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A Review on Gastrointestinal Disorders in ASD Patients

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ABSTRACT: Gastrointestinal (GI) tract disorders are very commonly found in ASD individuals. GI tract is considered from the oesophagus to the rectum. The inflammatory response may occur anywhere between oral-faecal points of entry. [4] Gastrointestinal tract assessment should be done to evaluate the condition of the patient. Treatment of gastrointestinal condition may increase the patient's cognitive psychology, lengthens their attention span and improves their rapid eye movement (REM) sleep.

KEYWORDS: Gastrointestinal system, ASD, disorders

I. INTRODUCTION

Autism spectrum disorders (ASDs) are a compilation of developmental disorders mainly characterized by the disability in interacting socially; deficits in verbal or/and non-verbal forms of communication; and stereotypical forms of behavioural patterns. The term ASDs encompasses Asperger syndrome, autistic disorder, childhood disintegrative disorder, Rett's syndrome and pervasive developmental disorder, not otherwise specified (PDD-NOS) which is also commonly known as atypical autism [1]. Based on the increase in medical investigations and research done, it has solidified the opinion that ASDs implies a continuum of acerbity and expression of the condition. As per research 1 in 88 children in the United States (US) are being affected with a form of ASDs [2] and also that male are more susceptible to ASD when compared to female, whereby makes have a 1 in 54 chance and females have a 1 in 80 chance. Studies have solidified the statement that gastrointestinal (GI) symptoms are indeed more noticeable in patients with ASD. Two distinctive studies showed that the incidence of gastrointestinal symptoms was at 80% and 70% respectively in autistic children [3, 4]. In patients, many GI disorders have been identified and reported when compared to normal people who are not afflicted with ASDs. Types of GI disturbances reported were diarrhea, acid reflux, flatulence, drooling and pyrosis. ASD is a condition in which verbal communication is a challenge, patients are, more often unable to confer the discomfort they felt to communicate with clinicians. A research studied by Valicenti-McDermott et al [3] showed that GI symptoms are increased in frequency in patients with ASD as compared to patients without ASD. The frequency of gastrointestinal symptoms in ASD patients is shown in figure 1.

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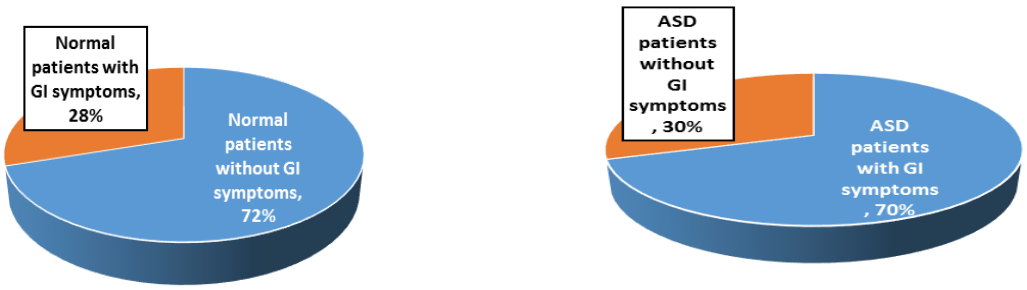
Figure 1. The frequency of GI symptoms in patients.



II. CLINICAL MANIFESTATIONS OF GI DISEASE IN ASD INDIVIDUALS

ASD individuals with GI disturbances tend to showcase aggressive behavior or more commonly known as self-injurious behavior (SIB) onto themselves. Patients are in a constant state of discomfort and also undergone sleeping anomalies [5]. Case studies showed that patients contain signs of colic in the abdomen and sleeping problems especially when the patients were in the first year of life. This also included infections to the upper respiratory tract and the GI system due to bacteria and yeast invasion. Patients affected by ASDs are also overly sensitive to light, sound and certain smells. These patients are also known to develop intolerance towards certain types of substances in food [6, 7, 8]. Symptoms that are presented in GI disorders with relation to ASD patients are diarrhoea, mostly chronic, abdominal pain, gastroesophageal reflux, overactive salivation, loss of weight, dysentery that can also be caused by bacterial origin and teeth grinding. Common phenomenon in ASD patients are their anomalous toileting behaviour would be the occurrence of diarrhea and infrequent evacuation of the bowels [9]. Behavioural markers of abdominal pain in ASD individuals is shown in Table 1.

Table 1: Behavior markers of Abdominal Pain or Discomfort in Individuals with ASDs [10]

Vocal behaviours	**Motor behaviours**	**Changes in overall state**
Frequent clearing of throat, swallowing, tics, etc.	Facial grimacing	Sleep disturbances: difficulty getting to sleep, difficulty staying asleep
Screaming	Gritting teeth	Increased irritability (exaggerated responses to stimulation)
Sobbing “for no reason at all”	Wincing	Noncompliance with demands that typically elicit an appropriate response (oppositional behaviour)
Sighing, whining	Constant eating/drinking/swallowing (“grazing” behaviour)	
Moaning, groaning	Mouthing behaviours: chewing on clothes (shirt sleeve cuff, neck of shirt, etc.), pica	
Delayed echolalia that includes	Application of pressure to abdomen:	

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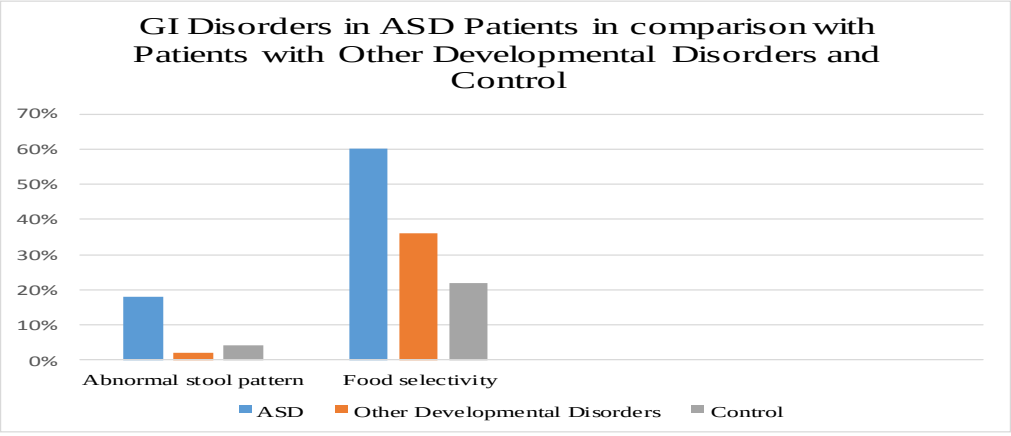
reference to pain or stomach (e.g., child says, "Does your tummy hurt?" echoing what mother may have said to child in the past)	leaning abdomen against or over furniture or kitchen sink, pressing hands into abdomen, rubbing abdomen	
Direct verbalizations (e.g., child says "tummy hurts" or says "ouch," "ow," "hurts," or "bad" while pointing to abdomen)	- Tapping behaviour: finger tapping on throat - Any unusual posturing, which may appear as individual postures or in various combinations: jaw thrust, neck torsion, arching of back, odd arm positioning, rotational distortions of torso/trunk, sensitivity to being touched in abdominal area/flinching - Agitation: pacing, jumping up and down - Unexplained increase in repetitive behaviours - Self-injurious behaviours: biting, hits/slaps face, head banging, unexplained increase in self-injury - Aggression: onset of, or increase in, aggressive behaviour	

A study done by Valicenti-McDermott (2006) showed that GI symptoms such as food selectiveness and abnormal stool pattern appeared to be higher in occurrences when compared to patients with other developmental disorders as well as controls as shown in figure 2.

Figure 2: GI disorders in ASD patients in comparison with patients with other developmental disorders and control [3]



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III. PATHOGENESIS

Chronic inflammation of the GI tract has been recently brought into view as a means of explaining the GI symptoms that affect ASD patients [11]. There are a few proposed variations to explain that how GI dysfunction influences the neurologic response in patients. One concept that has been used to explain it was that an inflamed lining of the intestine causes molecules that are absorbed to be rendered toxic to the brain [12]. This inflammatory action may be induced by the fact that the patient has undergone a course of broad range antibiotics, has insufficient enzymes in the gut or has taken non-steroidal anti-inflammatory drugs (NSAIDs) together with the course of antibiotics [13]. An intestine which is considerably more permeable can be another explanation, whereby this interferes and causes an anomalous gut immune response, which also corresponds to more than one type of food allergy. Due to the inflammation of the gut, it is a common finding that patients with autism generally have a higher number of pernicious bacteria in the bowel. With regards to this, antibiotics are used more frequently in order to combat this problem thus owing to the cause of further inflaming the intestine. Administration of wide spectrum antibiotic causes growth of Clostridium difficile, tremendously thus causing inflammation [14]. Sign like abdominal cramps, constipation and general pain in the abdominal region are reported by patients. A recent analysis showed that the abnormal variances and mean values of mitochondrial biomarkers in ASD individuals varied greatly with controls. Brain imaging studies showed that there is an increase in mitochondrial dysfunction is ASD individuals that exhibit GI symptoms [15]. Despite having many studies being performed, no one mechanism has been solidified as the pathogenesis of GI symptoms in ASD patients.

IV. IMMUNE MODELLING OF GUT DISEASES IN ASD

The immune system and its anomalies has been described in conjunction with atypical cytokine delineation in the gut of patient suffering from ASD with GI disturbances. Cytokines are protein substances that act as chemical carrier in cell signaling mainly in the intercellular capacity in order to elevate or repress the immune activity in the human body. The inflammation in the elevated and decumbent part of the GI tract has been assessed to have a varying degree of intensity [16]. In order to demonstrate specialized immune cells have been discovered to have showcased mottled rubor. An infiltration of cytotoxic T cells (CD8), helper T cells (CD4), γδ T cells and antibody producing plasma cells has been observed in these cases of study. This differentiates the response to inflammation from patients suffering from irritable bowel syndrome (IBS). In these patients, who suffer from GI disorders and are autistic, the site of inflammation is usually focused to the epithelium and basal layers of the intestine tissue layer when compared to IBS patients [16, 17]. One point of observation was that to have an intestinal disease, one does not need to have the particular symptoms [18, 19]. A research has been initiated to study and understand the anatomy and purpose of the GI mucosa in ASD patients in order to link the microscopic anatomy and the cause and development of ASD.

V. ENDOSCOPY OF THE UPPER GI TRACT

It is extremely important that ASD patients that exhibit symptoms of GI distress should be subjected to an upper gastrointestinal endoscopic procedure as there has been studies done which reported a higher frequency of occurrence of upper GI distress in patients suffering from ASD [20]. Gonzalez [2009] studied on a group of paediatric ASD patients, quite a number of them were afflicted with upper GI problems such as gastritis, gastroesophageal reflux disease (GERD) and bacterial infection.

VI. DIAGNOSIS AND TREATMENT

Treatment of ASD patients with GI diseases are not simple as they involve a complex process of assessing their medical history as well as performing a physical assessment of the patient, gross characteristics of stool, stool analysis

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in the laboratory for presence of bacterial aetiology and intestinal invasion of parasitic and fungal origin. In patients with ASD, the purpose of treatment is to reduce the pain, injury, response of the tissue, to increase the intake of nutrients by the body and to reduce the permeability of the intestine in the case of a leaky gut. ASD patients that are sensitive to certain types of food such as casein or gluten should try and avoid them as best as they can as these substances may trigger an allergic hypersensitivity response by which they exacerbate the inflammation in the gut. Immunoglobulin A (IgA) deficiency should also be treated to solidify the weak immune system [21]. In the case of mitochondrial dysfunction that is linked to the GI symptoms, several compounds can be used to target certain sites in the mitochondrion.

A combination of NSAIDs, antibiotics, antifungal therapy, a rigid diet and the consumption of external digestive enzymes should ensure that patients with ASD that have GI disorders lead a better life [23]. Apart from this, it is advisable for them who cannot communicate verbally or just partially to undergo speech therapy in order to be able to convey their discomfort to others, especially to their family members and physician.

VII. CONCLUSION

GI tract reached from the oesophagus to the rectum, the inflammatory response may be anywhere between oral-faecal point of entry.[4] Especially because these patients are not well versed in verbal skills, a full GI assessment should be done to evaluate the condition of the patient or the susceptibility of a patient in getting a GI disorder. Treating GI condition increases the patient's cognitive psychology, lengthens their attention span and improves their rapid eye movement (REM) sleep.

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