Chronic Kidney Disease and Its Impact on The Gastrointestinal Tract: A Prospective Observational Study

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Abstract

Chronic kidney disease (CKD) is a pervasive and progressive condition that wreaks havoc on renal function, but its far-reaching impact extends beyond the kidneys. In this article, we explore the intricate relationship between CKD and the Gastrointestinal Tract (GIT), shedding light on the underreported and multifaceted digestive pathologies that afflict CKD patients. We conducted a study involving 80 CKD patients admitted between June 2022 and June 2023, revealing that 85% of these patients experienced various GI symptoms, with nausea, vomiting, and anorexia being the most common. These symptoms may stem from urea and metabolic waste accumulation or dialysis-related effects. Endoscopic examinations unveiled abnormalities in 86% of the cases, primarily localized in the stomach, with gastritis being the predominant lesion. Gastric and duodenal ulcers were relatively rare, aligning with previous studies. Gastrointestinal bleeding occurred in 8% of cases, often linked to erosive gastritis or angiodysplasia. Interestingly, hiatus hernia prevalence was higher in conservative management patients rather than those undergoing haemodialysis. Most patients were in Stage V CKD, with 80% receiving conservative treatment. Our findings suggest a correlation between the severity of renal impairment and the likelihood of upper GI lesions. In conclusion, CKD profoundly affects the GIT, causing a spectrum of symptoms and potential complications, including underreported upper GI lesions. Early recognition through upper GI endoscopy and prompt management is crucial to reduce morbidity and mortality in CKD patients. This study highlights the need for increased awareness and vigilance in managing the intricate interplay between CKD and the GIT, benefitting both patients and healthcare professionals in their battle against this multifarious condition.

Keywords: Surgical procedures, Patients, Health professionals

1. Introduction

Chronic kidney disease (CKD) stands as a formidable adversary to human health, relentlessly progressing in its endeavour to diminish renal function. This ailment, marked by the insidious damage and depletion of nephrons, casts a far-reaching shadow over the entire human body. Amid its multifaceted repercussions, CKD’s profound influence on the gastrointestinal tract (GIT) emerges as a compelling area of concern.

In this article, we embark on a journey to explore the intricate interplay between CKD and the GIT. As we delve into this complex relationship, we will unveil the spectrum of symptoms, the underlying mechanisms, and the pivotal role of modern diagnostic tools like fibre-optic endoscopes. Join us as we navigate the depths of CKD's impact on the GIT, shedding light on the challenges faced by both patients and healthcare professionals in managing this multifarious condition.

2. Materials And Methods
A total number of 90 patients diagnosed as CKD admitted in Medicine ward / Nephrology unit of Arupadai veedu medical college and hospital, Puducherry between June 2022 and June 23 were selected in this study.

**Inclusion criteria**
1. Patients diagnosed as CKD with GFR <60ml/min/1.73m2 (Stage 3-5) (KDIGO guidelines)
2. Patients with age varying from 11 to 80 years.
3. Both male and female patients.
4. Patients on conservative treatment / Hemodialysis (HD) / Peritoneal dialysis

**Exclusion criteria**
1. Patients in Stage 1 and Stage 2 CKD. (KDIGO guidelines)
2. Patients in uremic encephalopathy.
3. Patients undergone Renal transplant
4. Patients having H/o acid peptic disease,
5. Drug intake like NSAIDs, steroids
6. Corrosive poisoning
7. Chronic alcoholic, Chronic smoker was excluded.

In our quest to understand the intricate relationship between chronic kidney disease (CKD) and the gastrointestinal (GI) tract, a rigorous and systematic approach was undertaken. This study targeted CKD patients who met specific inclusion criteria, setting the stage for a comprehensive exploration of their GI health.

Each CKD patient fitting the aforementioned criteria underwent a thorough and meticulous evaluation, beginning with detailed clinical history collection and an exhaustive clinical examination. To gain a holistic perspective of their health, a battery of routine investigations was conducted, including Complete Hemogram, Liver Function tests, Renal Function tests, ECG, ECHO, and abdominal ultrasound.

Furthermore, upper gastrointestinal endoscopy, facilitated by state-of-the-art fiber-optic endoscopes, was carried out after an overnight fasting period. Prior to their involvement in the study, patients were provided with comprehensive information and consent forms, ensuring their informed participation.

During the endoscopy procedure, special attention was dedicated to examining the mucosal changes within the oesophagus, stomach, and duodenum. This meticulous examination aimed to uncover any alterations or anomalies that could shed light on the intricate connection between CKD and the gastrointestinal system.

**3. Results and Discussion**
A total number of 90 chronic kidney disease patients were enrolled for the study from June 22 to June 23. Upper GI Endoscopy was done in these patients after thorough clinical assessment and relevant investigations.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th>Female</th>
</tr>
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<tbody>
<tr>
<td>11-20</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>21-30</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>31-40</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>41-50</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>51-60</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>61-70</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>71-80</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>23</td>
</tr>
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</table>
Out of 90 patients, 60.3% were males and 39.7% were females. The age group of the study population ranges from 11-80 years. The most common age group was 41-50 years.

<table>
<thead>
<tr>
<th>CKD STAGES</th>
<th>N (%)</th>
</tr>
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<tbody>
<tr>
<td>CKD STAGE 3</td>
<td>18 (16.2%)</td>
</tr>
<tr>
<td>CKD STAGE 4</td>
<td>26 (23.4%)</td>
</tr>
<tr>
<td>CKD STAGE 5</td>
<td>46 (41.4%)</td>
</tr>
</tbody>
</table>

In our study, a detailed analysis of chronic kidney disease (CKD) patients revealed distinct patterns in terms of CKD stage and the chosen mode of treatment. Here is a breakdown of our findings:

**CKD Stage Distribution:**

- **Stage V CKD:** The majority of patients, comprising 41.4%, were diagnosed with Stage V CKD, signifying the advanced nature of the disease.
- **Stage IV CKD:** A substantial portion, 23.4% of the patients, were classified under Stage IV CKD, indicating a moderately advanced stage.
- **CKD Stage 3:** The remaining 16.2% of patients were in Stage 3 of CKD, suggesting a relatively earlier stage of the condition.

**Treatment Mode Distribution:**

- **Conservative Treatment:** The majority of patients, constituting 80%, were managed conservatively, highlighting the preference for non-invasive approaches in CKD management.
- **Dialysis Treatment:** A significant proportion, 20% of patients, opted for dialysis as their chosen mode of treatment.

**Breakdown of Dialysis Patients:**

- **Hemodialysis:** Among the patients undergoing dialysis treatment, a notable 13 patients received hemodialysis, representing the more prevalent form of dialysis therapy.
- **Peritoneal Dialysis:** Three patients opted for peritoneal dialysis as their mode of treatment, indicating a less common but still important choice in CKD management.
These findings underscore the diversity in CKD patient profiles, with varying stages of the disease and treatment preferences. Understanding these distributions is crucial for tailoring personalized care plans and optimizing outcomes for CKD patients.

<table>
<thead>
<tr>
<th>GI SYMPTOMS</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorexia</td>
<td>67 (83%)</td>
</tr>
<tr>
<td>Nausea</td>
<td>61 (76%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>51 (64%)</td>
</tr>
<tr>
<td>Heart burns</td>
<td>30 (38%)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>22 (28%)</td>
</tr>
<tr>
<td>Hiccups</td>
<td>16 (20%)</td>
</tr>
<tr>
<td>GI bleed</td>
<td>6 (8%)</td>
</tr>
</tbody>
</table>

In our study, we observed that gastrointestinal symptoms were prevalent among CKD patients, affecting a substantial portion of the study population. Here's a breakdown of the findings:

- **Overall Prevalence:** Gastrointestinal symptoms were identified in a significant majority, accounting for 85% of the patients under investigation.
- **Most Frequent Symptom:** Anorexia emerged as the most frequent gastrointestinal symptom, affecting a substantial 83% of the CKD patients.
- **Second Most Common Symptom:** Nausea was the second most prevalent symptom, being reported by 76% of the CKD patients.
- **Following Symptoms in Order of Frequency:** The order of decreasing frequency for other symptoms was as follows:
  - **Vomiting:** Noted in 64% of the patients.
  - **Heartburn:** Experienced by 38% of the CKD patients.
  - **Abdominal Pain:** Reported in 28% of cases.
  - **Hiccups:** Observed in 20% of the CKD patients.
- **Least Common Presentation:** Gastrointestinal bleeding was the least common presentation, occurring in a total of 6 patients, representing 8% of the study population.

These findings shed light on the high prevalence of gastrointestinal symptoms among CKD patients, with anorexia and nausea being the most prominent complaints. Understanding the frequency and nature of these symptoms is essential for providing comprehensive care to CKD patients and addressing their specific needs.
we conducted endoscopic examinations on CKD patients to assess the presence of UGI mucosal lesions. Here's an overview of our findings:

- **Total Patients with UGI Mucosal Lesions:** Among the CKD patients studied, UGI mucosal lesions were identified in a significant majority, specifically in 69 patients.

- **Patients with Normal UGI Mucosa:** Conversely, 21 patients displayed normal UGI mucosa, accounting for the remainder of the study population.

- **Most Common UGI Mucosal Lesion:** Pan gastritis was the most prevalent UGI mucosal lesion, affecting 48% of the CKD patients.

- **Second Most Common UGI Mucosal Lesion:** Oesophagitis was the second most frequently observed lesion, noted in 32% of patients.

- **Other UGI Mucosal Lesions:** Additional UGI mucosal lesions were also documented as follows:
  - **Gastroesophageal Reflux:** Found in 10% of patients.
  - **Hiatus Hernia:** Identified in 8% of cases.
  - **Oesophageal Ulcer:** Occurred in one patient.
  - **Oesophageal Varices:** Observed in one patient.
Endoscopic Lesions in CKD Patients

- **Normal Findings:**
  - In the group of CKD patients receiving conservative treatment (n = 64), 10 patients (16%) exhibited normal endoscopic findings.
  - In the dialysis group (n = 16), only 1 patient (6%) had normal endoscopic findings.

- **Inflammatory Lesions (Gastritis/Duodenitis/Esophagitis):**
  - Among the CKD patients on conservative treatment, 24 patients (38%) displayed inflammatory lesions, including gastritis, duodenitis, or esophagitis.
  - In the dialysis group, 7 patients (44%) had inflammatory lesions.

- **Ulcers:**
  - Ulcers were observed in 5 patients (8%) in the conservative treatment group.
  - In the dialysis group, 2 patients (12%) had ulcers.

- **Angio Dysplasia:**
  - One patient (1.5%) in the conservative treatment group had angio dysplasia.
  - Similarly, one patient (6%) in the dialysis group had angio dysplasia.

- **Hiatus Hernia:**
  - Hiatus hernia was identified in 5 patients (8%) in the conservative treatment group.
  - In the dialysis group, 1 patient (6%) had hiatus hernia.

<table>
<thead>
<tr>
<th>ENDOSCOPIC LESIONS</th>
<th>CONSERVATIVE n =64</th>
<th>DIALYSIS n=16</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL</td>
<td>10(16%)</td>
<td>1(6%)</td>
</tr>
<tr>
<td>INFLAMMATORY LESIONS (GASTRITIS/ DUODENITIS / ESOPHAGITIS)</td>
<td>24(38%)</td>
<td>7(44%)</td>
</tr>
<tr>
<td>ULCERS</td>
<td>5(8%)</td>
<td>2(12%)</td>
</tr>
<tr>
<td>ANGIO DYSPLASIA</td>
<td>1(1.5%)</td>
<td>1(6%)</td>
</tr>
<tr>
<td>HIATUS HERNIA</td>
<td>5(8%)</td>
<td>1(6%)</td>
</tr>
<tr>
<td>PALE MUCOSA</td>
<td>7(11%)</td>
<td>5(31%)</td>
</tr>
</tbody>
</table>

Patients on conservative treatment had higher frequency of normal endoscopy as compared to those on dialysis (16% vs 6%). The frequency of upper GI mucosal lesions were more common in dialysis group when compared to conservative management group. However, Hiatus hernia was common in patients who were on conservative management.

<table>
<thead>
<tr>
<th>TYPE OF LESION</th>
<th>CKD STAGE 3 n=18</th>
<th>CKD STAGE 4 n=26</th>
<th>CKD STAGE 5 n=36</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL</td>
<td>5(28%)</td>
<td>4(15%)</td>
<td>2(5.5%)</td>
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</table>

Available online at: [https://jazindia.com](https://jazindia.com)
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| Esophagitis | 3(17%) | 8(31%) | 15(42%) |
| Hiatus hernia | 1(6%) | 2(8%) | 3(8%) |
| GER | 1(6%) | 3(12%) | 4(11%) |
| Esophageal ulcer | 0 | 0 | 1(3%) |
| Esophageal varix | 0 | 1(4%) | 0 |
| Pangastritis | 5(28%) | 11(42%) | 22(61%) |
| Pale mucosa | 0 | 4(15%) | 8(22%) |
| Gastric ulcer | 1(6%) | 1(4%) | 2(5.5%) |
| Angiodysplasia | 0 | 0 | 2(5.5%) |
| Erosive gastritis | 0 | 3(12%) | 7(20%) |
| Duodenitis | 2(11%) | 4(15%) | 9(25%) |
| Duodenal ulcer | 1(6%) | 1(4%) | 1(3%) |

Inflammatory mucosal lesions like Pangastritis, Esophagitis and Duodenitis was higher in Stage 5 CKD when compared to Stage 3 CKD and Stage 4 CKD. Hiatus hernia, gastro esophageal reflux lesions were equal in CKD Stage 4 and CKD Stage 5. Angiodysplasia was seen only in Stage 5 CKD while no such lesion was present in CKD Stage 3 or CKD Stage 4. Pale mucosa was predominantly seen in higher Stages of kidney disease. Duodenal ulcer was similar in all Stages of kidney disease. In CKD Stage 5, 20 % had erosive gastritis while in CKD Stage 4 it was only 12 %.

The digestive pathologies are more frequent in patients with chronic kidney disease (CKD). There is a clear under reporting of the disease, resulting in the lack of knowledge of the mechanisms that lead to a wide range of symptoms.

In our study, the age of patients ranged from 11 to 80 years, and the majority in the age group varying from 30 to 60 years. In a similar study conducted by Varma et al1., the age of the patients ranged from 17 to 70 years.

Different GI symptoms were noted in the patients under study. It was found that 85% of the patients had one or the other GI symptoms. This result was consistent with the studies conducted by Farsakhet al2., prevalence of GI symptoms was 70% in CKD patients, and Cano3 (72% CKD patients had GI symptoms). In a prospective study by Margolis et al.4, noticed that 59% patients had symptoms.

In our study nausea, vomiting and anorexia were the most common symptoms in both dialysed as well as non-dialysed patients of CKD. Similar findings have been reported by Farasakh et al2 and Sivinovic et al 5. In the Indian study by Kochar R6 and Goenka M, anorexia, nausea and vomiting were the predominant symptoms. The gastrointestinal symptomatology may be due to central effects of urea and other metabolic waste products which circulate in high concentrations in uraemic blood, as a part of dialysis disequilibrium syndrome or as a manifestation of volume depletion.

In our study, the prevalence of endoscopic abnormalities was 86 %. In a similar study carried out by Nardone7 with 50 CKD patients, it was observed that 74% patients had upper GI lesions on endoscopy. Khedmat8 also observed that 79% CKD patients had upper GI lesions. In a similar study of UGI endoscopic evaluation in CRF by Agrawal9 et al., 85.7% patients showed UGI involvement. Upper gastrointestinal lesions in our series had a predominant localization in stomach. In Serme at al10, gastric lesions were at the forefront followed with 68.7% of cases by duodenal lesions with 32.2% of cases

Of the various types of lesions seen, inflammatory changes were the most common (42%). Prakash11 J and Agrawal BK and Tani N et al12 found that patients with CRF had a high prevalence of inflammatory mucosal changes. In our study gastritis (60%) is the most common lesion in patients of CKD followed in frequency by esophagitis (32%) and duodenitis (19%). This result was similar to the findings of study by Nardone7 who found that 56% of CKD patients had gastric erosions. In the study conducted by Esfahani13, gastritis was the predominant one accounting for 60.8% and other lesions - duodenitis 13%, gastroduodenitis 7.2%. Patients of uraemia had improved capacity to secrete acid due to certain factors leading to gastritis. Haemodialysis by removing these factors allow the manifestation of undergoing hypersecretory state.

In our study, gastric ulcer (5%) and duodenal ulcer (4%) incidence was low. It was similar to Sunder et al.14. study who also reported low incidence of peptic ulcer. and Nardone 7in his study noticed duodenal ulcer in 6% patients. According to Andriulli15, et al, Patients with chronic renal failure are not at a risk of developing chronic peptic ulcer. In an Indian study by Prakash et al16 also noted that risk of developing peptic ulcer is not high in patients with chronic renal failure.
Gastrointestinal bleeding is known to occur in CKD patients. Gastritis often noted in uremic patients were reported to cause bleeding but according to Zukerman et al17 angiodysplastic lesions were the leading cause of gastrointestinal bleeding in patients with CKD. Goldstein18 et al reported a higher frequency of angiodysplasia lesions in severe uremia. In the present study, GI bleeding was present in 6 patients (8%). On endoscopy evaluation of these UGI bleed patients, 5 patients had erosive gastritis and one had angiodysplasia. Boyal19 et al also reported that gastric bleeding sites rather than duodenal ulceration were the most common source of bleeding. As in our study, the prevalence of angiodysplasia is relatively rare.

Hiatus hernia was found in 8% patients in this study. Our study was consistent with study done by Khedmat et al, who noticed hiatus hernia in 9% patients. According to the study conducted by Farsakh2 et al., hiatus hernia was more frequent in hemodialysis patients. But in our study, hiatus hernia was more in conservative management patients.

Most of the patients in our study belong to Stage V CKD (45%). The majority of the patients (80%) in the study were on conservative treatment rather than dialysis as treatment. Patients on conservative treatment had higher frequency of normal endoscopy when compared to those on dialysis (16% vs 6%). In our study there was no significant difference in the incidence of abnormal findings in dialysis group on comparison to non-dialysis group. Margolis et al4 and Andrivilli et al15 also found no relationship between duration of dialysis with the presence or absence of gastrointestinal lesion. According to our study, the more is the stages of renal impairment, the more is the chance of getting upper gastrointestinal lesions.

4. Conclusion
The most common, non-renal, chronic disorders in patients with CKD are GI disorders. CKD is associated with several abnormalities of all the segments in the GI tract. The genesis of GI symptoms in CKD is multifactorial. Upper gastrointestinal lesions often overlooked can lead to major complications in CKD. Thus, recognition of these lesions using upper GI endoscopy and prompt management can significantly reduce the morbidity and mortality in CKD patients.

References:

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