

An epidemiological study of etiology and management of abdominal pain in children: Government general hospital, Nizamabad

P Sirisha¹, K.Rajashekar², Kiran Madhala³, Chiluka Sudhakar^{4*}

¹Assistant Professor, Department of Pediatrics, Government General Hospital, Nizamabad, Telangana, India

²Assistant Professor, Department of Pediatrics, Government General Hospital, Nizamabad, Telangana, India

³Associate Professor, Department of Anesthesiology, Government General Hospital, Nizamabad, Telangana, India

⁴Assistant Professor, Department of Pediatrics, Government General Hospital, Nizamabad, Telangana, India

Received: 30-11-2021 / Revised: 23-12-2021 / Accepted: 01-01-2022

Abstract

Background: One of the most prevalent childhood concerns is abdominal discomfort. It is more common in children under the age of 13 and is linked to a variety of causes and variables. The goal of the study was to look at the epidemiology, etiology, and treatment of children who presented with stomach discomfort to a tertiary level pediatric department. **Methods:** Over a year, 720 children visited the pediatric OP department, 100 of them satisfied the inclusion criteria and were all enrolled. Pre-schooling (3-5 years), schooling (6-10 years), and young adolescent are the three age groups studied in this study (11-13 years). **Results:** Abdominal discomfort was observed to be prevalent in 12.8 percent of children with OP. The majority of the participants were between the ages of 11 and 13, accounting for 53% of the total. There are 56 percent females and 44 percent boys among the 100 subjects, with 77 percent being rural and 23 percent being urban. FGID (36 percent), Gastritis (19 percent), and Worm Infestations were the most prevalent etiologies (16 percent). **Conclusion:** In conclusion, abdominal pain is a typical presentation in the pediatric OP department, and physicians must investigate a variety of etiologies, particularly those that require rapid management to reduce morbidity and death. With the advancement of science and technology, it is more important than ever for children needing pediatric surgical care to receive safe and effective treatment. Continuous pharmacological care services are required to improve the quality of life of children. The clinical pharmacist must increase knowledge of numerous etiologies producing stomach pain in a community environment to reduce the incidence and prevalence of abdominal pain in children.

Keywords: Abdominal pain, acute abdomen, chronic abdomen, epidemiology, etiology.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Chronic stomach pain is a common problem in children, with prevalence rates ranging from 0.3 to 19 percent in school-aged children[1]. In more than 90% of these children, there is no biological explanation[2]. In children, abdominal pain is a common complaint, and it occurs often in pediatric practice[3]. Abdominal pain-related functional gastrointestinal disorders (AP-FGIDs) include functional dyspepsia (FD), irritable bowel syndrome (IBS), abdominal migraine (AM), functional abdominal pain (FAP), and functional abdominal pain syndrome (FAPS)[4]. Children with AP-FGIDs have significantly worse quality of life (QoL) scores than their healthy peers, and AP-FGIDs is the second most prevalent reason for school absence[5,6]. Despite receiving regular medical treatment, 29.1% of patients with chronic abdominal discomfort experience pain that lasts longer than 5 years[7].

The majority of the time, there are no issues, but sudden and acute abdominal discomfort is usually a sign of an intra-abdominal pathology and can be the primary reason for surgery. Because etiologic diagnosis is difficult and may represent a problem in pediatric emergency rooms, abdominal pain is a source of anxiety for children and their families, as well as doctors. Clear etiologies must be discovered as soon as feasible to avoid major morbidity or mortality in children[8, 9]. The goal of the study was to look at the epidemiology, etiology, and treatment of children who presented with stomach discomfort to a tertiary level pediatric hospital.

*Correspondence

Dr. Chiluka Sudhakar

Assistant Professor, Department of Pediatrics, Government General Hospital, Nizamabad, Telangana, India

E-mail: chilukasudhakar@gmail.com

Material and methods

Over a year, 720 children visited the pediatric OP department, 100 of them satisfied the inclusion criteria and were all enrolled. It is a prospective observational study with around 100 patients who met the study's criteria. The Patient Preferred was used to collect the necessary information from patients and their parents/representatives. To estimate the prevalence of stomach discomfort in children, the obtained data were examined using the relevant questionnaires and scales. Department of Pediatrics, Government general hospital, Nizamabad. After approval by the institutional ethical committee and documented informed permission. The study will take place from September 2020 until November 2021. It included all children aged 3 to 13 who visited a doctor complaining of severe stomach pains, as indicated by a score of 4 on Bieri's revised face self-evaluation scale (validated in children) administered during the interrogation[10, 11]. Chronic abdominal pain is defined as a series of painful events that last at least three months and are not preceded by acute episodes. The parents' informed consent was sought and obtained ahead of time. The toddlers were subjected to a thorough clinical examination as well as laboratory tests. Age, sex, the time between the onset of symptoms and the consultation, concomitant signs, geography, and signals of defense were all examined. Complete blood count (CBC), C-reactive protein (CRP), abdominal ultrasound, abdomen x-ray, and stool analysis were among the additional testing. Additional tests were necessary for addition to these: A thick smear, a chest x-ray, and a mid-stream urine sample are all recommended in the event of a fever. In the event of epigastric localization discomfort, a gastroscopy is recommended. Stool culture is recommended in cases of diarrhea that is accompanied by a fever or a poor overall state. The time between consultation and diagnosis, as well as the pain management, were all investigated. A leukocytosis of more than 10,000/mm³ with

a preponderance of lymphocytes, the lack of germs in bacterial culture, and/or the positive result of a virus detection test were all used to determine if the pathology was caused by a virus. A bacterial etiology was determined when the leukocytosis was more than 10,000/mm³ with a predominance of neutrophils and/or a bacterial culture was positive[12].

Statistical analysis

Independent Student's *t*-test is applied for intergroup analysis. Pearson's Chi-square test was used for an overall assessment of tolerability. The analysis of the student's *t*-test was used for comparisons of means. A *p*-value <0.05 was considered significant. All tests were carried out using SPSS 16 software.

Results

A total of 100 children were included in the study, out of 720 children who visited pediatric OP throughout the study period, with a prevalence of 12.8 percent for children complaining of stomach discomfort (3-13 years) in the pediatric OP department. The participants in the study are divided into three age groups: pre-school, school, and young adolescent. Twelve youngsters are enrolled in pre-school. A total of 35 pupils are enrolled in school. There are 53 children in the category of young adolescents. Out of 100 youngsters, the 11-13-year-old age group (young adolescent) accounted for 53 of them. About 56 percent of the people believe they are females, while 44 percent believe they are boys (figure -1). As a result, females are more likely than boys to have stomach pain.

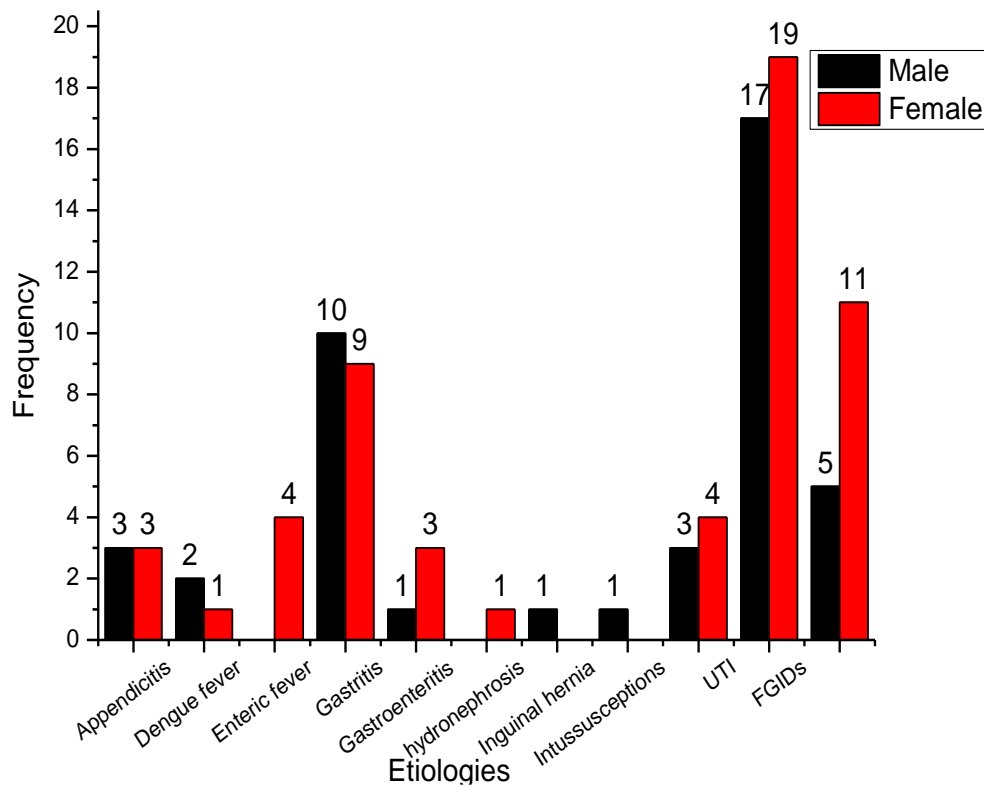


Figure 1: Gender wise distribution of etiologies causing abdominal pain in children

The rate of stomach discomfort reported varies considerably between rural and urban areas. About 77 percent of the population is rural, while 23 percent is urban.

There is evidence that a person's socioeconomic situation has an impact on their health and the healthcare they get. People with a lower socioeconomic class (SES) are more likely to have poor self-reported health, a shorter life expectancy, and more chronic diseases than those with a higher SES. Although stresses are present in both

urban and rural communities, economic downturns have had a greater impact on India's rural districts. Upper-class children account for seven, lower-middle-class children account for thirty-one, upper-middle-class children account for fourteen, and upper-middle-class children account for forty-eight (Figure-2). The upper-middle-class outnumbered the lower-middle class by 48 percent out of 100 children (48 children).

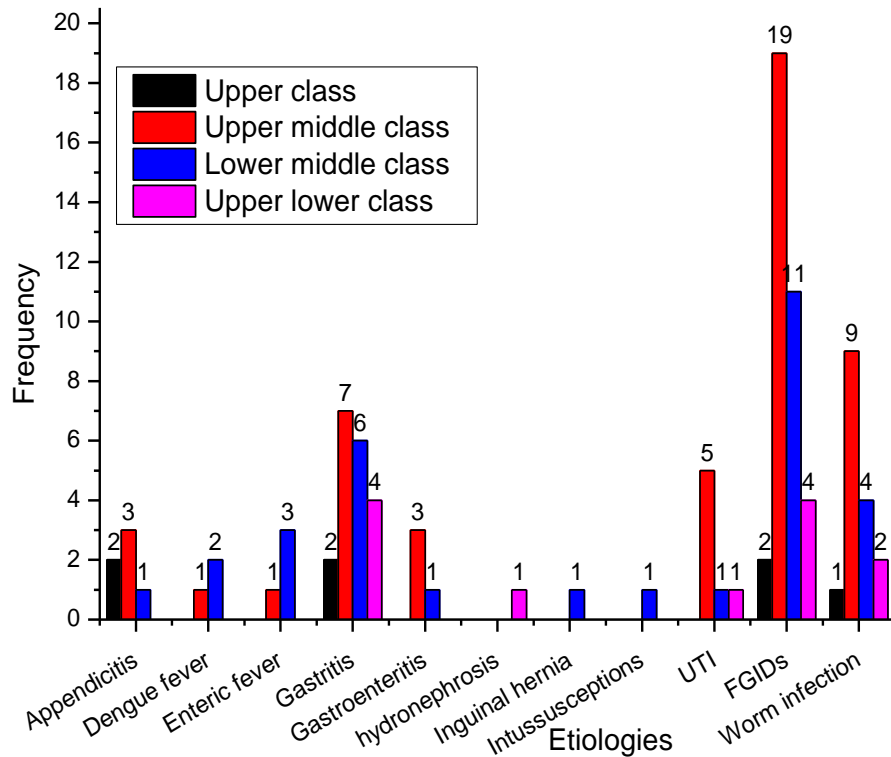


Figure 2: SES wise distribution of etiologies causing abdominal pain

FGID 36 (36 percent) was the most common cause of abdominal pain, followed by Gastritis 19 (19 percent), Worm Infestations 16 (16 percent), UTI 7 (7 percent), Appendicitis 6 percent, Enteric fever 4 percent, Gastroenteritis 4 percent, Dengue fever 3 percent, Mesenteric lymphadenopathy 2 percent, Inguinal Hernia, Hydronephrosis, and Intussusception 1 child each. The most prevalent form of pain was a diffuse dull ache, which was experienced by 56 percent of the children, followed by pricking type, scorching type, which was experienced by 13 percent of the children, and throbbing type, squeezing type, which was experienced by 9 children. Table 1 demonstrates the etiologies of abdominal pain depending on the different categories of pain.

Table -1: Etiologies causing abdominal pain based on types of pain characteristics

Etiologies and various causes of abdominal pain in children	Nature of Pain					Total (100%)
	Pricking pain	Throbbing pain	Burning pain	Diffuse dull aching pain	Squeezing pain	
Appendicitis	3 (50.0%)	2 (33.3%)	-	-	1 (16.7%)	6
Dengue Fever	1 (33.3%)	1(33.3%)	-	1(33.3%)	-	3
Enteric Fever	-	-	-	4(100%)	-	4
FGID	1 (2.8%)	1(2.8%)	6 (16.7%)	25 (69.4%)	3 (8.3%)	36
Gastritis	2 (10.5%)	-	7 (36.8%)	8 (42.1%)	2 (10.5%)	19
Gastroenteritis	-	-	-	2 (50.0%)	2 (50.0%)	4
Hydronephrosis	-	-	-	1 (100%)	-	1
Inguinal hernia	-	1 (100%)	-	-	-	1
Intussusception	-	-	-	1	-	1
MLN	2 (100%)	-	-	-	-	2
UTI	2 (28.6%)	-	-	5 (71.4%)	-	7
Worm infestation	2 (12.5%)	4 (25%)	-	9 (56.3%)	1 (6.3%)	16
Total	13 (13.0%)	9 (9%)	13(13%)	56(56%)	9(9%)	100

FGID =Functional Gastrointestinal Disorders; UTI= Urinary Tract Infection;MLN =Mesenteric lymphadenopathy

The majority of the 100 individuals had acute illnesses followed by a chronic ailment as the cause of their severe stomach discomfort. In acute situations, FGIDs were found in 35 patients (35%), followed by gastritis in 19 children (19%), and worm infestation in 13 children (13%), while in chronic conditions, worm infestation was found in 3% of subjects, followed by UTI 2%, FGIDs 1%, appendicitis 1%, and intussusceptions 1%. The causes of severe abdominal discomfort are listed in Table 2.

Table 2: Etiologies of intense abdominal pain

Etiologies and various causes of abdominal pain in children	Severity		Total (100%)
	Acute	Chronic	
Appendicitis	5 (83.3%)	1 (16.7%)	6
Dengue Fever	3 (100%)	-	3
Enteric Fever	4 (100%)	-	4
FGID	35 (97.2%)	1 (2.8%)	36
Gastritis	19 (100%)	-	19
Gastroenteritis	4 (100%)	-	4
Hydronephrosis	1(100%)	-	1
Inguinal hernia	1(100%)	-	1
Intussusception	-	1(100%)	1
MLN	2 (100%)	0	2
UTI	5 (71.4%)	2 (28.6%)	7
Worm infestation	13 (81.3%)	3 (18.8%)	16
Total	92	8	100

FGID =Functional Gastrointestinal Disorders; UTI= Urinary Tract Infection;MLN =Mesenteric lymphadenopathy

15 children were treated with dicyclomine, 10 children were treated with dicyclomine and dietary modifications, 7 children were treated with dicyclomine, dietary adjustments, and probiotics, and four children were treated with dicyclomine, dietary changes, probiotics, and cognitive-behavioral treatment (CBT). Three children with gastritis reacted to pantoprazole and famotidine in a study of 19 children with gastritis, 14 of them were treated with pantoprazole. Pantoprazole, famotidine, and sucralfate were given to one youngster. Pantoprazole, famotidine, sucralfate, and amoxicillin were given to one youngster. Eight of the 16 children with worm infestations were treated with albendazole, dicyclomine, and ivermectin. Cefixime, nitrofurantoin, and azithromycin were used to treat seven UTI patients. ORS, fluids, and dicyclomine were used to treat four individuals with gastroenteritis. Six patients with appendicitis, one patient treated with medication, one patient has undergone internal appendectomy and the other four patients have undergone an emergency appendectomy.

Discussion

Abdominal discomfort is one of the most common reasons for visits to pediatric units[13, 14]. In Africa, epidemiological investigations of these diseases in children are uncommon. The exact frequency of stomach discomfort is unknown. The prevalence of consultation was 7.2 percent in our research. Acute stomach discomfort in children was one of the most common reasons for visits to the Bangui Pediatric Complex, with an incidence of 8.5 percent[15]. In 2014, stomach discomfort was the most common uncomfortable symptom in preschool and primary school children in Switzerland, ahead of headaches, with 6% in kindergarten and 10% in primary schools[16]. In Iowa, 9 percent of 962 children aged 4 to 17 sought treatments for acute stomach discomfort in 2007[17]. The children in our research had a mean age of 8.0 3.5 years, which was similar to Loening-survey Baucke's in the United States[17], which had a mean age of 9.1 years. The higher mean age can be explained by the fact that we eliminated all children under the age of four from the research to get a satisfactory self-report of pain. Self-dependability assessment and validity. We did not find a difference between genders, probably due to the small size of our sample. One particular aspect of abdominal pain in children is its frequency in a large number of diseases so that in time, it hardens the confirmation of an etiologic diagnosis. The main groups of causes are intra-abdominal, extra-abdominal, and psychogenic[18]. Although stomach aches are usually benign, some might develop problems of varying degrees of severity, necessitating prompt diagnosis and treatment. A well-driven medical interrogatory, a well-led clinical examination, or even a basic supplementary test such as an abdomen x-ray or abdominal ultrasound is adequate to define etiologies.

Acute abdominal discomfort in children can be caused by a variety of factors that have been extensively described in the literature; nevertheless, because of the risk of a surgical issue, diagnosing this

group can be difficult. 6.8% of our patients had surgical pathology, according to our findings. Surgical reasons accounted for 2%[17] of cases in Iowa. According to Serengbe's findings, 32.4 percent of the children who sought medical attention for abdominal discomfort had appendicitis, 4.8 percent had a strangulated hernia, and 1.3 percent had occlusion syndrome. In our analysis, appendicitis accounted for more than half of the children who came with a surgical cause. With 20.8 percent of children hospitalized for abdominal pain, appendicitis is a prevalent cause of abdominal discomfort in children and a common pediatric surgical pathology[19, 20]. The diagnosis of appendicitis was made 24 hours following the consultation in our research. Despite the present strong technical assistance, it is still difficult to have a definitive diagnosis of appendicitis in our setting due to the variety of clinical characteristics (age of the kid, topography of the appendix). This difficulty has, as a consequence, delayed the decision about the surgery. Infectious pathologies were the leading causes of abdominal pain. They first were bacterial pathologies, in which the principal was pyelonephritis. All this explains that fever was the most observed associated sign. In Bangui, urinary infection represented 3.5%. In Iowa, chronic and acute constipation were the most frequent causes of acute abdominal pain in children. Urinary tract infection is the most recurrent bacterial infection in pediatrics after acute otitis media[22]. Pyelonephritis is a complicated infection that can cause renal parenchymal lesions in 50% to 60% of children. Also, for half of them, it creates renal scarring, which can lead to high blood pressure, microalbuminuria, proteinuria, and chronic renal failure[22]. Clinical and experimental data show that along delay in establishing an appropriate treatment increases the risk of renal scarring[23]. The length of 96 hours in our results is too long a delay. In this polyclinic, physicians are not accustomed to using urinary strips during consultations. Even so, they are aware that the positivity of a reactive strip confirms the diagnosis because of the positive predictive value of "leukocytes and positive nitrites" of 70% and the negative predictive value is close to 100% in children[23]. Pneumonia and pleuropneumonia constituted the second bacterial pathology observed in our study. The fact that symptoms of pneumonia are non-specific, especially in infants and young children, can explain this result[24]. Bacterial pathologies are followed by parasitic pathologies. Among them, malaria is the most observed pathology in 82.2% of cases. In Bangui, malaria was observed in 5.8% of all the children who were being consulted for abdominal pain. This rate was higher in our study with 22.3% (22/103) children having malaria. Fever is the master sign of malaria in an endemic zone, but it is not specifically characteristic of malaria[25]. Our study revealed a similar pattern of etiologies, functional being the most common, followed by gastritis and infections. The incidence of infections like acute gastroenteritis, Enteric fever, Worm infestations, UTI is well known to be common in lower economic status.

Chronic abdominal pain (defined by a constant or intermittent abdominal pain of organic, functional, or psychogenic cause and a minimum duration of three months) is one of the most frequent painful syndromes in children. Its prevalence is from 10% to 15% between the age of 4 to 16 years, and it represents 2% to 4% of the motive for the consultation of young patients[26]. A significant part of chronic abdominal pains is not due to a lethal cause, but they disrupt the quality of life of affected children and their families. The rate of chronic abdominal pain was 20.4% in our study population. Most of the time, the etiology is functional in children aged more than 4 years, namely without organic cause or psychogenic factors[26]. An average of 8% of the children is affected in Western countries. In our results, constipation, which is an organic cause, was the most observed. Constipation is a frequent problem that affects up to 22% of children. Its global prevalence is 3%, and it can go unnoticed because parents are unaware of their child's defecation habits[27, 28]; this justifies the fact that 27 of our patients presented a stercoral stasis on the abdominal x-rays while only 12 were said to have constipation in the anamnesis.

Our study showed a majority of them being diagnosed as functional gastrointestinal disorders (FGIDs) (36%) & noted response with Dicyclomine alone in (41.6%), the rest required the addition of dietary modifications (27%), probiotics (19.4%), all the above and cognitive behavioral therapy in (11.1%)[29-31]. the response was transient, inconsistent in many despite all the treatment modalities. Another significant proportion of children from our study was diagnosed with gastritis (peptic ulcer disease). A clinical constellation of upper abdominal, epigastric, retrosternal, and burning, deep-set pain associated with regurgitation, vomiting, and faltering growth. Diagnosis of gastritis is primarily clinical, although a few cases in our study were evaluated with stool examination, CBP (increased WBC count). PPI's (pantoprazole, lansoprazole) was the initial choice for which a majority responded (73%). Another few (15.7%) required H2 Blocker (famotidine) as an adjuvant to it. The annexation of ulcer protective (sucralfate) and amoxicillin was required (triple-drug regime as a part of helicobacter pylori eradication) in a scanty.

Conclusion

Abdominal pains are frequently encountered in pediatric medical practice. Their etiologies are multiform and constitute a real dilemma in consultation. The acute or chronic causative factors of abdominal pains, localization, and accompanying signs, ease the diagnosis in the majority of cases. Functional Abdominal pain, Worm Infestations, and Gastritis remain the three most common etiologies. Precise and timely diagnosis of the etiology helps in better management. Most of them achieved complete remission with minimal/no long-term effects/sequelae. Further symptoms assessment studies are required, preferably using the systematic methodology to obtain sufficient evidence to establish much-needed guidance and resources for decision support. Etiologies are indeed mostly benign, but appropriate care is a key to reducing morbid consequences usually observed. This treatment involves a systematic approach to the problem and justifies that a codified approach must be implemented in our pediatric emergency departments.

Financial support and sponsorship

Nil

Conflict of Interests

The authors do not report any conflicts of interest.

References

1. Chitkara DK, Rawat DJ, Talley NJ. The epidemiology of childhood recurrent abdominal pain in Western countries: a systematic review. *Official Journal of the American College of Gastroenterology* | ACG. 2005;100(8):1868-75.
2. Spee LA, Lisman-Van Leeuwen Y, Benninga MA, Bierma-Zeinstra SM, Berger MY. Prevalence, characteristics, and management of childhood functional abdominal pain in general

- practice. *Scandinavian journal of primary health care*. 2013;31(4):197-202.
3. Reust CE, Williams A. Recurrent abdominal pain in children. *American family physician*. 2018;97(12):785-93.
4. Steutel NF, Zeevenhooven J, Scarpato E, Vandenplas Y, Tabbers MM, Staiano A, Benninga MA. Prevalence of functional gastrointestinal disorders in European infants and toddlers. *The Journal of Pediatrics*. 2020;221:107-14.
5. Juul EM, Hjemdal O, Aune T. Prevalence of depressive symptoms among older children and young adolescents: a longitudinal population-based study. *Scandinavian journal of child and adolescent psychiatry and psychology*. 2021;9:64.
6. Sperber AD, Bangdiwala SI, Drossman DA, Ghoshal UC, Simren M, Tack J, Whitehead WE, Dumitrascu DL, Fang X, Fukudo S, Kellow J. Worldwide prevalence and burden of functional gastrointestinal disorders, results of Rome Foundation global study. *Gastroenterology*. 2021;160(1):99-114.
7. Freeman AJ, Maqbool A, Bellin MD, Goldschneider KR, Grover AS, Hartzell C, Piester TL, Szabo F, Kiernan BD, Khalaf R, Kumar R. Medical management of chronic pancreatitis in children: a position paper by the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition Pancreas Committee. *Journal of pediatric gastroenterology and nutrition*. 2021;72(2):324.
8. Di Lorenzo C, Colletti RB, Lehmann HP, Boyle JT, Gerson WT, Hyams JS, Squires Jr RH, Walker LS, Kanda PT. Chronic abdominal pain in children: a technical report of the American Academy of Pediatrics and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition: AAP Subcommittee and NASPGHAN Committee on Chronic Abdominal Pain. *Journal of pediatric gastroenterology and nutrition*. 2005;40(3):249-61.
9. Simrén M, Barbara G, Flint HJ, Spiegel BM, Spiller RC, Vanner S, Verdu EF, Whorwell PJ, Zoetendal EG. Intestinal microbiota in functional bowel disorders: a Rome foundation report. *Gut*. 2013;62(1):159-76.
10. de Araújo MC, Bocato JR, Berger SB, Oltramari PV, de Castro AC, Conti F, de Almeida MR, Freire Fernandes TM. Perceived pain during rapid maxillary expansion in children with different expanders: A prospective study. *The Angle Orthodontist*. 2021.
11. Bieri D, Reeve RA, Champion GD, Addicoat L, Ziegler JB. The Faces Pain Scale for the self-assessment of the severity of pain experienced by children: development, initial validation, and preliminary investigation for ratio scale properties. *Pain*. 1990;41(2):139-50.
12. Kuissi KE, Minto'o RS, Mowangue P, Njiomo M, Koko J. Epidemiological Aspects of Abdominal Pain in Children at the El Rapha Polyclinic in Libreville-Gabon. *Clin Pediatr OA*. 2017;2(126):2572-0775.
13. Leung AK, Sigalet DL. Acute abdominal pain in children. *American family physician*. 2003;67(11):2321-6.
14. Spatuzzo M, Chiaretti A, Capossela L, Covino M, Gatto A, Ferrara P. Abdominal pain in children: the role of possible psychosocial disorders. *European Review for Medical and Pharmacological Sciences*. 2021;25(4):1967-73.
15. Kim JS. Acute abdominal pain in children. *Pediatr Gastroenterol Hepatol Nutr*. 2013; 16: 219-24.
16. Perquin CW, Hazebroek-Kampschreur AA, Hunfeld JA, Bohnen AM, van Suijlekom-Smit LW, Passchier J, Van Der Wouden JC. Pain in children and adolescents: a common experience. *Pain*. 2000;87(1):51-8.
17. Loening-Baucke V, Swidsinski A. Constipation as cause of acute abdominal pain in children. *The Journal of pediatrics*. 2007;151(6):666-9.
18. Stinson JN, Kavanagh T, Yamada J, Gill N, Stevens B. Systematic review of the psychometric properties, interpretability, and feasibility of self-report pain intensity

-
- measures for use in clinical trials in children and adolescents. *Pain*. 2006;125(1-2):143-57.
19. Kim D, Butterworth SA, Goldman RD. Chronic appendicitis in children. *Canadian Family Physician*. 2016;62(6):e304-5.
 20. Sérénghé BG, Gaudeville A, Soumouk A, Gody JC, Yassibanda S, Mandaba JL. Acute abdominal pain in children at the Pediatric Hospital in Bangui (Central African Republic). Epidemiological, clinical, paraclinical, therapeutic, and evolutive aspects. *Archives de pediatrie: organe officiel de la Societe francaise de pediatrie*. 2002;9(2):136-41.
 21. Shalaby R, Elsayaf MI, Mohamad S, Hamed A, Mahfouz M. Needlescopic Appendectomy in Children and Adolescents Using 14-Gauge Needles: A New Era. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2021;31(4):497-504.
 22. Stein R, Dogan HS, Hoebeke P, Kočvara R, Nijman RJ, Radmayr C, Tekgül S. Urinary tract infections in children: EAU/ESPU guidelines. *European urology*. 2015;67(3):546-58.
 23. Taneja N, Chatterjee SS, Singh M, Singh S, Sharma M. Pediatric urinary tract infections in a tertiary care center from north India. *Indian journal of medical research*. 2010;131(1):101-6.
 24. Le Saux N, Robinson JL, Canadian Paediatric Society, Infectious Diseases and Immunization Committee. Uncomplicated pneumonia in healthy Canadian children and youth: practice points for management. *Paediatrics & child health*. 2015;20(8):441-5.
 25. Tabin R. Abdominal pain in children. *Revue medicale suisse*. 2014;10(415):299-300.
 26. Rafferty MS, Burrows H, Joseph JP, Leveille J, Nihtianova S, Amirian ES. Multisystem inflammatory syndrome in children (MIS-C) and the coronavirus pandemic: Current knowledge and implications for public health. *Journal of Infection and Public Health*. 2021..
 27. Laffolie J, Ibrahim G, Zimmer KP. Poor perception of school toilets and increase of functional constipation. *Klinische Pädiatrie*. 2021;233(01):5-9.
 28. Tabbers MM, DiLorenzo C, Berger MY, Faure C, Langendam MW, Nurko S, Staiano A, Vandenplas Y, Benninga MA. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations from ESPGHAN and NASPGHAN. *Journal of pediatric gastroenterology and nutrition*. 2014;58(2):258-74.
 29. Depoorter L, Vandenplas Y. Probiotics in Pediatrics. A Review and Practical Guide. *Nutrients*. 2021;13(7):2176.
 30. Vriesman MH, Koppen IJ, Camilleri M, Di Lorenzo C, Benninga MA. Management of functional constipation in children and adults. *Nature Reviews Gastroenterology & Hepatology*. 2020;17(1):21-39.
 31. Flanckgård G, Mörelius E, Duchon K, Rytterström P. Experiences of parents who give pharmacological treatment to children with functional constipation at home. *Journal of Advanced Nursing*. 2020;76(12):3519-27.