, as a result of harsh cold conditions

and constantly fluctuating temperatures, the human body experiences considerable acute stress actions triggered by sympathetic nerve excitation and rapid secretion of noradrenaline and adrenaline resulting in the contraction of blood vessels and the duodenal mucosa ultimately leading to mucosal damage due to insufficient oxygen[22]. Thus, the gastric secretions, with high amounts hydrochloric acid, further increase the susceptibility of the damaged mucosa to PUD. The seasonal photo-periodicity invokes the circadian variations of melatonin, which may play a major role in causing duodenal ulcers in addition to the stress caused by harsh winter conditions[27].In addition to meteorological factors, the seasonal variation observed in studies could also be due to the fact that most adults are prone to worsening of existing conditions like osteoarthritis and rheumatoid arthritis during winter months, which results in the increased NSAID usage[22].A study suggested that smoking was more common in winters[27].Other less obvious contributing factors may be due to the presence of concomitant diseases such as Crohn’s disease, Zollinger–Ellison syndrome[28].

Seasonality of *Helicobacter pylori* infection is another possible factor, which may affect PUD onset but Savarino *et al* [29]did not find any difference in the percentage of *H. pylori*-positive DU cases between seasons or a parallel annual fluctuation in gastric acidity and *H. pylori* infection.In our study most of the cases of PUD related GI bleeding were seen in spring season and June was the month when peak of cases were noted showing inconsistency with majority of the studies from around the world. In our study lowest number of cases were found in winter season as contrary to majority of studies where winter peak has been noted. One of the main reason for such finding in our study is that this part of India gets one of the harsh winters and many areas get cut-off from health care facilities, some roads connecting remote areas to city remain cutoff for weeks to months so all the patients are not able to get to the hospitals in time and mild cases of GI bleed don’t report to hospitals and these patients report to hospitals after weeks to months to get the proper health checkups .Another factor which may explain our peak in spring is increase in the use of aspirin and other NSAIDs resulting due to the peak of presentation of cardiovascular diseases and worsening of diseases like osteoarthritis and rheumatoid arthritis in winter and these new users of NSAIDs subsequently present in spring season with NSAID related ulcer bleed. So from our study we confirm the seasonal variation of PUD related GI bleed as noted in previous studies and at the same time our study shows that there may be lot of factors apart from meteorological factors responsible for such seasonal variation and the peak may vary with each region depending upon which of the factor plays major role.

Table 4: Seasonal variation in PUD related GI bleed in various studies

Author/setting	Sample size	Source of data	Time period	Peak
Marbella et al, 1988 (U.S.A.)	285	Single centre	1974-1976	Jan-Feb, Jul-Aug, Nov-Dec
Tishchenko et al, 1990 (Russia)	390	Single center	Not available	Jan, Oct, Sept
Shih et al, 1993(Taiwan)	2,889	Single center	1987 – 1992	Jan - Feb
Thomopoulos et al, 1997 (Greece )	1,992	Single center	1991 - 1996	Apr and Oct

Tsai et al, 1998(Taiwan)	10,331	Single center	1989 – 1996	Nov - Mar
Rodriguez et al,1999 (Mexico)	275	Single center	1991 - 1997	May, June, Nov
Nomura et al,2001 (Japan)	441	Single center	1996 - 1999	Autumn and Winter
Lopez-Cepero et al,2005 (Spain)	499	Single center	1998 - 2001	No seasonal variation

**Author's contribution:** SAS, BAK, SAK- Concept and design of the study; prepared first draft of manuscript; SAS,MK,MYM - Interpreted the results; reviewed the literature and manuscript preparation; SAS,MK- Concept, coordination, review of literature and manuscript preparation; SAS, BAK,ZAW - Statistically analysed and interpreted, preparation of manuscript and revision of the manuscript.

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