PREVALENCE OF GASTROINTESTINAL SYMPTOMS AND QUALITY OF LIFE IN PATIENTS WITH END STAGE RENAL DISEASE ON MAINTENANCE HAEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL.

A dissertation submitted in partial fulfilment of the requirements for the Master of Medicine Degree (MMed) in Internal Medicine of the University of Nairobi.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
BMI	Body mass index
CDAD	Clostridium difficile associated diarrhoea
CKD	Chronic kidney disease
DM	Diabetes Mellitus
eGFR	Estimated glomerular filtration rate.
ESRD	End stage renal disease
GERD	Gastroesophageal reflux disease
GIS	Gastrointestinal symptoms
GIT	Gastrointestinal tract
GSRS	Gastrointestinal rating scale
GIQLI	Gastrointestinal quality of life index
GSQ	GI symptom Questionnaire
HD	Haemodialysis
HRQOL	Health related quality of life
IBS	Irritable bowel syndrome
KDIGO	Kidney disease improving global outcomes.
KNH	Kenyatta National Hospital
MDRD	Modification of Diet in Renal Disease
NSAIDS	Non-steroidal anti-inflammatory drugs
PD	Peritoneal dialysis
PPIs	Proton pump inhibitors
PRD	Pre-dialysis
QOL	Quality of life
SF-36	36- Item Short Form Survey

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ABSTRACT

Background: Gastrointestinal symptoms (GIS) are regularly reported in end-stage renal disease (ESRD) patients undergoing haemodialysis (HD) and are associated with poor nutritional status and negative impact on quality of life (QOL) with subsequent mortality and morbidity.

Objective: To determine the prevalence of gastrointestinal symptoms and quality of life among patients on maintenance haemodialysis attending haemodialysis clinic at Kenyatta National Hospital.

Methods: A total of 165 patients with ESRD on maintenance HD completed two self-administered questionnaires: Gastrointestinal Symptom Rating Scale (GSRS) and Gastrointestinal Quality of Life index (GIQLI) which measures GIS and QOL respectively.

Results: Overall 137/165 (83.0%) of patients with ESRD reported at least one of the following GIS: Indigestion 75.9%, abdominal pain 70.1%, constipation 59.1%, reflux 46.7%, diarrhoea 36.5%. Quality of life was significantly worse in participants with GIS than in participants without symptoms: Participants (n = 137) who reported at least one gastrointestinal symptom (GSRS score >1) had significantly lower GIQLI total score than those (n =28) who did not report any GIS (91.2 ± 24.2 vs 128.4 ± 12.5; $P < 0.001$). Chronic glomerulonephritis and duration of dialysis were associated with poor QOL in those with GIS. However, age, gender, BMI, hypertension, and diabetes mellitus did not have any significant association with QOL.

Conclusion: Gastrointestinal symptoms are highly prevalent among patients with ESRD undergoing maintenance HD and these patients also experienced significantly poor quality of life than patients with no GIS. These findings strengthen the need for emphasizing symptomatic management and improving the QOL hence long-term prognosis for ESRD patients with GIS.

CHAPTER ONE

1.0 Introduction

Gastrointestinal symptoms (GIS) are common and have been shown to be associated with significant impairment of quality of life (QOL) and increased health care utilization (1). Like many chronic disorders, patients with end stage renal disease (ESRD) have also been shown to experience multiple gastrointestinal (GI) complaints (2–4). These GIS could be improved, worsened, or not influenced by haemodialysis (HD)(4–6).

Gastrointestinal symptoms such as abdominal pain, vomiting, heartburn, reflux, diarrhoea, constipation, anorexia, and nausea, have been reported in haemodialysis population (5,7,8). Kidney disease affects the function of both upper and lower gastrointestinal tract (GIT) with overlap of symptoms occurring following existence of functional gastrointestinal (GI) disorders and numerous comorbid illnesses. Frequent presentation of psychosomatic symptoms such as depression, anxiety among HD patients also correlates significantly with GIS(9).

Ultimately GIS may cause progressive deterioration of nutrition status through loss of appetite and decreased dietary intake with protein energy wasting, and malnutrition being the result(10). Malnutrition significantly impairs QOL and can cause frequent hospitalization and death (3). The recurring nature of these symptoms may also cause a substantial burden leading to poor QOL.

A disconnect exists between patients' perception of their own GIT health and clinical definition of GIS. Trimingham *et al* describes individual differences in GIT health hence demanding individualized dietary intervention and therapeutic treatment. Patients on hemodialysis may notice an increase in frequency or presence of GIS;

however clinicians may not focus on these during treatment due to lack of well standardized literature on GIS accompanying renal failure(11).

In Africa, there is inadequate literature evaluating the prevalence of GIS among patients on maintenance HD. In this study it is of particular interest to find out the prevalence of GIS in patients on maintenance haemodialysis using The Gastrointestinal Symptom Rating Scale (GSRS). The study is also set to assess health related quality of life in patients with and without gastrointestinal symptoms on maintenance haemodialysis using The Gastrointestinal Quality of Life Index (GIQLI).

CHAPTER TWO

2.0 Literature Review

2.1 Prevalence of gastrointestinal symptoms in haemodialysis patients.

Prior studies have stated inconsistent prevalence of GIS in patients undergoing regular dialysis with a range of 29.2% to 91.3% (3,12,13). Prevalence range of GIS is generally indistinguishable in HD, Pre-dialysis (PRD) and Peritoneal dialysis(PD) patients (3), but there is existence of increasing GIS with prolonged period of kidney disease (6).

Zuvela *et al* reviewed 30 studies on the prevalence of GIS in patients on dialysis, all published between 1998 and 2016. The review highlighted a high prevalence and diverse range of GIS are observed in dialysis patients (2). In this review article two studies reported high percentage of patients presenting with at least one GIS during their disease: 91.3% by Daniel *et al* and 70.7% by Chong *et al.* Additionally 65% of patients experienced upper GIS; 34.1% lower GIS and 34.1% had an overlap of both in Chong *et al*'s study(9,14). Constipation, indigestion, diarrhoea, abdominal pain and reflux were the most routinely evaluated GIS in spite of evidence that a wide scope of GIS are documented in HD patients(2). The most common GIS was constipation, stated in 14 studies with a prevalence range of 1.6 -71.7% in HD patients(15). Indigestion had a prevalence range of 30-72.3%, abdominal pain 33-55%, reflux 24.2-65.3% and diarrhoea had a prevalence range of 3.5-38.3% all in HD group(2).Four studies compared the prevalence of GIS between dialysis patients and healthy controls where vomiting and irritable bowel syndrome (IBS) were reported significantly more in those on dialysis than age and gender matched control groups(3,4,9,16).

Strid *et al* compared prevalence of GIS among four groups: PRD, HD, PD, and controls, total GSRS score was notably higher in patients with ESRD than controls.

Those on haemodialysis had higher GSRS scores for all the domains of the scale except reflux(3)

Silva *et al* found that approximately 1 of 3 patients on maintenance HD complained of at least one of the assessed symptoms (anorexia, nausea, diarrhoea, and vomiting). There was a significantly high number of participants who reported at least 1 of these symptoms who had less than 3months of HD compared to those with more than 3 months of HD. In this study women had higher prevalence of GIS than men and vomiting was highly associated with diabetes mellitus (DM) compared to other symptoms(17).

Recent study in Cameroon focusing on 83 patients on HD found a high prevalence of symptoms mainly in younger adult participants possibly associated with underdialysis. Rome IV modified GIS rating scale was used to measure prevalence of symptoms. In the study GIS was reported in 87.9% of the participant. Diarrhoea was the commonest GIS reported at 47%, followed by constipation and vomiting both at 38.6 %(18).

2.2 Gastrointestinal symptoms in patients on haemodialysis.

2.2.1 Definition, risk factors and pathophysiology.

Gastrointestinal symptoms in ESRD just like in the general population can either be "organic" or "functional." **Organic disorders/ symptoms** occur following underlying pathological lesions and have measurable physiological changes(5).

Retained uremic toxins following loss of kidney function in ESRD modify intestinal physiology. This results in increased intestinal permeability, increased intestinal inflammation, mucosal injury and gut dysbiosis. Gut dysbiosis affects gastric emptying and colonic transit time causing, vomiting, diarrhoea, and constipation.

Endoscopic evaluation of dyspeptic patients in the HD, PRD, and control groups by Nardone et al found a higher prevalence of oesophageal, gastric, and duodenal erosions in HD group compared to control. This study also noted a high prevalence of Helicobacter Pylori infection in the same population as compared to control group(19).

Sodium polystyrene sulfonate, an exchange resin regularly used in the treatment of hyperkalemia in CKD has been shown to exacerbate abdominal pain in uremic GIT as studies have found that it causes GIT necrosis(20,21)

Cardiovascular events are the most common complications in ESRD patients (22) and patients are usually on long term prophylactic antiplatelet drugs such as aspirin which is a common cause of dyspepsia. Furthermore, it has been proposed that nonsteroidal anti-inflammatory drugs (NSAIDs) are responsible for almost all dyspeptic symptoms in CKD patients(23). A two year follow up of uremic patients diagnosed with ESRD on HD by Gy *et al* found that 63.6 % (28/44) suffered from non-Helicobacter pylori peptic ulcer. In these patients 41% had cardiovascular disease and were on aspirin while 22.7% used NSAIDs for pain control (24).

Phosphate binders are routinely prescribed to ESRD patients for the management of hyperphosphatemia when dietary restrictions are inadequate. Phosphate binders are often associated with GI distress (25). GIS are the most frequent cause for discontinuation of calcium based phosphate binders (~50%) and this is considered to affect compliance and tolerability of these drugs(26). In a study by Mitrović *et al* indigestion was found to be the most severe (73%) and recurring GIS in HD patients. (27).

Sevelamer is a frequently prescribed non-calcium phosphate binder. Among the GIS; nausea (25%), vomiting (24%), diarrhoea (21%), dyspepsia (16%), and constipation (13%) are common with sevelamer carbonate, whilst diarrhoea (16%), dyspepsia

(11%), and vomiting (12%) are reported with sevelamer hydrochloride (25). Research work in Japan by Suzuki *et al* reported that the constipation score improved when sevelamer hydrochloride was substituted with lanthanum carbonate with consequent improvement of QOL in patients undergoing HD (28).

Diabetes mellitus is the most common cause of CKD. Diabetic kidney has been shown to increase the incidence and severity of GIS; these patients tend to present with GIS secondary to gastroparesis (29). However there is conflicting literature with most studies finding no notable differences in the prevalence and severity of GIS between non diabetic and diabetic HD patients (9,30).

Functional symptoms are attributed to absence of demonstrable GI pathological lesions. Symptoms are influenced by GIT dysmotility, psychological factors (anxiety and depression) visceral hypersensitivity and GIT polypeptide hormones (5). Data has shown that 40% of HD patients have GIS not related to GIT lesions (31).

Gastrointestinal motility disorders are common in CKD patient. Prior to existence of pathological lesion in the upper gut of CKD patients Fu *et al* noted delayed gastric emptying time, decreased intestinal transit time in participants presenting with functional vomiting and irritable bowel syndrome (IBS) (32). Wu *et al* found that diarrhea and constipation, or alternating constipation/diarrhea were commonly seen in patients diagnosed with CKD undergoing long-term dialysis; their colonic transit time was shorter in diarrhea, and prolonged in constipation (33).

Psychological disorders like depression and anxiety contributes to GIS in renal failure. Patients on long term HD have a high prevalence of depression and anxiety which are in turn are linked to psychosomatic disorders including GIS (5). A study in Turkey showed that there was a direct correlation between psychosomatic symptoms and GIS in ESRD patients on HD(9).

2.2.2 Constipation

Constipation has been documented to be a frequent complaint in CKD patients relative to the overall population (4,34,35). This observation has been attributed to dialysis modality-based lifestyle that consist of renal diet (low fibre diet and reduced fluid intake). Other factors include sedentary life style, multiple comorbidities(e.g. stroke, DM and secondary hyperparathyroidism), and concomitant drug therapy (potassium-binding resins, phosphate binders, calcium channel blockers and iron supplements) (36,37).

Despite being considered a self-limiting and easily treatable symptom, constipation can be a functional GI disorder presenting as a chronic symptom causing negative impact on patients QOL (37). Among HD patients with constipation, Zhang *et al* found a significantly low HRQOL score while using the 12-Item Short Form Survey (SF-12) to evaluate QOL. Constipation causing medication, DM and HD were 3 independent predisposing factors for constipation in this study (15)

Current evidence elucidate constipation to be independently linked with progression of CKD and high risk of mortality. This has expounded the future probability of newer therapeutic strategy of this outcome (38). There is a higher occurrence of constipation in HD than PD population (4,12,15,35).
Yasuda *et al* carried out a questionnaire survey on bowel habits of HD and PD patients where the risk of constipation was noted to be 3.14 times more in HD patients as compared to PD patients. In the same study there was lower rate of dialysis modality based lifestyle modification, constipation drug administration and intake of low fibre diet(35). In contrast among a cohort of HD patients in Taiwan, Wang *et al* found a high percentage (38%) use of laxatives/cathartics to ease chronic

constipation(39). Cano *et al* observed similar finding among 100 patients on HD where 55% used laxatives to ease constipation (4).

Prevalence of constipation has been broadly documented in haemodialysis patients among the Asian population however there is insufficient literature among this group in sub–Saharan Africa patients.

2.2.3 Dyspepsia and gastroesophageal reflux

Kidney disease is linked to increased prevalence of acid related GIS (40,41), which worsens with progressive loss of nephrons (42). Among HD patients 76.4% were reported to regularly take acid suppression medications in a study be Chong *et al* (9). A study by Strid *et al* noted that a higher percentage of females commenced PPI treatment after initiating HD than males, concluding that dialysis in itself affect presence of dyspepsia and GERD (43). In contrast, the incidence of GI pathology causing dyspeptic and GERD symptoms declined as the period of haemodialysis increased with a 31% death rate after 2 years of HD treatment in a study by Chachati *et* al (44).

Dyspepsia is a constellation of upper abdominal fullness, burning epigastric pain/discomfort and early satiety after feeding (45). In its organic form dyspepsia can also be described as occurrence of pyrosis, indigestion, nausea, or regurgitation (46). As a consequence of uraemia the occurrence of gastroduodenal ulcer and gastritis, can cause dyspepsia in ESRD (47). Previous studies have found no positive correlation between declining renal function and dyspepsia (48,49), moreover the diverse GIS in dyspepsia is related to notable decline in QOL with increased socioeconomic burden in patients with kidney disease (50).

In GERD, acid regurgitation and pyrosis are the most typical presentation (51). Kawaguchi *et al* found a high prevalence of symptomatic GERD with evidence GI

lesions in HD (50%) and PRD patients: patients on HD experienced severe symptoms as compared to the PRD population (42). Similarly, another study in Brazil showed that patients with GERD had lower estimated glomerular filtration (eGFR) rate as compared to control (48). A study in Morocco found that patients on follow up for GERD reported reduced QOL for all domains of the Reflux-Qual Short form questionnaire (52).

2.2.4 Nausea, vomiting and diarrhoea.

Uremic nausea and vomiting occur frequently before and during dialysis sessions in advanced CKD and is reported to increase in severity with progression of CKD (53,54). A study of patients with ESRD revealed that nausea was the most common GIS (74%) with vomiting at 68%, functional vomiting was seen to be more common in HD population than in controls (54).

Currently there are nonpharmacological ways of managing nausea and vomiting in patients undergoing haemodialysis(54,55) that have not been adopted locally due to scarcity of literature on the magnitude of the problem. In a study of patients of Asian descent though the prevalence of nausea and vomiting was slightly lower (28.3% and 11.7% respectively) it was recommended that better nursing care and change in health care policy would be essential so as improve quality of management (56).

With advanced kidney disease there is a higher risk of clostridium difficile – associated diarrhoea (CDAD) (57) as result of immune dysregulation, uremic colitis and frequent antibiotics use (58,59).CDAD carries a high mortality in HD patients(57). Previous studies documented a prevalence range of 17%-89% in patients on maintenance HD and those initiating HD (4,57,60,61). Among 24% of patients with diarrhoea Oba *et al* found that 59% were on antibiotics and diarrhoea was complicated with infectious disease (61). Nausea, vomiting and diarrhoea may

interfere with adequate management of ESRD and negatively affects patient QOL (56,58).

2.3 Gastrointestinal symptoms diagnostic tools.

Evaluation of GIS among HD patients is challenging. Standardized definitions for the presence or absence of GIS are lacking. Moreover frequency of symptoms and presence of diverse patient population pose a challenge in symptom definition (5).
In a previous systematic review, tools used to evaluate presence and level of severity of GIS in HD patients comprised of Gastrointestinal Symptom Questionnaire (GSQ), a non-validated patient administered questionnaires, Rome II (for functional bowel disorders) and Rome III (for IBS) questionnaires, and GSRS tool. Additional tools included Izumo scale, Bristol stool chart and an unspecified validated questionnaire. Interview process, laboratory stool analysis, and laxative use as an indicator for constipation have also been applied. Most of these tools have a narrow symptom focus thereby overestimating the burden of reported symptoms and underestimating the importance of other GIS. GSRS was the most commonly used scale with high inter-rater reliability. GSRS provided insight in a broad range of symptoms and symptom severity in this review (2).
The English version of GSRS is psychometrically evaluated and is shown to be both reliable and valid. The norm values in the general population are available (62). Translation and validation of the GSRS questionnaire to different languages has shown an adequate value of overall reliability and good internal consistency for use in clinical trials and settings. However, the test-retest reliability is low in most language versions (63,64).
By evaluating gastrointestinal symptoms, GSRS help physicians interpret clinical benefits as outcomes of significance to patients. GSRS can clinically and statistically

differentiate among patients with various GIS, showing sensitivity to presence and severity of symptoms. Previous studies have concluded that the GSRS is a brief, fairly comprehensive assessment of common gastrointestinal symptoms. However, the questionnaire contains questions about how one has been feeling for the past one week this approach excludes chronic intermittent symptoms which are also important in patients with ESRD (63,64).

In our locality the tool has been used to assess the presence of GIS in post kidney transplant patients and a Kiswahili version was also available in the study. The tool was found to have good reliability and construct validity in this study with a conclusion that the GSRS is a useful patient-rated symptom scale for evaluating the presence of GIS in clinical practice (65).

Gastrointestinal Symptoms Rating Scale is a disease specific, self-administered tool containing 15 items , each rated on 7 graded Likert scale from no discomfort (lowest score) to very severe discomfort (highest score). It is distributed into five domain exploring abdominal pain (*abdominal pain, hunger pains and nausea*), diarrhoea syndrome (*diarrhoea, loose stools, and urgent need for defecation, number of daily defecations* ≥ 3), reflux syndrome (*heartburn and acid regurgitation*), indigestion syndrome (*borborygmus, abdominal distension, burping and increased flatus)* and constipation syndrome (*constipation, hard stools, and feeling of incomplete evacuation*) (62).

2.4 Health related quality of life

2.4.1 Overview

Over the last decades health care has primarily incorporated assessment of perceived impact of a disease so as to improve patients physical, psychological and social well-being. When these factors are not considered prolonged treatment and over utilization of health care resources ensues. QOL has been acknowledged as a crucial part of health and is often measured alongside conventional clinical parameters. For matters associated with health care, QOL has been applied specifically to those life concerns that are most affected by health, disease, or medical intervention hence the term "health-related quality of life". Health related quality of life represents a subjective appraisal of the impact of disease or its medical intervention; individual patients with identical disease extent, severity and medical therapy can report different HRQOL due to unique dissimilarities in expectations and coping abilities (66).

2.4.2 Health related quality of life among haemodialysis patients

The interest in assessing perceived impact of CKD on patients has increased over the past few years. Kamau *et al* while assessing HRQOL on HD patients at the renal unit in Kenyatta National Hospital (KNH) found that physical domain of QOL is more of concern as compared to mental and social domain (67). Similarly, a study in Ethiopia found that nearly half of the patients with ESRD on hemodialysis had lower overall HRQOL which is associated with their unemployment status and frequency of HD per week (68).

Factors contributing to decline in HRQOL in patients on HD include hypertension, anemia, frailty, behavioral factors, demographic factors and symptom burden. Although the detrimental role of symptoms on HRQOL in advanced CKD is now

better recognized (69), most attention is focused on symptoms such as pain, fatigue, sexual dysfunction and depression. The impact of GIS on HRQOL in patients on HD is frequently overlooked yet it is critical consideration when evaluating their overall medical care.

2.4.3 Gastrointestinal symptoms and health related quality of life.

In the general population GIS are among the most common cause of consultation either as a temporary or ongoing basis. Chronic symptoms greatly inconvenience the affected individuals (70). Certain factors that accompany chronic GIS like frequent hospital visits, consumption of medication, impairment of social and sex life and mental distress have an influence on patients QOL (3).

A study conducted by Fletcher *et al* focusing on symptom burden and HRQOL of life in CKD patients highlighted key GIS as significant cause of deteriorating HRQOL among the HD group. GIS such as indigestion, vomiting, diarrhoea, constipation, heartburn, and bloating were associated with a decrease in QOL. Symptom burden and QOL were worse in patients with ESRD on HD (71).

Strid *et al* assessed association between GIS and patients' psychological well-being on HD, PD and PRD groups. In this study all CKD groups demonstrated a negative correlation between GIS and psychological well-being compared to control groups. The study also noted lower psychological well-being in patients with diabetic nephropathy as compared to other causes of CKD (3).

Review article by Zuvella *et al* reports that there are limited studies on how patients on routine HD are subjectively affected by GIS (2) with hardly no local studies attempting to determine this association.

2.5 Evaluation of health-related quality of life in patients with gastrointestinal symptoms.

Health related quality of life in patients with gastrointestinal disease has been measured using The GIQLI tool, Psychological General Well-Being Index, 12 item short form survey (SF-12), 36 item short form survey (SF-36) and the Becks Depression Scale in previous studies (2). Of these scoring systems GIQLI tool is more specific for GI disease as opposed to the other tools.

The GIQLI questionnaire is found to be valid and reliable measure of overall health related quality of life among patients with some form of GI disease. Moreover, it is the only general gastrointestinal index available. Other measures have been developed for specific symptom entities like constipation, GERD, and dyspepsia (72). GIQLI questionnaire was adopted for this study because of its ability to capture deteriorating HRQOL for a broad range of GIS. The GIQLI is a 36-item self-administered questionnaire deeming it too long and participates may not complete answering the questions hence affecting the quality of data obtained.

Since its development it has increasingly been used in various GI conditions and translated into various languages. Comparing responsiveness and minimal clinically important differences between the GIQLI and the SF-36 in cholecystectomy patients Shi *et al* found that GIQLI tool had a better response rate than SF-36 and concluded that disease specific measures are superior in evaluating GI disease outcomes(73). The GIQLI is an appropriate, validated, and useful tool to assess HRQOL in clinical studies of patients with gastrointestinald disease and in daily clinical practice making it applicable in our local population. Maru *et al* used The GIQLI tool to evaluate HRQOL in renal transplant patients at Kenyatta National Hospital, the tool was also translated to the Kiswahili language (65).

The GIQLI records patients' health status on a five-point Likert scale. The questionnaire consists of 5 subscales: core symptoms (19 items), physical functions (7 items), emotions (5 items), social functions (4 items) and medical treatment (1 item). Each item is scored from 0 to 4, with a higher score indicating a better HRQOL. The total GIQLI scores range from 0 to 144, with higher score implying better HRQOL. While the theoretical maximum GIQLI score is 144, preliminary studies by the developers of the questionnaire mean score for healthy subjects was found to be of 125 +/- 13 (72).

Core symptoms are questions that involve irritating symptoms of GI disorders for example pain, abdominal bloating and flatus. Physical health entails physical strength and ability to function on individual level despite disease existence. Social health focuses on ability to get involve in social roles and activities. Medical treatment effects in respect to ones quality of life is the last domain (72).

2.6 Study justification

The prevalence of CKD in Africa and primarily in Kenya has been an upward trend in the recent past(74) with majority of patients presenting at an advanced stage requiring renal replacement therapy. CKD represents a substantial health economic burden with symptomatology contributing to negative impact on QOL. GIS has detrimental effect in patients on maintenance HD: symptoms may interfere with patient management (haemodialysis and drug administration) and contribute to disease progression. Management of CKD is aimed at preventing progression of systemic clinical manifestation (for example GIS) that occur following loss of renal function. Furthermore, the 2012 Kidney Disease: Improving Global Outcomes (KDIGO) guidelines suggests management of CKD patients in multidiscplinary setting in which psychological and social care is part of the approach.

Comprehending the GIS burden in HD population can assist health care providers in better clinical evaluation of patients, identification of possible modifiable factors and successful symptom management and prevention hence optimising ESRD management. Utilizing validated psychometric disease specific questionnaires such as GSRS and GIQLI could be used as references and provide easier and consistent means of measuring, and managing the potential GIS burden associated with ESRD in patients on regular HD.

A recent study evaluated the prevalence of GIS inpatients post kidney transplant patients, however there is currently no local data on the prevalence of similar symptoms in patients on maintenance HD, who constitute a majority of the chronic kidney disease patients. A patient centered approach to guide in decision making is lacking. This study will provide a foundation and purpose to raise awareness of the burden of GIS in HD patient population and to be able to implement measures to ameliorate these symptoms through concerted effort by doctors, nurses, and nutritionist.

2.7 Research question

1.What is the burden of gastrointestinal symptoms among patients on maintenance haemodialysis attending haemodialysis clinic at Kenyatta National Hospital?

2.8 Broad Objective

1. To determine the prevalence of gastrointestinal symptoms and quality of life in patients on dialysis.

2.8.1 Primary Objective

1. To determine the prevalence of gastrointestinal symptoms among patients on maintenance haemodialysis using the GSRS questionnaire.

2. To assess health related quality of life using GIQLI questionnaire in patients with and without gastrointestinal symptoms on maintenance haemodialysis.

2.8.2 Secondary objective

1. To compare the health-related quality of life among those with gastrointestinal symptoms and different clinical characteristics.

CHAPTER THREE

3.0 Materials and methods

3.1 Study Design.

A descriptive cross-sectional study.

3.2 Study site

The study site was at the Kenyatta National Hospital (KNH). KNH is a tertiary teaching and referral hospital located in Nairobi. The hospital runs specialized clinics that include nephrology clinics (renal and haemodialysis clinics) that offer outpatient services to CKD patients. The study was conducted at the KNH hemodialysis clinic at the renal unit that runs on Mondays every week.

3.3 Study population.

An adult (>18yrs) patient with ESRD on maintenance haemodialysis who presented at the haemodialysis clinic for outpatient follow up.

3.4 Case definition

ESRD refers to irreversible decline in kidney function with an estimated glomerular filtration rate less than 15 mL per minute per 1.73 m^2 body surface area (75). Maintenance haemodialysis refers to regular intermittent regime of thrice-weekly, 4-hourly dialysis sessions offered to patients with ESRD (75). (Biweekly sessions was applicable for this study).

3.5 Patient selection

3.5.1 Inclusion criteria

Adults (>18 years) with a diagnosis of ESRD on maintenance haemodialysis, who were on follow up at KNH outpatient haemodialysis clinic.

3.5.2 Exclusion Criteria

Patients who were unwilling to sign a written informed consent form.

3.5.3 Sample size calculation

This being primarily a descriptive study, the sample size was determined using this formula: (76)

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

n = Sample size

Z = the statistic corresponding to 95% (1.96) level of confidence

P = prevalence (Prevalence of gastrointestinal symptoms in Adults on Maintenance Hemodialysis' from Kaze *et al* study in Cameroon was 87.9 (18)}

d = margin of error 5%

$$n = \frac{1.96^2 . 0.879(1-0.879)}{0.05^2} = 163$$

Assuming a 5% margin of error with a 95% confidence interval at least 163 participants were to be enrolled.

165 patients were found to be eligible for the study.

3.6 Sampling and recruitment procedure

The total number of patients attending the HD clinic was estimated for the entire duration of the study as 15 patients per week for 12 weeks which was the projected duration of the study. This gave an estimate of 180 patients with ESRD on maintenance HD. Calculated sample size was 163 participants on maintenance HD. Before each clinic day, the patient files were retrieved from KNH central health record and information office and taken to the haemodialysis clinic records office. Screening of patient's files (medical records) to identify patients with end stage renal disease on maintenance haemodialysis was carried out by principal investigator and two trained research assistants (registered medical officers). Consecutive sampling of patients who met the inclusion criteria was applied.

Eligible participants were approached by principal investigator with the assistance of two trained research assistants. Informed consent was obtained from those who met inclusion criteria; patients clinical characteristics were collected from their medical records and then 2 questionnaires administered. This process was repeated until the desired sample size was achieved.

3.7 Data collection, management, and analysis

3.7.1 Data collection

Data collection involved use of study proforma and self-administered questionnaires.

Patient data

Patient data was collected from medical records. The following data were recorded in a study proforma: sociodemographic data (age, gender), BMI, consumption of drugs that cause GIT irritation, GI drugs, underlying comorbidities, duration of haemodialysis and eGFR.

eGFR was calculated using Modification of Diet in Renal Disease (MDRD) equation based on 4 variables that included age, sex, race, and serum creatinine.

Questionnaires

Gastrointestinal Symptom Rating Scale (GSRS) questionnaire was used to determine the presence and level of severity of GIS. The GSRS data was presented as a total score and as domain (abdominal pain, reflux syndrome, diarrhoea, indigestion syndrome and constipation) scores. The higher the score the more pronounced the symptoms.

The severity of gastrointestinal symptom was scored as below(Table1)

Table 1: Gastrointestinal symptoms severity score

Severity score	0-1.0	1.1-1.2	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-7.0
Symptoms	No symptoms	Minor	Mild	Moderate	Moderately severe	Severe	Very Severe

Gastrointestinal Quality of Life Index (GIQLI) questionnaire was used to assess QOL of patients with and without GIS. Scores were calculated for each domain (core symptoms, emotion, physical, social, and medical treatment) and for overall GIQLI score, with higher scores indicating better quality of life. (Table 2)

Quality of life as determined by the GIQLI questionnaire mean score range in healthy subjects (72).

Table 2: GIQLI Scores

GIQLI score	>125	125-96	95-65	65 or less
Interpretation	No impairment	Mild impairment	Moderate impairment	Severe impairment

3.7.2 Data management and analysis

Data entered and cleaned in Microsoft Excel was imported into Stata version 17 for analysis.

The prevalence of gastrointestinal symptoms was calculated as a proportion of patients on maintenance haemodialysis with gastrointestinal symptoms over the total sample size and was reported as a percentage.

Total GIQLI scores and those for all four dimensions of the GIQLI was calculated and presented as mean with standard deviation. The Independent t-test was used to assess the statistical difference between QOL of respondents with and without GIS.

The Analysis of Variance (ANOVA) was used to determine if there were differences in the overall GIQLI mean scores of the patients with gastrointestinal symptoms with respect to gender , BMI, age, duration of dialysis and comorbidities. Results of the ANOVA that was found to be statistically significant was subjected to post hoc analysis to determine where the differences exist.

The results of data analysed was presented using frequency distribution tables, and graphs. Throughout the analysis, a $p<0.05$ was considered statistically significant.

3.7.3 Study variables:

a) Age – This was recorded as the nearest number of years from reported date of birth.

b) Gender– This was determined by the phenotypical sexual appearance of the participants.

e) Duration of dialysis- This was determined to the nearest year/month by documented date of when the patient was first initiated on haemodialysis.

f) Gastrointestinal irritant drugs- This included groups of drugs commonly used by patients on HD that have been proven to cause GIS. Examples are NSAIDs, steroids, phosphate binders, vitamin D, calcimimetics, antiretrovirals, opioids and potassium binders.

h) Use of GI drugs- This was defined as drug therapy prescribed to alleviate gastrointestinal symptoms. Examples are laxatives, PPIs, antacids, and probiotics.

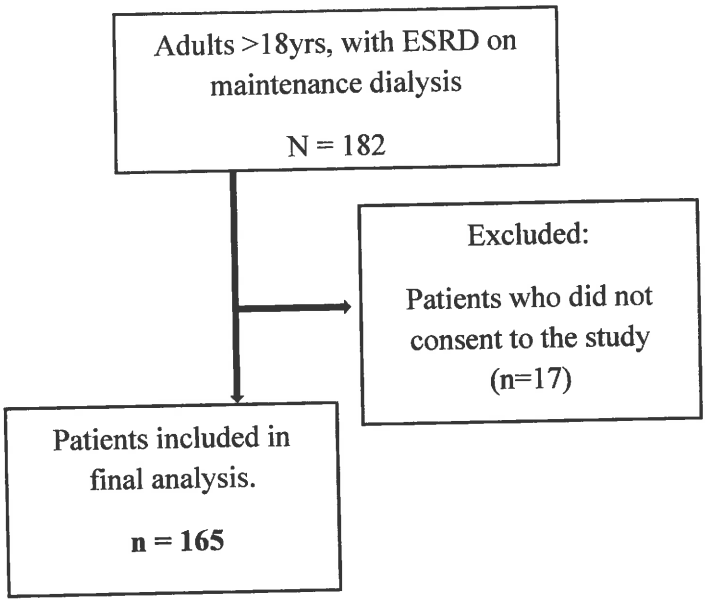
h) BMI was categorized as underweight (<18.5), healthy (>18.5 and <25), overweight (>25 and <30) or obese (>30) (77).

3.8 Ethical considerations

Ethical approval to conduct the research was obtained from University of Nairobi/KNH research ethical committee. The study was conducted according to the guidelines laid down in the Declaration of Helsinki. Informed consent was obtained from the study participants prior to conducting the study. After data collection, information obtained was used for research purpose and confidentiality was strictly maintained.

CHAPTER FOUR

Figure 1: Study flow chart



4.0 RESULTS

4.1 Clinical characteristics/demographics and drug consumptions of patients with End Stage Renal Disease.

A total of 165 participants responded to the questionnaires. Among the 165 participants, 50.9% (84/165) were females while 49.1% (81/165) were males. The age range was from 18 years to 76 years with a mean age of 46.1 years (S.D 16.4). Duration of dialysis range from 1 month to 84 months with a mean of 18.5 months (S.D 8.7). The participants mean eGFR was 7.3 ± 2.8. (Table 3).

Table 4: End stage renal disease patients comorbidities

Comorbidities	Frequency (*n=165)*	Percent (%)
Hypertension	**135**	**81.8**
Diabetes	**53**	**32.1**
Chronic glomerulonephritis	**30**	**18.2**
Lupus nephritis	5	3.0
Obstructive uropathy	12	7.3
Reflux nephropathy	3	1.8
Retroviral disease	8	4.8
Systemic sclerosis	1	0.6
Polycystic kidney disease	3	1.8
Horseshoe kidney	2	1.6

Consumption of gastric irritant drugs and GI drugs

The most frequently prescribed gastric irritant drugs were phosphate binders (65.5%), vitamin D (19.4 %), potassium binders and NSAIDs at 7.9 %.

PPIs (39.4%), laxatives (18.8%), antacids (13.9%) and probiotics (12.1%) were the most prescribed GI drugs. (Table 5).

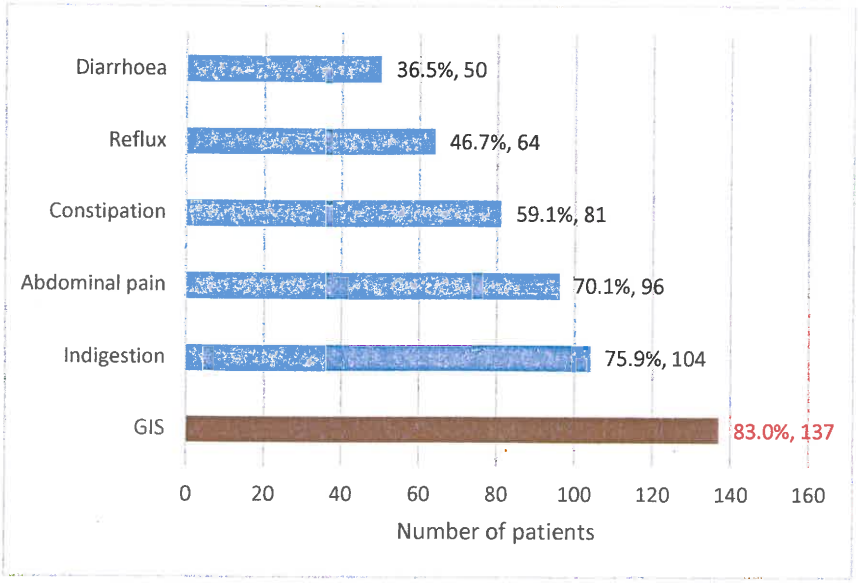
Table 5: Consumption of gastric irritant drugs and GI drugs.

GI irritant drugs	Frequency	Percent of patients, *(n=165)*
NSAIDS	13	7.9
Steroids	6	3.6
Phosphate binders	57	65.5
Vitamin D	32	19.4
Calcimimetics	9	5.5
Antiretroviral	5	3.0
Opioids	7	4.2
Potassium binders	13	7.9
GI drugs		
Laxatives	31	18.8
PPIs	65	39.4
Antacids	23	13.9
Probiotics	20	12.1
Antiemetics	11	6.7

4.2 Prevalence of GIS

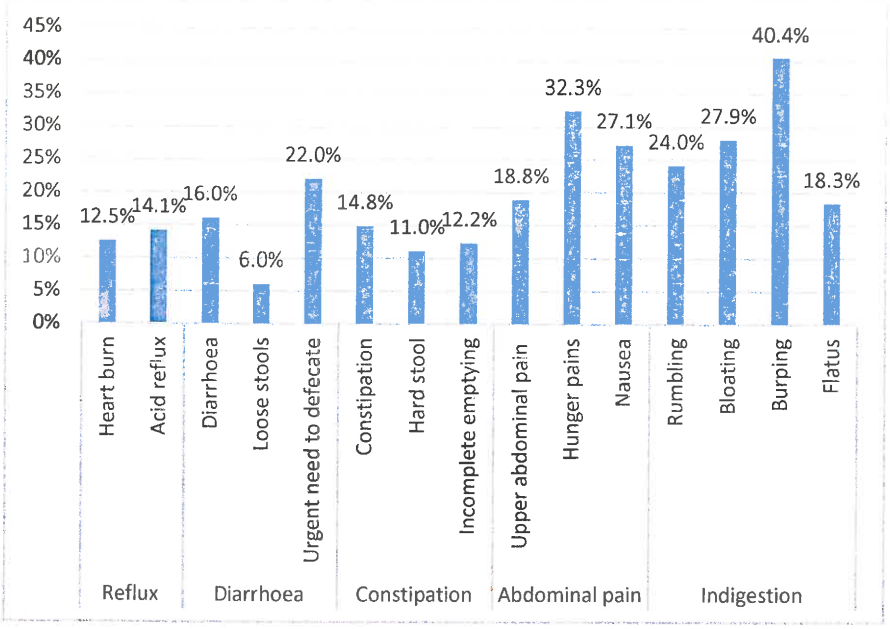
137/165(83%) of the study participants had at least one GIS (GSRS>1). The commonest GIS was indigestion syndrome (75.9%) followed by abdominal pain syndrome (70.1%) constipation syndrome (59.1%), reflux syndrome (46.7%), and diarrhoea syndrome (36.5%).

Figure 2: Prevalence of gastrointestinal symptoms



For each of the GIS syndrome there were category of specific symptoms highlighted in Figure 3 below. Overall: burping (40.4%) was the most reported symptom and loose stool the least reported at 6%.

Figure 3: Prevalence of specific symptoms



For each of the gastrointestinal symptom, a mean score was calculated for symptom severity. Majority of patients reported mild to moderate symptoms while 'very severe' symptom severity was the least reported. Table 6, Figure 4, and Figure 5

Table 6: Gastrointestinal symptoms severity score

Symptom	**1.1 – 2.0**	**2.1 – 3.0**	**3.1 – 4.0**	**4.1 – 5.0**	**5.1 – 6.0**	**6.1 – 7.0**
	Minor	**Mild**	**Moderate**	**Moderate severe**	**Severe**	**Very severe**
Reflux *(n=64)*	13 (20.3)	16 (25.0)	17 (26.6)	10 (15.6)	6 (9.4)	2 (3.1)
Diarrhoea *(n=50)*	4 (8.0)	15 (30.0)	14 (28.0)	8 (16.0)	5 (10.0)	4 (8.0)
Constipation *(n=81)*	12 (14.8)	19 (23.5)	23 (28.4)	11 (13.6)	9 (11.1)	7 (8.6)
Abdominal pain *(n=96)*	20 (20.8)	32 (33.3)	24 (25.0)	12 (12.5)	4 (4.2)	4 (4.2)
Indigestion *(n=104)*	26 (25.0)	27 (26.0)	26 (25.0)	10 (9.6)	11 (10.6)	4 (3.8)

For each of the gastrointestinal symptom there were category of specific symptoms of which their distribution in terms of severity is as shown on:

Figure 4: Lower gastrointestinal symptoms

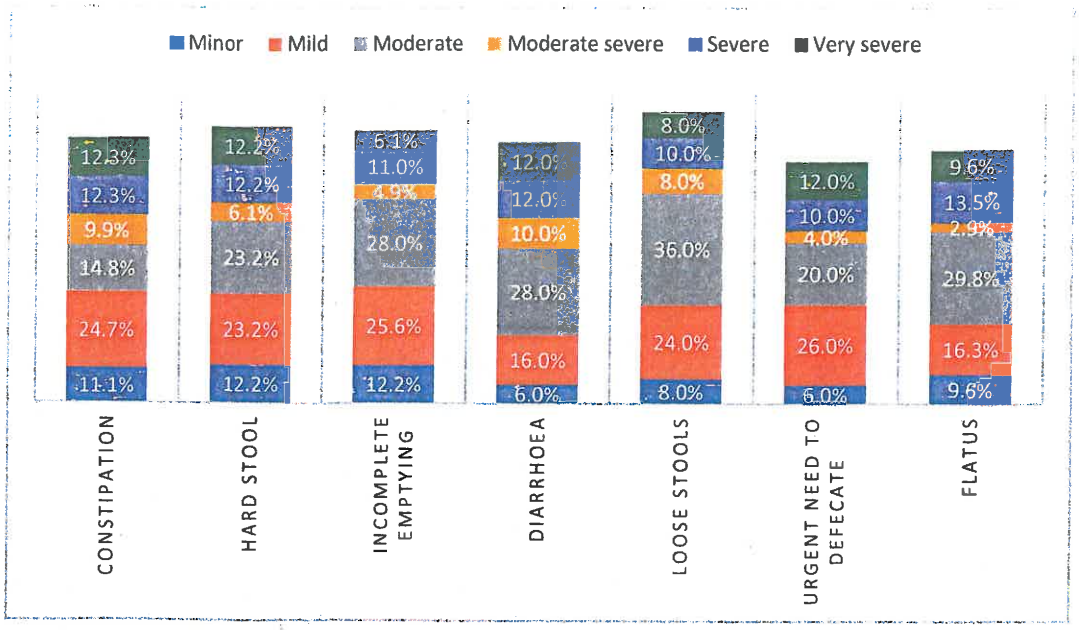
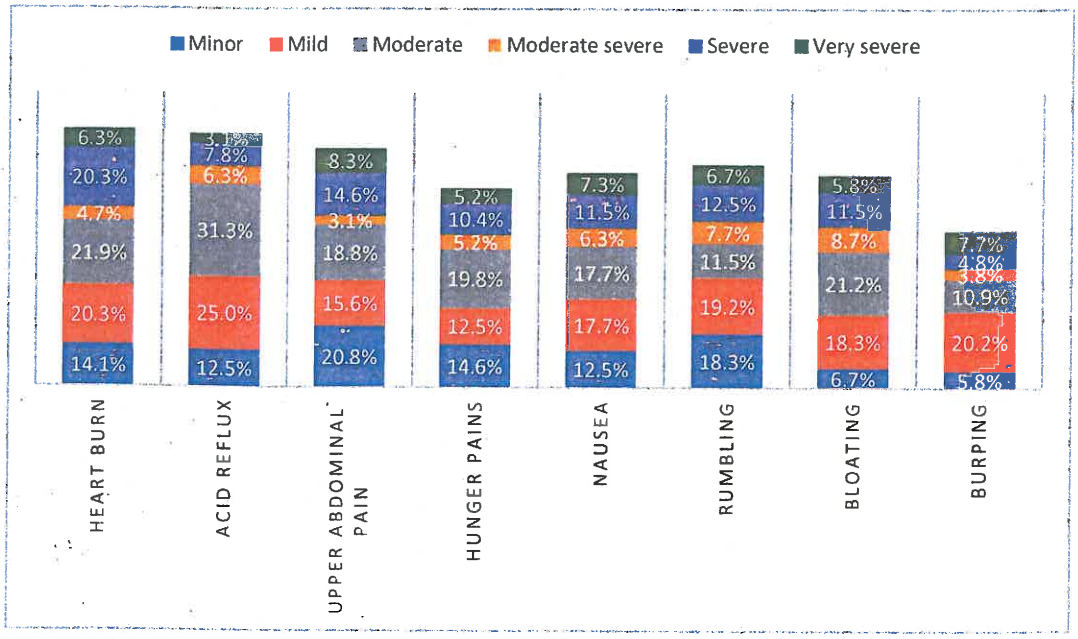


Figure 5: Upper gastrointestinal symptoms



4.3 Quality of life

Quality of life was significantly worse in participants with gastrointestinal symptoms than in participants without symptoms: Participants (n =137) who reported at least one gastrointestinal symptom (GSRS score >1) had significantly lower GIQLI total score than those who did not report any gastrointestinal symptoms (n =28) (91.2 ± 24.2 vs 128.4 ± 12.5; P < 0.001). (Table 7).

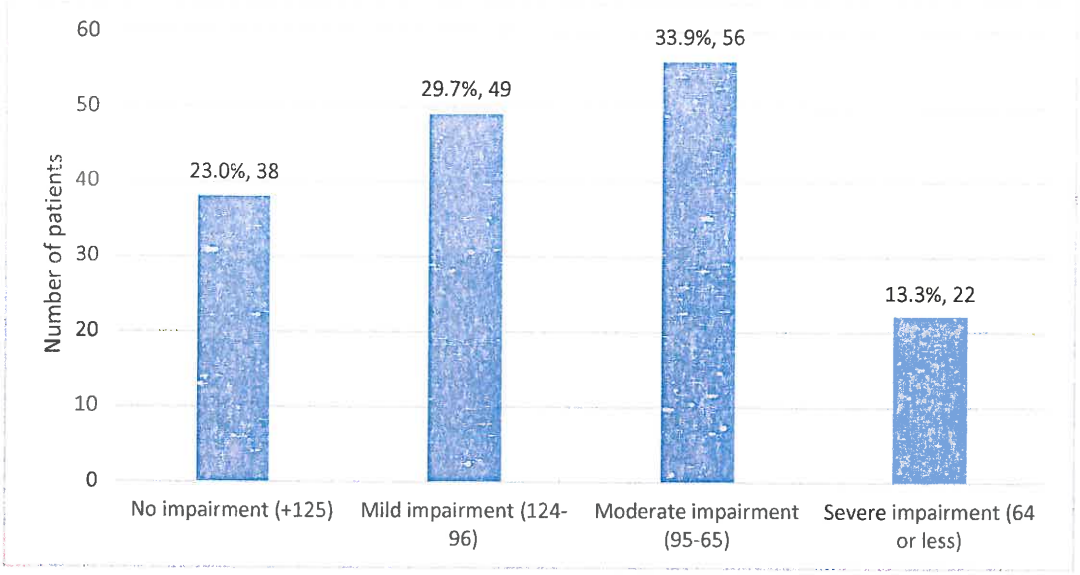
Individual scores for all 5 domains of the GIQLI scale were lower in patients with gastrointestinal symptoms compared to those without symptoms. Core symptoms (56.1 ± 12.7 vs 78.8 ± 1.8), Social function (7.8 ± 4.4 vs 12.7 ± 4.2), Physical function (12.8 ± 6.6 vs 19.3 ± 5.8), Emotion function (12.3 ± 5.1 vs 15.1 ± 4.4) and medical treatment 2.2 ± 1.5 vs 2.6 ± 1.6). These differences were statistically significant in social function, physical function (P< 0.001) and emotion function (P: 0.008).

Table 7: Domains of quality of life using GIQLI questionnaire in patients with and without gastrointestinal symptoms on maintenance haemodialysis

Domain	With GI symptoms, *(n=137)*	Without GI symptoms, *(n=28)*	p-value
Core symptoms	56.1 ± 12.7	78.8 ± 1.8	**<0.001**
Social function	7.8 ± 4.4	12.7 ± 4.2	**<0.001**
Physical function	12.8 ± 6.6	19.3 ± 5.8	**<0.001**
Emotion function	12.3 ± 5.1	15.1 ± 4.4	**0.008**
Medical treatment	2.2 ± 1.5	2.6 ± 1.6	0.250
Total score	**91.2 ± 24.2**	**128.4 ± 12.5**	**<0.001**

Analysis of GIQLI severity scores revealed that 33.9% had moderate impairment, 29.7% mild impairment, 23.0% no impairment and 13.3% had severe impairment of quality of life. (Figure 5)

Figure 6: GIQLI symptom severity score



4.4 Health-related quality of life among those with gastrointestinal symptoms and different clinical characteristics.

The Analysis of Variance (ANOVA) was used to determine if there were differences in the overall GIQLI mean scores of the patients with gastrointestinal symptoms. For age, the results indicate a decreasing mean score as age increases, though the differences of the mean scores were not statistically significant. On gender, the male patients had a higher score than female patients, though this difference in the scores were not statistically significant. For the duration of dialysis (<1year, 1-5years, >5years) there were statistical differences in the mean scores, and a post-hoc analysis revealed that pairwise comparison of the durations amongst each other showed statistical differences with the exception of the pairwise comparison between those with less than 1 year and those above 5 years ($p=0.515$). There were no statistical differences for the mean scores on BMI. On comorbidities, only the scores for chronic glomerulonephritis were statistically different.

Table 8: Health-related quality of life among those with gastrointestinal symptoms and different clinical characteristics

Age	Frequency	Mean ± SD	p-value
<30	31	99.6 ± 22.5	0.122
31 – 40	21	91.9 ± 22.5	
41 – 50	27	90.5 ± 26.8	
>50	58	86.7 ± 23.7	
Gender			
Male	71	93.1 ± 24.4	0.339
Female	66	89.1 ± 23.9	
Duration of dialysis			
< 1 year	76	85.8 ± 23.5	**0.001**
1 – 5 years	55	100.4 ± 21.5	
> 5 years	6	75.0 ± 30.0	
BMI			
<18.5	29	90.1 ± 24.1	0.929
18.5 – 25.0	95	91.7 ± 23.8	
>25.0	13	89.6 ± 28.9	
Comorbidities			
Hypertension			
Yes	119	90.5 ± 24.2	0.392
No	18	95.7 ± 24.2	
Diabetes			
Yes	42	86.6 ± 26.0	0.142
No	95	93.2 ± 23.2	
Chronic glomerulonephritis			
Yes	28	99.3 ± 22.7	**0.046**
No	109	89.1 ± 24.2	

CHAPTER FIVE

5.0 DISCUSSION

In this study, validated Gastrointestinal Symptoms Rating Scale (GSRS) and Gastrointestinal Quality of Life Index (GIQLI) questionnaires were administered to patients with End Stage Renal Diseases on maintenance haemodialysis to determine the prevalence of gastrointestinal symptoms (GIS) and to assess quality of life (QOL) in patients with and without symptoms.

The overall prevalence of GIS, defined by a GSRS > 1, in ESRD patients on HD was high at 83.0% (137/165). This data is in line with other studies (9,12–14,18,27,60) that have demonstrated a high prevalence of GIS ranging from 29.2%- 91.3% among uraemic patients. In one study that reported a prevalence of 70.7 % among the Asian population(9) the method of assessment of GIS was not well described. In a similar study in Sweden(3) a comparison of symptom prevalence was made among four groups: healthy controls, peritoneal dialysis group, predialytic groups and haemodialysis group. The total GSRS score was significantly higher in the CKD subgroups, but peritoneal dialysis patients had a more severe reflux and eating dysfunction. This comparison with healthy controls, predialytics and peritoneal dialysis patients was lacking in our study.

The prevalence of GIS in adults on maintenance haemodialysis in Cameroon was 87.9%, with a plausible explanation of underdialysis (18). This could be a similar reason in our study as most patients are on biweekly dialysis sessions compared to the three sessions recommended by guidelines (75).

Indigestion was the most prevalent symptom complex (75.9%) in our study. This is similar to study done by Daniel *et al* that reported a prevalence of 70% among

African American haemodialysis population where older patients were more likely to report indigestion (14).

The pathophysiological explanation on high prevalence of dyspeptic symptoms among renal failure patients is well outlined. Patients with renal failure are more likely to present with gastric mucosal injuries than general population owing to local or systemic circulatory insufficiency, hypergastrinemia and higher levels of ammonia and inflammation (19,47).

However a Swedish study by Strid *et al* found a much lower prevalence (38%) of dyspepsia (43) when compared to our study, this difference could be attributed to better health resources with increased dialysis frequency in their patients as compared to our patients.The high prevalence of dyspeptic symptoms in our study was also reflected by the high prescription of acid suppression therapy(53%), a findings similar to what has been shown in other studies (3,9).

Studies that have assessed constipation symptoms using different methods in HD population have indicated a frequency ranging from 1.6% to 71.7% depending on the definition criteria (2,13,35) this is consistent with the results in our study (59.1%). Present study provided a more detailed criteria in the assessment of constipation and not merely the reduced frequency of GIT movements: other symptoms such as "hard stools" and "incomplete emptying" were also identified. This is in accordance with previous literature in which few bowel movements did not constitute the major symptom reported by the participants (78,79). For this reason, when assessing constipation, it is preferable to investigate a set of symptoms for precise diagnosis. In our study, 18.8% of participants were on laxatives, a higher proportion was noted in similar studies 38% by Wang *et al*(31), 55% by Cano *et al* (4) and 66.2% by Ikee *et al* (80). Prolong use of laxatives has however been discouraged by The American Gastroenterological Association. Intestinal secretagogues, probiotics, prebiotics,

synbiotics and regular exercise appear to be more effective for the management of bowel habits in this population(80). Daily use of mineral oils, flaxseed oil and olive oil has also been found to be efficacious(81).

Diarrhoea had the lowest prevalence (36.5%) among the 5 syndromes assessed in this study. However this finding is still higher than that reported in other studies (6,60). This difference could have been attributed to the standard definition of diarrhoea in these studies as opposed to our study.

By contrast, a study by Kaze *et al* (18) found that diarrhoea was the most prevalent symptom at 47% in a population with similar profile as ours. The exact reason for this difference is unknown but it is possible that cultural background may be important.

Majority of our patients reported mild to moderate symptom severity. "Severe" and "very severe" were the least recognized categories. The severity may have been masked by frequent use of GI drugs, dialysis therapy and adequate control of underlying comorbidities.

Participants with GIS had a lower mean total GIQLI score when compared with those who did not report any GIS. Social, emotion, physical and medical treatment domains of the GIQLI scale were also found to have a lower score in participants with GIS when compared to those without symptoms.

The significant difference in QOL scores in patients with and without symptoms implies that GIS have a major influence on daily life for patients with uraemia. Existing literature has shown that GIS adversely affect the HRQOL with increasing severity being linked with poorer HRQOL scores (34,71). This is consistent with a study by Strid *et al* (3), while there are some similarities between their study and ours, a number of important differences exist. Both were cross sectional studies that evaluated the prevalence of GIS in stable haemodialysis patients by use of GSRS, however Strid *et al* (3) used Psychological General Well-Being Index (PGWB) index

to assess QOL, the index had different QOL domains (anxiety, depressed mood, positive well-being and self-control). The GIQLI tool used in our study is more comprehensive covering physical, social and medical treatment aspect of QOL and not just psychological (emotion function) parameter. Nonetheless, The GIQLI Emotion subscale was highly correlated with the PGWB total score and with its Anxiety and Depressed Mood subscales in transplant patients in a South American cohort(82).

Despite a large proportion of our study participants having prescription for both GI irritant and GI drugs there was no statistical significance on the use of medical treatment between those with symptoms and those without. Medical treatment may not be stressful for them at this point, as they are quite familiar with the healthcare system, their clinicians and treatment. Therefore, it is logical that medical treatment would not be associated with severe decline in HRQOL. Nonetheless, the large proportion of patients with abnormal bowel health despite reporting use of drugs used to treat GIS suggests that patients are not taking the correct treatment to ameliorate symptoms or that these treatments are ineffective and are not the most appropriate choice for this group.

To our knowledge there is no previous published literature in sub–Saharan Africa comparing the QOL of patients with GIS on haemodialysis to those without symptoms.

Chronic glomerulonephritis and duration of dialysis were found to be significantly associated with patients' quality of life, while age, gender, BMI, hypertension, and DM were not. This contrasts with Strid and colleagues' study where duration of dialysis did not have an impact on general psychological well-being this could be due a shorter dialysis vintage time in their study population when compared to ours.

Patients with diabetic nephropathy had a lower psychological well-being in the same study. The reason for these differences is unknown.

Our results highlighted the considerable symptom and HRQOL burden associated with ESRD, these provides information that has direct implications for clinical practice. Identification of the burden of symptoms for patients with advanced ESRD is important so has to reduce morbidity and mortality. These findings may support healthcare professionals when discussing, measuring, and managing the potential treatment burden associated with ESRD. Furthermore, our findings will support clinicians and patients in consultations, to ensure that all potential GIS associated with ESRD are recognised, facilitating shared decision-making regarding management. Gastrointestinal symptoms reported can be mitigated by changes in clinical management. Inclusion of GSRS and GIQLI tools can be employed in clinical practice to support timely diagnosis and intervention.

In order to fully understand and potentially treat GIS in ESRD patients, future attention ought to be directed towards the pathophysiological basis for the greater symptom prevalence.

5.1 Conclusion

In conclusion, GIS are highly prevalent among patients with ESRD undergoing maintenance HD and these patients also experienced significantly poor quality of life than patients with no GIS.

These findings strengthen the need for emphasizing symptomatic management and improving the QOL hence long-term prognosis for ESRD patients with GIS.

5.2 Limitations

i. This was a cross-sectional study that captured only a snapshot of symptom prevalence. Both GIS and QOL are continuously changing in nature and

influenced by factors such as level of uraemia, dialysis, medication use and underlying illness.

ii. Recall bias may have limited the ability to answer questions appropriately and missing answers influenced the quality of the data obtained.

iii. The questionnaires were only available in English and Swahili and thus exclude patients who did not understand either of these languages. (Language bias)

5.3 Recommendations

i. Multidisciplinary approach by gastroenterologists, nephrologists and nutritionists in symptom control is recommended.

ii. A longitudinal study is recommended to assess the prevalence of symptoms over time so as to provide insight into when and why GIS occur or develop.

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7.0 APPENDICES

APPENDIX I: Study details and consent form.

Research Title: Prevalence of gastrointestinal symptoms and quality of life in patients with end stage renal disease on maintenance haemodialysis at KNH.

What is the purpose of the study?

Dr. Brenda Juma who is currently studying for a master's degree in medicine (Internal Medicine) at University of Nairobi is carrying out a study to determine how common the problems of gastro-intestinal system are in patients on haemodialysis and how these symptoms influence patients' quality of life.

Study procedures: If you choose to participate in the study, none of personal identifiers including your name will be captured. To conceal your identity, you will be assigned a number that will be used throughout the entire data handling process. The data from your medical file will not be accessed by any unauthorized persons and will only be used for purposes of statistical data analysis.

You will be asked several questions concerning your digestive health by use of 2 questionnaires that will take around 30 minutes to complete.

Confidentiality: All the information collected will be anonymous and no information regarding you will appear on either the datasheets or the final thesis.

Benefits: The findings of the proposed study will help in quantifying the burden of gastrointestinal symptoms among haemodialysis patients attending haemodialysis clinic in Kenyatta National Hospital.

Risks of participation: There are no foreseeable risks to you for participating in the study. There is no added that you will incur to participate in this study. You will not receive any payment of any kind to participate in this study.

Voluntariness of participation: Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or choose to stop.

I, the undersigned, have been explained to and have understood the above and willingly accept to participate in the research study.

Signature/ thumbprint..... Date.....

I the investigator, having explained in depth the purpose of this study, hereby commit that confidentiality of the data collected will be maintained and only details relevant to the study revealed.

Investigator: **Dr. Brenda Juma**
Mobile number: **0726528360**
Email: **Brendaakinyi21@gmail.com**

Signature..... Date.....

APPENDIX 2: Study Proforma:

Patient No:……

1. Age (years)……..
2. Gender M F
3. Weight (kg)……..Height(cm)…… BMI(kg/m^2)……
4. Estimated glomerular filtration(mL /min-' 1.73)……
5. Underlying comorbidities……
6. Duration of dialysis ……
7. Is patient taking any gastric irritant medication:

i. NSAIDs Yes No

ii. Steroids Ye No

iii. Phosphate binders Ye No

iv. Others; specify……...

7. Is patient on:

i. Laxative Yes No

ii. PPIs Ye No

iii. Antiacids Ye No

iv. Probiotics Ye No

APPENDIX 3: The Gastrointestinal symptom rating scale (GSRS)

Please read this first:

This survey contains questions about how you have been feeling and what it has been like DURING THE PAST WEEK. Mark the choice that best applies to you and your situation with an "X"

1. Have you been bothered by PAIN OR DISCOMFORT IN YOUR UPPER ABDOMEN OR THE PIT OF YOUR STOMACH during the past week?

    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe discomfort

2. Have you been bothered by HEARTBURN during the past week? (By heartburn we mean an unpleasant stinging or burning sensation in the chest.)

    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe

3. Have you been bothered by ACID REFLUX during the past week? (By acid reflux we mean the sensation of regurgitating small quantities of acid or flow of sour or bitter fluid from the stomach up to the throat.)

    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe

4. Have you been bothered by HUNGER PAINS in the stomach during the past week? (This hollow feeling in the stomach is associated with the need to eat between meals.)

    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe

5. Have you been bothered by NAUSEA during the past week? (By nausea we mean a feeling of wanting to throw up or vomit.

    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe

6. Have you been bothered by RUMBLING in your stomach during the past week? (Rumbling refers to vibrations or noise in the stomach.
    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort
    5.Moderately severe discomfort
    6.Severe discomfort
    7.Very severe

7. Has your stomach felt BLOATED during the past week? (Feeling bloated refers to swelling often associated with a sensation of gas or air in the stomach.
    1.No discomfort at all
    2.Minor discomfort
    3.Mild discomfort
    4.Moderate discomfort

5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

8. Have you been bothered by BURPING during the past week? (Burping refers to bringing up air or gas from the stomach via the mouth, often associated with easing a bloated feeling.

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

9. Have you been bothered by PASSING GAS OR FLATUS during the past week? (Passing gas or flatus refers to the need to release air or gas from the bowel, often associated with easing a bloated feeling.

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

10. Have you been bothered by CONSTIPATION during the past week? Constipation refers to a reduced ability to empty the bowels).

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

11. Have you been bothered by DIARRHEA during the past week? (Diarrhearefers to a too frequent emptying of the bowels).

1.No discomfort at all
2.Minor discomfort
3. Mild discomfort
4. Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

12. Have you been bothered by LOOSE STOOLS during the past week? (If your stools (motions) have been alternately hard and loose, this question only refers to the extent you have been bothered by the stools being loose).

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe discomfort

13. Have you been bothered by HARD STOOLS during the past week? (If your stools (motions) have been alternately hard and loose, this question only refers to the extent you have been bothered by the stools being hard.)

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

14.Have you been bothered by an URGENT NEED TO HAVE A BOWEL MOVEMENT during the past week? (This urgent need to go to the toilet is often associated with a feeling that you are not in full control.)

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort

7.Very severe

15.When going to the toilet during the past week, have you had the SENSATION OF NOT COMPLETELY EMPTYING THE BOWELS? (This feeling of incomplete emptying means that you still feel a need to pass more stool despite having exerted yourself to do so).

1.No discomfort at all
2.Minor discomfort
3.Mild discomfort
4.Moderate discomfort
5.Moderately severe discomfort
6.Severe discomfort
7.Very severe

PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED! THANK YOU FOR YOUR CO-OPERATION.

Kiwango cha ukadiriaji wa dalili za Utumbo (GSRS)
Tafadhali soma hii kwanza:

Utafiti huu una maswali kuhusu jinsi umekuwa ukihisi na jinsi imekuwa WAKATI WA WIKI ILIYOPITA. Chagua hali inayokufaa.

1. Je, umesumbuliwa na MAUMIVU AU KUSIWAHI TUMBO LAKO LA JUU AU SHIMO LA TUMBO LAKO katika wiki iliyopita?

   1.Hakuna usumbufu hata kidogo
   2.Usumbufu mdogo kidogo
   3.Usumbufu mdogo
   4.Usumbufu wa wastani
   5.Usumbufu mkali kiasi
   6.Usumbufu mkubwa
   7.Usumbufu mkali sana

2. Je, umetatizwa na kiungulia katika wiki iliyopita? (Kwa kiungulia sisi maanisha hisia mbaya ya kuuma au kuungua kwenye kifua.)

   1.Hakuna usumbufu hata kidogo

2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

3. Je, umetatizwa na hisia ya kurudisha kiasi kidogo cha asidi katika wiki iliyopita? (au mtiririko wa majimaji siki au uchungu kutoka tumboni hadi kooni.)
1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

4. Je, umesumbuliwa na MAUMIVU YA NJAA tumboni wiki iliyopita? (Hisia hii ya utupu ndani ya tumbo inahusishwa na hitaji la kula kati ya milo.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

5. Je, umetatizwa na kichefuchefu katika wiki iliyopita? (Kwa kichefuchefu tunamaanisha hisia ya kutaka kutapika au kutapika.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo

4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

6. Je, umetatizwa na KURUMBUA tumboni mwako katika wiki iliyopita? (Kuunguruma hurejelea mitetemo au kelele tumboni.)
   1.Hakuna usumbufu hata kidogo
   2.Usumbufu mdogo kidogo
   3.Usumbufu mdogo
   4.Usumbufu wa wastani
   5.Usumbufu mkali kiasi
   6.Usumbufu mkubwa
   7.Usumbufu mkali sana

7. Je, tumbo lako limevimba wiki iliyopita? (Kuhisi uvimbe unarejelea uvimbe ambao mara nyingi huhusishwa na hisia ya gesi au hewa ndani ya tumbo.)
   1.Hakuna usumbufu hata kidogo
   2.Usumbufu mdogo kidogo
   3.Usumbufu mdogo
   4.Usumbufu wa wastani
   5.Usumbufu mkali kiasi
   6.Usumbufu mkubwa
   7.Usumbufu mkali sana

8. Je, umesumbuliwa na kutokwa na hewa mdomoni wiki iliyopita? (inarejelea kuleta hewa au gesi kutoka tumboni kupitia mdomo, ambayo mara nyingi huhusishwa na kupunguza hisia ya uvimbe.)

   1.Hakuna usumbufu hata kidogo
   2.Usumbufu mdogo kidogo
   3.Usumbufu mdogo
   4.Usumbufu wa wastani
   5.Usumbufu mkali kiasi
   6.Usumbufu mkubwa
   7.Usumbufu mkali sana

9. Je, umetatizwa na KUPITISHA GESI katika wiki iliyopita? (Gesi inayopita au flatus inarejelea haja ya kutoa hewa au gesi kutoka kwenye matumbo, ambayo mara nyingi huhusishwa na kupunguza hisia ya uvimbe.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

10. Je, umetatizwa na choo ngumu katika wiki iliyopita? (Kuvimbiwa kunarejelea uwezo mdogo wa kutoa matumbo.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

11. Je, umesumbuliwa na KUHARISHA katika wiki iliyopita? (Kuhara hurejelea kutokwa na matumbo mara kwa mara.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

12. Je, umetatizwa na choo nyepesi katika wiki iliyopita? (Ikiwa kinyesi chako kimekuwa kigumu na kisicholegea, swali hili linarejelea tu kiwango ambacho umekuwa ukisumbuliwa na kinyesi kulegea.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo

3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

13.Je, umetatizwa na VITI VIGUMU katika wiki iliyopita? (Ikiwa kinyesi chako kimekuwa kigumu na kisicholegea, swali hili linarejelea tu kiwango ambacho umekuwa ukisumbuliwa na kinyesi kuwa kigumu.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

14. Je, umetatizwa na HAJA YA HARAKA YA KUTENGA TUMBO katika wiki iliyopita? (Hitaji hili la haraka la kwenda kwenye choo mara nyingi huhusishwa na hisia kwamba huna udhibiti kamili.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani
5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

15.Wakati wa kwenda chooni katika wiki iliyopita, je, ulikuwa na HISIA ZA KUTOKUTWAGA KABISA matumbo? (Hisia hii ya kutokamilika bila kukamilika inamaanisha kuwa bado unahisi hitaji la kupita kinyesi zaidi licha ya kuwa umejibidiisha kufanya hivyo.)

1.Hakuna usumbufu hata kidogo
2.Usumbufu mdogo kidogo
3.Usumbufu mdogo
4.Usumbufu wa wastani

5.Usumbufu mkali kiasi
6.Usumbufu mkubwa
7.Usumbufu mkali sana

TAFADHALI ANGALIA KUWA MASWALI YOTE YAMEJIBIWA! ASANTE KWA USHIRIKIANO WAKO.

APPENDIX 4: Gastrointestinal symptoms quality of life index (GIQLI)

Instructions: Please circle the answer that best describes your symptom.

1. During the last 15 days, you have had a stomach-ache?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

2. During the last 15 days, you had the feeling of having bloated stomach
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

3. During the last 15 days, you had the feeling of having a lot of gas in the stomach
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

4. During the last 15 days, have you been bothered the issue of "winds".
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

5. During the last 15 days, have you been bothered by belching or referrals
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

6. During the 15 days were you embarrassed by noises "gurgling" in the belly?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

7. During the last 15 days, you've been bothered by frequent bowel movements
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

8. During the last 15 days, you ate with pleasure and appetite?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

9. Because of your illness, you are required to remove certain foods?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

10. During the last 15 days, you have been able to overcome daily problems?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

11. During the last 15 days, how many times your illness made you sad?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

12. During the last 15 days, how many times have you been anxious because of your illness?

Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

13. During the last 15 days, how many times have you felt joy of living?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)
14. During the last 15 days, how many times have you been frustrated because of your illness?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

15. During the last 15 days, how often did you feel tired?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

16. During the last 15 days, how many times have you been in pain?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

17. During the last week, did you awake during the night?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

18. Since you are sick, have you been bothered by changes in your appearance?
For a very large part (0), for an important part (1), a little (2), a few (3), not at all (4)

19. To what extent is that it has reduced your requirement physics in general?
Enormously (0), a lot (1), some (2), a little (3), not at all (4)

20. Because of your health, you have lost your endurance?
For a very large part (0), for an important part (1), a little (2), a few (3), not at all (4)

21. By your illness you feel the loss of your tone?
Major (0), moderate (1), small (2), insignificant (3), none, you feel well (4)

22. During the last 15 days, how many times have you been able to do your usual activities (work, school, cleaning, etc.)?
Never (0), rarely (1), sometimes (2), most of the time (3), always (4)

23. During the last 15 days, you have been able to attend your usual leisure or new activities
Never (0), rarely (1), sometimes (2), most of the time (3), always (4)

24. During the last 15 days, have you been bothered by medical treatment?
Enormously (0), a lot (1), some (2), a little (3), not at all (4)

25. To what extent your illness she disrupts your relationships with others (family or friends)?
For a very large part (0), for an important part (1), a little (2), a few (3), not at all (4)

26. To what extent has your illness harmed your sex life?
For a very large part (0), for an important part (1), a little (2), a few (3), not at all (4)

27. During the last 15 days, how many times have you been inconvenienced by liquid or food in the mouth (regurgitation)?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

28. During the last 15 days, have you felt forced to decrease the speed with which you eat?
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

29. During the last 15 days, you had problems to swallow
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

30. During the last 15 days, you have felt the need urgent need to defecate
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

31. During the last 15 days, you have been inconvenienced by Diarrhoea
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

32. During the last 15 days, you have been inconvenienced by constipation
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

33. During the last 15 days, you have been inconvenienced by nausea
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

34. During the last 15 days, you were worried by presence of blood in stool
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

35. During the last 15 days, you have been inconvenienced by burn or acidity back in the chest
Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

36. During the last 15 days, you have been inconvenienced by incontinence for stool?

Always (0), most of the time (1), sometimes (2), rarely (3), never (4)

NYONGEZA YA 4: Dalili za njia ya utumbo ubora wa kiashiria cha maisha (GIQLI)

Maagizo: Tafadhali weka duara kwenye jibu linalofafanua vizuri dalili yako.

1. Katika siku 15 zilizopita, umeumwa na tumbo?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

2. Katika siku 15 zilizopita, ulikuwa na hisia ya kuwa na tumbo lililojaa
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

3. Katika siku 15 zilizopita, ulikuwa na hisia ya kuwa na gesi nyingi kwenye tumbo
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

4. Katika siku 15 zilizopita, umesumbuliwa na suala la "upepo"
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

5. Katika siku 15 zilizopita, umetatizwa na kutokwa na damu au rufaa
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

6. Je, katika muda wa siku 15 ulikuwa na aibu kwa kelele kwenye tumbo?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

7. Katika siku 15 zilizopita, umekuwa ukisumbuliwa na choo mara kwa mara
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

8. Katika siku 15 zilizopita, ulikula kwa raha na hamu ya kula?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

9. Kwa sababu ya ugonjwa wako, unatakiwa kuondoa baadhi ya vyakula?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

10. Katika siku 15 zilizopita, umeweza kushinda matatizo ya kila siku?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

11. Katika siku 15 zilizopita, ugonjwa wako ulikuhuzunisha mara ngapi?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

12. Katika siku 15 zilizopita, ni mara ngapi umekuwa na wasiwasi kwa sababu ya ugonjwa wako?

Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

13. Katika siku 15 zilizopita, ni mara ngapi umejisikia furaha ya kuishi?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)
14. Katika siku 15 zilizopita, ni mara ngapi umechanganyikiwa kwa sababu ya ugonjwa wako?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

15. Katika siku 15 zilizopita, ni mara ngapi ulihisi uchovu?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

16. Katika siku 15 zilizopita, umekuwa na uchungu mara ngapi?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

17. Katika wiki iliyopita, uliamka wakati wa usiku?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

18. Kwa kuwa wewe ni mgonjwa, umechukizwa na mabadiliko katika sura yako?
Kwa sehemu kubwa sana (0), kwa sehemu muhimu (1), kidogo (2), chache (3), sio kabisa (4)

19. Ni kwa kiwango gani imepunguza mahitaji yako ya fizikia kwa ujumla?
Kubwa (0), nyingi (1), zingine (2), kidogo (3), sio kabisa (4)

20. Kwa sababu ya afya yako, umepoteza uvumilivu wako?
Kwa sehemu kubwa sana (0), kwa sehemu muhimu (1), kidogo (2), chache (3), sio kabisa (4)

21. Kwa ugonjwa wako unahisi kupoteza sauti yako?
Meja (0), wastani (1), ndogo (2), isiyo na maana (3), hakuna, unajisikia vizuri (4)

22. Katika siku 15 zilizopita, ni mara ngapi umeweza kufanya shughuli zako za kawaida (kazi, shule, usafi, n.k.)?
Kamwe (0), mara chache (1), wakati mwingine (2), mara nyingi (3), kila mara (4)

23. Katika siku 15 zilizopita, umeweza kuhudhuria tafrija yako ya kawaida au shughuli mpya
Kamwe (0), mara chache (1), wakati mwingine (2), mara nyingi (3), kila mara (4)

24. Je, katika siku 15 zilizopita, umesumbuliwa na matibabu?
Kubwa (0), nyingi (1), zingine (2), kidogo (3), sio kabisa (4)

25. Ugonjwa wako unavuruga kwa kiwango gani uhusiano wako na wengine (familia au marafiki)?
Kwa sehemu kubwa sana (0), kwa sehemu muhimu (1), kidogo (2), chache (3), sio kabisa (4)

26. Ugonjwa wako umeathiri maisha yako ya ngono kwa kiwango gani?
Kwa sehemu kubwa sana (0), kwa sehemu muhimu (1), kidogo (2), chache (3), sio kabisa (4)

27. Katika siku 15 zilizopita, ni mara ngapi umetatizwa na kioevu au chakula kinywani?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)
28. Katika siku 15 zilizopita, umejisikia kulazimishwa kupunguza kasi ya kula?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)
29. Katika siku 15 zilizopita, ulikuwa na matatizo ya kumeza
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

30. Katika siku 15 zilizopita, umehisi haja ya haraka ya kujisaidia haja kubwa
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

31. Katika siku 15 zilizopita, umesumbuliwa na Kuhara
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

32. Katika siku 15 zilizopita, umesumbuliwa na kuvimbiwa
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

33. Katika siku 15 zilizopita, umetatizwa na kichefuchefu
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

34. Katika siku 15 zilizopita, ulikuwa na wasiwasi kutokana na kuwepo kwa damu kwenye kinyesi
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)
35. Katika siku 15 zilizopita, umetatizwa na kuungua au tindikali kwenye kifua.
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)
36. Katika siku 15 zilizopita, umetatizwa na kukosa choo?
Kila mara (0), mara nyingi (1), wakati mwingine (2), mara chache (3), kamwe (4)

APPENDIX 5: Plagiarism report

PREVALENCE OF GASTROINTESTINAL SYMPTOMS AND QUALITY OF LIFE IN PATIENTS WITH END STAGE RENAL DISEASE ON MAINTENANCE HAEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL

ORIGINALITY REPORT

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2	dspace.muhas.ac.tz:8080 Internet Source	1%

APPENDIX 6: Lead supervisor and chairman of the department approval:

This dissertation has been submitted with the approval of my lead supervisor and chairman of the department of Clinical Medicine and Therapeutics

Lead Supervisor:

Prof. Seth O. McLigeyo

Consultant Physician, and Nephrologist, Department of Clinical Medicine, and Therapeutics

Signature_____

Date 10/11/23

Chairman of the Department:

Prof. E. O. Amayo

Chairman of the Department of Clinical Medicine and Therapeutics,

Professor, Consultant Physician and Neurologist, Department of Clinical Medicine, and Therapeutics

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Signature_____

Date 14/11/2023