

**UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF PAEDIATRICS AND CHILD HEALTH**

**PREVALENCE OF CONSTIPATION AMONG CHILDREN REFERRED TO
GASTROENTEROLOGY CLINIC WITH CHRONIC ABDOMINAL PAIN AT
KENYATTA NATIONAL HOSPITAL**

BY:

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DECLARATION

This dissertation is my original work and has not been submitted elsewhere

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DEDICATION

This dissertation is dedicated to:

My beloved husband Mr. Mohamed Omer Halane who has been a pillar to me, without him I would not have accomplished my study.

My children, Majid, Jassim and Dima, for their love, patience, support and understanding which lightened up my spirit.

My parents, for their prayers and encouragement, for their laying the foundation for my education and for teaching me that even the biggest task can be accomplished if it is done one step at a time.

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ABSTRACT

Background: Chronic abdominal pain is one of the most common presenting complaints to primary care providers and pediatricians. Chronic abdominal pain in children is generally believed to be functional, and its treatment cause can be a challenge. Studies in developed countries have shown that constipation is one of the most common diagnoses in children presenting with chronic abdominal pain. Constipation and its associated symptoms adversely affect the quality of life of the child and his or her family if left untreated. There is paucity of data on the prevalence of constipation in children with recurring abdominal pain in our region.

Objective: To determine the prevalence of constipation in 4-13 year-old children referred to gastroenterology clinic with chronic abdominal pain and to describe the pharmacological and non-pharmacological management of children with constipation at Kenyatta National Hospital.

Methods: A cross-sectional hospital based study was carried out on children aged 4 to 13 years referred to the paediatric gastroenterology clinic at Kenyatta National Hospital between July to December 2014. A questionnaire was administered to children with chronic abdominal pain who fulfilled Apley's criteria and constipation was determined using Rome III criteria. SPSS version 19.0 was used for analyzing the data. Descriptive analysis was used to show the frequency and proportion of variables.

Results: A total 84 children with chronic abdominal pain were seen, 47 (55.95%) were girls and the median age was nine years. The prevalence of constipation in children with chronic abdominal pain with two or more Rome III criteria was 69 out of 84 (82%, 95%CI: 72%-95%), out of whom 37(53.62%) were females and 32(46.3%) were males.

The difference between the proportion of boys and girls was not statistically significant. Pharmacological management was more commonly used than non-pharmacological management. The medication given to children with constipation include: lactulose syrup with milk of magnesium, dietary advice, water intake and behavioral change which was given to 29(42.0%) of the children, lactulose/ dietary advice/water which was given to 18(26.1%) of the children, while dis-impaction/water intake/ dietary advice was given to 6(8.7%), while lactulose alone was given to 16(23.2%) of the children.

Conclusion

The prevalence of constipation in children with chronic abdominal pain is 82%. Pharmacological management was more commonly used than the non-pharmacological and the commonest drug prescribed was lactulose which was used for treating 91.3% of children with constipation.

Recommandations:

Constipation to be considered as an important aetiology in children presenting with chronic abdominal pain.

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

Globally Chronic abdominal pain is one of the most common presenting complaints among children seen by primary care providers and pediatrician. ¹CAP affects 10 –15 % of 4–16-year-old children, with considerable morbidity. RAP often has a great impact on the life of the child and his family and frequently causes much anxiety. ²

CAP is defined clinically as the occurrence of three or more bouts of pain severe enough to affect the child's activities over a period of not less than three months. ³

Many times, chronic abdominal pain in children is functional with no objective evidence of an organic disorder being found ^{4,5}. Studies have shown that constipation is one of the most common diagnoses in children presenting with chronic abdominal pain children.

Early diagnosis and management of constipation is important and the use of laxatives has been recommended as first line treatment for constipation. Changes in diet, fluid intake and life style may be beneficial in case of simple acute constipation (NICE 2010)⁶

This study sought to determine the prevalence of constipation among children presenting with chronic abdominal pain and to describe the treatment given to these children at the Kenyatta National Hospital.

1.2 Literature Review

1.2.1 Overview

Globally, the prevalence of constipation in all age groups has been found to range between 0.7% to 79% with the prevalence rate among children being between 0.7% and 29.6% ⁷.

In the 1990's, the first Rome criteria for diagnosing functional gastrointestinal disorders (FGIDs), including functional abdominal pain and functional constipation, was followed by a second version of the Rome criteria ('Rome II criteria') ⁸ which were published in order to come to more uniform patient groups as a basis for research. In turn, the Rome II criteria were followed by Rome III criteria published in 2006 ⁹. The Rome III criteria are internationally recognized clinical criteria for diagnosing functional childhood constipation. A study done by Loening-Baucke and Swidsinski using Rome III showed that constipation is the most frequent cause of chronic abdominal pain in children and that constipation contributed to 83% of children who had been diagnosed with chronic abdominal pain at the University of Iowa Children's Hospital. ¹⁰

Markus et al found a prevalence of constipation in children with recurrent abdominal pain of 57.4% among children examined at Schneider Children's Medical Center of Israel. 14.7% of those children had a history of constipation while 42.6% had occult constipation ¹¹. The constipation was managed with paraffin oil and phosphate enema. The abdominal pain subsided considerably or disappeared within 2 weeks to 3 months of treatment in 82.84% of cases. 96.5% of the parents interviewed by telephone 1–1.5 years after discharge reported that both the abdominal pain and constipation had subsided or disappeared. ¹¹.

Using Rome II criteria for functional constipation, Gijbers et al in Juliana Children's Hospital in Netherlands found a prevalence of 46% among 200 children with recurrent abdominal pain with functional or occult constipation¹².

Using Rome II criteria for functional constipation, Boccia et al found that in 67 % of patients with functional dyspepsia, the symptoms of both functional constipation and functional dyspepsia subsided significantly with laxatives in these patients and that the gastric emptying time decreased²

Keuzenkamp-Jansen et al retrospectively investigated clinical symptoms and outcome of treatment in 244 children diagnosed with constipation as assessed by plain abdominal X-ray. Of these children, 75 presented with hard and infrequent stools, while 77 had abdominal pain as the presenting symptom.¹³

Stordal et al reported the frequency of recurrent abdominal pain in children with constipation of 16%. In 55% of these children, no organic disease was found.¹⁴

Chronic abdominal pain has been found to be common in children suffering from functional constipation. Studies have shown that abdominal pain occurs in 10% to 70% of cases of children with constipation¹⁵.

1.2.2 Chronic Abdominal Pain in Children

Chronic abdominal pain (CAP) is defined clinically by Apley criteria as the occurrence of 3 or more bouts of pain severe enough to affect child's activities over a period of not less than 3 months.³ Chronic abdominal in children is generally believed to be functional, when it is recurrent without specific cause it is treatment can be challenge.

1.2.3 Causes of Chronic Abdominal Pain in Children

The origin of abdominal pain is complex, it not being attributable to a single cause¹⁶. Several organic disorders can lead to CAP. In most instances, the pathophysiology of CAP is related to infection, inflammation, distension or obstruction of a hollow viscous. Studies have shown that constipation is one of the most common diagnoses in children presenting with chronic abdominal pain. Other causes of chronic abdominal are listed in table 1below. Table1 below shows the common causes for CAP among children ^{16,17},

Table 1: Causes of Chronic Abdominal Pain

Gastrointestinal	
<ul style="list-style-type: none">• Chronic constipation• Inflammatory bowel disease• Parasitic infection (<i>e.g.</i> amoeba, giardia)• Dietary intolerance (<i>e.g.</i> lactose)• Gastro-esophageal reflux disease• <i>Helicobacter pylori</i> infection• Celiac disease• Peptic ulcer	<ul style="list-style-type: none">• Hepatitis• Gall bladder calculi• Chronic appendicitis• Chronic pancreatitis• Functional dyspepsia• Irritable bowel syndrome• Functional abdominal pain/syndromes• Abdominal migraine
Urinary tract	

-
- Urinary tract infection
 - Urinary calculi
 - Pelvi-ureteric junction obstruction
-

Gynecological

- Ovarian cyst
 - Endometriosis
 - Pelvic inflammatory disease
-

Miscellaneous

- Abdominal epilepsy
 - Physical, emotional and sexual abuse
-

1.2.4 Pathophysiology of Abdominal Pain in constipation;

Abdominal pain in constipation is a pain that is caused by stimulation of autonomic nerves in the visceral peritoneum surrounding the hindgut structures. fecal impaction in the rectum and in the large intestine leads to tension, stretching of the rectum which stimulate visceral pain fiber thus hindgut structures such as the large intestine cause lower abdominal pain visceral pain is vague and not well localized and usually described as pressure-like, deep squeezing dull or diffuse³

1.2.5 Constipation in Children

In children, constipation is one of the most common problems accounting for 3-10% of visits in general pediatric clinics and up to 25% of referrals to pediatric gastroenterologists.¹⁸ For many parents, constipation is a source of anxiety.

1.2.5.1 Definition of constipation

Constipation is broadly defined as an unsatisfactory defecation characterized by infrequent stools, difficult stool passage or both that lasts for 2 weeks or longer¹⁹. There are two types of constipation, namely functional and organic constipation. Functional constipation presents after the neonatal period, is not associated with any pathology and accounts for 90% of all constipation. The organic constipation accounts for the remaining 10% of cases of constipation and is characterized by the presence of pathology and presents in neonatal period.^{20,21} A study in India, found functional constipation to be the most common cause of constipation and accounts for almost 85% of the cases²⁰. Similar study in Sudan by M.W.Ali et al among Sudanese children found that the prevalences of functional and organic constipation were 88.7% and 11.3% respectively²¹.

Definition of constipation for this study;

ROME III criteria for diagnosing functional constipation include:^{18,19,20}

- a) Two or fewer defecations in the toilet per week
- b) At least 1 episode of faecal incontinence per week
- c) History of retentive posturing or excessive volitional stool retention
- d) History of painful or hard bowel movements
- e) Presence of a large faecal mass in the rectum
- f) History of large diameter stools that may obstruct the toilet

A child with a developmental age ≥ 4 years has functional constipation if he or she has had 2 or more of the above features occurring at least once per week for at least 2 months at presentation.

Any child with constipation but not fulfilling the above criteria's will be considered to have organic constipation and investigated for other causes of gastrointestinal disorders.

1.2.5.2 Causes of Constipation in Children

Constipation is caused by stool remaining for too long in the colon. Normally the colon absorbs water from the stool and if the stool stays in the colon for too long, too much water will be absorbed from the stool, making it hard and dry. Hard, dry stool is more difficult for the muscles of the rectum to push out of the body. Common factors or disorders that lead to constipation are diets low in fiber, lack of physical activity, medications, life changes or daily routine changes and ignoring the urge to defecate. The table 2 below shows the causes of and risk factor for constipation.

Table 2: Causes and Risk Factors of Constipation in Children

Intestinal causes	Hirschsprung disease Anorectal malformations Neuronal intestinal dysplasia
Metabolic/endocrine causes	Hypothyroidism Diabetics mellitus Hypercalcemia Hypokalaemia Vitamin D intoxication
Drugs	Opioids Anticholinergics Antidepressants
Other causes	Anorexia nervosa Sexual abuse Scleroderma Cystic fibrosis
Risk factors	Low fiber diet Psychological stress Cow's milk protein allergy Familial predisposition Prematurity Living in urban areas

Low consumption of dietary fibre has long been considered as one of the leading risk factors. Undigested fibers in the colon are thought to decrease the colonic transit time and increase stool output. Lee et al found that kindergarten children with constipation took significantly low median dietary fibre than non-constipated children²². Furthermore, fruits and total plant food intake were significantly lower in the constipated group.²² Two other studies among older children also noted that children with constipation consume significantly less amount of dietary fibre than controls.^{23,24} Available studies from Asia also show that fiber consumption in Asian countries such as Hong Kong^{22,25} and Maldives²⁶ is lower than the recommended values.

Cow's milk protein allergy is considered as a risk factor for constipation. Several studies have reported reduction of constipation by elimination of cow's milk from

diet.²⁷ However, further studies are needed to confirm this association and to introduce cow's milk-free diet in infants and children with constipation.

Few studies have demonstrated the relationship of constipation with psychological factors. Inan et al have shown that physical or psychological trauma and personal health problems were associated with constipation in school-aged children.²⁸ Furthermore, they have found that abnormal oral habits (which were considered as an indirect measure of psychological stress) were significantly associated with constipation.²⁸ A study from Sri Lanka involving school children aged 10-16 years noted that school-related stressful events such as separation from best friend, bullying at school, failing examinations and family-related events such as severe illness of family member, parents' job loss and frequent punishment by parents were predisposing them to develop constipation.²⁹ Furthermore, children living in a war-affected area had high prevalence of constipation compared to children non-war-affected areas.²⁹ Psychological factors including emotional stress are likely to modulate colonic and rectal functions, through the brain-gut axis, leading to constipation. Other demonstrated risk factors are extreme low birth weight,³⁰ positive family history^{20,23} and living in urban areas.^{20,31} High consumption of junk foods with low fiber content and sedentary life style might have contributed to higher prevalence of constipation reported in children living in urban areas

1.2.5.3 Pathophysiology of constipation

The pathophysiology of constipation in children is multi-factorial and is associated with interactions of many risk factors. Many organic diseases cause constipation. However, the majority of constipation secondary to organic conditions usually has other clinical features suggestive of the relevant underlying organic disease. Organic diseases

presenting as isolated constipation are rather uncommon. Functional constipation presents after the neonatal period, is not associated with any pathology and accounts for 90% of all constipation. The organic constipation accounts for the remaining 10% of cases of constipation and is characterized by the presence of pathology and presentation in neonatal period.^{19,20} Borowitz et al³² reported painful defecation as the commonest factor for constipation. If there is pain during defecation, children usually withhold stools. During the withholding, the rectal mucosa absorbs water from the faecal mass, which becomes harder and larger as the time passes and ultimately defecation becomes difficult. Therefore, when the desire to pass stools comes, children adopt retentive posture and hide from parents till the urge pass off. Passage of this fecal mass is painful and sometimes results in anal fissures which further aggravate pain and precipitate stool withholding. This sets up a vicious cycle of stool retention. Accumulation of stools in rectum causes gradual dilatation leading to megarectum resulting in loss of rectal sensation and urge for defecation. It has been shown that children with megarectum have high sensory threshold for rectal sensation.³³ Several studies have demonstrated slow colonic transit in 25%-69% children with constipation.³⁴ Furthermore, those with slow transit constipation had more severe symptoms including night time soiling.³⁴

1.2.5.4 Clinical manifestation of constipation:

The commonest symptoms of constipation are reduced stool frequency and passage of hard stools. The other symptoms include fecal soiling, passage of large volume stools, painful defecation and characteristic "retentive posturing." Straining at defecation, abdominal pain, anorexia, vomiting and bleeding per rectum are other associated features, although they are not among the diagnostic criteria. The physical examination shows

palpable fecal masses in the abdomen and fecal impaction in the rectum. However, few studies have been done to find the relative frequency of gastrointestinal presentations among children with functional constipation.³⁵ Urinary incontinence is also another sign. The stool in colon may press against the bladder causing daytime or nighttime wetting³⁶. It has been shown that constipation was the commonest cause of acute abdominal pain presenting to emergency department or primary care clinics.³⁷

Dehgani et al found that the most frequent signs of constipation were large and hard stool (93.7%), painful defecation (92.3%), and withholding behavior (91.9%), followed by fecal impaction (59.9%). In general, ROME III symptoms were more frequent than non-Rome III symptoms, except for pellet like stool (58.1%), abdominal pain (41.4%), and anorexia (38.3%) which were more frequent than ROME III symptoms such as fecal soiling (33.8%) and fecal mass (9.5%)³⁸. Another study by Ali et al showed that the main clinical characteristic of functional constipation were faecal impaction which occurred in 59.4% of the patients, straining which occurred in 43% of the patients, withholding behavior which occurred in 32.3% of the patients, soiling which occurred in 16.5% of the patients, and abdominal pain which occurred in 12% of the patients.²⁰

1.2.5.5 Diagnosis and treatment of constipation in children:

1.2.5.5.1 Evaluation

A detailed history and thorough physical examination are the cornerstones in assessing a child with constipation. These 2 steps would reveal the possible etiology and associated complications in the majority of children. Investigations are only needed in those children who show clinical features of organic diseases and those who do not respond to initial medical management.

In the newborn, the time of meconium passage is of diagnostic importance in neonates as most normal newborns pass meconium within first 48 hours of birth. Delayed passage of meconium raises the possibility of short segment Hirschsprung disease and anorectal malformations.

Time of onset the majority of children develop constipation around 2-4 years of age. Significant intestinal pathologies such as anorectal malformations and neuronal intestinal dysplasia are common in children presenting with constipation very early in life. In some patients, the onset of symptoms is related to major stressful life events such as birth of a sibling or parental job loss.

Regarding bowel habits and defecation behaviors, the majority of children with constipation have infrequent passage of stools. Hard and large caliber stools that can clog the toilet may lead to passage of blood with stools. Occurrence of withholding posture should be specifically sought because sometimes parents interpret this as a genuine attempt to pass stools. Children stand on tip toes and often hold on to furniture till the desire for defecation is passed. Sweating and facial redness are also noted in this period. Leaking stools into the underwear without realizing indicates severe constipation.

Associated symptoms: Although non-specific, the presence of abdominal pain, nausea, and vomiting are associated with constipation. Most parents would complain the child has loss of appetite and fail to gain weight. History of urinary incontinence is also a feature.³⁶ Endocrine diseases which may cause constipation, such as diabetes mellitus would have features such as polyuria, polydipsia and weight loss. Furthermore, children with hypothyroidism may present with lethargy, poor school performances and weight gain.

1.2.5.5.2 Physical Examination

Physical growth: Measurement of height and weight and comparison with the age appropriate centile charts gives idea about the physical growth. Hypothyroidism and other organic disorders may present as short stature or failure to thrive.

General examination: Young children with constipation often cling to their parents and look frightened during the consultation. Smell of the faeces due to incontinence and general demeanor of the child are also important to note. Children with anorectal malformation and hypercalcaemia may sometimes show associated features. Young girls with anorexia nervosa often would show features of weight loss. Presence of scars, lipomas and haemangiomas on the lower spine would suggest the possibility of spinal dysraphism and underlying neurological abnormalities.

Abdominal examination: The main aim of the abdominal examination is to look for the presence of palpable faecal mass. Usually it is found in the left iliac fossa or supra pubic region.³⁹

Perianal inspection and digital examination of the rectum: Inspection of the perianal region shows position of the anus, fissures, tags and inflammation. Repaired anorectal malformations would show surgical scars around the anus. Digital rectal examination determine the anal tone and detects the presence of fecal mass. It is noted that the frequency of digital examination of rectum is unacceptably low in children with constipation.³⁹

Neurological assessment: This will reveal neurological abnormalities in the lower spinal cord which may present as constipation.

1.2.5.5.3 Investigations

Laboratory investigations are rarely indicated in childhood constipation except in those with evidence of organic diseases from history and examination and in those who do not respond to adequate medical management. This is because the investigations are unlikely to reveal any additional information for the management.

Plain abdominal X-ray: Plain abdominal radiograph is performed to identify the degree of fecal loading in the colon and rectum⁴⁰. It is considered to be useful in children who are not willing to undergo a rectal examination due to pain and fear. However, a systematic review shows that interpretation of the radiological findings is difficult, inconsistent and there is a poor correlation between clinical and radiological diagnosis. The scoring systems for fecal loading are reported to have wide inter-observer and intra-observer variability, poor diagnostic accuracy, poor reproducibility and depend on the experience of the scorer.⁴⁰ Therefore, plain abdominal radiograph has a very limited value in clinical assessment of constipation.

Other investigations include; Colonic transit time studies, Anorectal manometry, Colonic manometry

1.2.5.6 Treatment of Constipation in Children

Treatment for constipation in children is done through education, changing the eating, diet and nutrition of the child or through behavioral changes and medication ³⁵.

1.2.5.6.1 Education

The management of constipation in children should begin with education and counseling of the parents and the child about the nature of constipation. This education helps to reassure both the child and parents of the possibility of successful treatment. The education also helps to ease stress and removes the feeling that child's fecal incontinence may be intentional. At the same time, the child's self-confidence improves rapidly and this knowledge in many a time helps change family reaction from one of hostility to one of support ⁴¹.

1.2.5.6.2 Eating, Diet, and Nutrition

Children suffering from constipation have decreased stool weight or bulk, usually from a lack of dietary fiber. A hygroscopic fiber such as bran or psyllium helps in increasing stool water content and weight ⁴¹. Dietary changes to help treat constipation therefore include taking high fibre containing foods such as, cereals, beans, fruits and vegetables and drinking prune juice. Health care providers should recommend to parents the amount of liquid intake a child should have based on the child's age, health, and activity level and where the child lives. Dietary changes for children prone to constipation include limiting foods that have little or no fiber such as ice cream, cheese, meat, and processed foods ³⁷.

Amongst children, the Academy of Nutrition and Dietetics recommends a daily consumption of fibre measured as “age of child plus 5”grams ⁴¹. Currently, many children are eating too many refined and processed foods from which the natural fibre has been removed. Therefore, it is important for the health care provider to assist parents plan a diet with the appropriate amount of fibre⁴². Even though the evidence on the role of diet in childhood constipation is weak, dietary education, especially supplementation of fiber is today the first line treatment of chronic functional constipation in children ⁴². Table 3 below gives a list of high-fibre foods that are healthy for constipating children. ^{41, 42}

Table 3 List of high-fiber foods

	Fiber
Beans, cereals, and breads	
½ cup of beans (navy, pinto, kidney, etc.), cooked	6.2–9.6 grams
½ cup of shredded wheat, ready-to-eat cereal	2.7–3.8 grams
⅓ cup of 100% bran, ready-to-eat cereal	9.1 grams
1 small oat bran muffin	3.0 grams
1 whole-wheat English muffin	4.4 grams
1 cup of oatmeal	4 grams
1 cup of lentils cooked	7 grams

1 slice bread(whole wheat)	2 grams
1 cup spaghetti (whole wheat)cooked	6 grams
1/4 cup of sesame seeds	4 grams
1 cup of popcorn	1.2 grams
Weetabix 100 grams	10 gram
Fruits	Fiber
1 medium avocado(raw)	11 grams
1 small apple, with skin	3.6 grams
1 medium pear, with skin	5.5 grams
1 pineapple(472 grams)	5.7 grams
½ cup of raspberries	4.0 grams
1 medium mango	3.7 grams
1 banana	3 grams
½ cup of stewed prunes	3.8 grams
1medium orange	3 grams
½ cup sections of grapefruit	1.5 grams
1 cup of strawberries	4 grams

1 medium peach	1.8 grams
1 cup of raisin	6.20
Vegetables	Fiber
½ cup of carrots	3grams
½ cup tomato	1 grams
½ slice of eggplant	2.3 grams
½ cup of winter squash, cooked	2.9 grams
1 medium sweet potato, baked in skin	3.8 grams
½ cup of green peas, cooked	3.5–4.4 grams
1 small potato, baked, with skin	3.0 grams
½ cup of mixed vegetables, cooked	4.0 grams
½ cup of broccoli, cooked	2.6–2.8 grams
1.2 cup of pumpkin mashed	4 grams
½ cup of greens (spinach, collards, turnip greens), cooked	2.5–3.5 grams
10 olives	1 grams

1.2.5.6.3 Behavioral Changes

Older children should be encouraged to use the toilet shortly after meals to promote regular stool passage. Some children may respond well to a reward system. Children who are still in the process of toilet training may need to take a break from toilet training until the constipation resolves³². At the school setting, toileting may need to be addressed by the teachers with the involvement of a school nurse²⁵.

1.2.5.6.4 Medications

Early treatment of treatment of constipation in children usually involves a thorough cleansing of the bowel. This involves the injection of liquid into the rectum through the anus for cleansing or for stimulating evacuation of the bowels. Laxatives are medications that loosen stool and increase bowel movements are also administered. Treatment of constipation calls for children being under medication until their bowel habits are normal for a fairly long time and until when they are able to overcome their holding behavior. This is because if the treatment is stopped rapidly, a child may become constipated again. Parents and care givers should not give children laxatives unless under prescription from a health care provider³⁴.

The following ingredients found in laxatives are generally recognized as safe and effective. In general laxatives can be grouped into:

- a) **Bulk-Producing Laxative.** The bulk forming agents cause the stool to absorb more fluid into the intestines so that the stool becomes bigger. The large stool then stimulates the urge to pass the stool. Thus, the constipation is treated. The bulk producing laxatives include: Psyllium (Metamucil, Fiberall, Bulk-K, Fibro-XL) and Methylcellulose (Citrucel).

- b)** Stool Softener Laxatives, such as Docusate (Colace, Correctol, Docu-Soft, Dok), lubricate and soften the stool in the intestine, the lubrication and softening making the stool easy to pass.⁴³
- c)** Lubricant Laxatives, such as Mineral oil (Fleet, Kondremul), lubricant laxatives simply make the stool slippery, so that it slides through the intestine more easily. Lubricant laxatives also retards colonic absorption of water and so soften the stool.
- d)** Osmotic Laxatives, absorb fluids into the intestine from other tissue and blood and hold fluids in the intestine. This extra fluid in the intestines makes the stool softer and easier to pass. There are two principal types; saline and hyper osmotic (nonabsorbable sugars).⁴³

Saline Laxative include Magnesium hydroxide (Phillips Milk of Magnesia, Fleet Pedia-Lax Chewable), Magnesium citrate (Citroma) and Magnesium sulfate.

Hyper osmotic laxatives include, Lactulose (Constulose, Enulose, Generlac, Kristalose), Sorbitol and Polyethylene glycol solution (Miralax)

- e)** Stimulant Laxatives, Such as Senna (Senokot, Ex-Lax, Senexon, Senna-Gen) Bisacodyl (Bisac-Evac, Biscalax, Dulcolax, Dacodyl), Cascara sagrada, or Castor oil increases the intestinal motility by stimulating the line of the intestinal mucosa and nerve plexus, a process which moves the stool through the intestines fast.

Newer therapies for constipation include the prokinetic agent prucalopride, the osmotic agent lubiprostone, and the guanylate cyclase C (GC-C) agonist linaclotide. When a laxative is necessary to relieve pain from occasional constipation, magnesium hydroxide, is often recommended.

In Kingston, Ontario, 653 pediatric patients were studied for 16 months at the Pediatric Bowel Management Clinic at Hotel Dieu Hospital, in order to determine the most commonly laxatives in the treatment of constipation. Senna and docusate sodium were found to be the most commonly used laxatives. Both of them were found to have favorable results in clinical use ⁴⁴. Both enemas and oral therapies can usually be given at home as directed by a child's health care provider. However, a child who does not respond to treatment may need to be admitted to the hospital.

1.2.5.6.5 Long term monitoring:

Assessment of constipation after disimpaction assures that the prescribed therapy was effective. At that time, maintenance laxative therapy can be prescribed. When the patient has bowel movements regularly for weeks or months without apparent pain, fear, or excessive straining, attempting to discontinue laxative therapy is reasonable.

1.2.5.6.6 Outcome of constipation in children:

Complications that can arise from constipation if left untreated include hemorrhoids, anal fissures, rectal prolapse, and fecal impaction. In later stages of constipation, the abdomen may become distended, hard and diffusely tender. Severe cases ("fecal impaction" or malignant constipation) may exhibit symptoms of bowel obstruction (vomiting, very tender abdomen) and encopresis. Which finally leads to impaired quality of life a study done by Youssef et al states those Children with chronic constipation had lower quality of life scores than the healthy children⁴⁵. Early recognition of constipation and appropriate treatment are necessary for successful outcome and improved quality of life.⁴⁵

Early treatment and sufficient treatment time may also be important factors to achieve an early response and prevent relapse.

CHAPTER TWO

2. STATEMENT OF THE PROBLEM AND JUSTIFICATION

2.1 Justification and Utility of the Study

Chronic abdominal pain is one of the most common presenting complaints to primary care providers and pediatricians. It accounts for significant school loss, impaired quality of life, and parental frustration²¹. A recent study by Youssef et al demonstrated that quality of life was impaired in children with functional abdominal pain.⁵⁰

Evaluation of abdominal pain in children at times poses a challenge to both parents and pediatrician. A major challenge in managing children with abdominal pain is making a timely and accurate diagnosis.³⁴ Therefore, while evaluating children with abdominal pain, a thorough history and examination is required to identify the most likely cause⁴⁵. It is important to note that little data exists on the natural history of abdominal pain in children⁴ though it is known to affect between 10% and 25% of children aged over 4 years.

Although chronic abdominal pain in children is usually attributable to a functional disorder rather than an organic disease. There are numerous misconceptions and insufficient knowledge among the health care professionals, which in most instances, lead to the wrong evaluation of symptoms. The initial goal of most health care providers evaluating children with chronic abdominal pain is to exclude any serious disease⁴⁶.

Constipation is one of the most common diagnoses in children presenting with chronic abdominal pain⁵. Constipation in children is a common health problem affecting many children globally.

Constipation has a huge psychological, social and economic impact not only the child but also on the parents and health care system. If left untreated, one third of children will have their symptoms persisting into adulthood, contributing to poor quality of life ^{44, 47}.

A study done by Youssef et al states those Children with chronic constipation had lower quality of life scores than the healthy children with gastrointestinal disorders ⁴⁴. Early recognition of constipation and appropriate treatment are necessary for successful outcome and improved quality of life. ⁴⁴

The purpose of this study was to determine the prevalence of constipation in children presenting with chronic abdominal pain at the Kenyatta National Hospital pediatrics section. Knowledge regarding diagnosis and causes influencing the clinical course of constipation in children is important. This is because it enables general practitioners and pediatricians to give accurate patient information and offer effective treatment.

It is anticipated that this study will form a baseline for improvement of outcome for children with constipation presenting with chronic abdominal pain and acts as a good reference point of the prevalence constipation in children presenting with abdominal pain.

2.2 Aim and objectives of the study

2.2.1 Primary objective

To determine prevalence of constipation in 4-13 year old children referred to gastroenterology with chronic abdominal pain at the KNH in Nairobi.

2.2.2 Secondary objective:

To describe the pharmacological and non-pharmacological management of children with constipation

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Study Area

The study was carried out at the paediatric gastroenterology clinic of Kenyatta National Hospital (KNH). KNH is Kenya's national referral hospital and is located at the Upper Hill area of Nairobi, the country's capital city.

3.2 Study Design

This study was a cross sectional hospital based study

3.3 Study Population

The subjects studied were 4-13 year old children who presented to the paediatric gastroenterology clinic at KNH for chronic abdominal pain between July to December, 2014.

Paediatric gastroenterology clinic is the only gastroenterology clinic in KNH and is a referral clinic for all children with problems of the gastrointestinal tract. The clinic is held once weekly. The total number of new patients seen at gastroenterology clinic is about 100 per month. Approximately 20% of these patients present with chronic abdominal pain. 50% of these patients with chronic abdominal pain are diagnosed with constipation.

The team includes consultant and specialist of paediatric gastroenterologists and hepatologists, paediatric residents and nurse

3.4. Study period:

The study was conducted from July to December, 2014.

3.5 Sample Size Determination and Calculation

The study targeted all children with chronic abdominal pain who sought treatment at gastroenterology clinic in KNH.

The sample was calculated using Fischer formula:⁴⁸

$$n = \frac{Z^2 \times p \times q}{d^2}$$
$$n = \frac{1.96^2 \times 0.10 \times 0.90}{0.065^2} = 82$$

Where;

n = sample size

p = estimated prevalence of chronic abdominal pain amongst children
(estimated to be 10%³)

Z = confidence level at 95% (corresponding to a standard Z value of 1.96)

q = 1- p

d = margin of error (0.065)

Therefore n = 82 Children

3.6 Inclusion Criteria

All 4-13 year-old children who presented with chronic abdominal pain at the paediatric gastroenterology clinic. Children whose parent gave written informed consent.

Chronic abdominal pain (CAP) is defined clinically as (by the Apley criteria): 3 or more bouts of pain severe enough to affect activities over a period of not less than 3 months³⁴.

3.7 Exclusion Criteria

Children whose parents declined to give consent

All children with acute abdominal pain

Children with suspected abdominal malignancy on the basis of history and physical examination, children with known malignancy children on chemotherapy treatment or children with abdominal masses.

3.8 Data Collection Tools and methods

Data was collected using various tools and techniques described as follows. A semi-structured questionnaire was used by the principal investigator assisted by the research assistant to collect or record the patient data after obtaining informed signed consent from the care giver/guardian or ascent form older age group children. The research assistant was qualified a clinical officer who was recruited and trained on the study objectives and on how to collect the data. The research assistant also aided in the translation whenever it was necessary.

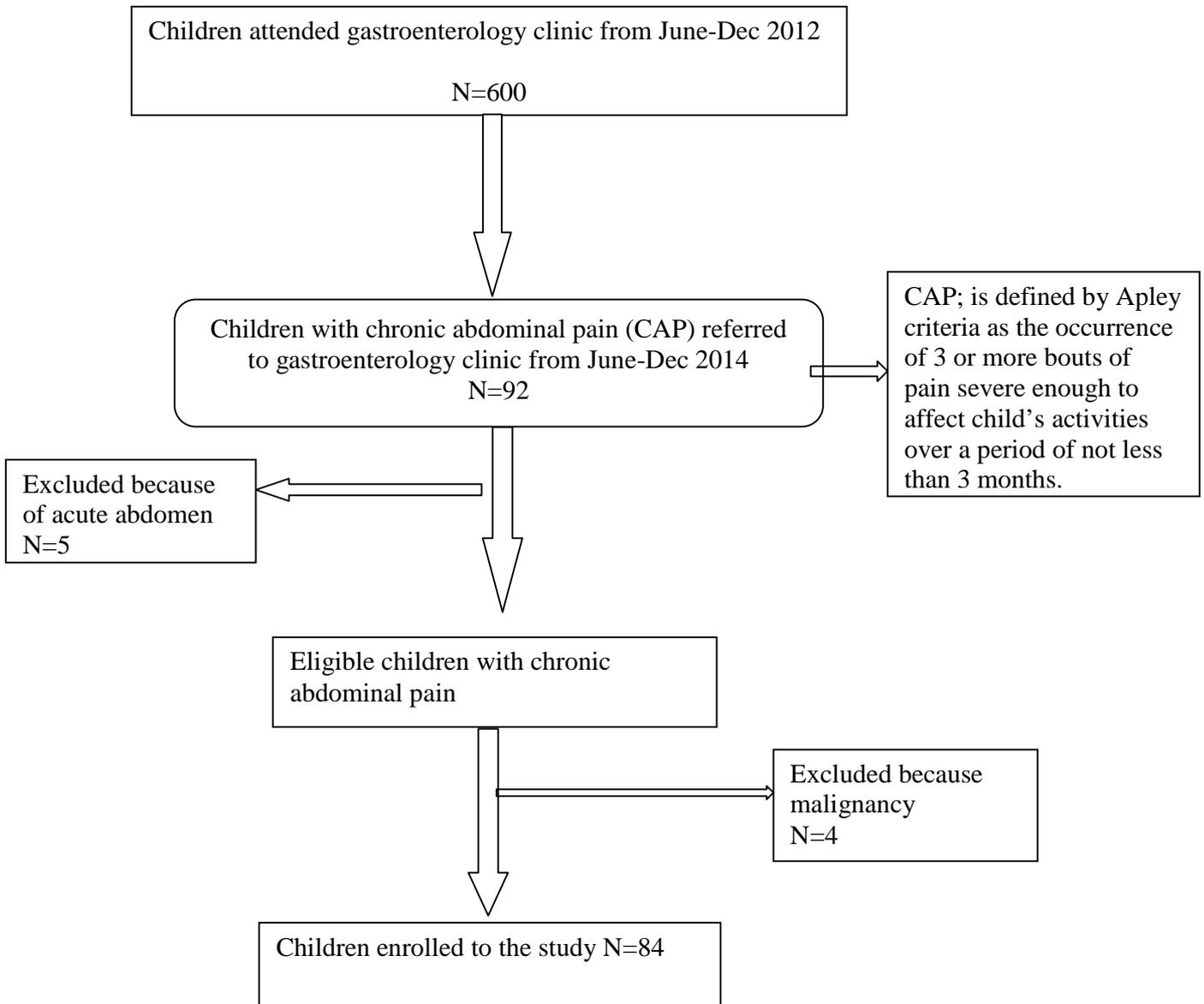
A questionnaire was completed for each patient who referred to pediatric gastroenterology with CAP and agreed to participate. Data collected included presentingsymptoms, which included history of CAP and symptoms associated with CAP. Then Rome III questionnaire adopted from the Rome Foundation.¹³ was applied it

was consisted of the followings: large feces, painful defecation, withholding behavior, soiling, and other manifestation like rectal bleeding. Finally children were examined to exclude suspected malignancy, and then large fecal mass in rectum and digital rectal examination as an initial diagnostic tool was done. Then the initial management given for the constipation was recorded. Consecutive sampling was done until minimum sample achieved.

Functional constipation in a child has been defined by the Rome III criteria (13) as having two or more of the following features occurring at least once a week for the duration of at least 2 months before diagnosis: two or fewer stools per week, either hard stools or painful stools, a passage of very large stool that may obstruct the toilet, stool retention “once a week” or more often (retentive posturing), a history of large fecal mass in rectum, and/or soiling “once a week” or more often.

Chronic abdominal pain (CAP) is defined clinically by Apley criteria as the occurrence of 3 or more bouts of pain severe enough to affect child’s activities over a period of not less than 3 months. ³.

3.9 STUDY FLOW CHART



3.10 Limitations

1. There was a recall bias, since some of parents were unable to recall number of bowel movement in younger children
2. One of the Rome III criteria was difficult to assess in families and children who used pit latrines.

3.11 Data Analysis and Presentation

The gathered data was checked for completeness, coded and then entered into a computer. Data analysis was guided by study objective prevalence of constipation was obtained by the number of children with at least two or more Rome III criteria. Descriptive analysis was used, exploratory data analysis and categorical variables were summarized using frequency tables whereas continuous variables were summarized using measure of central tendency dispersion. Management of constipation was described using pharmacological and combined methods are summarized using tables and charts data was analyzed using SPSS software version 19.0. Results were presented in the form of frequency tables, pie charts and figures together with their descriptions.

3.12 Ethical Considerations

3.12.1 Confidentiality

The researcher maintained maximum confidentiality for all information and data presented by the respondents. All information collected on the patients was considered confidential and treated as such. The instruments used for the research were void of the patients' names to ensure confidentiality.

Documents containing patient's confidential information were neither photocopied nor the names of the patients or clinicians be recorded. The data along the questionnaire was accessible only to the investigators and all information collected on the patients considered confidential and treated as such. At the end of the study raw data will be destroyed and deleted.

3.12.2 Ethical Approval

Ethical approval to carry the study was sought from Kenyatta National Hospital/University of Nairobi/Ethics and Research Committee. Informed written consent was gotten from the primary caregiver/guardian for enrollment to study. Assent form was obtained from the older children. Strict confidentiality of study participation and results will be observed. All children with constipation will be managed under the direction of pediatric gastroenterologist and children with CAP from other causes referred to relevant clinics. The participants were not exposed to any risk during the study

CHAPTER 4

4.RESULTS

The study recruited 92 children between 4-13 years of age, 5 children were excluded because of acute abdomen and 4 children had known malignancies. Therefore the study included 84 children with chronic abdominal pain during the period July 2014 to December 2014. The descriptive analysis of the basic characteristics of these patients is presented in the section below.

4.1 Characteristics of the assessed children

Majority of the patients were female 47 (55.95%). Majority of the children were aged between 10-14 years (36.9%).The median age of the respondents was 9 years (IQR=4) Most of the respondents were from the school aged children (72.6%) that is from 7-13years. As shown in table 4 below, the school children were more than the pre-school children.

Table 4: Description of the participants (N=84):

Age distribution	Frequency	Percent (%)
Age group		
4-6 years (pre-school)	23	27.4%
7-9 years (school aged children)	30	35.7%
10-13 years (school aged children)	31	36.9%
Sex		
Female	47	55.9%
Male	37	44.1%

4.2 Assessment of Abdominal pain

The assessment and the characteristics of the abdominal pain in children is shown in the table 5.

Children who experienced abdominal pain for more than 1 year were 40 (47.6%). 18(21.4%) had abdominal pain for 4-11months while 26(31.0%) had abdominal pain for 3moths. Peri-umbilical pain, the most common type of abdominal pain, occurred in 31(36.47%) of the children. Upper abdomen and lower abdomen pains occurred in 26(30.9%) and 24(28.6%) of the children respectively. Only a few children complained of pain on the right and left side of the abdomen. The severity of the abdominal pain was moderate in most of the participants 45(52.4%). A little discomfort was felt in 27(32.1%) of the children and very severe occurred in 9(10.7%) children. Only 4(4.76%) of the children could not characterize the severity of the pain.

According to the duration of pain episode, most of the respondents experienced pain for less than an hour 50(59.5%) while 19(22.6%) had pain that lasted 1-2hours, 14(16.7%) of the children had pain lasted 2-4hours, while only 1(1.2%) had pain throughout.

Table 5: Characteristics of the abdominal pain:

Assessment of abdominal pain	Frequency	Percent (%)
Duration of abdominal pain		
3 months	26	31.0%
4-11 months	18	21.4%
>1 year	40	47.6%
Part of the abdomen with pain		
Lower abdomen	24	28.6 %
Upper abdomen	26	30.9%
Periumbilical	31	36.9%
Left side abdomen	2	2.4 %
Right side of the abdomen	1	1.2 %
Severity of the abdominal pain		
Little Discomfort	27	32.1 %
Moderate	45	52.4 %
Severe	9	10.7 %
Don't know	4	4.8%
The duration of pain episode		
Less than 1 hour	50	59.5%
1-2 hour	19	22.6%
2-4 hour	14	16.7%
All the time	1	1.2 %

Table 6: Feelings associated with abdominal pain

Feelings and comfort associated with abdominal pain	Frequency	Percent (%)
Bloated belly		
No	54	64.3%
Yes	30	35.7%
Loss of appetite		
Ye	40	47.6%
No	44	52.4%
Headache		
Yes	18	21.4%
No	66	78.6%
Pain in the arms, legs, or back		
Yes	17	20.2%
No	67	79.8%
Difficulty in sleeping		
Yes	46	54.8%
No	38	45.2%

Dizziness		
Yes	18	21.4%
No	66	78.6%
feeling better after having a poop		
Yes	51	60.7%
No	33	39.3%
Brought to health facilities or for review before		
Yes	67	79.8%
No	17	20.2%
Medical history		
Amoebiasis	8	9.5%
Painkillers	31	37.0%
Anti-acids	19	22.6 %
Treated for constipation	10	11.9%
Don't know	16	19.0%

The symptoms and the discomfort associated while having abdominal pain are shown in table 6.

30(35.7%) of the children had bloated abdomen associated with the abdominal pain while 54(64.3%) of the children did not have bloated abdomen.

Half of the children with abdominal pain had associated loss of appetite 40(47.6%) while 44(52.4%) had no loss of appetite.

A few children 18(21.4%) had headache while 66(78.6%) of the children did not have headache.

Most of the children 67(79.8%) did not have pain in the legs or arms while the remaining 17 (20.2 %) had pain in the legs and arms.

Most of the children 46(54.8%) had difficulty in sleeping while 38(45.2%) did not have difficulty in sleeping.

Few children 18(21.4%) felt dizzy or faint while 66(78.6%) majority of the children did not feel dizzy or faint.

Most of the children 51(60.7%) with abdominal pain felt better after passing stool while 33(39.3%) did not feel better after passing stool.

The figure 1 below shows that most of the children with abdominal pain 65(77.4%) missed school during the period of the abdominal pain. While 19(22.6%) did not miss their school.

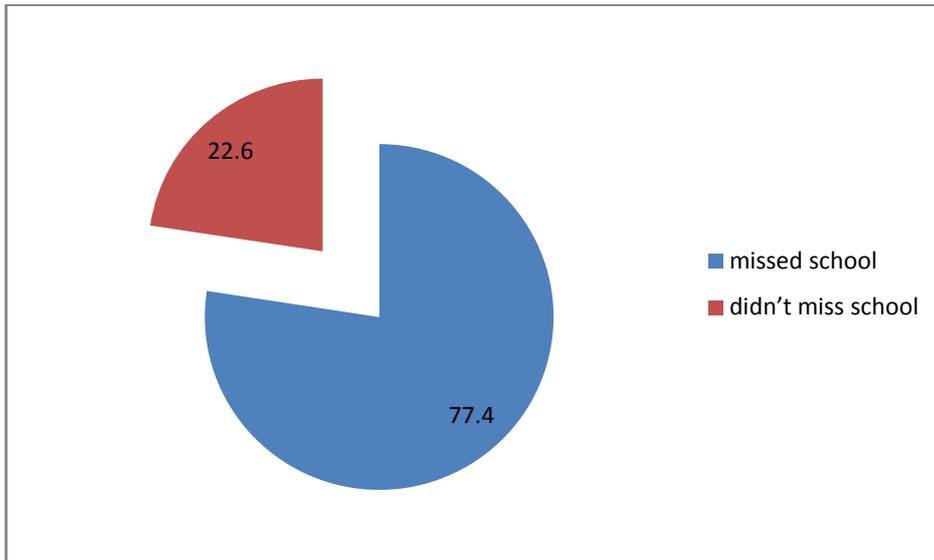


Figure1: Child missing school due to chronic abdominal pain

4.3 Nature of the bowel functions

The nature the bowel function identified in the last 2months is show in table .

48(57.2%) of the children had ≥ 3 time bowel movement per week, 30(35.7%) had ≤ 2 bowel movement per week and only 6(7.1%) of the children had one or more bowel movement per day.

Most of the children were having stool of type 2 (sausage-shaped but lumpy) 38(45.2%) while least where having stool type 4-7(watery stool).

Table 7: Assessment of bowel functions for the last 2 months

Variable	Frequency	Percent (%)
Kind of stool the children have been having		
Type 1(separate, hard lumps like nuts)	17	20.2%
Type 2(Sausage-like but lumpy)	38	45.2%
Type 3(sausage but with cracks in the surface)	13	15.5%
Type 4(sausage or snake, smooth and soft)	5	5.9%
Type 5(Soft blobs with clear-cut edges)	3	3.6%
Type 6(Fluffy pieces a mushy stool)	4	4.8%
Type 7(Watery, no solid pieces)	4	4.8%
Number of bowel movements in a day		
≥ Once a day	6	7.1%
≥ 3 times a week	48	57.2%
2 times a week or less	30	35.7%
History of pain/ hard poop for the child		
Hard/painful	44	52.4%
Not too hard Not too soft	26	31.0%
Very soft	7	8.3%
Don't know	7	8.3%
History of retentive posturing		
Never	59	70.2%
Once a week	22	26.2%
Don't know	3	3.6%

Big poop that clogged the toilet		
Yes	21	25.0%
No	53	63.1%
Don't know	10	11.9%
Stained or soiled underwear		
Never	59	70.2%
Once per week or more	13	15.5%
Don't know	12	14.3%
Blood in the toilet paper		
No	68	80.9%
Yes	13	15.5%
Not sure	3	3.6%
Large stool on the abdomen(fecal mass)		
Yes	42	50.0%
No	42	50.0%
Large stool on the rectum(Fecal impaction)		
No	28	33.3%
Yes	56	66.7%
Child passing mucus or phlegm during a poop		
Yes	14	16.7%
No	70	83.3%

History of painful and hard stool once per week for the last 2 months was present in 44(52.4%) of the children. Majority of the children 59(70.2%) did not have stool leakage while 13(15.5%) of children had soiling/feacal incontinence and 12(14.3%) of them are not sure if there is history of soiling. There was no history of retentive posturing in 59(70.2%) while 22(26.2%) of the children had history of retentive posturing. Presence of large abdominal faecal mass was present in half of the patient 42(50%) while the other half was not having fecal mass. Feacal impaction in the rectum was present in 56(66.7%) of the children. Passage of mucus in the stool occurred in 14(16.7%) of the children while the rest 70(83.3%) had no mucus in the stool.

Figure 2 below demonstrates the frequency of Rome III criteria among children with chronic abdominal pain.

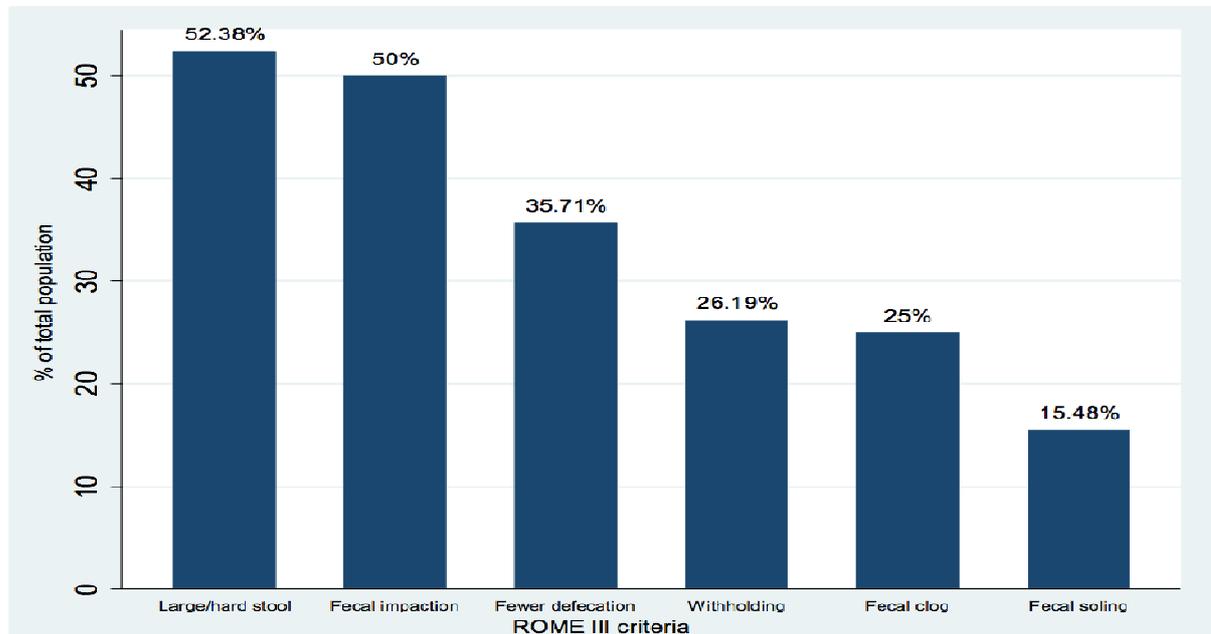


Figure 2: Frequency of Rome III criteria among children with chronic abdominal pain.

Most of the children were having hard/painful stool and fecal mass in the rectum 42/84(50.00%) and 42/84(50.0%) respectively, while 30/84(35.7%) of the children had two or fewer defecations in the toilet per week. 22/84(26.19%) of the children withholding behavior. A large stool diameter that clogged the toilet occurred in 21/84(25.0%) of the children, while fecal soiling was the least frequent symptoms and occurred in 13/84(15.5%).

The prevalence of constipation in children with chronic abdominal pain with two or more Rome III criteria was 69 out of 84 (82%, 95%CI: 72%-95%) out of which female were 37(53.62) and male were 32(46.3%).The difference in the prevalence of constipation

among the boys and girls was not statistically significant (p -value >0.05). Figure below shows the prevalence of constipation in children with chronic abdominal pain

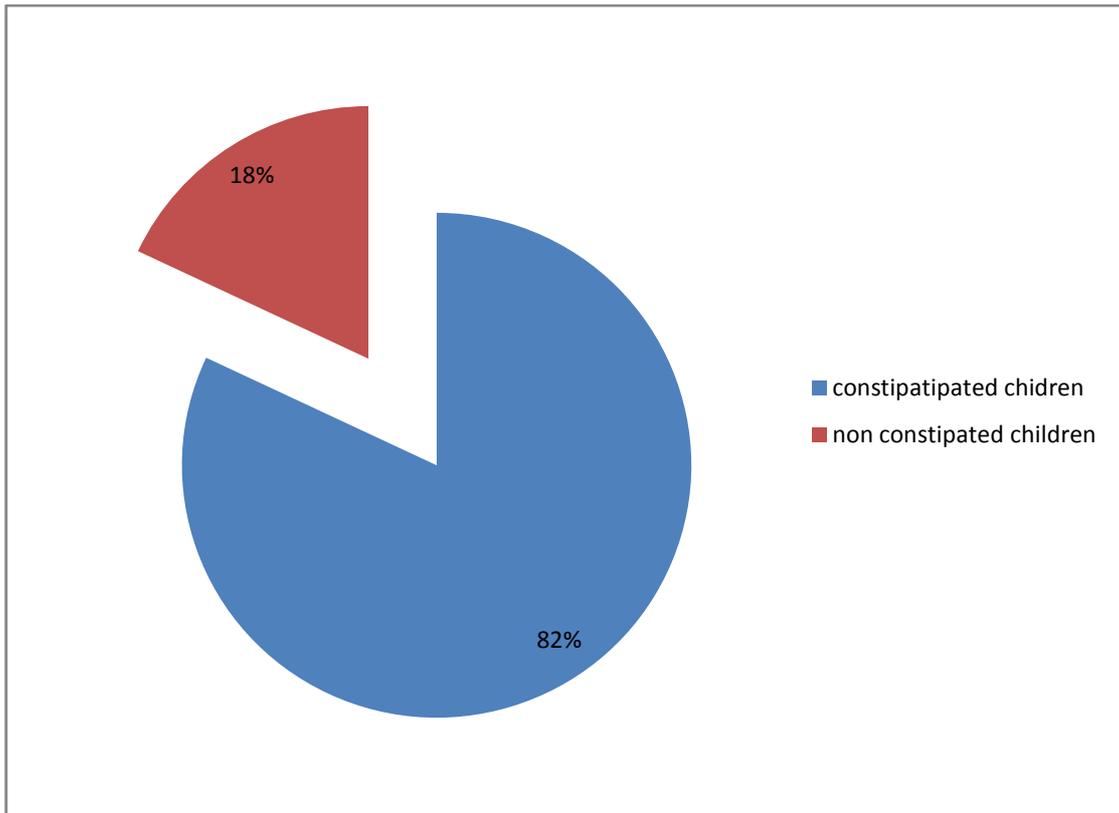


Figure 3: Prevalence of constipation in children with chronic abdominal pain

Table 8: OTHER MANIFESTATION ASSOSITED WITH BOWEL FUNCTION

	Frequency	Percent (%)
Child with any dysuria		
Yes	11	13.1%
No	73	86.9%
Child with increased frequency of urine		
Yes	31	36.9%
No	53	63.1%
Child with any bed wetting		
No	44	52.4%
Yes	40	47.6%
Child rushing to the bath-room to poop		
Yes		23.8%
No	20	76.2%
	64	
Child having a feeling of not finishing poop		
Yes	32	38.1%
No	52	62.9%

Table 8 above shows other symptoms associated with bowel function in children with chronic abdominal pain these;

Majority of the children 73(86.9) had no dysuria while 11(13.1) had dysuria.

Most of the children did not have an increased urinary frequency 53(63.1%) while 31(36.9%) were having increased urinary frequency.

Half of the children reported bed wetting 40(47.6) while the other half reported no bed wetting.

Majority of the children 64(76.2%) reported not rushing to the bath-room while 20(23.8%) were rushing to the bath-room

Majority of the children 52(62.9%) experienced feeling of having finished passing stool while 32(38.1%) had feeling of not having finished passing stool.

4.4 Management of Constipation

Table 9: Pharmacological and non-pharmacological management of constipation

Management of constipation(N=69)	Frequency	Percent (%)
Pharmacological		
Lactulose syrup	63	91.3%
Milk of magnesium	29	42.0%
Dis-impaction(PEG3350)	6	8.6%
Non-pharmacological management of constipation		
Advised to use toilet shortly after meals(behavioral)	28	40.6%
Education and Specific diet advised (fiber, fruit, vegetable, water intake)	53	76.8%
Combination of pharmacological and non-pharmacological		
Lactulose syrup, Milk of magnesium, Education & dietary advice	29	42.0 %
Lactulose & education/dietary advice	18	26.1 %
Lactulose, dis-impaction(PEG3350) & Education & dietary advice	6	8.7 %

As shown in table 9 the management given to the children with constipation included:

Most of the children were treated with pharmacological, lactulose was 63(91.3%) while milk of magnesium was given 29(42.0%) while 6(8.7%) was done di-impaction (PEG)

The most used non-pharmacological management of constipation was educational and dietary advice 53(76.8%) ,while 16(23.2%) was not given dietary advice.

Behavior change advice was given to 28 (40.6 %) while the 41(59.4%) was not gives the advice of behavioral chan.

Lactulose syrup, Milk of magnesium, educational & dietary advice and Behavioral change which was given to 29(42.0%) of the children, and Lactulose,educational and dietary advice was given to 18(26.1%) of the children, while Dis-impaction educational and dietary advice was given to 6(8.7%), while lactulose alone was given to 16(23.2%) of the children.

CHAPTER 5

5. DISCUSSION

The study sought to determine prevalence of constipation in children 4-13 year old presenting with chronic abdominal pain at KNH in Nairobi and to describe the management of children with constipation in these children. The study recruited 84 children presenting to the pediatrics gastroenterology clinic at KNH for chronic abdominal pain between July-December 2014.

Out of these 84 patients, majority of the respondents were school aged children between 7-13 years (72.26%) with a median age of 9 years. Majority of the patients were female (55.95%) and there was no statistical difference between male and female respondents ($p=0.123$). As in our study, Leo et al⁴⁹ also found a female preponderance of 60% among children with recurrent abdominal pain. The female preponderance may reflect a hyperalgesic state in female in both irritable bowel disease and constipation. In our study, school children were the ones mostly affected while in a study in south Jordan preschool children were the ones most commonly affected². Most of our subjects were experiencing the pain at the peri-umbilical 36.47. Localization of pain at the peri-umbilical area was also found by Rasuland Khan et al⁵⁰.

This could be attributed to the fact that most cases of the recurrent abdominal are due to functional pains which commonly manifest in the peri-umbilical area. Our study found that (77.38%) of children with chronic abdominal pain missed school. This finding was comparable to that of RasulandKhan et al who showed that the majority of children with RAP do not attend schools regularly, and school absenteeism is significantly higher among these children⁵⁰. This is because when children are having pain they are usually

irritable and have some discomfort and is usually accompanied by loss of appetite which makes the children uneasy, not playful and unable to concentrate in school. This is also due to the parents' decision not to allow their children to go to school because of their worries and in most cases they take their children to hospital during the attack of the pain even during the school time. Although the general consensus on RAP is that it is most common among the high academic achievers, data available to date failed to show any association between RAP and school academic performance. Our finding that 47.62% of children had recurrent abdominal pain more than one year is similar to the 37.1 % reported by Leo AA et al.⁵⁰

The prevalence of constipation in children with chronic abdominal pain with two or more Rome III criteria was 69 out of 84 (82%, 95%CI:72% - 95%) out of these 37(53.6%) were females and 32(46.3%) were males. The difference in the prevalence of constipation among the boys and girls was not statistically significant ($p > 0.05$). This finding is similar to that Loening-Baucke and Swidsinski who reported that constipation is the most frequent cause of chronic abdominal pain in children and that the prevalence of constipation in children with chronic abdominal pain was 83%,⁸ after using Rome III criteria for diagnosis of constipation as it was done in our study. Ali et al study also showed a high prevalence of constipation of 80% among children seen coming at the gastroenterology clinic in Sudan.²¹ Our prevalence is higher than the prevalence reported by Eildlitz-Markus et al who found that the prevalence of constipation in children with recurrent abdominal pain was 57.4% at Schneider Children's Medical Center of Israel⁹. Low prevalence could be attributed to the different criteria for diagnosis of constipation.

In the Markus study, diagnosis was based on finding both distended large intestines at plain abdominal x-ray and hard stool on rectal examination.

Gijbers et al study in Juliana Children's Hospital in Netherlands also found a lower prevalence of 46% (92/200) of functional constipation in children with recurrent abdominal pain¹⁰. This still lower prevalence was found using Rome II criteria for diagnosis of functional constipation which is an older criteria for constipation while in our study we used Rome III criteria. A recent community-based study comparing Rome II and Rome III criteria showed a 2.5-fold higher in prevalence of functional constipation with the use of Rome III criteria identified than with the use of that of Rome II criteria.

Our prevalence of hard stool of 52.38% was lower than the 80% hard stool prevalence reported by Loening-Baucke and Swidsinski¹⁵, and much lower than the prevalence of 90% reported by EyadAltamimi et al in Jordan⁵¹ and 92.3% by Dehghani's study³⁸. Dehghani and Eyad studied subjects who presented with symptoms of constipation from the beginning whereas in our study recruited patients with recurrent abdominal pain then looked for symptoms of constipation.

Our study also revealed that 35.71% of the children passed stool less than twice per week, a finding which is similar to the finding of 35% reported by Loening-Baucke and Swidsinski¹⁵

The study further revealed that 25% of the children had big stools that obstructed the toilet, a finding which is similar to Loening-Baucke and Swidsinski's study of 28%¹⁵.

The prevalence of large stool which obstruct the toilet is lower than that of 59.9% reported by Dehghani et al³⁶. This difference is probably because there was no classification regarding consistency of fecal impaction so some difference in the result

may be due to lack of standard classification for consistency of fecal material or impaction in the Rome III classification for functional constipation. On the other, hand some of the respondents from our study were using pit latrines and were unable to detect the obstruction or lack of obstruction of the toilet.

In our study, faecal mass on abdominal examination was present in 50% of children, a finding which was similar to the 51% and 59.4% to the study done by Loening-Baucke¹⁵ and MW Ali²¹ respectively.

In our study, 15.48% of the children reported that they soiled in their underpants, a finding which is similar to the 15% and 18% reported by Loening-Baucke¹⁵ and Ali²¹ respectively. The soiling rate of 15% in our study was lower than the 33.8 % found by Dehghani et al³⁸. Incontinence may be useful as an objective marker for the severity of functional constipation and in monitoring effectiveness of treatment.

Our study revealed withholding behavior in 19% of the children, a finding which is similar to the 23% reported by Loening-Baucke and Swidsinski¹⁵. The rate of withholding behavior in our study is lower than the 27%²⁰ by Khanna in india, and still much lower than the 60% reported by Rasquin et al. The rate of withholding behavior in our study is also lower than the 32.3% by Ali et al in sudan²¹. Stool withholding behavior is usually misinterpreted as straining, which aims to prevent anal relaxation rather than pushing the stool down.

In our study, 15.47% of the children had blood in their motion or on the toilet paper. This rate of passing blood in the stool is similar to 13% reported by Loening-Baucke and Swidsinski et al¹⁵, it is lower than the 42 % reported by Martinez-Costa et al in Korea and is higher than the 8.1 % reported by Dehghani et al³⁸. The blood in the stool is

because most of the people with constipation tend to have anal fissure which can cause bleeding with the stool or hemorrhoid due to chronic constipation.

Our study found that 13% of the children with constipation had dysuria which is similar to 11% reported by Loaning-Baucke et al¹⁵. 52.4% of the children in our study had enuresis. The rate of enuresis in our study of 47.62% is higher than the 29% reported by Loaning-Baucke et al¹⁵. The enuresis is because the faecal mass presses on the bladder and there is a voiding dysfunction caused by pelvic floor muscle spasms.

In our study, lactulose is the medication which was most commonly used for treating constipation 91.3% of the children similar to SooHee Chang et al which reported most commonly prescribed medications was lactulose 94% .⁵³

This finding was similar to what Brazzelli and Griffiths et al Found in a South Korea where lactulose was the drug of choice for treating constipation.⁵⁴ Unlike in our study, PEG was the most commonly used medication for treating constipation in Iran by SoyluOb¹⁴. In our study milk of magnesium was given 42.0% of the children, while in SooHee Chang et al report that magnesium oxide was used in 44%. In our study disimpaction was used for 8.7 of the children which is lower than by SooHee Chang et al the reported 13% of their gastroenterologist always performed disimpaction as an initial treatment for constipation⁵³. Ginkel R et al⁵⁵ reported effective use of lactulose over the long term, up to 8 years, in a large cohort of children with chronic constipation. The choice of the medication depends on the child's preference, safety, cost, ease of administration, and the practitioner's experience. In our study education and dietary advice was given 76.8% of the children which is similar to SooHee Chang et al⁵³ report that the gastroenterologists all recommended more intakes of fruits and vegetables, while

only 25% of the gastroenterologists referred their patients to a dietitian. The combination of lactulose syrup, Milk of magnesium, education & dietary advice and Behavioral change was given to 29(42.0%) of the children. Brazzelli and Griffiths et al reported that combination of laxatives and behavioral modification is better than laxative therapy alone or behavioral modification alone for children with chronic constipation⁵⁴. Behavioral modification is an important component of therapy, particularly for children with constipation. It involves regular sitting on the toilet for up to 5 minutes three or four times a day after meals to establish normal bowel habits. Previous clinical trials failed to show significant improvement of bowel habits after fiber treatment compared to placebo and traditional treatments such as lactulose.^{56,57} Low fiber intake has been recognized as a risk factor for constipation. Adequate intake of dietary fiber (age + 5 in grams) reduces risk of constipation, but further increase in fiber has no proven therapeutic value. One study proved that polyethylene glycol (PEG) without electrolytes cleared fecal impaction in 75% of children with constipation and that children using higher doses had more clearance than those using lower doses⁵⁸. According to study by Young et al an increase of water intake by 50% did not improve stool frequency or consistency⁵⁹.

6. Conclusion

1. The prevalence of constipation in children with chronic abdominal pain is 82%.
2. Pharmacological management was more commonly used than the non-pharmacological and the commonest drug prescribed was lactulose which was used for treating 91.3% of the children with constipation

7.Recommandations:

1. TheConstipation to beconsidered as an important aetiologyin children presenting with chronic abdominal pain.
2. Further studies in our population should be done in larger sample size to give a better prevalence.

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APPENDICES

APPENDIX I: INFORMED CONSENT

Patient study identification number-----Date -----

I am Dr. Atika Abdurahman a postgraduate student at the University of Nairobi, Department of paediatric and child health I am conducting a study as part of the requirement for the degree of Master of Medicine in Paediatric.

The study aims to evaluate the prevalence of constipation and management in children presenting with chronic abdominal. The study is based at the Kenyatta National Hospital Paediatric gastroenterology clinic. I would like to invite you to participate by providing with some information regarding yourself or your child as regarding to your/your child's experiences with constipation.

Approval for this Study has been given by the Kenyatta National Hospital/University of Nairobi ethics committee {KNH/UON-ERC}.

I will be available to answer any questions that will help you understand the nature of the study. If you wish to seek any clarification, kindly contact me on 0708275332.

Procedure

A questionnaire will be provided. It should take approximately 10-15 minutes to complete. We researchers will be available to guide you through the question. If you agree to participate in the study, you will be requested to fill in a questionnaire with the assistance of the researcher. The nature of the questions will be in regard to constipation.

The questionnaires in which this information will be filled will have no personal identifiers to protect your confidentiality.

Risks/Discomfort

There is no risk associated in participating in this study. There will be no invasive procedures that will be carried out in this study that may cause harm to your child. Refusal to participated will not change any treatment that you child will receive while at the clinic.

Benefits

There will be no direct benefit in participating in the study, Participation in the study is voluntary, but in case you have any questions the interviewer will readily assist you. If you choose not to participate, you will not be denied any service. You will be free to withdraw from the study at any time and at the same you will get your health services provided completely.

Confidentiality

Strict confidentiality will be maintained at all times. There shall be no mention of names or identifiers in the report or publications which may arise from the study. Each participant in the study will be identified by use of codes in order to link them with their results and the data collected will only be accessible to the investigators.

Persons to contact

If you have any questions regarding the study, you may contact **Dr. Atika Abdurahman** on mobile number 0708275332.

If you have any question on your rights as a research participant you can contact the Kenyatta National hospital ethics & research committee by calling 2726300 Ext 44355.

Your participation in the study will be highly appreciated.

CONSENT FORM

I -----having received information on the study, benefits, risks hereby AGREE/DISAGREE (cross out as appropriate) to participate in the study with my child.I understand that participation is voluntary and i am free to withdraw at any time.

Parent/ guardian's signature-----date-----

I -----declare that i have adequately explained information to the parent/guardian on the study, benefits, risks and given her time to ask questions and seek clarification regarding the study. I have answered all the questions to the best of my ability.

Investigator's signature-----date-----

ASCENT FORM

I -----having received information on the study, benefits, risks hereby AGREE/DISAGREE (cross out as appropriate) to participate in the study. I understand that participation is voluntary and i am free to withdraw at any time.

Participant's (Child) signature-----date-----

Witness Name----- signature-----date-----

I -----declare that i have adequately explained information to the child (participant) on the study, benefits, risks and given her time to ask questions and seek clarification regarding the study. I have answered all the questions to the best of my ability.

Investigator's signature-----date-----

APPENDIX II

QUESTIONNAIRE

Patient study identification number-----Date -----

Section A: Demographic Information of Child

1. What is the age of the Child?yrs
2. Gender of Child
 - a) Male
 - b) Female
3. What is your area of residence?.....

Section B: Assessment of Abdominal Pain

4. Is your child presenting with abdominal pain?
(If Yes, answer the questions that follow, If No exclude them)
5. Does your child has any medical illness or is he on any prolonged medication
 6. Yes b) No
 7. If yes exclude from the study
8. How long has the child been suffering from abdominal pain?
 - a) 3 months
 - b) 4-11 months
 - c) > 1year
9. Which part of the abdomen has been paining?
 - a) Lower Abdomen
 - b) Upper Abdomen

- c) Left side Abdomen
- d) Right Side Abdomen
- e) Peri umbilical

10. How severe of the abdominal pain is you/your child feels?

- a) little discomfort
- b) moderate
- c) severe
- d) don't know

11. When your child hurt or felt abdominal pain, for how long did it last (pain episode)?

- 1. Less than an hour
- 2. 1 to 2 hours
- 3. 2 to 4 hours.
- 4. All the time

12. The list below gives some feelings and discomforts associated with abdominal pain in children. (Please tick where appropriate)

	YES	NO
a) Did the hurt or uncomfortable feeling get better after your child had a poop?	<input type="checkbox"/>	<input type="checkbox"/>
b) Did your child complain of a bloated belly?	<input type="checkbox"/>	<input type="checkbox"/>

c) Did the child have a headache?	<input type="checkbox"/>	<input type="checkbox"/>
d) Did the child have difficulty sleeping?	<input type="checkbox"/>	<input type="checkbox"/>
e) Did the child have pain in the arms, legs, or back?	<input type="checkbox"/>	<input type="checkbox"/>
f) Did the child feel faint or dizzy?	<input type="checkbox"/>	<input type="checkbox"/>
i) Is there is loss of appetite	<input type="checkbox"/>	<input type="checkbox"/>

9. Did your child miss school due to abdominal pain ?

a) Yes

b) No

10. i) Have you ever brought your child before To health facility for treatment?

a) Yes b) No

ii) If Yes, what was he/she suffering from or what kind of treatment was administered?

.....

11. Does your child has any dysuria

a) Yes

b) No

12. Child with increased frequency of urine

a) Yes

b) No

13. Child rushing to the bath-room to poop

a) Yea

b) No

14. Child having a feeling of not finishing poop

a)Yes

b) No

15. Does your child have any medical illness?

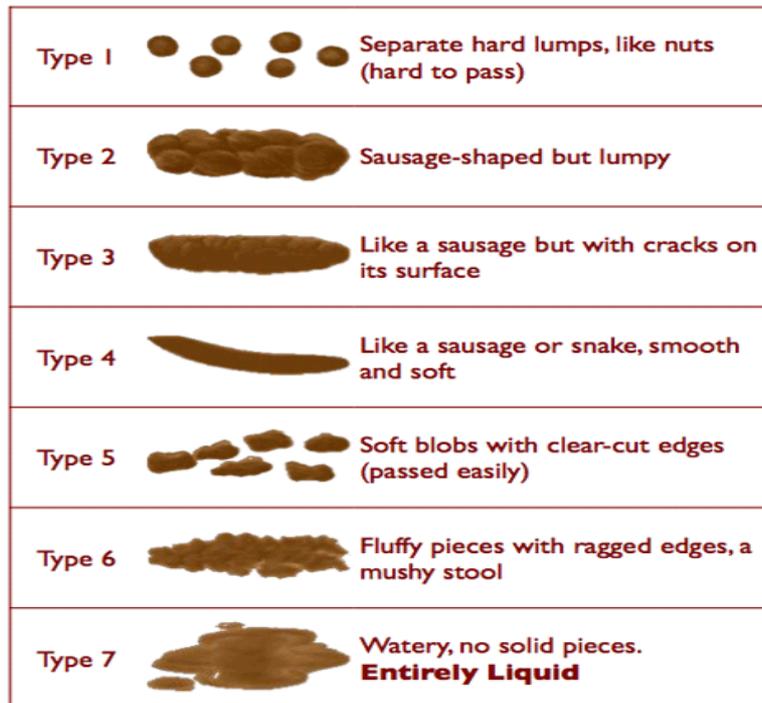
a) Yes b) No

If yes, please specify

.....

Section C: Assessment of bowel function and Rome III criteria

16. Below is a Bristol Stool Chart, please tick the kind of stool your child has been having of late.



17. Has your child had any blood in his/her motion OR had blood on toilet paper in the last 2 months

a) Yes

b) No

c) Not Sure

18. How is pattern of the stool of your child for the last for the last 2 months?

a) Hard/painful

b) Not too hard not too soft

c) Very soft

d) Don't know

19. In the past 2 months: How many bowel motions does your child have in a day/week?

a) $\geq 1/\text{day}$

b) $\geq 3/\text{week}$

c) < 2 week or less

20. In the last 2 months, did your child have a poop that was so big that it clogged the toilet at least once a week or more?

a) Yes

b) No

c) Not Sure

21. Some children hold in their poop even when there is a toilet available. They may do this by stiffening their bodies or crossing their legs. In the last 2 months, while at home, how often did your child try to hold in a poop?

a) Never.

b) Once a week.

c) Several times a week.

d) Don't know

22. Do you/your child leak any solid or loose motions (soiling) in his/her underpants in the last 2 months?

- a) No, never .
- b) Yes, approximately once a week
- c) Yes, daily
- d) don't know

23. Abdominal examination to be done

- a) had a huge poop inside(fecal mass)
- b) no large poop inside(no fecal mass)

24. digital rectal examination

- a) fecal impaction in the rectum
- b) No fecalimpactionin the rectum

Section D: Management of Constipation

25. Which medication was prescribed for the patient with constipation ?

.....

26. Education and dietary advice (high fiber, fruits, vegetable and fluid intake) was given to the child?

- Yes
- No

27. Is the child/guardian advised to use toilet shortly after meals?

Yes

No

.....

APPENDIX III

BUDGET

Items	Cost Unit kshs	Total Cost Kshs
Typing Services		
Proposal 46 pages	25	1,150
Photocopy 46 pages (10 Copies)	3	1,380
Internet charges		8,000
Binding 10 copies	50	500
Ethics fees		2000
200 Questionnaires (4 pages)	3	2,500
200 consent forma(2 pages)	2	1,200
Final Project		
Typing 90 pages	25	2,250
Photocopying 14 copies	3	3,780
Spiral Binding (10 copies)	100	1,000
Hard Cover binding (10 copies)	300	3,000
Stationery		
Assorted Pens		300
Flash Disk		1,000

Hard Cover book		500
Laptop Acer		60,000
Printer		8,000
Data Collection		
Reseach assistance		20,000
Training and the transportation		6000
Data Analysis		
Statistician		25,000
Poster presentation		5000
Contingency 10%		16,700
Total		183,743

APPENDIX IV

TIME PLAN

Jan 2014 to November 2014																	
ACTIVITY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Sep	Oct	Nov	Dec	Jan1 5	Feb 15	
Proposal development and approval	■	■															
Ethical clearance			■														
Corrections from ethics				■	■												
Training research assistants and pre-testing questionnaires						■											
Data collection and verification							■	■	■	■	■	■	■	■			
Data analysis															■		
Writing & presentation of the draft																■	
Correction, and final thesis presentation																	■