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A COMPARATIVE STUDY OF MICRO NUTRIENT STATUS IN CHILDREN WITH LEARNING DISABILITY

Biochemistry

Divya D Nambisan Research Scholar, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Churu Rd, Vidyanagari, Churela, Rajasthan

Dr Jithesh TK* Associate Professor, Dept of Biochemistry, MES Medical College, Palachode, Malappuram *Corresponding Author

ABSTRACT

Learning disabilities (LD) affect up to 10 per cent of children in India. Prevalence estimates for LD in the US population range between 5 and 9 per cent. Learning disorders are a Bumbershoot term for a broad class of education problems. The status of micronutrients can influence cognitive function at any age. Vitamin and trace elements deficiencies could influence memory function and might contribute to the progression of learning disability. Nutrition is a modifiable lifestyle factor and may be relevant to the pathogenesis of LD. In the present study, we have investigated the influence of the micronutrients on cognitive functions of children having a learning disability. In this study, an attempt was made to assess the role of nutrients not only to monitor the changes in children with disabilities but also its role in prognosis as well as in the management. Our study clearly shows that micronutrients status have a strong association with learning disability and Correction of nutritional deficiencies following linguistic therapy, drastically improves learning ability of children having LD.

KEYWORDS

learning disability, nutrition, micronutrients, cognitive function, linguistic therapy

INTRODUCTION

The status of micronutrients can influence cognitive function at any age. Vitamin and trace elements deficiencies could influence memory function and might contribute to the progression of learning disability1. Nutrition is a modifiable lifestyle factor and may be relevant to the pathogenesis of LD2. Diet, in particular, has become the target of intense research in association with cognitive ageing and neurodegenerative diseases. Nutrients are bioactive molecules that are important and functional to human health. The bulk cannot be internally synthesized by the human body and must be derived from food. About 30% of healthy children have subclinical malnutrition of one or more dietary components, such as vitamins. Correction of such deficiencies might have a role in preventing or retarding cognitive decline in later life[3].

Biochemical studies of LD may aid us to realize the connection between exact pattern deficits causative to learning disorders. Furthermore, identification of biochemical impairments of these abnormalities may provide a useful guideline for the treatment of learning disorders4. An educated child will struggle with low self-esteem, anger and other problems. Professionals in mental health may help young people understand these emotions, improve coping skills, and create healthier relationships. Keeping given the importance of the micronutrients and their achievement status and lack of conclusive studies in this area, it was thought worthwhile to undertake researches in this area[5].

The status of micronutrients will influence the function of the brain at all ages. Vitamin deficiencies can affect memory function and lead to LD. The control of mental function and mood includes vitamin B6, which contains three chemically distinct compounds: pyridoxal, pyridoxamine and pyridoxine. Vitamin B6 is also a cofactor of critical homocysteine re-methylation and deficiency is related to elevated levels of blood homocysteine. Homocysteine is a risk factor for stroke and may also have direct harmful effects on central nervous system neurons. There are conflicting cross-sectional and prospective data on the association of vitamin B and folate with LD and cognition[6].

Vitamin therapy with folic acid, alone or in combination with B6 and B12 Vitamins and dietary supplementations using enriched cereal grain products and folate-based breakfast cereals can reduce plasma homocysteine levels, with a reverse relationship to the dietary intake of folate and vitamins B6 and B12.Epidemiological data on diet and cognitive decline in humans suggest that specific macro and micronutrients may have a preventive effect even if data are still conflicting. The disparities in relationships of meat/animal food dietary models with cognitive function may result from beyond study variations in total energy intake, as well as the mechanisms used for assessing cognition and sample size. Higher intake vitamins, flavonoids, unsaturated fatty acids, fish; higher levels of vitamin B12 and Folate; and lower total fats have been linked to a lower risk for Ld[7].

MATERIALS AND METHODS

A case-control study was conducted at Sevana speech and hearing centre for 18 months. A total of 100 children recruited for the study. Test population includes 60 LD children and 40 age and sex-matched controls included with the above criteria Control population included Normal children of 6 – 15 years of Age. Test population included children having LD of 6 – 15 years of Age. Test population further divided based on management and treatment.

Linguistic profile test (LPT) was used for assessing the functioning levels of children with language impairments in the following component skills of the language: phonology, semantics, syntax, auditory reception, receptive vocabulary, aural comprehension and verbal expression. Biochemical parameters are estimated photo metrically using specific standard procedures.

RESULT AND DISCUSSION

The study is conducted in 40 control subjects of the Age (7.55 ± 1.75) years and 60 LD Subjects. The Age at pre-test of the LD subjects is (7.35 ± 1.68) years, and post-test is (8.35 ± 1.68) years. The height, weight and BMI of the control subjects is 123.58 ± 7.18 cm,23.18 ± 5.86 Kg and 14.98 ± 2.46 Kg/m2 respectively. Based on this analysis, researcher found out those micronutrients such as vitamin D, C, B vitamins and minerals (Magnesium & Zinc) affect the cognitive functions of children with LD. The level of micronutrients can be positively connected to hormonal conditions. Low catecholamine and thyroxine are present in LD. Women. Women. Fixing dietary deficiencies after language therapy significantly enhances children with LD's learning ability.

Figure 01: Mean age of subjects in control (n=40) and test groups.

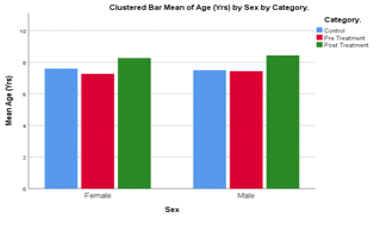

Table 01: Distribution mean of parameters among the control and test groups

Parameters	Control (n=40)	Pre Treatment (n=60)	Post Treatment (n=60)	p
Age (Yrs)	7.55 ± 1.753	7.35 ± 1.676	8.35 ± 1.676	<0.01**

Height (cm)	123.58 ±7.179	122.6 ± 6.551	126.15 ±6.483	<0.01**
Weight (Kg)	23.18 ± 5.857	22.95 ± 5.64	25.1 ± 5.577	0.086
BMI (Kg/m2)	14.98 ± 2.462	15.08 ± 2.392	25.1 ± 5.577	<0.01**
Vitamin D (ng/mL)	32.03 ± 3.704	25.7 ± 4.496	30.25 ± 3.368	<0.01**
Vitamin C (mg/dL)	1.068 ± 0.152	0.658 ± 0.206	0.987 ± 0.178	<0.01**
Folate (ng/mL)	16.56 ± 2.619	14.59 ± 3.061	17.47 ± 2.463	<0.01**
Vitamin B6 (µg/L)	36.3 ± 4.978	22.22 ± 6.707	35.05 ± 5.173	<0.01**
Vitamin B12ng/dL)	64.88 ±10.802	46.37 ±12.384	63.78 ±12.571	<0.01**
Magnesium mg/dL)	1.91 ± 0.1692	1.762 ±0.1223	1.845 ±0.1254	<0.01**
Zinc (µg/dL)	85.98 ± 6.758	66.6 ± 8.718	84.1 ± 7.512	<0.01**
LPT Test score	260.38 ± 10.0	252.97 ± 10.6	263.65 ± 11.6	<0.01**

CONCLUSIONS

Micronutrients such as Vitamin D, C, B vitamins (Folate, B6 & B12) and minerals (Magnesium and Zinc) have a positive influence on the cognitive functions of children having LD. Correction of nutritional deficiencies following linguistic therapy drastically improves learning ability of children having LD.

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