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PEPTIDES, GLUTEN, CASEIN AND AUTISTIC BEHAVIOR – A REVIEW

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ABSTRACT… Autism is a complex disease with spectrum of communication deficits and social limitations. There are multiple approaches in explaining this disease. Literature shows an association between peptides and its derivatives to have an effect in altering the mental functions presented as autism. Gluten and casein, forms of proteins have been suggested to aggravate the symptoms and is advised to give a gluten and casein free diet to these patients. Such special diet plans and psychiatric intervention may reduce the symptoms in these patients. More investigations are required to establish the facts regarding effect of diet on autistic behavior.

Key words: Autism, Gluten diet, Casein diet, Peptides, Psychiatry, Mental Health

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INTRODUCTION

Autism is a lifelong, complex, heterogeneous neurodevelopmental disorder characterized by the problems in three major areas: communication, social interaction, repetitive behaviors with restricted interests. Several theories have been proposed in explaining the pathophysiology of autism, few declaring it as genetic abnormality.[1] Some hypotheses have presented deficits in intellectual processing of brain (Theory of mind, Executive dysfunction hypothesis etc.). Environmental factors, dietary deficiencies, emotional isolation, all are various models that have been proposed as the cause of autism. The role of peptides in the symptomatology of autism has also been documented.

Clinical features of Autism

Taking the various studies of diet into account, reported positive effects can be broadly categorized into several areas to include core autism and peripheral symptoms:

- Communication and use of language.
- Attention and concentration.
- Social integration and interaction.
- Self-injurious behavior/altered pain perception.
- Repetitive or stereotyped patterns of behavior.
- Motor coordination.
- Hyperactivity.

Protein derivatives altering brain function

Peptides can gain access to brain by crossing blood brain barrier and can directly affect the neuronal maturation. Both endogenous and exogenous peptide molecules affect brain processing. Exogenous peptides are derived for food sources like gluten and casein. These molecules are metabolically digested in our gut by the enzyme dipeptidyl peptidase. If digestive system is not functioning normally like either due to deficiency of the enzyme or increase in permeability of intestinal membrane, these peptide molecules enter the circulation and cross blood brain barrier to affect neuronal cell.[2]

Comorbid gastrointestinal problems exist which can increase uptake of food derived opioid peptides. Mal-digestion of dietary peptides forms the basis of this theory. Charney states in his book that several investigators have proposed that mal-digestion of dietary proteins, particularly gluten and casein containing foods, produces small peptide molecules gliadomorphin and casomorphin respectively that may function as exogenous opioid peptides. These peptides bind opioid receptors in brain and alter brain function through opioid modulation.[3] Another important fact described states a decrease in activity of dipeptidyl-peptidase in autistic individuals with high peptides level.[4] This abnormal opioid activity leads not only to behavioral problems but also to deficits in attention, learning social communication which are characteristics of autism.[5]

Several studies have been done to test 'Opioid excess theory of Autism'. Abnormally high levels of the peptides have been found in the urine and cerebrospinal fluid of individuals with autism. In a study "Peptides Role in Autism with Emphasis on Exorphins", high level of peptides with opioid activity has been found in urine of individuals with autism. Other studies also confirmed abnormal high level of peptides in urine sample of autistic children. But in one study, "Opioid Peptides and Dipeptidyl-peptidase in Autism", neither high level of peptides were found in urine nor deficit in digestive enzyme was observed.[6,7]

Gluten Free/Casein Free Diet for Autistic patients

However, based on the established data, it was hypothesized that it would be advisable to remove gluten and casein containing foods from diet. This led to Gluten Free/Casein Free (GFCF) diet as the treatment of autism. In this intervention, autistic children are deprived of any food containing gluten and casein, e.g. wheat products, barley, oat, rice and all milk products. GFCF intervention is very simple and easy to implement. Gluten and casein diets are exogenous source of opioid like peptides. The basic purpose of eliminating these foods is to stop opioid peptides from entering in brain in excessive amount. So that these peptides cannot affect brain functioning and see how the symptoms of autism respond to the deprivation of opioid peptides.

There is not any particular training required and anyone even parents can administer it.

In a study evaluated the effectiveness of GFCF diet in treatment of autism. They collected data using 90-item online questionnaire from 387 parents or primary caregivers of children diagnosed with autism on the efficacy of GFCF diet. Parents also reported on their child's GIT symptoms, food allergies and the length of their diet implementation. After analyzing the data, authors have found that GFCF diet is associated with improvement in ASD behaviors in children whose parents reported GI symptoms of food allergies as compared to children without these problems.[8]

Many authors have published literature on all previous researches done the diet effectiveness. A study reviewing past investigations stated that experimentally no universality or validation could be established between success of autistic spectrum of diseases and GFCF diet. Recommendation of such a unique diet for such patients is debatable but by the previous knowledge, it is established that such diet cannot prevent or control the symptoms of autism.[2]

In 2013 a case was reported who had autism and epilepsy. After being put on GFCF diet, the child had reported marked improvement in autism symptoms after 14 months, child was removed from the diagnosis of autism and the epilepsy treatment was offered. This brought in confidence that GFCF diet can be a treatment of autism.[9]

In 1999, an investigation mentioned 522 children on GFCF diet over 5 months period. A teacher interview, observation, psychological testing and urinary profiling was carried. Results suggested that participants on a gluten-free diet showed an improvement on a number of behavioral measures. However there was no significant decrease in specific urinary compounds excreted

when compared with controls and a gluten challenge group[10]

A study investigated through four hundred and seventy articles and analyzed the effectiveness of diet intervention in autism. They conclude that efficacy of GFCF diet interventions for individuals with autism is inconclusive and further studies with sound methodology are required to make a final comment.[11]

On the other side there was another fact established by a study published in 2013 in tested the efficacy of GFCF diet in treating autism using a double blinded study design. 12 children were selected and they were followed over five weeks. Data was collected and it was observed that no statistically significant improvement occurred in symptoms. The interesting thing was that the parents reported improvement in the symptoms of the children.[12]

Authors' View point

There were some studies that have not found any improvement in symptoms despite being on GFCF diet. It is possible that studies stating no improvement in autistic symptoms with GFCF diet may be due to limitations in the methodology used or smaller participant numbers. Short trial duration, problems associated with the outcome measures used, problems with the monitoring of dietary adherence can be some causes affecting the results. Also it was not mentioned whether those children were receiving any other intervention along with special diet. If they were under behavioral therapy, it might be possible that the improvement was due to therapy sessions. Findings were mostly based on the parents' observation so these results are based on subjective evaluation. It is also not analyzed yet that what positives changes are present in quality and functioning of individuals with GFCF diet, i.e. these clinical improvements in behavior actually cause statistical improvement in functioning of individual.

Also we know that wheat and milk products are important sources of vitamins and calcium which play vital role in immunity and mineralization of bones. If we deprive children of these foods, it means they are also not getting essential nutrients which may put them at risk of poor physical health. It is necessary to replace all these ingredients through alternate foods during treatment period.

A child may be hypersensitive to the texture, smell, and temperature of foods and become easily overwhelmed during mealtime, triggering a tantrum and food refusal.[13]

CONCLUSION

At this point in time we need more evidence based studies to establish that GFCF diet can treat or minimize the autistic symptoms. For now, we can say that it is better to redirect such individual for this kind of diet though the studies supporting it are not validated in every population. Also along with dietary changes, it is better to undergo other psychiatric interventions that can help modify the mind status which will eventually lessen the symptoms.

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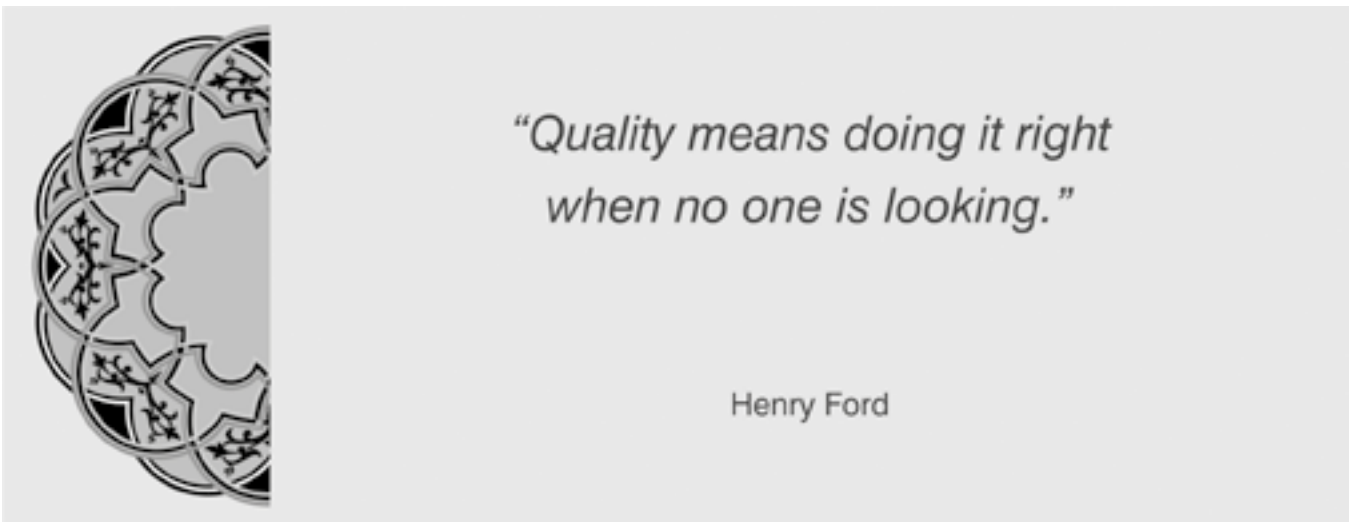

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