Original article
Correlates of Dietary Profile, Nutritional, and Health status among children with reference to autism spectrum disorder

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ABSTRACT

Autism spectrum disorder is a serious neurodevelopment disorder that impairs a child's ability to communicate and interact with others. It also includes restricted repetitive behaviours, interests and activities. Disorder begins in the childhood marked by abnormal or impaired development in social interaction and communication and marked by restricted variety of activity and interest, manifestation of the disorder vary. Children with autism have deficit in reciprocal social interaction like poor eye to eye contact and not responding to the names, deficit in verbal and non verbal communication, stereotypical behaviour, sensory deviation, abnormal play and mood effect. Often this has tended to result into developmental anomaly in autistic children. With this backdrop the present cross sectional clinical based study is carried out with an aim to assess the nutritional, health and dietary status among Autistic children. 30 children age group between 2-13 years diagnosed with autism spectrum disorder who were attending to the treatment at All India Institute Of Speech And Hearing, Mysuru south region of Karnataka formed the study participants. Respectively 20 children without ASD of similar age under normal setting were included in the study as a counterpart with ASD children depending on the developmental level and chronological age of the individual. Findings: Children with autism have been found to have impaired health status and follow certain diets such as casein free gluten free and low lactose diet. Certainly oral and motor problems are the most common health problems experienced by ASD children. In fact children with ASD possess dietary abnormalities due to presence of oral motor problems and disaccharidases in the intestinal juices. Incomplete digestion of dietary gluten and casein in the lumen of the small intestine and increased absorption of incompletely hydrolysed peptides tend to impair the nervous system. Besides, these peptides found to demonstrate biological activity similar to endogenous opioid peptides. Wasting, overweight, obesity, vitamin and mineral deficiencies are the commonly experienced consequences by the autistic children as result of poor nutrition intake and GI function.

Researchers have hypothesized that the mother’s nutritional status to be among the environmental cause of autism development that interact with genetic factors. Indeed, multiple studies have established strong correlations between dietary behaviours of mother towards higher risk of autism in the child. Typically conventional treatment with combination of pharmacotherapy, behavioural and dietary therapy found to be beneficial in the management of autistic disorder. Especially adapting an appropriate personalised diet could alleviate the severity with respect to the psychological and gastrointestinal symptoms.

1. Introduction

Autism is an eurodevelopment disorder with symptoms arising that are apparent throughout the patient's lifespan. Autism Spectrum Disorders (ASD) are characterised by impaired social and communication interactions as well as restricted, insecurity and repetitive behaviours (ICD10). Of vital importance, the early diagnosis and interventional strategies have been proven to be conducive towards treating health risks in autistic patients. It is often believed that both genetic and environmental factors tend to influence on disease development. Furthermore findings have been emphasized the significance of précised diagnostic approach to detect early manifestation of autism symptoms including both psychological, gastro-intestinal and metabolic issues [10]. Autistic individuals likely suffer from leaky gut syndrome caused by intestinal mucosa damage, inflammation and abnormal bacterial overgrowth leading to a disorder of bowel motility [11]. Certainly other symptoms include hypochlorhydria of the gastric juice (low gastric acid secretion) and decreased activity of disaccharidases in the intestinal juices. Incomplete digestion of dietary gluten and casein in the lumen of the small intestine and increased absorption of incompletely hydrolysed peptides tend to impair the nervous system. Besides, these peptides found to demonstrate biological activity similar to endogenous opioid peptides. Wasting, overweight, obesity, vitamin and mineral deficiencies are the commonly experienced consequences by the autistic children as result of poor nutrition intake and GI function.

Researchers have hypothesized that the mother’s nutritional status to be among the environmental cause of autism development that interact with genetic factors. Indeed, multiple studies have established strong correlations between dietary behaviours of mother towards higher risk of autism in the child. Typically conventional treatment with combination of pharmacotherapy, behavioural and dietary therapy found to be beneficial in the management of autistic disorder. Especially adapting an appropriate personalised diet could alleviate the severity with respect to the psychological and gastrointestinal symptoms.

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MATERIALS AND METHODS

The proposed investigation is a prospective school based study conducted among children aged between 2-13 years. The study was carried out with an interest to collect data about the nutritional status, and dietary status of the children.

The study was conducted on the 30 diagnosed autistic children between the age group of 2-13 years attending to the treatment at All India institute of speech and hearing and 20 children without Autism of same age under normal conditions. With obtaining approval from the selected academic institution; the purpose as well as the protocols of the study was explained to participants. A written consent was obtained from the children care takers who agreed for the participation in the study. All the selected participants were screened for nutritional status and dietary patterns.

Selection criteria

Children who had typical signs and symptoms of autism such as repetitive behaviours, reduced eye to eye contact, irritability and who had mild to moderate cases were included in this study and children who had severe symptoms of autism and other cases such as seizures, schizophrenia, OCD & bipolar disorders, coordination disorder were excluded in this study.

Tools for the study

With obtaining approval from the selected academic institution, the purpose as well as the protocols of the study was explained to participants. A written consent was obtained from the children care takers who agreed for the participation in the study. All the selected participants were screened for nutritional status and dietary patterns.

Anthropometric assessment: assessment included the measurements of height and body weight.

Clinical assessment: Clinical assessment of the subjects was performed according to the schedule described by Jelliffe. It includes an orderly examination of the obvious physical sign/symptoms for deficiency disorders initiating from hair, skin, eyes, teeth, gum etc.

Dietary intake:

24 hour recall method: An interview schedule was developed to elicit information about all foods that were consumed in quantity 24 hours previous three days including both working and non-working days. Participants who cooperated to answer the queries by recalling what had been consumed previous day 24 hours before selected. This was an interview method of data collection, and obtained on one to one basis. Standard measures such as cups, tumbler, spoon and models for chapathi, dosa and ragi ball were used as display items to quantify the intakes. Subjects were assisted to remember the food items consumed during the regular meal eaten as well as with other meal. In case of milk, curd/butter milk the extent of dilution was also assessed. For items like fish/meat/mutton the number of pieces and the appropriate size of each piece were noted. From the recall data intake of nutrients were calculated using a standardised ready recknor for cooked foods by weighment method in the laboratory. Energy, protein, fat, calcium, iron and β carotene intakes were assessed.

Food frequency schedule: It includes the qualitative information about the frequency of different foods consumed by the subject. It also includes information about likes and dislikes of the subjects about each food items and regularity of eating different meals.

RESULT

Out of the 30 diagnosed autistic children the prevalence was observed to be higher in boys than in girls. The overall health status as seen in figure 1 was slightly compromised in autistic children compared to normal children. It revealed that 40% to 32% of autistic boys of the age group 2-5 and 6-9 years respectively were observed to be energetic. Respectively 12% of autistic boys with age group of 2-5 years was feeling fatigue. While, the frequency of falling ill was found to be more in autistic children compared to the normal children as shown in fig 1a and 1b. Markedly 32 to 20% of autistic boys with age group of 2-5yrs and 6-9yrs respectively often fell ill.

Various common sicknesses were observed more in children with autism in comparison to the children without autism. To greater extent 12% of autistic boys aged between 2-5 years suffered from diarrhoea, while 8% to 12% of autistic boys aged between 2-5 yrs and 6-9 yrs respectively had frequent allergies.

Figure 2a and 2b illustrates the wasting and stunting incidence in both the genders with and without autism based on water low classification. Typically there was 25% increment in weight and height is achieved during growing period and influence on the extent of developmental attainment. In view appropriate weight to the height is an important indicator to evaluate nutritional status of an
individual. Data reveals that 32 to 36% of autistic boys between age groups 2-5yrs and 6-9yrs respectively were observed to have normal weight by age and height by weight. Comparatively 16% of autistic boys were wasted. There was no observed significant difference seen in weight status among normal girls.

Figure 2a : Prevalence of wasting and stunting in boys with autism and without autism

Out of 30 autistic children involved in the study as shown in figure 3 depicts the feeding problems seen in autistic children. Data revealed that 37% of autistic girls had chewing problems compared to autistic boys. Markedly 23% of autistic boys predominantly were observed with swallowing difficulties. Often 20% of autistic children had choking problems. Anecdotal reports from parents, teachers and caregivers suggest that inappropriate behaviours in children with ASD evidence to be the reason for the common feeding problem occurrence.

Figure 3 : Feeding problems in ASD children

Figure 4 : GI problems seen in normal and autistic children

Data from figure 3 reveals the various coexisting problems such as GI dysfunction and immunological symptoms with autism disorders. Markedly autistic children exhibited GI problems in comparison with normal counterparts. Higher percentage of Autistic boys had experienced GI problem in comparison with autistic girls.

TABLE 1: Specific diets followed by children with and without autism

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>NORMAL</th>
<th>Autistic behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIRLS N=11</td>
<td>BOYS N=9</td>
<td>GIRLS N=5</td>
</tr>
<tr>
<td>CFGC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low lactose</td>
<td>9.1(1)</td>
<td>11.0(1)</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>36.4(4)</td>
<td>44.4(4)</td>
</tr>
<tr>
<td>Other</td>
<td>54.5(6)</td>
<td>55.5(5)</td>
</tr>
</tbody>
</table>

Findings from table 1 illustrate the special diets followed by autistic children and normal children. Data reveals that majority of autistic children followed vegetarian diet while 40% and 12% autistic girls and boys followed low lactose diet. In addition 16% of autistic boys followed CFGC diet and 12% autistic children followed elimination diets. Autistic Children found to have leaky gut syndrome that acts as brain opiates originated from improper digestion of proteins such as casein and gluten.

Nutrient Intake

Analysis from table 2a and 2b portrays the mean nutrient intake and its percentage of nutrient adequacy observed in children with and without autism. Findings reveals that percent energy intake was not adequate in children of both the groups in comparison with standard RDA 2010. Percent energy intake of autistic boys found to be lower in comparison with autistic girls. Protein intake of normal children found to be 80% to 90% where as autistic children was 70% to 80%

Mineral consumption was lower among autistic children in comparison to their counterpart. Intake of iron was found to be 59% to 63 % while among normal children was 80% to 88%. Calcium and β - carotene intake of normal children and autism children was lower.
DISCUSSION

The proposed investigation is a prospective clinical study conducted among children aged between 2 to 13 years. The study was carried out with an interest to collect data about the nutritional status and dietary status of the children with and without autism. Approximately 30 diagnosed autistic children between the age group of 2–13 years undergoing treatment at All India Institute of speech and hearing and 20 children without Autism of same age under normal conditions formed study population.

Out of the 30 diagnosed autistic children the prevalence was observed to be higher in boys than in girls. Productivity of health was more compromised in ASD children compared to normal children. To a greater extent children with autism were wasted. Children with ASD exhibited oral motor problems and GI problems consequently resulting to poor food intake.

CONCLUSION

Dietary abnormalities to be one of the underlying situations experienced by the autistic children due to presence of oral motor problems and lower GI tract problems. Findings reveal inter-linkages between metabolic alterations, poor gastrointestinal function with behaviour abnormalities among autistic cases. Dietary therapy is insufficient alone to effectively treat autism. Comprehensive dietary regime including omega-3 fatty acids and vitamins in combination with medical and psychological interventions proven to correct nutritional deficiencies in autistic cases. In fact appropriately designed elimination diet has led relief of autism symptoms and occurrence of gastrointestinal complaints. In accord data elicit the necessity of dietary management in correcting nutritional risks in autistic children.

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Mysore for giving permission to carry out the research work. I would like to place my special thanks to Dr Shyamla KC and Ms Suchithra professor of speech and language pathology and the students of psychology AIISH mysore for their assistance and valuable support. I would like to place my special thanks to Ms Padmavathy K, senior dietitian for providing me encouragement and valuable guidance to carry out my research work.

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