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Abstract

The comorbidity of gastrointestinal (GI) diseases is high among attention deficit and hyperactivity disease (ADHD) children with autism spectrum disorder (ASD). Previous investigations report fecal incontinence and constipation as the most prevalent GI disorders among ADHD-ASD children, posing clinical questions regarding effective management approaches. This case series investigates the incidences, symptomatology and behavioral disorders reported by children with and without histories of ADHD and ASD to inform evidence-based interventions and policy. Methods. This case series investigated gastrointestinal abnormalities among 12 preschoolers in a psychiatric clinic. The investigation considers a history of children with GI disorders and comorbidity with psychiatric illness. Parents' and teachers' accounts of children informed the clinical decisions. The case series reported a higher incidence of constipation and fecal retention among male than female children, 7 and 5, respectively. The international classification confirmed the signs and symptoms reported by constipated children, including high avoidance of school and public restrooms and a preference for home restrooms. Behavioral disorders like hyperfocus, which are a defense mechanism against the sensory-rich school environment, marked the incidence of the disorders. However, clinical interventions like stool softeners, including polyethylene glycol, and other laxatives were administered to stimulate defecation by enhancing bowel motility. The cognitive behavioral therapy was indicated to the children to impart coping skills necessary to handle sensory-rich environments. Preschoolers presented fundamental behavioral disorders and other symptoms, including hyperfocus, fecal incontinence at home and retention at school due to the sensory-rich environments. Medications like laxatives and stool softeners enhance bowel movement, whereas psychotherapy enhances children's coping skills to prevent the withholding of feces in sensory-rich environments like schools and other public places. These interventions alleviated symptoms and improved the children's quality of life.

Keywords: *Pediatric Constipation, Fecal Incontinence, ADHD, Autism Spectrum Disorder (ASD), Neurodevelopmental Disorders*

1.0 Introduction

Neurodevelopmental disorders in children, especially ADHD and ASD, present comorbidities and medical conditions like GI disorders; estimated prevalence of about 1 out of 100 children and about 1% of the global population; male to female ratio of 2:1 (Cerminara et al., 2021; Esposito et al., 2024). Esposito et al. assert that constipation is the most prevalent than other complications like stomach pains, diarrhea, nausea and vomiting. The increasing number of children with GI disorders in ADHD and ASD necessitates investigations to gather evidence on environmental influence to expand clinical practices and related policy-making.

Neither the mechanisms nor symptoms of GI disorders in ASD are fully understood (Bjørklund et al., 2020). However, several studies have hypothesized and presented various modalities on the same. Despite the fundamental implication of gut microbiota (Bjørklund et al., 2020), the brain-gut axis, which has been mentioned in several studies, influences behavior via autonomic nervous, neuroimmune and neuroendocrine systems. Esposito et al. argued that GI disorders in ADHD can be attributed to multiple factors: miscommunication between the enteric nervous system and the central nervous system. This miscommunication alters distension perception and GI motility. Other factors include nutritional deficiency and poor response to defecation stimulus as a result of behavioral problems.

According to Esposito et al., behavioral problems have been reported among preschoolers, children as young as 18 months to 5 years, in Norway, Italy, United States of America. Common behavioral problems faced by children with ADHD/ASD are restrictive behaviors, restricted interests, and impaired social interaction or communication (Brooks et al., 2021). More recently, clinicians have been advised to pay more attention to functional defecation disorder. Many children aged 2 to 12 years have been admitted to tertiary hospitals (Peeters et al., 2013), with varied incidence and severity depending on stressful factors, geographical locations and lifestyle behaviors (Koppen et al., 2018). The present case series critiques five children, focusing on environmental influence and behavioral tendencies to elaborate GI disorders in ADHD and ASD. The presentations unveil key insights suitable for clinical practices and management.

2.0 Methods

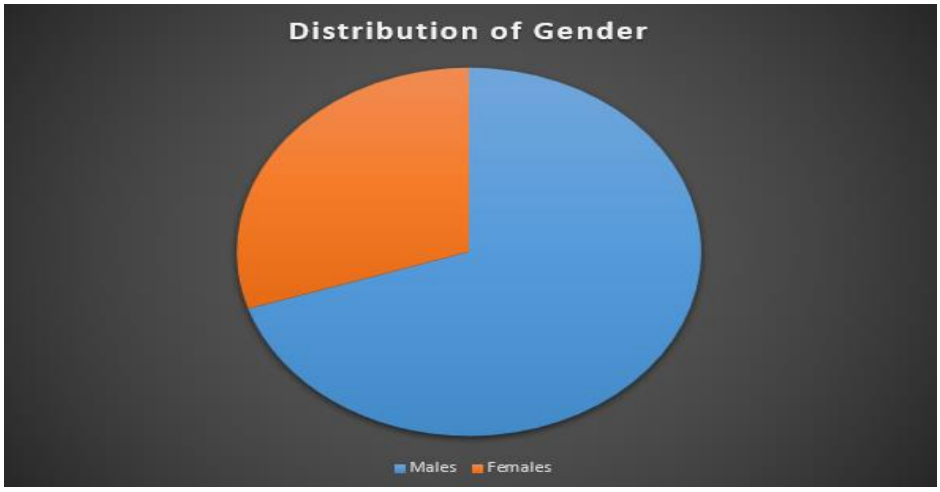
Case selection and criteria. The cases were randomly selected from the psychiatric clinic. The selected children had been diagnosed with ADHD and ASD and admitted to the hospital in the last three months. Children identified to have reported avoidance triggers, hyperfocus, constipation, fecal retention at school and sensitivity to the sensory-rich school environment were prioritized.

Data collection and analysis. To obtain clinically relevant data, the children's medical records were reviewed. The review process focused on reported symptoms, clinical presentations, and proposed interventions. To represent the patient data, descriptive data analysis and visualization were performed using Microsoft Excel, and the outcomes are illustrated in **Table 1**.

Table 1: A summary of the participants' features

Sex	n	Mean age (years)
Males	7	10.43
Females	5	8.83

Figure 1: Gender Distribution



3.0 Case Presentation

Case 1

Three months ago, a 9-year-old was diagnosed with ADHD and ASD. He has been presenting occasional fecal incontinence and chronic constipation. Noticeably, he avoids the sensory he avoids the washroom while in his friend's company. His elder brother, who gives him most company at school, asserts that he does not like visiting the washrooms at school. When his parents noticed, his brother confirmed that Ian hardly uses the restroom in school. Also, the parents indicated that the boy is too reluctant to use public restrooms while they go to church or any other place. He has to wait to get home to use the restroom comfortably.

Case 2

An 8-year-old girl loves arts lessons. Often, she draws on her own when the lessons are done. Her teachers report her tendency to stay in class during time times and not like playing with her classmates. Her teachers add that she stays in the classroom to avoid her colleagues and draws until she breaks home in the evening. At home, her parents have been complaining about her tendency to rush to the restroom as soon as she arrives home from school. Similarly, her parents indicate that she avoids her group at church and other people at public events.

Case 3

In the last two weeks, a 10-year-old boy complains to his teachers of fecal incontinence, citing defecating difficulties. In response, his teacher attempted to take him to the washroom during the lesson's break. He was too uncomfortable to use the school washroom. At the end of the day, the boy would rush home and use the washroom. His parents confirmed that the boy would rush to the bathroom after school or use it within an hour after arriving home. When asked about his experience, the boy reiterated his discomfort using the school washroom.

Case 4

At the beginning of the term, a 7-year-old girl presents with defecating difficulties and emphasizes her inability to use the school washroom. She demands to return home to use her washroom, forcing her teachers to contact her father. This trend goes on for three weeks, after which she no longer bothers her teachers. However, her classmates told her teachers that she never visited the washroom. While at home, she complained of fecal incomitance.

Case 5

A couple noticed that their 11-year-old son avoids public restrooms and complains about defecation difficulties at home. In the last four weekends, the couple's attention was drawn to this trend. Last weekend, they went to a birthday party at a friend's house, and the boy forced them to return home early so that he could use their restroom. Upon inquiring from the boy's teacher, the couple learned that their son does not use the school restrooms. Also, the house helps inform the boy's parents that their son demands absolute privacy and locks his restroom.

Case 6

A white single mother presents at the clinic with his 10-year-old daughter, with a history of ADHD but not constipation. However, at the time of admission, the girl complained of constipation, hyperactivity and poor concentration. Also, while the girl complained of epigastric pain that began 7 days before they visited the clinic, abdominal pain, constipation with bowel movements, sleep difficulties and sadness, her mother mentioned that she was oppositional and had anger issues. The girl's teacher had informed the mother to look into the abdominal pains. At this time, she was taking 30 mg of lisdexamphetamine salts BD and OTC 10 mg melatonin to manage insomnia. The mother asserted that she monitored her daughter's medication, discounting incidences of issues or acute ingestion. Within 40 minutes, the girl's abdominal pain worsened, and she was asked to produce a stool sample for analysis of medication retention. She declined. An X-ray was recommended to reveal the contents of her colon. The X-ray revealed LDX capsules in the colon, prompting the indication of two saline enemas and intravenous fluid administration at an interval of 2 hours.

Case 7

An 11-year-old female was brought to the clinic at 5:00 pm with a provisional diagnosis revealing constipation and GI obstruction. Her teachers claim that she hardly used the school bathroom, whereas the parents argue that she would request them to leave the house if she wanted to use it. On this particular day, she arrived from school and her father at home. She

requested him to excuse her so that she could use the bathroom. Her father left but returned immediately and listened to her by the door. He heard her sobbing and grimacing. A physical exam reveals anal fissures and blood stains. While a weekly cognitive behavioral therapy was prescribed to equip the child with coping skills, 4g/mol polyethene glycol and nitroglycerin ointment were prescribed to soften the stool and relax anal muscles for easy defecation. Within 14 days, the girl was relieved of constipation and was confident enough to use the school and home bathroom without restrictions.

Case 8

This involves a 15-year-old boy who had posted deteriorating results in the last few terms. His teachers and parents are noting the drastic changes. A week after admission to the clinic, the boy's teacher contacted the parents and indicated that he is somewhat inattentive, stressed, reserved, emotional and compulsive at school. His father did not hesitate to seek medical assistance. The clinicians assessed the boy for fecal compaction through the International Classification of Diseases, 9th Revision, Clinical Modification diagnostic approaches. This assessment found fecal compaction and voiding disorders. However, within 7 days of 4g/mol polyethylene glycol administration and 21 days of cognitive behavioral therapy, the boy's teachers reported improved attention, adequate interaction with classmates and use of the school bathroom.

Case 9

A 9-year-old boy presented at the psychiatric clinic with a history of constipation with chronic abuse of laxatives. In the last 3 weeks, his teacher noted significant behavioral rigidity and hyperfocus. The boy did not break out to rest except over the lunch hour. However, he would return immediately and confine himself in the corner of the classroom. When asked to partake in physical activities, the boy resisted and argued that he did not like intensive physical exercises. The teacher reported these behaviors to the school clinic, where the boy's parents were notified to transfer him to the psychiatric facility.

Case 10

A 10-year-old boy with a history of constipation and fecal incontinence at home. On this day, they had broken home early for home as it was the beginning of their half-term holiday. He arrived home only to find the bathrooms under maintenance due to sewer line blockage. The boy became too hyperactive and complained of abdominal pains. In school, his teachers claim that the boy does not like group work or any activity that engages him with colleagues. In the last two days, he had been engaged as the group leader but did not focus on group activities. Instead, he left the classroom for an empty classroom to look at his picture book. He could not allow the teacher to take him back to the classroom.

Case 11

The case series involves an 8-year-old female child with a history of ADHD and severe ASD. The girl's parents are working in the next town, so they do not spend much time with her. However, the mother noticed unusual and concerning voiding behavior when she took her leave. For the two weeks, she noted that her daughter rarely visited the bathroom. In one incidence, they had gone for a family gathering, and the daughter complained that she was pressed. When the mother urged her to use her bathroom when they got back home. The mother

contacted the house help if she had noticed any such behavior, which she confirmed to be true. At the clinic, clinicians asked the girl if she had abdominal pains. She acknowledged and got irritated. The girl was prescribed 4g/mol polyethylene glycol and ascorbic acid. Seven days later, the girl was brought back to the clinic for a follow-up, which revealed significant relief.

Case 12

In this case, a 9-year-old boy presents at the clinic with persistent constipation, reluctance to use the school restroom and pain while defecting. The boy complains of excruciating pain while defecating. The boy has a 3-year history of ADHD and ASD, mainly presenting with limited verbal communication, irritability, sensory aversions, and repetitive behaviors. The clinicians indicated 15ml of milk of magnesia TID, occupational therapy and CBT to address constipation and enable the boy to cope with the sensory-rich environment. 31 days later. The boy was brought to the clinic for follow-up. His parents cited reduced severity of constipation, citing frequent and painless defecation.

4.0 Discussion

The comorbidity of constipation with ADHD and ASD affects the quality of life and health status among affected preschoolers. Thus, effective treatment and management modalities seek long-term solutions to the disease. Poor treatment and lack of supportive environments have been associated with exacerbation of fecal incontinence and constipation among children with ASD and ADHD, prompting the need for investigations on possible interventions and addressing environmental factors.

Importantly, the case series demonstrated a higher incidence of constipation and fecal retention among male preschoolers than among females. The data shows that 7 males and 5 females, with an average age of 10.43 and 8.83 years, were affected. One study supports these findings by emphasizing the high prevalence of fecal retention and constipation among male children than females (Al-Beltagi et al., 2023). This data raises clinical concerns for male children and highlights a crucial clinical approach and policy to address the high propensity of the disorder among male children.

Pre-schoolers face unique environmental challenges at school and home, resulting in unique presentations of GI disorders and varied severity. Individualized management, including frequent follow-up, is often considered for better clinical results (American Academy of Child and Adolescent Psychiatry (AACAP, 2007). Individualized care focuses on addressing particular behavioral symptoms reported by each child.

Behavioral manifestations are common among ADHD and ASD children with GI disorders (Buie et al., 2010). Apart from the tendency and need to control their environments, constipation emerged as a common GI complication among preschoolers with ADHD and ASD children. In cases 1 to 5, this symptom manifested at school and in public places, with parents noticing concerning fecal incontinence among their children after school. Avoidance of school and public restrooms was coupled with a preference for home restrooms. However, in case 6, the teacher complained to the parent as the girl had been complaining about abdominal pains. One clinical trial involving 80 children attributed constipation to pharmaceutical agents or delayed maturation of the digestive tract. Mainly, constipation concerns the poor relationship between the central nervous and digestive systems (Bazmamoun et al., 2023). For this reason, the young girl resisted using the clinic bathroom as a defense against the environmental stressor.

As for the association of constipation with pharmaceutical agents, LSDX is a major causative agent. A study by Hameed et al. is an example of a previous case series investigating the LDX-constipation nexus among children. This investigation established that LDX capsules may be retained in children's colons, with X-rays revealing intact capsules (Bazmamoun et al., 2023). This informs the investigating sympathomimetic toxidrome risks upon attempting to disintegrate LDX capsules in the GI.

In the last decades, fecal incontinence among preschoolers concerned parents and clinicians. This act has been subject to debates as to whether it is voluntary or involuntary. However, fecal incontinence among preschoolers after school has been regarded as a behavioral disorder mostly associated with psychiatric illnesses (Feng et al., 2022). Both male and female children have reported relatively equal incidence.

The key reason for the desire for environmental control is to avoid triggers of fecal incontinence and constipation. Behavioral patterns displayed by the twelve cases demonstrated that the school environment is unideal for ASD-ADHD preschoolers and hinders them from comfortably relieving themselves in the restrooms. Consequently, the preschoolers cited unique but aligned reasons to avoid school restrooms and preferred using them at home. Looking at the literature on GI disorders in ADHD and ASD children, evidence of constipation and defecation difficulties strongly emerge among children with a high tendency to withhold bowel movements (Sharma et al., 2021). This evidence is aligned with the consistent pattern of resisting school restrooms.

As contested by the American Academy of Child and Adolescent Psychiatry, individualized management produces better clinical outcomes. Case 7 is an excellent example, as the patient reported remarkable symptomatology relief within 14 days. Her treatment included 4g/mol polyethylene glycol, weekly cognitive behavioral therapy, and nitroglycerin ointment application on the anal fissures. Polyethylene glycol stimulates peristalsis and softens the stool, preventing the children from withholding feces (De Geus et al., 2023). This intervention addressed the physical effects of fecal retention and impacted the patient's psychology.

As for hyperfocus among ADHD-ASD children with abnormal bowel movements, maladaptive attention strength has been reported and described in many investigations. Previous evidence aligns with the behavior in cases 2, 9 and 10, who preferred secluding herself to draw and focus on arts. These children displayed weakness and poor response to sensory-rich environments. Defiance, irritability and defiance were common in the three cases, pronouncing the symptomatology of constipation and fecal retention among ADHD-ASD children. These observable behaviors are crucial for diagnosis (Al-Beltagi et al., 2023). The literature emphasizes that hyperfocus children display perfectionism and conserve themselves (Zhang et al., 2022), as demonstrated by the girl. Hyperfocus ties with distress in sensory-rich environments that trouble ASD-ADHD preschoolers. To avert the negative implications of the distressing environments, they focus on particular tasks as a decoy.

Again, the outcomes of hyperfocus at school elaborate fecal incontinence among preschoolers as soon as they get home. The present case series established that the five preschoolers relieved themselves in their restrooms when they got home. Alternatively, they demanded to go back home to relieve themselves. These incidences deviate from the theoretical perspective of associating fecal incontinence with constipation (14), attributing the incontinence to a less distressing environment. As home environments are devoid of sensory factors, preschoolers prefer home restrooms, resulting in sudden incontinence.

Even though the incidences reduce with age, the behavioral manifestations of GI complications among preschoolers pose significant health risks. Thus, evidence-based treatments are needed

to address the disorders. Buie et al. (year) advocate enforcing pediatric treatment guidelines to address all GI complications among preschoolers. However, the present study focuses on preschoolers with ADHD and ASD.

The American Academy of Child and Adolescent Psychiatry endorses multiple interventions, including psychosocial interventions and pharmacological approaches like the administration of stimulants, ointments and atomoxetine transdermal patches. The rationale of stimulant medications regards the need for hour-by-hour pharmacodynamic and pharmacokinetic effects (American Academy of Child and Adolescent Psychiatry (AACAP, 2007). The case series showed that the administration of 4g/mol of polyethylene glycol stood out. This medication enhanced peristalsis and softened stool, preventing fecal retention (Bundgaard-Nielsen et al., 2023; De Geus et al., 2023). Arguably, this intervention best works with cognitive behavioral therapy that enables preschoolers to adapt to their environments. Additionally, the mainstream approaches to constipation treatment apply. For instance, stool softeners and laxatives are recommended to loosen stool and enhance bowel movement, respectively.

Even though the illustrated interventions address constipation and fecal incontinence, they do not address the psychiatric aspect of the disorder. The American Academy of Child and Adolescent Psychiatry and the American Academy of Pediatrics recommend psychotherapeutic interventions, particularly cognitive behavioral and social integration therapies, to address the behavioral disorders associate with constipation and fecal incontinence after school among preschoolers (Ali et al., 2011; Siegel et al., 2024). The Cognitive behavioral intervention is a problem-based approach that addresses the negative thoughts and burdening environmental sensory problems that deter preschoolers from using school restrooms. The psychotherapeutic interventions are indicated as long-term interventions against behavioral disorders.

On the other hand, sensory integration therapy equips preschoolers with the ability and skills to handle sensory-rich school environments, alleviate behavioral rigidity and hyperfocus, and enhance social capabilities. The American Academy of Pediatrics emphasizes that sensory integration therapy imparts tactile inputs needed for sensory-based behaviors and problems. This approach makes school restrooms and environments less overwhelming to children with ADHD and ASD. Thus, they confidently relieve themselves and avoid withholding feces.

Fundamentally, cases 11 and 12 demonstrated anxiety, rigidity and environmental preferences among ADHD children with severe ASD who presented with fecal retention. Particularly, case 11 showcases primary symptoms of constipation, irritability and abdominal pains, marking the severity of the disorder in the young girl. The girl withholds feces and does not let their house help notice that she has any problems. Literature contends high levels of anxiety among ADHD and ASD children with constipation (Raturi et al., 2021). This anxiety is connected to sensory preferences, where the girl demonstrated intolerance to a bathroom other than her home. Previous investigations support the indication of milk of magnesia as an effective agent that decompacts bowel contents, enhancing bowel movements and defecation.

In case 12, the reluctance to use the school restroom demonstrates environmental sensitivity and sensory preference. The boy decided to withhold feces till he got home to use his own. Nonetheless, the indication of milk of magnesia, cognitive behavioral therapy and occupational therapy marked a significant improvement in his bowel movements (De Geus et al., 2023; Mori et al., 2021). This case emphasizes the importance of combined therapy in managing constipation and fecal retention in ADHD-ASD children.

The interventions against behavioral disorders span beyond psychotherapy and pharmacological interventions. Harnessing school and home environments and providing support are emerging as ideal approaches to supplement the above-described interventions.

Creating supportive environments prevents fecal retention among preschoolers. Particularly, establishing privacy in the bathrooms promotes flexibility and confidence among preschoolers with ADHD and ASD with GI complications. Additionally, warm and welcoming teaching staff encourage the children to seek assistance whenever necessary.

5.0 Conclusion

GI complications are common comorbid conditions in ADHD and ASD. In recent years, an increasing incidence and prevalence of gastrointestinal complications have been reported in many psychiatric facilities. A case in point is fecal incontinence after school and constipation among preschoolers. This case series critiqued five preschoolers with constipation and fecal incontinence after school to comprehend the clinical aspects of the complications.

The investigation established that intense sensory school environments are a key determinant of constipation and fecal retention among preschoolers. Strong evidence that constipation and fecal retention are profound symptoms of behavioral disorders embodying the GI complications in ADHD and ASD. Registered behaviors are crucial diagnostic factors for fecal retention and constipation, often done through observation.

Pre-schoolers deployed hyperfocus and avoidance as defense mechanisms in response to the sensory-rich school environments. The children withheld feces, resulting in constipation, and waited to relieve themselves at home. In response, the American Academy of Pediatrics and the American Academy of Child and Adolescent Psychiatry recommend pharmacological interventions and psychotherapy to alleviate symptoms and address behavioral disorders.

The different classes of pharmacological agents include laxatives to promote bowel movement and stool softeners to loosen stool for easy defecation. Generally, the pharmacological agents focus on decongesting the gastrointestinal tract. Psychotherapeutic interventions focus on relieving psychiatric disorders and complement the pharmacological interventions. Cognitive behavioral therapy and sensory integration approaches target ADHD and ASD. The children acquire coping skills to handle the sensory-rich school environments.

Importantly, harnessing the school environment emerged as a key approach to addressing fecal retention among preschoolers. A conducive school environment encourages preschoolers to use the bathrooms and prevents fecal retention. Parents and teachers are required to partner and establish private bathrooms in school. Teachers play a crucial role in ensuring that every child is comfortable enough to use the bathrooms whenever needed.

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