

Gastroscope Findings and Risk Factors in End-Stage Renal Disease: A Prospective Study

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Abstract: *This prospective study evaluated upper gastrointestinal (GI) findings in 54 end-stage renal disease (ESRD) patients with GI symptoms. Endoscopic abnormalities (70.4%) included gastric erythema (40.7%), erosions (20.4%), and ulcers (12.9%). Chronic gastritis (68.5%) and H. pylori infection (22.2%) were prevalent. Older age (>60 years) and type 2 diabetes significantly correlated with lesions (p<0.05). Proactive GI evaluation in ESRD patients is recommended.*

Keywords: End-stage renal disease; Gastrointestinal disorders; Uremic gastrointestinal complication; Gastric erosion; Gastric ulcer

1. Introduction

End-stage renal disease (ESRD) is a rapidly increasing global health and health-care burden. Up to an estimated 434.3 million adults have CKD in Asia, including up to 65.6 million who have advanced CKD. If we based on the International Society of Nephrology's (ISN) 2019 Global Kidney Health Atlas (GKHA) cross-sectional survey of 160 participating countries, the average number of new ESRD diagnoses worldwide was 144 individuals per million general population ¹.

End-stage renal disease (ESRD) affects virtually all systems in the human body which is due to multiple risk factors with several deleterious effects on each different system, inclusive of gastrointestinal tract

(GIT) involving all its segments ². GIT symptoms involvement in ESRD frequently manifests as epigastric pain, gastroenteritis, nausea, vomiting, anorexia, melena and/or hematemesis ³.

GI symptoms in end-stage renal disease may be due to the uremia itself, the effect of hemodialysis or peritoneal dialysis treatment, the many drugs these patients are taking, the dietary changes, or the lifestyle restrictions as a result of the illness or the dialysis treatment ⁴.

Gastrointestinal (GI) symptoms are also said to be common in patients with end-stage renal disease and there are reports of prevalence rates as high as 77% and 79% ⁵. This study addresses the high prevalence of underdiagnosed GI complications in ESRD, which contribute to morbidity and mortality, emphasizing the need for early endoscopic evaluation. Upper GI endoscopy has been used to investigate

the etiology and prevalence of underlying mucosal lesions; thus, we can manage them early and effectively to prevent further severe complications such as GI bleeding, which can significant reduction in quality of life, also substantial morbidity burden and outcome of kidney disease itself ^{6,7}.

Aims

To identify the most common upper GI diseases in ESRD patients presenting with GI symptoms and to assess the connection between these diseases and potential risk variables.

Objectives

- 1) To describe selected socio-demographic aspects (age, gender, provenances).
- 2) To evaluate clinical GIT manifestation of the patients with end stage renal disease.
- 3) To verify gastroscopic findings, pathological results and H. pylori infections.

2. Materials and Methods

The present study was carried out in the department of Medicine A4 and Medicine A6, the department of multidisciplinary including Nephrology, Calmette hospital. The prospective study included 54 patients who were admitted during the period from 1st November 2022 to 31st January 2023. The Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software program version 26.0. The data were also analyzed using the mean and standard deviation (SD) or median, depending on the variable distribution. Differences between the two groups with continuous data were assessed using a chi-square test, a Z test. A two-sided p-value of less than 0.05 was considered statistically significant.

Sample Size Justification

The sample size was calculated based on a 70% prevalence of gastrointestinal (GI) lesions reported in prior studies, with 80% power and a 5% significance level.

Inclusion Criteria

- Age over or equal to 18 years, both sexes
- The patients with ESRD (Creatinine clearance <15ml/mn/1.73m²) who present GI symptoms (nausea, vomiting, heartburn, epigastric pain hematemesis and/or melena)
- ESRD patients who accepted Gastroscopy.

Exclusion Criteria

- ESRD patients with a history of NSAID exposure or alcohol consumption. NSAID use and alcohol consumption were determined through self-reports.

3. Results

Baseline characteristics included patients

In total, endoscopic examinations were conducted on 54 patients, with males constituting the predominant gender in the study, the sex ratio was 32 males per 22 females (sex ratio: 1.45:1 males/female). The average age of the participants was 50.5 years. The majority of the patients, 38 (70.4 %) originated from rural areas, primarily Takeo province, while the remaining 26 (29.6 %) were from Phnom Penh.

In terms of treatment modalities, conservative treatment cases surpassed hemodialysis, comprising 39 (72.2%) and 15 (27.8%) patients, respectively. Among comorbidities, the finding suggested that hypertension reached out at 98.1% (53 cases), followed by T2D at 35.2%, heart failure (9.3%), cancer and hepatitis B, both at 1.9%. Anorexia was the most frequently reported symptoms (96.3%), followed by nausea, which was present in 50 cases (92.6%), upper abdominal pain (83.3%), vomiting (53.7%), melena (35.2%), and heartburn (27.8%). Hematemesis was the least commonly observed presentation, occurring in 2 patients (3.7%).

Table 1: Baseline characteristics of patients included

Characteristics		Variable	
Patients included			
Sex	Male	32 (52.3%)	Sex ratio 1.45: 1
	Female	22 (40.7%)	
Mean age		50.5 ± 18.1 years	
Geographic origins	Phnom Penh	26 (29.6%)	
	Provinces	38 (70.4%)	
Treatment modalities	Conservative treatment	39 (72.2%)	
	Hemodialysis treatment	15 (27.8%)	
Comorbidities	Hypertension	53 (98.1%)	
	T2D	19 (35.2%)	
	Heart failure	5 (9.2%)	
	Cancer	1 (1.8%)	
	Hepatitis B	1 (1.8%)	
GI symptoms	Anorexia	52 (96.2%)	
	Nausea	50 (92.5%)	
	Upper abdominal pain	45 (83.3%)	
	Vomiting	29 (53.7%)	
	Melena	19 (35.1%)	
	Heartburn	15 (27.7%)	
	Hematemesis	2 (3.7%)	

Endoscopy and Pathology findings

In this study, upper gastrointestinal (UGI) mucosal lesions were observed in 38 (70.4%) patients during endoscopic examination, while the remaining 16 (29.6%) displayed normal UGI mucosa. The most prevalent lesion observed was gastric erythema, presented in 22 patients (40.7%), primarily located in the antrum. Subsequently, gastric erosion occurred at a rate of 20.4%, followed by gastric ulcer at 12.9%, gastric polyp at 7.4%, and gastric atrophy at 3.7%. In other parts of the gastrointestinal tract (GIT), hiatal hernia and bulbar duodenal ulcer or erosion were observed at rates of 1.9% and 3.7%, respectively.

As for pathological findings, chronic gastritis was predominant, noted in 37 cases (68.5%), followed by H. pylori in 12 cases (22.2%) and intestinal metaplasia in 8 cases (14.8%). Atrophic gastritis was the least common finding, occurring in 2 cases (3.7%).

Significantly more GI lesions were noted in patients older than 60 years (p-value: 0.038). Among comorbidities, the T2D subgroup exhibited the highest frequency of GI lesions at 44.7% (p-value: 0.023). No significant associations were observed among other variables.

4. Discussion

In numerous previous studies, ESRD has been associated with a substantial impact on GIT which is really common and can significantly impair quality of life and in some cases, prove fatal^{8,9}. Patients with chronic renal failure may encounter an increased risk of gastric mucosal damage when compared to those with normal kidney function. Among the theories that have been proposed for this phenomenon are chronic circulatory failure, hypergastrinemia and elevated ammonia levels¹⁰⁻¹².

This study revealed a notable gender disparity, with males predominantly presenting with ESRD, consistent with findings from related studies by Sotoudehmanesh R, et al and Pakfetrat M, et al. (sex ratio:1.5:1 and 1.78:1 respectively)^{13,14}. Males in this survey also manifested more GI lesions than females, although no significant association between gender and GI lesions was observed (p-value: 0.753). As reported by Sotoudehmanesh R, et al. male patients were 2.24 times more likely to exhibit significant lesions¹³.

Regarding age, this study highlighted the prevalence of ESRD across various age groups (20-84 years old). While ESRD can affect people of any age, it rises with advancing age, with one in two patients beginning hemodialysis after the age of 65¹⁵. While the average age was 50.5 ± 18.1 years, younger patients (37%) were predominant. Older patients demonstrated a higher rate of lesions (36.8%) in endoscopic procedures (P-value: 0.038), aligning with findings in Iran¹⁴.

Hypertensive nephropathy and diabetic nephropathy are widely acknowledged as the primary causes and outcomes of ESRD in both developed and developing nations, underscoring the severe consequences of these silent threats¹⁶. In this study, hypertension and T2D, were prevalent (98.1%) and 35.2%, respectively). Significant correlations were observed between abnormal endoscopy findings and

T2D (p-value 0.023 and <0.001) in this study and in Pakfetrat M, et al. report, suggesting a potential impact on GI motility¹⁷.

Despite the uncertain pathogenesis of uremia, GI symptoms are prominent¹⁸. According to Elango G. anorexia (83%) was mostly represented, followed by nausea (76.0%), vomiting (64.0%) and upper abdominal pain (28%)¹⁹. One patient could have more than one symptom. In this study reported clinical presentation with anorexia (96.3%), nausea (92.6%), upper abdominal pain (83.3%) and vomiting (53.7%), which are commonly seen in uremic toxicity.

The toxicity also favors Upper Gastrointestinal Bleeding (UGIB) induction due to uremia-induced platelet dysfunction and an increased risk of vascular malformation²⁰. Discussing the serious GI symptom as UGIB, 35.2% of patients were found with melena, but fewer than 4% had hematemesis. However, according to Habas E, et al. hematemesis (57.8%) and melena (27.8%) were represented more²¹. It was particularly notable that there was no significant relationship between the presence of symptoms and a finding of endoscopic lesions, similar to other previous study^{8,22}.

In the endoscopic evaluation, a mere nine patients exhibited ulcerous lesions, comprising 12.9% with gastric ulcers predominantly located in the antrum and 3.7% with duodenal ulcers. In a large dialysis cohort by Nazeer A et al. endoscopic examination revealed gastric ulcer at 11.4%, duodenal ulcer at 6.4%²³. On the other hand, Sugimoto M et al. found gastric ulcer at 4.1% and duodenal ulcer at 3.3% in the annual health checks of patients with normal renal function²⁴. As demonstrated by Liang CC et al., the incidence of ulcerous lesions was more than 10 times higher in CKD patients than in those without CKD²⁵.

Regarding histological aspects, Vatsala Misra and colleagues established that mucosal edema was the predominant feature in 82.3% of cases²⁶. Conversely, Al Muelio et al. in Saudi Arabia identified chronic gastritis as the primary histological alteration in 51.9% of patients²⁷. Similarly, in this study, chronic gastritis was the most prevalent pathological observation (68.5%), followed by intestinal metaplasia at 14.8% and atrophic gastritis at 3.7%. Dysplasia and neoplasia weren't discovered. In patients with ESRD, there is evidence indicating H. pylori urease activity elevates ammonia levels by hydrolyzing endogenous urea.

This process is associated with consequential structural and functional alterations in the gastric mucosa²⁸. According to various studies, the prevalence of H. pylori infection in uremic patients ranges from 24% to 73%^{23,27}. and it was lower in CKD patients than non-CKD patients in most studies, but it was controversial²⁹. H. pylori was found in 22.2% of all patients and is still remarkable even in those with normal endoscopy results (25%). Similarly, in a large local study by Oung B et al. H. pylori was found in 29% of non-CKD dyspeptic patients, who had a normal endoscopy result³⁰.

Uremic toxins are theoretically significant contributors to GI injury, leading to inflammation and erosion of the mucosa. Additionally, they may induce GI motor dysfunction, characterized by prolonged transit time and diminished motility^{31,32}.

In this study, the mean serum urea was 1.44 (± 0.73) g/l which was as similar as Chih-Chia Liang and al. study (1.41 \pm 1.00 g/l). There was no relation between serum urea and GI lesions³³. Conversely, serum urea was statistically associated with GI bleeding in study of Chih-Chia Liang and al. and with acute lesions of the gastric mucosa (ALGM) in the study of Rebeca García Agudo et al. (p-value: <0.001 and 0.035 respectively)³⁴.

5. Conclusion

Our study highlights the significant burden of gastrointestinal (GI) symptoms and lesions among patients with end-stage renal disease (ESRD). The findings reveal a high prevalence of upper GI abnormalities, particularly gastric erythema, chronic gastritis, and H. pylori infections, underscoring their critical causes. Older age and type 2 diabetes emerged as significant risk factors for GI lesions, emphasizing the need for targeted management strategies for these groups. Targeted endoscopic screening for ESRD patients with T2D or advanced age may mitigate GI complications.

6. Recommendation

We recommend that nephrologists, gastroenterologists, and other healthcare professionals managing ESRD patients prioritize proactive gastrointestinal evaluations. Such efforts are essential to improving patient outcomes and addressing the significant GI complications associated with ESRD.

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