

## A Retrospective Analysis of Endoscopic Findings in the Pediatric Population of Al-Ahassa

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### Abstract

**Background:** Gastrointestinal endoscopy, comprising of both esophagogastroduodenoscopy (EGD) and colonoscopy, has emerged as an inevitable component of diagnostic evaluation and therapeutic interventions of innumerable gastrointestinal diseases in the pediatric population. This study is aimed at exploring the number of endoscopic procedures performed in Al-Ahssa, their indications, the age and gender of the patient population.

**Results:** Among the total 509 children included in the retrospective analysis, 84.3% underwent an endoscopy, while 15.7% had a colonoscopy performed. Among the colonoscopy patients, complete bowel intubation was achieved in 41.25% of the study group. The study group had almost equal gender distribution. The most common age group was reported to be the school-aged children amounting to a total of 56.19%. The most common indication for which endoscopy was performed was recurrent abdominal pain, as seen in 36.1%. 56% of the endoscopic results were grossly normal, with erythema being the most commonly reported abnormality (31%). Among the total 509 patients, 49 had an endoscopy for the removal of the foreign body, and the most commonly isolated foreign bodies included coins (34.69%).

**Conclusion:** Our study revealed gastrointestinal endoscopy to be a safe, cost-effective, and inevitable procedure, commonly implemented in our facility. The most common finding obtained in the study group was normal mucosa comparable to other regional studies. Foreign body studies in the patient population had a similar profile to regional and global studies. Further studies are recommended to explore the limitations and complications of endoscopy.

**Keywords:** Gastrointestinal Endoscopy; Esophagogastroduodenoscopy; Colonoscopy in Children; Pediatric Gastroenterology; Endoscopic Indications; Foreign Body in Children

### Abbreviations

GI: Gastrointestinal; EGD: Esophagogastroduodenoscopy

**Introduction**

Gastrointestinal diseases continue to be to an ever-growing ailment in the pediatric population around the globe [1]. Ever since its commencement in the 20<sup>th</sup> century, gastrointestinal endoscopy, including both esophagogastroduodenoscopy (EGD) and colonoscopy, has grown to occupy a prime position in both diagnostic and therapeutic procedures owing to its superiority to other investigations including barium studies [2]. This can be explicitly observed from the perpetually increasing number of endoscopic procedures performed in children, coupled with a low complication rate averaging at 2% [3]. Although endoscopy has received enough attention worldwide, there exists a relative scarceness of deserved attention in the Middle East. Here we present a retrospective analysis of endoscopic procedures performed in the Eastern province of the Kingdom of Saudi Arabia (KSA), Al-Ahssa.

**Materials and Methods**

**Patient population**

A retrospective analysis was performed in the endoscopy unit of Maternity and children’s hospital Al-Ahssa. The study included 509 children admitted between the years 2013 and 2018 to the endoscopy unit.

**Inclusion criteria**

Only children who were less than 14 years of age at the time of admission were included. Only patients who underwent an endoscopic procedure in the five years study period were included regardless of cause.

**Exclusion criteria**

All individuals above the age of 14 years were excluded. Children admitted and treated for gastrointestinal illnesses who did not undergo endoscopy were not included.

**Methods**

The medical case history files of each of the 509 patients were studied in detail. The pertinent findings that were noted were age, gender, indication for endoscopy, final diagnosis, treatment, and any endoscopy related complication. The results were compiled and tabulated and then compared with existing relevant literature.

**Results and Discussion**

The results obtained from retrospective analysis of the study population revealed that among the total 509 patients evaluated, 84.3% of the children underwent EGD while the remaining 15.7% underwent a colonoscopy. Among the latter, complete examination up to the terminal ileum was successfully performed in 33 (41.25%) of the population while the colonoscopy was halted before reaching the level of cecum in 58.75% of the population owing to technical, anatomical or bowel preparation limitations (Table 1). A gender based evaluation of the study population revealed an approximately equal number of males and females, with female patients being the greater contributor at 51.1% (Table 2).

	Frequency	Percentage
EGD	429	84.3%
Colonoscopy Reached terminal ileum	80	15.7%
Yes	33	41.25%
No	47	58.75%

**Table 1:** Comparison of frequencies of EGD and colonoscopy.

Gender	N	%
Male	254	49.9%
Female	255	50.1%

**Table 2:** Gender of study population.

The most prevalent age group that underwent endoscopies over the five year study period included school aged children, making up about 56.19% of the total study group. The second most prevalent age group was the preschool group contributing about 19.25%, followed by toddler (11.79%), infant (7.47%), young (4.52%) and neonate being the least contributor at 0.79% (Table 3).

Age Group	N	%
Neonate	4	0.79%
Infant	38	7.47%
Toddler	60	11.79
Preschool	98	19.25%
School	286	56.19%
Young	23	4.52%

**Table 3:** Age groups of participants.

The most common indication for endoscopy was recurrent abdominal pain, being the primary indication for endoscopy in 184 patients making a total of 29.39% of the study group. The second most common indication for endoscopy was weight loss seen in 12.3% of the population followed by vomiting seen in 10.7% of the population. The least common cause for performing endoscopy was enlisted as dysphagia seen in 13 patients (2.07%) (Table 4). The most common result obtained from endoscopy was a grossly normal gastrointestinal tract as seen in 51.07% of the children, accounting for 285 of the total 509 children. The most common abnormal finding observed in endoscopy was erythema as seen in 25.62% of the study population, a total of 143 patients. Other finding observed endoscopically included peptic ulcer disease (5.73%), bleeding (5.37%), hiatal hernia (3.94%), esophageal varices (3.58%), polyp (3.22%) and the least being chronic skip lesions seen in only 1.43% (Table 5).

Indication	N	%
Recurrent abdominal pain	184	29.39%
Weight Loss	77	12.3%
Vomiting	67	10.7%
Rectal Bleeding	65	10.38%
Diarrhea	49	7.82%
Foreign Body	49	7.82%
Diabetes and Celiac	47	7.5%
Miscellaneous	29	4.63%
Hematemesis	23	3.67%
Portal Hypertension	23	3.67%
Dysphagia	13	2.07%

**Table 4:** Indications of endoscopy.

Endoscopic findings	N	%
Grossly Normal	285	51.07%
Erythema	143	25.62%
Peptic Ulcer Disease (PUD)	32	5.73%
Bleeding	30	5.37%
Hiatal Hernia	22	3.94%
Esophageal Varices	20	3.58%
Polyp	18	3.22%
Colonic Skip Lesion	8	1.43%

**Table 5:** Endoscopic findings.

Among the total 509 patients, 49 children underwent endoscopy for the purpose of removal of an accidentally ingested foreign body. Among these 49 children, 25 were males and 24 were females, giving a cumulative frequency of 51% and 49% respectively (Table 6).

Gender	N	%
Male	25	51%
Female	24	49%

**Table 6:** Gender of patients who underwent foreign body removal.

Among the total 49 children that had an endoscopic removal of foreign body, the most commonly removed foreign object was coin as seen in 34.7%. The second most common foreign body removed was a battery, as seen in 14.3%, regardless of the type. Of note, the foreign body remained unidentified in 6.1% and was not found in 2% of the cases (Table 7). The majority of foreign objects were recovered from the esophagus in 71.4% of the cases, a total of 35 children. 20.4% were recovered from the stomach and 4.1% both from the duodenum and colon (Table 8).

Characteristic	N	%
Coin	17	34.7%
Battery	7	14.3%
Broken Glass	4	8.2%
Earning	4	8.2%
Nail	3	6.1%
Miscellaneous	3	6.1%
Screw	2	4.1%
Sharp	2	4.1%
Disc Battery	1	2%
Earphone	1	2%
Long Object	1	2%
Magnetic Ball	1	2%
Metallic Cover	1	2%
Metallic Object	1	2%
Not Found	1	2%

**Table 7:** Type of foreign body removed.

Location	N	%
Esophagus	35	71.4%
Stomach	10	20.4%
Duodenum	2	4.1%
Colon	2	4.1%

**Table 8:** Location from where foreign body was removed.

**Discussion**

Gastrointestinal disorders are among the most commonly reported and diagnosed illnesses in the Middle Eastern and Arab populations [4]. This study was conducted in a large regional referral center in the Eastern province of Saudi Arabia and is among the few known studies published in this region. Gastrointestinal endoscopy has long been established as one of the safest and most cost-effective approaches to gastrointestinal diseases and hence has been widely employed around the globe [5]. This gold standard technique has not only served to accelerate our understanding of gastrointestinal pathophysiology but has also tremendously improved treatment approach.

In our study, among the total 509 children, 84.3% underwent esophagogastroduodenoscopy (EGD), while 15.7% had a colonoscopy done, among which complete intubation up to the level of terminal ileum was successfully performed in only 41.25% of the population. This is less than what has been observed in other studies. A study conducted by Kalaoui, *et al.* in Kuwait successfully achieved complete intubation in 87% of the study population who had a colonoscopy [6]. The lower levels of complete intubation by colonoscopy observed in our facility could be either due to technical drawbacks and poor bowel preparation or sedation prior to the procedure by the team, or it could be explained by anatomical limitations. In either scenario, fluoroscopy is recommended in cases where complete intubation has not been achieved by colonoscopy and can be utilized in such settings [7].

Our results indicate an insignificant gender difference in the study population, as 51.1% were females, and 49.9% were males. Variable gender distributions have been reported by different studies performed to evaluate patient populations that undergo gastrointestinal (GI) endoscopy. In one study performed in Uganda, the male to female ratio of the population undergoing endoscopy was dictated as 1:2.5 [8]. This gross difference was attributed to females having a lower tolerance and hence reporting GI symptoms earlier than males. In another study by Lyons, *et al.* in 2017, the percentage of the patient population was reported to be 51.5%, similar to what we observed in our facility, however significant positive endoscopic findings were only observed in 29.9% of females [9]. This discrepancy was explained by a possible higher reporting of functional dyspepsia in females.

The most common group that had an endoscopy performed in our study was the school-aged children (56.19%) followed by preschool (19.25%), toddler (11.79%), infant (7.47%), young (4.52%) and neonate (0.79%) group. This is similar to the age distribution of the pediatric population observed in studies conducted elsewhere. A study reported that the majority of the children scoped in the pediatric department were adolescents aged 15years or older [8]. In another study, the mean age of performing endoscopy in children was reported to be 9.6 years with a standard deviation of 5.7 years [9]. These findings are in comparison to the finding observed in our hospital, where school-aged children are among the highest scoped pediatric population.

The three most common indications for undergoing endoscopy in our pediatric department included recurrent abdominal pain (29.39%), followed by weight loss (12.3%) and vomiting (10.7%). These findings are consistent with another study performed in Saudi Arabia, where the most common indication for endoscopy was observed to be abdominal pain seen in 75% of the entire study population [10]. Abdominal pain was also reported to be the most common indication for endoscopy in various studies conducted around the

globe, such as in Africa [11], Jordan [12] and the United States of America [13]. The second most common indication for endoscopy after abdominal pain is reported variably and includes diarrhea [6], heartburn [12] and dyspepsia [8].

Our results indicate that the most common finding on endoscopy was grossly normal GI tract with no observed pathology. Where pathology was observed, erythema was the most common, seen in 25.62% followed by peptic ulcers and bleeding, both seen in 5.73% and 5.37%, respectively. These findings are parallel to other studies where no pathology was found in the predominant number of endoscopies performed. A study conducted by Al-Quorain., *et al.* showed normal mucosa in 603 children among the total 1590 patients, amounting to 37.9% of the study population. Similarly, a large scale retrospective analysis conducted in Kenya reported no pathology seen on endoscopy in 30.4% of the total 1690 patients involved [14]. The most commonly reported pathologies discovered by endoscopy included esophagitis in Europe (15.5%) and peptic ulcer in China (17.1%) [15]. Peptic ulcer was also observed in 6% of our study group. This could partly be attributed to a noted increment in non-steroidal anti-inflammatory drugs (NSAID) prescribing practices observed among practitioners in Saudi Arabia as evidence in a prospective study conducted by Mazhar., *et al.* in 2016 [16].

Foreign body ingestion remains a commonly encountered problem seen in emergency departments around the world. Children and adolescents remain at high risk for accidental foreign body ingestion, along with those who are alcohol and/or drug abusers and psychiatric patients [17]. The pediatric population remains predisposed to accidental foreign body ingestion due to natural hand to mouth behavior. Our results reveal that 51% of the cases of foreign body ingestion seen over the 5year study period were male, and 49% were females. Males are reported to be the commoner of the two to present with a foreign object with studies showing ratios of male to female of 1.5:1 [18]. A study conducted on 176 children in Turkey by Aydoğdu S., *et al.* revealed 55.6% of the study population to be male [19]. Hence our findings are comparative to studies conducted elsewhere.

The most frequently ingested foreign body in our study was reported to be a coin in 34.7%, followed by batteries being the second most commonly seen in 14.3% of the population. This is similar to what has been observed globally, where coins are reported to be the most commonly ingested object in children [20]. A study conducted in pediatric gastroenterology showed coins to be the most common foreign body isolated in 26.23% of the population, followed by batteries in 6.55% of the group [21]. The most common location from which the foreign body was isolated in our study was the esophagus in 71.4%, followed by the stomach in 20.4% population. This is similar to other studies such as a large scale study including 64 pediatric patients with foreign body ingestion had objects removed from the upper esophagus in 26 cases, mid esophagus in 2 cases, lower esophagus in 8 cases and the stomach in 10 cases, making esophagus and stomach the two most common locations of foreign body removal similar to what we observed. Parameters that should be kept in mind when deciding the timing of endoscopy in children who have ingested foreign objects include the child's age and body weight, the time elapsed since the ingestion, acuity of clinical presentation, present location in the GI tract and the type and size of the foreign body [22].

### Conclusion

Gastrointestinal endoscopy is an important and frequently utilized technique in our facility. The frequency of endoscopies and colonoscopies performed in our facility are comparable to other facilities. However, complete bowel intubation is achieved a lesser number of times in this facility owing to possible anatomical and technical limitations. The gender and age distribution of endoscopy patients is similar to other Middle Eastern studies. The most common indication and findings are also similar to what is observed else, namely abdominal pain and normal mucosa, respectively. With regards to the cases of foreign body ingestion, males are seen more frequently than females, with coins and batteries being the most commonly ingested object, constructing a similar profile to other studies globally. The site of impaction of the foreign body is also reported to be the same as in other studies, namely the esophagus followed by the stomach. This study is one of the few retrospective analyses done in this region and calls out for a further exploration in the field of pediatric gastroenterology, possibly focusing on complications and limitations of endoscopy and the perceived need for a higher number of pediatric gastroenterologists to accommodate the ever-growing patient population.

### Conflict of Interest

The authors declare that they have no competing interests.

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