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Endoscopic and histopathological findings in children with growth retardation

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ABSTRACT

OBJECTIVE: The study aimed to describe the clinical characteristics, endoscopic and histopathological findings of children admitted to the paediatric gastroenterology outpatient clinic for growth retardation.

METHODS: The study was carried out with 90 patients aged 2–18 years who presented to our paediatric gastroenterology outpatient clinic with complaints of growth retardation and underwent oesophagogastroduodenoscopy (EGD) because growth retardation persisted despite adequate caloric support (at least 3 months).

RESULTS: The mean age of the patients was 11.11±4.27 years, 56 (62.2%) were female and 52 (57.8%) were under 12 years of age. Of the patients, 36.7% had mild, 47.8% moderate and 15.6% severe acute malnutrition, 22.2% stunting and 7.8% severe stunting. Associated dyspeptic symptoms were present in 34 (37.8%) patients and celiac antibodies were positive in 20 (22.2%) patients. Iron deficiency was present in 28.9% and B12 deficiency in 41.1% of the patients. The most common endoscopic findings were pangastritis (88.9%), duodenitis (61.1%), bile reflux (35.6%) and bulbitis (31.1%). Chronic Helicobacter pylori (*H. pylori*) gastritis was found in 72.2%, celiac disease in 20.0% and reflux oesophagitis in 17.8% of the patients. No association was found between chronic *H. pylori* gastritis and iron deficiency anaemia and vitamin B12 deficiency (p=0.90, p=0.89). There was no association between chronic *H. pylori* gastritis and height-for-age, weight-for-height and BMI z scores (0.31, 0.57, 0.43).

CONCLUSION: In this study, positive endoscopic findings were found in all children with persistent growth retardation despite adequate caloric support, even in the absence of accompanying dyspeptic symptoms. More studies evaluating the usefulness of endoscopy in children with growth retardation are needed.

Keywords: Child; endoscopy; growth retardation.

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Growth retardation is a state of malnutrition caused by inadequate caloric intake, malabsorption or excessive caloric expenditure. It may be a sign of underlying systemic disease and is a common clinical problem, accounting for 5–10% of patients seen in outpatient clinics [1, 2]. The anthropometric criteria recommended by the World Health Organisation (WHO) for the diagnosis of growth retardation are weight for height z scores in the first 5 years of life and body mass index (BMI) z scores in children aged >5 years (Weight for height/ BMI z scores: -1 to -1.9: mild acute malnutrition, -2 to -2.9: moderate acute malnutrition, ≤-3: severe acute malnutrition). The height for age z score is used to assess chronic malnutrition (Height for age z-score <-2: stunting, <-3: severe stunting) [3].

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The causes of growth retardation can be organic (medical) or non-organic (social or environmental). Organic gastrointestinal (GIS) causes include gastrointestinal obstruction, gastroesophageal reflux disease, eosinophilic oesophagitis and gastroenteritis, food allergy, celiac disease, intestinal lymphangiectasia and inflammatory bowel disease [1, 2, 4]. The effect of Helicobacter pylori (*H. pylori*) infection on growth retardation remains controversial. Some studies have shown that *H. pylori* has a negative effect on children's growth (both height and weight or only height growth) [5–11], while other reports suggest that *H. pylori* infection has no negative effect on growth [12–16].

Oesophagogastroduodenoscopy (EGD) is an invasive procedure that is widely used in the diagnosis and management of upper gastrointestinal disorders [17]. Currently, the most common indication for endoscopy in children is abdominal/epigastric pain, followed by vomiting, growth retardation or weight loss [18].

The aim of this study is to investigate endoscopic and histopathological findings in pediatric patients who have had unexplained and persistent nutritional problems despite adequate caloric support for at least 3 months and who underwent EGD due to suspected underlying gastrointestinal disease.

Highlight key points

- All children with persistent growth retardation showed abnormal endoscopic findings, even without dyspeptic symptoms.
- Pangastritis, duodenitis, bile reflux, and bulbitis were the most common endoscopic findings.
- Chronic Helicobacter pylori gastritis and celiac disease were frequent histopathological diagnoses in these patients.

MATERIALS AND METHODS

This study was carried out with 90 patients aged 2–18 years who were admitted to the Paediatric Gastroenterology Outpatient Clinic of Kahramanmaras City Hospital between June 2023 and September 2024 with the complaint of growth retardation and who underwent EGD because unexplained nutritional problems persisted despite adequate caloric support (at least 3 months). The approval of Kahramanmaras Sutcu Imam University Medical Research Ethics Committee numbered 22/01 and dated 02.09.2024 was obtained and this study was conducted according to the Declaration of Helsinki.

Demographic characteristics, complaints, clinical findings, laboratory results, endoscopic and histopathological findings were obtained from patient records. Upper GI endoscopy was performed by the same paediatric gastroenterologist using an Olympus GIF-H180J endoscope under deep sedation provided by the anaesthetist. Biopsy specimens were transported to the pathology laboratory in formaldehyde solution. A rapid urease test was also used to establish the diagnosis of *H. pylori*, and the presence and colonisation of *H. pylori* in biopsy specimens was assessed by histopathology. The presence and severity of *H. pylori* gastritis was determined using the modified Sidney scoring system, and the presence of celiac disease was determined using the Marsh scoring system.

To evaluate growth retardation, weight-for-height *z*-scores in the first 5 years of age and BMI *z*-scores at >5 years of age were used as anthropometric criteria as recommended by WHO. The height-for-age *z*-score was used to assess chronic malnutrition. Patients were classified as preterm (<37 weeks of gestation) and term (≥37 weeks of gestation) according to gestational age, SGA (birth weight <10^{th} percentile for gestational age) and normal (birth weight 10^{th}–90^{th} percentile for gestational age) according to birth weight.

Descriptive statistics were presented as numbers and percentages for categorical variables and as mean standard deviation for numerical variables. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess whether continuous variables were normally distributed. The Chi-square test was used to analyse categorical variables. The Mann-Whitney U test was used to analyse continuous variables in independent groups that did not have parametric characteristics. Analyses were performed using the SPSS software program, version 21.0 (Armonk, New York: IBM Corp.). The level of statistical significance was set at $p<0.05$.

RESULTS

The mean age of the patients was 11.11±4.27 years, 56 (62.2%) were female and 52 (57.8%) were under 12 years of age. Of the patients, 36.7% had mild, 47.8% moderate and 15.6% severe acute malnutrition, 22.2% stunting and 7.8% severe stunting. Associated dyspeptic symptoms were present in 34 (37.8%) patients and celiac antibodies were positive in 20(22.2%) patients. Iron deficiency was present in 28.9% and B12 deficiency in 41.1%

of the patients (Table 1). The most common endoscopic findings were pangastritis (88.9%), duodenitis (61.1%), bile reflux (35.6%) and bulbitis (31.1%). Chronic Helicobacter pylori (*H. pylori*) gastritis was found in 72.2%, celiac disease in 20.0% and reflux oesophagitis in 17.8% of the patients (Table 2).

No association was found between the presence of accompanying dyspeptic symptoms and the degree of malnutrition (p=0.12) (Table 3). No association was found between chronic *H. pylori* gastritis and iron deficiency anaemia and vitamin B12 deficiency (p=0.90, p=0.89). There was no association between chronic *H. pylori* gastritis and height-for-age, weight-for-height and BMI *z* scores (p=0.31, p=0.57, p=0.43) (Table 4). There was no association between the degree of malnutrition and birth week, birth weight and consanguineous marriage (p=0.81, p=0.83, p=0.64).

DISCUSSION

Growth retardation may affect patients of any gender, race and age, but it is most commonly observed in infants and young children. Anthropometric assessment is essential to determine the severity of nutritional deficiency [2]. In this study, the majority of patients were under 12 years of age [2–6 years (17.8%) and 6–12 years (40%)] and 47.8% were acutely moderately malnourished. 30% were chronically malnourished (stunted).

Micronutrient deficiencies, including vitamins and trace minerals (e.g. copper, zinc, iron, iodine), are associated with impaired cognitive function, increased risk of infection, poor growth, developmental delay and increased risk of morbidity and mortality [14]. Therefore, children with growth retardation should be screened for these nutrient deficiencies and supplemented if necessary [15]. Iron deficiency is the most common micronutrient deficiency worldwide and its prevalence in children and adolescents in Turkiye has been reported to vary from 6.5% to 42% in different regions [16]. Epidemiological studies have highlighted that the rate of B12 deficiency varies between 5% and 60% [17]. In this study, iron deficiency was found in 28.9% and B12 deficiency in 41.1% of the patients.

Endoscopic evaluation in children with growth retardation is not well defined. In a prospective study performed in children with growth retardation referred to a paediatric gastroenterology clinic, the diagnostic value of endoscopy was found to be higher than imaging and lab-

TABLE 1. Demographic and clinical characteristics of the patients (n=90)

	%
Gender	
Female	62.2
Male	37.8
Age groups	
2–6 years	17.8
6–12 years	40
>12 years	42.2
Birth week	
Preterm	4.4
Term	95.6
Birth weight	
Normal	87.8
SGA	12.2
Consanguineous marriage	
No	72.2
Yes	27.8
Degree of malnutrition	
Mild	36.7
Moderate	47.8
Severe	15.6
Stunting	
No	70.0
Yes	22.2
Severe	7.8
Accompanying dyspeptic symptom	
No	62.2
Yes	37.8
Antitissue trans Ig A	
Negative	77.8
>3–7 times positive	2.2
>x7 times positive	2.2
>10 times positive	17.8
Iron deficiency anaemia	
Yes	28.9
No	71.1
Vitamin B12 deficiency	
Yes	41.1
No	58.9

SGA: Small for gestational age; Antitissue trans Ig A: Antitissue transglutaminase immunoglobulin A.

Table 2. Endoscopic and histopathological findings of the patients

	%
Endoscopic diagnosis	
Pangastritis	88.9
Duodenitis	61.1
Bile reflux	35.6
Bulbitis	31.1
Oesophagitis	16.7
Antral gastritis	10.0
Lower esophageal sphincter insufficiency	7.8
Hiatal hernia	1.1
Oesophageal ulcer	1.1
Antral ulcer	1.1
81.1% of patients had more than one abnormal finding.	
Histopathological findings	
Chronic *Helicobacter pylori* gastritis	72.2
Chronic gastritis	27.8
Mild chronic duodenal inflammation	56.7
Reflux oesophagitis	17.8
Celiac disease	20.0
Potential celiac disease	2.2

88.8% of patients had more than one abnormal finding.

Table 3. Relationship between dyspeptic symptoms and malnutrition

	Accompanying dyspeptic symptoms				p
	No		Yes		
	n	%	n	%	
Degree of malnutrition					0.12
Mild	25	44.6	8	23.5	
Moderate	23	41.1	20	58.8	
Severe	8	14.3	6	17.6	

Table 4. The relationship between chronic *Helicobacter pylori* gastritis and anthropometric measurements

	Chronic *Helicobacter pylori* gastritis				p
	No		Yes		
	M	SD	M	SD	
Height for age z score	-1.69	1.25	-1.42	1.26	0.31*
Weight for height z score	-2.08	0.58	-1.94	0.52	0.57*
BMI z score	-2.37	0.95	-2.48	0.95	0.43*

M: Mean; SD: Standard deviation; BMI: Body mass index; *: Non parametric test.

oratory evaluation. No positive endoscopy result was obtained in any of the children who underwent endoscopy for growth retardation without accompanying symptoms [18]. All of the patients in our study had positive endoscopic findings and accompanying dyspeptic symptoms were present in 37.8%. The most common endoscopic findings in our patients were pangastritis (88.9%), duodenitis (61.1%), bile reflux (35.6%) and bulbit (31.1%) and 81.1% of the patients had more than one abnormal endoscopic finding.

Celiac disease (CD) is a chronic autoimmune enteropathy caused by the ingestion of gluten in genetically predisposed individuals and its prevalence varies between 8% and 24% in children with unexplained growth retardation [19]. Gastroesophageal reflux disease is also one of the organic causes of growth retardation in children [20]. In this study, celiac antibodies were positive in 22.2% of the patients and CD was found in 20.0% and reflux oesophagitis in 17.8%.

H. pylori infection is common in both developed and developing countries. In Turkiye, the prevalence of *H. pylori* was found to be 82.5% in adults, 75.8% in children aged 13–18 years and 40% in children aged 4–6 years [21, 22]. *H. pylori* has been shown to cause acute and chronic gastritis, peptic ulcer disease and stomach cancer. It has been suggested that it may also be associated with extraintestinal findings including iron deficiency anaemia, immune thrombocytopenic purpura, growth retardation and vitamin B12 deficiency, but the findings are contradictory [23]. Three different pathophysiologies explaining the negative effect of *H. pylori* infection on growth have been defended. Firstly, malabsorption which develops due to suppression of gastric acid secretion, secondly, dyspepsia-related decreased appetite caused by *H. pylori* infection. Finally, iron deficiency anaemia due to *H. pylori* infection is also thought to impair growth [24]. In our study, chronic *H. pylori* gastritis was found in

72.2% of the patients and no relation was found between chronic *H. pylori* gastritis and iron deficiency anaemia and vitamin B12 deficiency. There was no relationship between *H. pylori* gastritis and height-for-age, weight-for-height and BMI *z* scores of the patients.

Conclusion

In this study, positive endoscopic findings were detected in all children with growth retardation and unexplained nutritional problems despite adequate caloric support, even in the absence of accompanying dyspeptic symptoms, and their treatments were reorganized according to these findings. In children with unexplained growth retardation, performing an EGD to detect organic gastrointestinal diseases will contribute to patient follow-up. More studies evaluating the usefulness of endoscopy in children with growth retardation are needed.

Ethics Committee Approval: The Kahramanmaras Sutcu Imam University Clinical Research Ethics Committee granted approval for this study (date: 02.09.2024, number: 22/01).

Informed Consent: Written informed consents were obtained from patients who participated in this study.

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