International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Gluten Free Casein Free Diet for Children with Autism Spectrum Disorder: A Review

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ABSTRACT

Autism Spectrum Disorder is a group of neurodevelopmental conditions characterized by social and repetitive behaviour. As per WHO it is estimated that worldwide 1 in 160 children has ASD. Based on epidemiological studies conducted over the past 50 years, the prevalence of ASD appears to be increasing globally. Delayed speech, frequent repetition of set words and phrases, no social interactions, sensory changes etc. are the main symptoms of ASD. There is no known cure for ASD, but many different approaches are used to treat the symptoms of the disorders, for example, visual aids are used to improve communication, social stories interventions are used to teach appropriate social behaviour, and medication is used to ameliorate specific symptoms like aggression. Dietary intervention as a tool for maintaining and improving physical health and wellbeing for ASD is a widely researched and discussed topic. Studies have depicted that there is a link between diet, gut epithelial changes and altered immune response in the spectrum disorders exhibited by children with Autism. A gluten-free casein-free diet is also known as the GFCF diet. It is one of several alternative treatments for children with autism. When following this strict elimination diet, all foods containing and casein are removed from the child's daily food intake.Foods that contained proteins such as gluten and casein causes hypersensitivity to children with ASD. The children cannot digest these proteins properly. This result to increase the level of urinary small peptides. These peptides bind to opioid receptors and become biologically active, which results excess of opioid and leads to an increase of the behavioral difficulties seen in the children. Dietary interventions with the exclusion of gluten, casein or both are thought to have a positive effect on behavioral symptoms because of the elevated levels of peptides seen in the urinary analyses. Since the chemical structure of gluten and casein are very similar to each other, it is very likely that having sensitivity to one of them means having sensitivity to both, even though one could be worse than the other. This paper provide an overview of the gluten free casein free diet and its positive and negative results of Gluten free Casein free diet on the basis of reviewing case studies.

Introduction

Autism spectrum disorder is a condition related to brain development that has an influence on how a person perceives and socializes with others. Autism spectrum disorder (ASD) is a complex developmental disorder that involves persistent challenges in social interaction, speech and nonverbal communication and restricted/ repetitive behaviour (American Psychiatric Association, 2013). Autism Spectrum disorder cannot be cured but in order to live independently and carry out the day to day life

activities, children needs to undergo medical treatment, therapies, education and rehabilitation programs. Among therapies, cognitive behavior therapy, psychotherapy, speech and language therapy, horticultural therapy, and diet therapy are the main therapy used for autism. Autism affects nearly one out of every hundred children. A formal autism treatment which can cure the disorder is not yet established. Many parents are trying autism diet and supplements that they have heard from other parents or from the media (National Research Council, 2001). According to the autism network (2010) nearly 1 in 5 children with autism are in a special diet. Dietary intervention is the cornerstone in the treatment of autism, Making calculated omissions and additions to food choices is the first step in improving autistic children's health and wellbeing.

Relation between diet and behaviour

Estevez *et al.* (2000) reported that diet can play an important role in behavior, learning and mood. Diet is important not only for physical health, but also for optimal mental development and functioning. Diet plays an important role in the prevention and management of many kinds of difficulties in behavior, learning and mood. Many people eating the wrong kind of food could be a contributing factor in the rise of mental and behavioural problems. The connection between diet and brain function has been present and growing for many years. A number of health professionals, parents, teachers and patient organizations have repeatedly asserted that changes to diet are mirrored in mental health and behavioral changes. They include, everyday difficulties in behavior, learning or mood that can affect children and adults - at home, at school or in the workplace, developmental conditions - such as ADHD, dyslexia, dyspraxia, and autistic spectrum disorders and mental health conditions - such as anxiety, depression, bipolar (manic-depressive) disorder and schizophrenia.

Diet therapy for Autism Spectrum Disorder

Studies have depicted that there is a link between diet, gut epithelial changes and altered immune response in the spectrum disorders exhibited by children with Autism. Diet therapies include different type of diets, supplementations, exclusion of some compounds etc. Major diet therapies are Gluten free Casein free diet, Specific Carbohydrate Diet (SCD), Feingold Diet and Nutritional supplements (Byron, 1997).

According to Zelman (2019), nearly one in five children with autism are on a special diet. There is no specific diet, but removing certain proteins may relieve symptoms. The Gluten Free Casein Free (GFCF) diet has the most research and is one of the most common dietary interventions.

Gluten Free Casein Free (GFCF) Diet

A gluten-free casein-free diet is also known as the GFCF diet. It is one of several alternative treatments for children with autism. When following this strict elimination diet, all foods containing gluten (found in wheat, barley and rye) and casein (found in milk and dairy products) are removed from the child's daily food intake. GFCF diet is a strict elimination diet, all foods containing gluten and casein are removed from the child's daily food intake. Foods that contained proteins such as gluten and casein causes hypersensitivity to children with ASD. The children cannot digest these proteins properly. This result to increase the level of urinary small peptides. These peptides bind to opioid receptors and become biologically active, which results excess of opioid and leads to an increase of the behavioral difficulties seen in the children. Dietary interventions with the exclusion of gluten, casein or both is thought to have a positive effect on

behavioral symptoms because of the elevated levels of peptides seen in the urinary analyses. Since the chemical structure of gluten and casein are very similar to each other, it is very likely that having sensitivity to one of them means having sensitivity to both, even though one could be worse than the other (Hart *et al.*, 2015).

Gluten Free Casein Free Diet for Autism Spectrum Disorder management

Gluten free casein free diet is one of the most popular treatments for addressing systemic inflammation in the Autism Spectrum Disorder which is healed by strong anecdotal parental reports to greatly improve and even cure symptoms of ASD (Herbert and Buckley, 2013). This section provides an overview of the state of the recent evidence regarding the use of GFCF diet for treatments of individuals with Autism Spectrum Disorder.

Table:1 Summarizes the GFCF intervention research studies, which gave negative result

Sl. No.	Author	Study topic	Duration of the study	Age of participants	Result
1	Christison and Ivany, 2006	Gluten or Casein elimination in children with ASD	10 months	3-22 yrs	Inadequate evidence to delay support or refuse use of GFCF for ASD symptom alleviation.
2	Mulloy, *et al.*, 2010	GFCF diets in treatment of ASD; a systematic review	11 months	4-10 yrs	No new conclusion in light of the new studies.
3	Hyman *et al.*, 2010	GFCF diet a double blind, place to controlled challenge study	12 weeks	30-54 months	No group difference in frequency or quality of stools, sleep, activity, attention / activity ratings.
4	Johnson *et al*; 2011	Effects of GFCF diet in young children with autism a pilot study	3 months	3-5 yrs	. No clinically significant difference in behaviours outcomes for dietary intervention group.
5	Hurwitz 2013.	The GFCF diet and autism limited returns on family investment	Not mentioned	2-16 yrs	GFCF diet does not significantly change functioning of behavior.
6	Mari-caused *et al*, 2014	GFCF type restrictive diet's treatment effectiveness and safety in ASD	Not mentioned	2 yrs – Adults	Evidence of limited and weak in supporting use of GFCF diets for treatment of ASD.

Table 2. Summarizes the GFCF intervention research studies, which gave positive result

Sl. No	Author	Study topic	Duration of the study	Age	Result
1	Mageshwari and Minitha, 2006	Impact of dietary exclusion of casein and gluten on selected autistic children	Regular 6 weeks	2-16 yrs	Statistical significance in pre- and post-intervention behavioural ratings not reported. 80% of intervention subgroup had behavioural improvements with majority improving in hyper activity and digestion.
2	Nznietani *et al*, 2008	Effect of GFCF diet in young children with ASD	2 months	3 to >11yrs	Significant difference in pre- and post-intervention behavioural ratings
3	Whiteley *et al.*, 2010	The scan Brit randomized, controlled, single-blind study of a gluten and casein free dietary intervention for children with ASD	24 months	4-10 yrs	Statistically significant improvements above pre-determined threshold for subjects in the GFCF diet group warranted reassignment of control participants to the intervention.
4	Hue, *et al.*, 2009	Effects of a GFCF diet in children with ASD A case report	11 months	42 months old male	Improved appetite, and reduced post prandial vomiting and constipation within 2.5 months.
5	Gannage, 2010	Integrative autism treatment hire telling medicine's future	3 months	3-5 yrs	Gastrointestinal symptoms were relieved within 1 month and initiating gluten restricted diet.
6	Genuis and Bouchard, 2010	Celiac disease presenting as autism	3 months	3-5 yrs	. Gastro intestinal symptoms were relieved within 1 month and initiating gluten restricted diet.
7	Herbert and Buckley	Autism and diet therapy: case report and review of literature	Not mentioned	5-12 yrs	Language improvements immediate after implementation of GFCF diet. General development in auditing sensitivity. Gradual improvement in tantrum severity and also ignificantly improved several weeks after

					GFCF ketogenic diet was implemented and gastro intestinal symptoms also improved but did not resolve.
8	Patel and Curtis, 2007	A comprehensive approach to treating autism and attention deficit hyper acting disorder a pilot study	3-6 months	4-10 yrs	Improved behavior, social motor and GI symptoms; statistically significant reduction of urinary lead levels;
9	Pennesi and Klein, 2012	Effectiveness of the gluten free casein free casein free diet for children diagnosed with ASD. Based on parental report	Not mentioned	> 6 months	Statistically significant reduction of ASD behavior physiological and social symptoms for sub group with GI symptoms – especially constipation and diarrhea, sub group with allergy symptoms, and sub groups GFCF diet implementation greater than 6 months.
10.	Pedersen, *et al.*, 2014	Data mining the scan Brit study of a gluten and casein free dietary intervention for children with ASD: behavioural and psychometric measures of dietary response.	Not mentioned	4-12 yrs	Statistically significant regression analyses indicate children, aged 7-9 yrs, who have clinically significant ADHD-IV scores at baseline have strongest probability of benefiting from GFCF diet.

Discussion

Literature review has shown significant use of GFCF diets as part of management of children with autism. Longer scientific studies are needed to understand how effective the GFCF diet to autism, because of this reason many scientific studies were incomplete and give negative result. Knowing what is GFCF diet and selecting GFCF ingredients very wisely can help manage autism and avoid nutritional deficiencies associated with elimination diet.

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