



NUTRITION AND COGNITION IN CHILDREN

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ABSTRACT

Diet provides the food components that are converted into health and life sustaining nutrients by metabolic processes. Foods affect body's biochemistry by influencing the food factors that can make some children very sensitive to foods and chemicals. Food intolerance can cause a variety of problems including hyperactivity, co-ordinated issues, emotional instability and short attention span. These children are at increased risk of behavioural issues and oral diseases. Children have specific dietary needs based on their unique biochemistry, health history and genetics. There is growing need to customize diet and nutrition to prevent these children from behavioural changes as well as oral diseases. The clinical application of diet and nutrition intervention that is customised to the unique need of children. Implementation of these recommendations can assist the paediatric dental team as they join paediatric nutritionists in delivering the best possible care.

KEY WORDS: Nutrition, Diet, Bio-individual diet

INTRODUCTION:

Diet and nutrition are the process of taking in nutrients from the foods. Diet provides food components that convert into health and life-sustaining nutrients by metabolic processes.¹ Adequate brain function is a prerequisite for efficient cognition and the organized behaviour. Indeed, the uninterrupted activity of the brain is of vital importance to the survival of the organism since it ensures the continuous performance of many essential voluntary and involuntary functions.¹ Nutrition disorders and compromised nutritional status are common among children with special health care needs.

FOOD INTOLERANCE AND COGNITIVE EFFECTS:

Food affects body's biochemistry by influencing food factors that can make some children very sensitive to food and chemicals called food-intolerance. Food intolerance can cause variety of problems including hyperactivity, short-attention span, co-ordinated issues and emotional instability.

Many food types are there which can cause food-intolerance. **1.** Artificial colours and dyes like tartrazine, allura red, ponceau 4R, Quinoline yellow WS, Sunset yellow (FD&C Blue no.1 and 2, FD&C Green no.3, FD&C Red no. 3 and 40) can lead to many behaviour issues. Artificial colours found in candies, soft drinks, juices, cereals etc.² **2.** Caffeine is also a food which affects child's emotions and body. Caffeine most commonly found in coffee, cola, hot-chocolate, ice creams, bars etc. caffeine is a diuretic so it flushes out many important minerals from body like Calcium, magnesium and Zinc.² **3.** Essential fatty-acid can lead to behaviour disturbances, water loss, failure in healing, growth retardation and mental deterioration in ADHD and Dyslexia children as they cannot convert and digest essential fatty-acids. Docosahexenoic acid (DHA) and Arachidonic acid (AA) are directly given to these children.² **4.** Preservatives which are added into packed food to preserve them for long time are affecting child's behaviour like Mood and behaviour changes, head-aches, abdominal cramping and hyperactivity. Preservatives like Nitrates, Nitrites, Na benzoate and Mono sodium glutamate are harmful. Special children like Autism, Attention Deficit Hyperactivity Disorder (ADHD), Dyspraxia, Dyslexia etc. are at increased risk of symptoms of food intolerance.

CHALLENGES FOR PEDIATRIC DENTIST:

Paediatric Dentist faces problems while treating these special children as they are not so cooperative as well as they are suffering from emotional instability due to food intolerance. Behaviour management has to be done with these kinds of children.¹ Right diet and nutrition are advisable to deal with them. Right diet and nutrition do plenty of good things in an individual's body like Support biochemistry and body systems for healing, increase clinical effectiveness, reduce dependence on certain medical and/or pharmaceutical interventions, Improve and restore nutrient status, Balance intestinal flora for gastrointestinal support. So, for managing these children we have to strategize the bio-individual diet.

DISCUSSION:

Bio individual diet is the science and clinical application of diet and nutrition intervention that is customized to the unique needs of an individual.³ Bio-individual diet strategizes according to the specific dietary needs of the child based on their unique bio-chemistry, health-history and genetics. Bio-individual

diet can be strategizing with following steps,

1. Understanding Chronic Disease
2. Determining Bio-Individuality
3. Discovering How Foods Affect Bio-Chemistry
4. Mastering Special Diets
5. Customizing Bio-Individual Nutrition Strategy
6. Evolving Diet

In bio-individual diet therapeutic and customized diet is advised to a child according to their biochemistry. Customized diet excludes food intolerance substances like oxalate, salicylates, complex saccharides, glutamate, casein etc.

Low oxalate diet:

Oxalate is an organic acid which occurs in many plants, where it is synthesised by the incomplete oxidation of saccharide. Primary source of oxalate is fungus such as aspergillums, penicillium, and candida.⁴ Limit of oxalate is 40-50 mg/day. Avoid high oxalate diets (10-20mg oxalate/ serving) which include chocolate milk, soya cheese, coca, nuts, kiwis, black berries, wheat bran.⁴

Ketogenic diet:

Ketosis is a normal metabolic process when the body does not have enough glucose for energy, it burns stored fats instead; this results in a build-up of acids called ketones within the body.⁵ In this diet we encourage ketosis by having ketogenic diet. Avoid high glucose diet which includes grains (wheat, corn, rice, cereals), sugar (honey, maple syrup, chocolates etc.), fruits (apple, banana, oranges etc.) and tubers (potato, yams, ginger etc.)

Low histamine diet:

Histamines releases from mast cells of the body, children with histamine intolerance (who have low histamine metabolizing enzyme which is diamine oxidase) have difficulty to digest histamine food are advised to have low histamine diet.⁶ So, avoid high histamine diet which includes pickle, matured cheese, smoked meat products, vinegar, nuts, ready meals, salty snacks etc.

Low FOODMAPS diet:

FOODMAPS (Fermentable Oligosaccharide Disaccharide Monosaccharide and Polyols). FOODMAPS is a group of carbohydrates that ferment easily when contacts with bacteria. Foods high in fermentable bacteria are difficult to digest.⁶ FOODMAPS intolerance caused by lacked of digestive enzyme like GLUT 5 which needs to transport fructose across the gut membrane, results excess FOODMAPS which are not absorbed through digestive membrane and are left in the colon which causes discomfort and gas leads to cramps, diarrhoea, constipation etc.⁶ Avoid high FOODMAPS diet which includes, garlic, ripe bananas, kidney beans, avocado, raisins, veg and legumes, fruits with high fructose, prebiotic food and dairy foods.

Glutamate diet: Glutamate is an anion of glutamic acid and its role is as a neurotransmitter; a chemical that nerve cells used to send signals to other cells. Precursor of Glutamate is mainly dietary sources. Glutamate can also produce artificially and combined with sodium to keep it stable known as Monosodium Gluta-

mate (MSG).⁷ MSG is the sodium salt of glutamic acid and non-essential amino-acid which is used as flavour enhancer in packed food. Glutamate balanced diet is advised in neurodegenerative conditions like Autism, Alzheimer's disease, Parkinson's etc. Avoid source of MSG which includes hydrolysed protein, gelatine, tomatoes, cheese, meat soups etc.⁷

GFCF diet:

Gluten free casein free diet is also called Autism diet. Gluten is a protein found in wheat, barley and rye. Casein found most in dairy products and milk. Autistic child is unable to breakdown casein and gluten and have increased intestinal permeability (leaky guts) so the undigested or partially digested proteins leaks from wall of intestine and combine into blood.⁶ These proteins reach to brain and can lead to imbalanced functions of brain, impaired speech, behaviour changes etc.⁸ Avoid gluten and casein from diet which includes starchy vegetables, packed food, pasta, cereals, yogurt, honey, sugar, dairy products etc.

SCD (Specific carbohydrate diet) diet:

SCD removes complex carbohydrates replace by simple carbohydrates which can be easily digest. SCD diet is designed to promote gut functioning, supposed to lead to improvement in behaviour, cognitive and language development in children. SCD diet removes, starch food, sugar food, complex carbohydrates, detoxification and reboot. SCD diet allows vegetables, legumes, unprocessed meat, fish eggs, natural cheese, homemade yogurt etc.

CONCLUSION:

With the help of diet counselling we can do behaviour management of special health care needs children as well as normal child in clinical practise. It is safe and there is no adverse effect. Doctor of the future will treat the disease with the help of nutrition rather than the help of the medicine.

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