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Review Article

**GLOBAL INCIDENCE AND PREVALENCE OF PEPTIC ULCER  
DISEASE: A SYSTEMATIC REVIEW STUDY**<sup>1</sup>Dr Shah Alam, <sup>2</sup>Dr Muzzamil Ikram, <sup>3</sup>Dr Rabia Aslam<sup>1</sup>House Officer, Jinnah Hospital Lahore, <sup>2</sup>Quaid-e-Azam Medical College Bahawalpur,<sup>3</sup>University of Medical and Dental College Faisalabad.

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**Abstract:**

**Background and aim:** Peptic ulcer disease (PUD) are mainly associated with *Helicobacter pylori* infection and the use of acetylsalicylic acid (ASA) and nonsteroidal anti-inflammatory drugs (NSAIDs). The management of *H. pylori* infection has improved radically in recent years; however, the prescription of ASA and NSAIDs has increased over the same period. Aim To evaluate the current global incidence and prevalence of PUD by systematic review of the literature published over the last decade.

**Methods:** Systematic searches of PubMed, EMBASE and the Cochrane library with search terms peptic ulcer, incidence, prevalence and *h. pylori* infection.

**Results:** Incidence rates of PUD were 0.10–0.19% for physician diagnosed PUD and 0.03–0.17% when based on hospitalization data annually. The 1-year prevalence based on physician diagnosis was 0.12–1.50% and that based on hospitalization data was 0.10–0.19%. The majority of studies reported a decrease in the incidence or prevalence of PUD over time.

**Conclusions:** Peptic ulcer disease remains a frequent condition, although reported cases of incidence and prevalence are decreasing. This reduction in the reported Peptic ulcer cases may be due to a decrease in *H. pylori*-associated PUD.

**Key words:** peptic ulcer, prevalence, incidence, *helicobacter pylori* infection

**Corresponding author:****Dr Shah Alam,**

House Officer, Jinnah Hospital Lahore



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**INTRODUCTION:**

Peptic ulcer disease (PUD) develops when the protective mechanisms of the gastrointestinal mucosa, such as mucus and bicarbonate secretion, are overwhelmed by the damaging effects of gastric acid and pepsin. Peptic ulcers occur mainly in the stomach is known as gastric ulcer (GU) or ulcer occur in the proximal duodenum is known as duodenal ulcer (DU) (fig 1). A sharp worldwide decline in both the incidence and mortality of gastric cancer in second half of the 20<sup>th</sup> century. Despite this, the condition remains the world’s second leading cause of cancer mortality behind lung cancer. It has been estimated that there will have been more than 870,000 deaths from the disease in the year 2000, accounting for approximately 12% of all cancer deaths [1-3]. Gastric cancer has attracted much attention from epidemiologic investigators over recent years, particularly with the emergence of *H. pylori* as a risk factor for the condition. Differences in exposures to *H. pylori* and a range of other environmental factors probably account for much of the variations seen in the

incidence of gastric cancer over time and between populations.

GU has become more commonly associated with the use of non-steroidal anti-inflammatory drugs (NSAIDs) and acetylsalicylic acid (ASA). [4-6] Individuals with PUD are at risk of developing complications such as gastro duodenal hemorrhage, perforation and obstruction, and mortality among patients with these complications is high. [7] Management of *H. pylori*-associated PUD has improved radically during the past few decades, culminating in the widespread use of proton pump inhibitor (PPI)-based triple therapy for *H. pylori* eradication. [8] However, prescriptions for drugs implicated in the etiology of PUD, such as aspirin and NSAIDs, have also increased over this time period [8] and adherence to gastro protection for prevention of NSAID-induced PUD remains far from optimal. [9,10] The aim of this report is to evaluate the current global incidence and prevalence of PUD by systematically reviewing the literature published over the last decade.

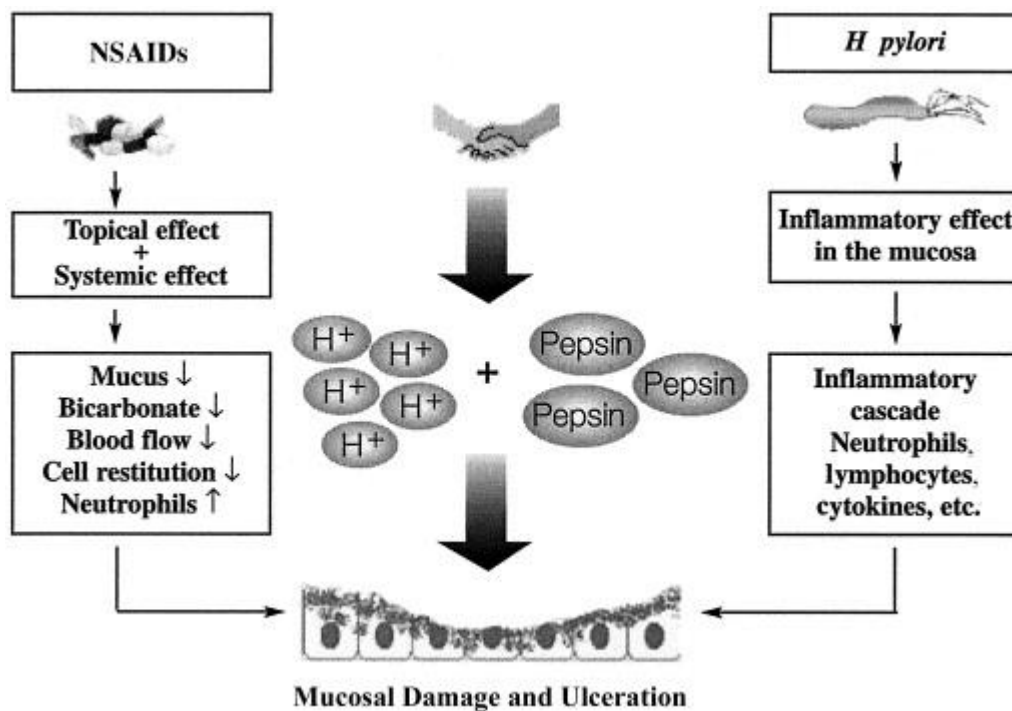


Fig 1: peptic ulceration

**METHOD:****Search Strategy:**

PubMed, EMBASE and the Cochrane library were searched for studies of human subjects published between 1997 and 2017. The studies were searched to identify the documented prevalence or incidence of PUD in the general population or in a healthcare-based setting (Figure 2).

**Inclusion Criteria:**

Only studies were selected with a total sample size of at least 1000, to avoid incidence and prevalence estimates that were too imprecise.

**Exclusion:**

Studies reporting only data earlier than 1980 were excluded to focus on recent trends in PUD epidemiology. In addition, studies reporting on GU only or DU only were excluded, as they did not provide data on PUD overall. Excluded studies that examined only self-reported PUD<sup>10-14</sup> as well as all endoscopic studies that did not report on the use of antisecretory medications. One study that examined a consecutive series of self-selected patients with dyspeptic symptoms who attended the H. pylori center of a single university hospital was also excluded, as this was unlikely to give an accurate reflection of the general population<sup>15</sup> Data on the incidence and prevalence of PUD, as well as time trends in this incidence or prevalence, were extracted from studies that fulfilled the inclusion and exclusion criteria

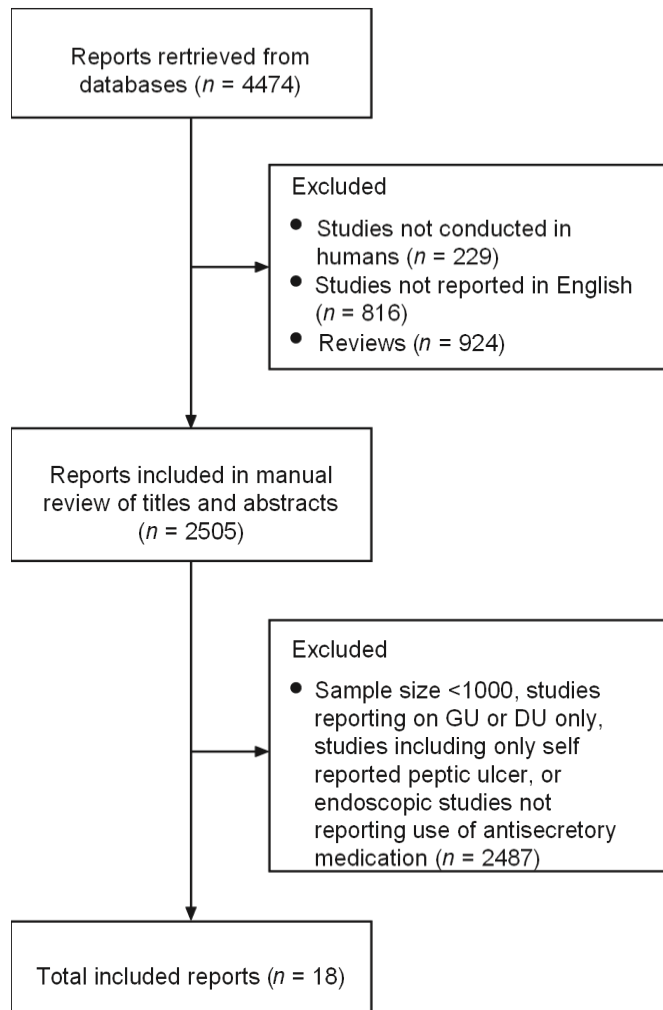


Figure 2. Flow chart of systematic literature searches conducted to identify studies that reported the prevalence or incidence of peptic ulcer disease in the general population or in a healthcare-based setting

**International Variations:**

There is marked geographic variation in the incidence of gastric cancer. International Agency for Research on Cancer data.

Country, region	Male	Female	Ratio
Japan, Yamagata	95.5	40.1	2.4
Japan, Hiroshima	83.1	35.9	2.3
Korea, Kanwha	65.9	25.0	2.6
Japan, Osaka	65.0	27.3	2.4
Costa Rica	51.5	22.7	2.3
China, Shanghai	46.5	21.0	2.2
Italy, Florence	36.3	15.9	2.3
Columbia, Cali	33.3	19.3	1.7
Peru, Trujillo	31.1	20.1	1.5
Yugoslavia, Vojvodina	20.8	9.4	2.2
Hong Kong	19.4	9.5	2.0
Germany, Saarland	18.5	9.0	2.1
Italy, Genoa	17.6	8.3	2.1
United Kingdom	16.1	6.3	2.6
Spain, Granada	15.5	7.0	2.2
US, SEER <sup>a</sup> (Black)	14.5	5.9	2.5
Norway	13.6	6.4	2.1
Switzerland, Geneva	12.3	5.4	2.3
France, Bas Rhin	12.2	4.9	2.5
Australia, Victoria	11.7	4.9	2.4
Philippines, Manila	11.1	6.4	1.7
Canada	10.6	4.5	2.4
Australia, NSW	10.1	4.2	2.4
Singapore (Malay)	8.7	5.5	1.6
India, Bombay	7.7	3.8	2.0
Thailand, Chiang Mai	7.5	4.9	1.5
US, SEER* (White)	7.5	3.1	2.4
Highest/lowest ratio	12.7	12.9	

Table 1

International comparison of age-adjusted incidence rates (/100,000) of gastric cancer in selected countries

**RESULTS:**

Out of a total of 4474 reports retrieved from the databases, 18 were included in this review (Figure 3, Tables 2 and 3). Seven studies reported on the incidence of PUD, even studies reported the population-based prevalence of PUD and four studies reported the prevalence of PUD in endoscopic case series. Eleven of the studies reported changes in the incidence or prevalence of PUD over time.

**Incidence of PUD:**

Seven studies reported the incidence of PUD extrapolated to the general population, or as a proportion of patients registered in primary care (Table 2, Figure 4). One of these studies was from the US and six were from Europe. Four studies were based on physician diagnoses and three were based on hospitalizations. The annual incidence of PUD reported across the studies showed remarkable consistency, ranging from 0.10% to 0.19% based on physician-diagnosed PUD and from 0.03% to 0.17% when based on hospitalization data.

Table 2. Incidence of peptic ulcer disease extrapolated to the general population, or as a proportion of patients registered in primary care

Diagnostic basis	Reference	Country	Sample size	Annual incidence of PUD*, % ( years )
Physician-diagnosed Hospitalization	Bartholomeeusen et al. <sup>15</sup>	Belgium	140 000	0.19 (2002/2003)
	Garcia Rodruigez and Hernandez-Diaz <sup>14</sup>	UK	458 840	0.10 (1995–1999)
	Lassen et al. <sup>13</sup>	Denmark	470 000	0.15 (2002)
	Perez-Aisa et al. <sup>16</sup>	Spain	237 068	0.14 (2000)
	Lewis et al. <sup>17</sup>	US	270 000	0.17 (1999)
	Paimela et al. <sup>18</sup>	Finland	5 200 000	0.07 (1999)
	Post et al. <sup>19</sup>	The Netherlands	15 500 000	0.03 (2003)

PUD, peptic ulcer disease .

\* Most recent, if more than one reported.

Reported as a proportion of patients registered in primary care.

Reported as a proportion of the general population.

Table 2. Population-based prevalence of peptic ulcer disease

Diagnostic basis	Reference	Country	Sample size	Year study conducted	Mean age (years)	Prevalence period	Prevalence of PUD* ( % )
Physiciandiagnosed Hospitalization	Aro et al. <sup>24</sup>					Cross-sectional	4.1
	Kang et al. <sup>22</sup>	Sweden	1001	1998–2001	54	1 year	0.12
	Levin et al. <sup>21</sup>	UK	1 400 000	1998	NR	1 year	1.1
	Munnangi and Sonnenberg <sup>20</sup>	US	2 400 000	1994/1995	NR	1 year	1.5
	Rennert and Peterburg <sup>23</sup>	US	4 067 000	1995	NR	NR	4.7
	Peterburg <sup>23</sup>	Israel	1 409 725	1998	NR	14 years	2.6
	Hein et al. <sup>25</sup>	Denmark	3387	1977–1991	NR	Average 1 year	0.19
	Kang et al. <sup>26</sup>	UK	5 000 000	2000–2002	NR	1 year	0.10

NR, not reported; PUD, peptic ulcer disease. \* Most recent, if more than one reported.

**Physician-diagnosed PUD.**

Of the four studies that used physician diagnosis to estimate the incidence of PUD, two examined uncomplicated and complicated PUD separately. A Danish study estimated the incidence of complicated and uncomplicated PUD between 1993 and 2002. Data from four population-based registries covering reports on endoscopies and surgical procedures were included.

**Hospitalization data.**

In the study from Denmark discussed above,<sup>25</sup> the prevalence of PUD among employed men was assessed from hospital admission records. During this period, 2.6% of study participants had been hospitalized for PUD, amounting to an average 1-year prevalence of 0.19%.

**Changes in The Incidence and Prevalence of PUD Over Time**

Eleven of the studies identified for this review reported on temporal trends in the incidence or prevalence of PUD, revealing consistent changes in recent decades (Figures 4 and 5). Some studies also identified changes in the association of PUD with *H. pylori* infection and use of NSAIDs.

**Temporal trends in incidence.**

The Intego database study from Belgium recorded the 1-year incidence for PUD during the time periods 1994 / 1995 and 2002 / 2003.<sup>15</sup> The physician-diagnosed incidence of PUD decreased significantly between these time periods, from 0.18% to 0.10% for GU (incidence ratio: 0.58; 95% CI: 0.47–0.72) and from 0.22% to 0.09% for DU (incidence ratio: 0.38; 95% CI: 0.31–0.48).

**DISCUSSION:**

Our systematic review of the literature on the epidemiology of PUD highlights several important points. First, it shows that PUD remains a relatively common condition worldwide, with annual incidence ranging from 0.10% to 0.19% for physician-diagnosed PUD and from 0.03% to 0.17% for PUD diagnosed during hospitalization. The 1-year prevalence of physician diagnosed PUD was 0.12–1.5%, and the 1-year prevalence of PUD diagnosed during hospitalizations was 0.10–0.19%. The data show that the incidence of PUD has decreased over recent decades in many countries, most likely as a result of the decrease in *H. pylori* infection, particularly in Western populations.

However, it is possible that the situation may be different in Asian countries; a recent study in Korea revealed that the prevalence of *H. pylori* infection in association with GU was increasing with time, whereas *H. pylori* infection in DU was decreasing. The most reliable study of physician-diagnosed prevalence was from Sweden, reporting cross-sectional data representative of the general population. The study thus included both symptomatic and asymptomatic PUD. The overall prevalence of PUD observed in this study was 4.1%; 19.5% of all PUD cases identified were asymptomatic. Comparing this prevalence with the lower rates obtained from other studies of physician diagnosed PUD in primary care suggests that a proportion of individuals with PUD remain undiagnosed. In individuals with asymptomatic PUD, severe complications, such as gastrointestinal hemorrhage, may be the first signs of the disease. Hemorrhage is associated with mortality approaching 10% and high recurrence. Overall, our review of the literature shows that the reported incidence and prevalence of PUD have decreased over time in recent decades. However, temporal trends in the rate of hospitalizations for complications of PUD varied in studies included in our review, remaining unchanged or increasing in recent decades in two studies in Finland and the Netherlands but declining over time in one study in Scotland.

**CONCLUSION:**

Peptic ulcer disease remains a common condition, although reported incidence and prevalence are decreasing. This decrease may be due to a decrease in *H. pylori*-associated PUD.

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