

# The Effect of Two Different Doses of Omeprazole on Gastric pH in I.C.U. Patients

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## Abstract

About 1.5-6 % of the patients with gastric and duodenal erosions admitted to I.C.U. are prone to gastrointestinal (G.I.) bleeding with its ensuing complications. Routine prophylaxis with H<sub>2</sub>-blockers and anti-acid has been used in these high risk patients for decades. In this study we evaluated the effect of P.O omeprazole, a potent acid inhibitor with prolong effects on gastric pH. Patients with gastric pH higher than 4 and active G.I bleeding were excluded from the study. The patients were given omeprazole in daily doses of 20 mg and 40 mg via nasogastric tube.

Gastric pH was measured at 8.00 A.M. about 30 min before each dose of omeprazole and thereafter every 8 hours for 3 days. In 10 patients receiving 20 mg omeprazole mean intragastric pH increased from  $2.6 \pm 0.13$  to  $4.28 \pm 0.33$  ( $p < 0.008$ ) after treatment. In 5 patients given 40 mg Omeprazole the corresponding pH value raised from  $2.79 \pm 0.2$  to  $5.56 \pm 0.39$ . ( $p < 0.001$ ). At the end of treatment, an intragastric pH of 4 prevailed in 50 and 100 percent of patients on 20 and 40 mg Omeprazole respectively. In conclusion, the present study shows that omeprazole P.O in daily dose of 40 mg maintains gastric pH > 4 in I.C.U. patients.

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**Keywords** • Omeprazole • I.C.U. • ulcer • G.I. bleeding.

## Introduction

**H**igh risk patients in I.C.U. develop gastric erosions in acid secreting region of the stomach in early days of hospitalization and subsequent ulcers in distal part of stomach. In majority of patients ischemia is known to be a pathogenic factor but in most cases with head trauma, an increasing acid secretion is involved in the pathogenesis of ulcers. The development of G.I. bleeding and its associated consequences in 1.5 to 6 percent of these patients demands a mandatory prophylaxis. For many years medications including anti-acid, sucralfate, parenteral ranitidine and cimetidine have been used routinely but their effects on reducing G.I. bleeding and mortality rate are controversial.<sup>2</sup> Omeprazole a proton pump inhibitor in parietal cells is the most potent acid inhibitor with prolong effect which might have a potential use in I.C.U. patients at the risk of erosions and ulcers.<sup>3</sup> In present study, the effect of two different doses of PO omeprazole on gastric pH of I.C.U. patients was studied.

## Patients and Methods

Patients with head trauma, G.C.S between 3-6 and increased I.C.P. were admitted to I.C.U. and recruited into the present study whose objective was discussed with patient's relatives. Individuals with active G.I. bleeding and those who had

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	Omeprazole	
	20mg po	40mg po
Patients(n)	10	5
Age range(y)	(20-65)	(24-75)
Male	8	4
Female	2	1

recently received anti-acid or H<sub>2</sub>-blockers were excluded from the study. Fifteen patients (3 females and 12 males) of similar age and G.C.S., one with meningitis, two with brain tumor and twelve with head trauma were eligible for the treatment protocol. Both groups were similar with respect to age, G.C.S. and tube feeding. Nasogastric tube size 14F was placed in the stomach and controlled by auscultation or radiology. Gastric pH was measured 8 hourly. Patients with gastric pH less than 4 were selected for the treatment protocol. Omeprazole granules mixed with 20cc lemon juice were flushed into the stomach by means of a syringe attached to nasogastric tube. The omeprazole granules remaining in the tube were then flushed with 15 ml of water. Gastric pH was measured before each dose of omeprazole and then 8 hourly for 3 days.

### Statistical analysis

Pre and post treatment results were analyzed using Wilcoxon test.

### Results

Table I shows demography of patients who only differed in gender.

Table II shows pre and post treatment intragastric pH profile in two groups. Whereas an intragastric pH higher than 4 was found in all patients receiving 40mg omeprazole, only 50% of those on 20mg regimen showed a similar response. Subjects in 20 mg group had variability in response to omeprazole; 50% had pH

more than 4, all subjects in 40 mg group had pH response of more than 4.

In 10 patients receiving 20 mg omeprazole mean intragastric pH was  $2.6 \pm 1.3$  which was raised to  $4.28 \pm 0.33$  after treatment ( $p=0.008$ ).

In 5 patients receiving 40 mg omeprazole the corresponding pH value increased from  $2.79 \pm 0.2$  to  $5.56 \pm 0.39$  after treatment ( $p<0.001$ ).

### Discussion

Gastric and duodenal erosions are reported to occur in majority of I.C.U. patients in whom G.I. bleeding is a serious complication.<sup>1</sup> Routine prophylactic treatment with H<sub>2</sub>-blockers has long been used in I.C.U. patients with severe burn, shock, sepsis, coagulopathy and those under mechanical ventilations.<sup>2</sup> Numerous studies have shown that such prophylactic regimens are of no benefit to an overall mortality rate.<sup>9</sup> Comatose patients and those with multiple organ failure, are more prone to the side effects of cimetidine.<sup>6</sup> In addition, gradual tolerance to H<sub>2</sub>-receptor antagonists develop on the 2nd and 3rd days of treatment.<sup>9</sup> Continuous IV infusion of cimetidine can maintain pH>4 in 75% to 87% of patients in I.C.U. The use of bolus dose appeared to be less effective. The administration of long acting and more potent acid inhibitors in preventing undesirable outcomes was also evaluated in our present study. In 5 patients, 40mg omeprazole given orally, maintained gastric pH level above 4 without any serious side effect. In a similar study It was found that omeprazole in high dose is more effective in maintaining gastric pH level above 4.<sup>8</sup> In our study the gastric pH was checked intermittently but according to recent studies no significant difference was found between intermittent and constant pH measurements.<sup>4</sup> If ulcer formation and its complications are due to a low intragastric pH, the daily administration of 40mg omeprazole, can effectively suppress acid hypersecretion.

Patients	X10	Y10	X5	Y5
1	2.15	5.19	2.15	5.59
2	2.56	3.33	3.12	5.65
3	2.93	5.57	2.44	5.01
4	2.72	2.73	3.10	4.60
5	2.59	3.82	3.14	6.95
6	3.17	6.00		
7	3.37	4.81		
8	2.12	4.17		
9	2.4	3.82		
10	2.15	3.37		
Mean±SEM	2.609±1.3	4.280±0.33	2.791±0.2	5.561±0.39

X=Mean pH before treatment

Y=Mean pH after treatment

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