

Nutritional Status and Micronutrient Assessment in Children with Cerebral palsy

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Abstracts

Introduction: Cerebral palsy (CP) is essentially a permanent disorder affecting movement and posture, causing limitations in activity due to non- progressive disturbances that occur in the developing fetal or immature infant brain. **Aim of The Work: The aims of this study are to:** To measure levels of micronutrients in children with cerebral palsy. To compare serum level of micronutrients in children with cerebral palsy with neurologically normal children. To study relation between serum micronutrients level and nutritional status of children with cerebral palsy. **Patients and Methods:** This is a prospective case control study which was conducted at Mallawi and EL_Minia university hospital during the period of (September 2017 to February 2018). The total number of the study sample was 90 children aging (2-12) years. The total 90 children included in the study were classified into two groups. **Results:** Data were collected, coded, revised, entered and all statistical analyses were performed to the Statistical Package for Social Science (IBM SPSS) version 21. Results are expressed as means \pm SD (range) for quantitative data and by No. (percentage) for qualitative data. **Recommendations: From the obtained results, it could be concluded that:** Our present results revealed that children with cerebral palsy have significantly lower level of micronutrients (Zinc, copper, magnesium and iron) and abnormal CBC values as compared to neurologically normal controls. Also, micronutrients levels were positively associated with body weight. Lower levels of these micronutrients may affect cognition, behavior, social interaction and developmental outcomes and hence quality of life. In light of our findings, it is recommended to follow children with CP by a clinical dietitian. Also, adjuvant micronutrients therapy should be seriously considered in the management of cerebral palsy children to obviate complications that may arise from such nutritional insufficiencies. Nutrition education should therefore be included families of children with cerebral palsy, especially to formulate and implement nutrition education programs to correct micronutrient deficiency. This study had some limitations such as, the relatively small sample size, blood sampling and storage methods till analyses which may have one of improper steps that might give inaccurate results and also, micronutrients analyses require an expertise and equipments that are not readily available in clinical laboratories. So, further prospective larger studies are warranted focusing on the nutritional assessment and micronutrients levels in relation with cerebral palsy in children.

Keywords: CBC: Complete blood count, Cu: Copper, CNS: Central nervous system

Introduction

Cerebral palsy (CP) is essentially a permanent disorder affecting movement and posture, causing limitations in activity due to non- progressive disturbances that occur in the developing fetal or immature infant brain (Park et al., 2011).

CP is one of the most common causes of physical disability in childhood, with a reported prevalence of approximately 1.5–3

per 1,000. It has been estimated that 80% of the global prevalence of CP is in low resource countries, having larger populations and potentially greater incidence rates (McCullough et al., 2013).

El-Tallawy et al reported that 52 of 25,540 children in Al-Karga District, Egypt, had CP, giving a prevalence of 2.04 (95% confidence interval 1.48–2.59) per 1,000 live births (El-Tallawy et al., 2011).

Also, it was reported that cerebral palsy (CP) is one of the most common life-long developmental disabilities and affects approximately 1 per 500 live births (Rosenbaum, 2007).

The etiology of CP is very diverse and multifactorial. The causes are congenital, genetic, inflammatory, infectious, anoxic, traumatic and metabolic. The injury to the developing brain may be prenatal, natal or postnatal. As much as 75%-80% of the cases are due to prenatal injury with less than 10% being due to significant birth trauma or asphyxia. The most important risk factor seems to be prematurity and low birth weight with risk of CP increasing with decreasing gestational age and birth weight. Cerebral palsy is seen in 10-18 % of babies in 500-999 grams birth weight (Michael, 2004).

The topographic classification of CP is monoplegia, hemiplegia, diplegia and quadriplegia; monoplegia and triplegia are relatively uncommon. There is a substantial overlap of the affected areas. In most studies, diplegia is the commonest form (30%-40%), hemiplegia is 20%-30%, and quadriplegia accounting for 10%-15%. In an analysis of 1000 cases of CP from India, it was found that spastic quadriplegia constituted 61% of cases followed by diplegia 22% (Singhi et al., 2002).

Aim of the Work

The aims of this study are to:

To measure levels of micronutrients in children with cerebral palsy.

To compare serum level of micronutrients in children with cerebral palsy with neurologically normal children.

To study relation between serum micronutrients level and nutritional status of children with cerebral palsy.

Patients and Methods

This is a prospective case control study which was conducted at Mallawi and El-Minia university hospital during the period of (September 2017 to February 2018). The total number of the study sample was 90 children aging (2-12) years. The total 90 children included in the study were classified into two groups as follow:

Group (I): Cases: Included 45 children with a diagnosis of cerebral palsy attending child clinic.

Group (II): Control: Included 45 normal healthy control children of matched age, sex and neurologically normal.

All included children were chosen according to the following criterias:

Inclusion criteria:

Children with cerebral palsy aged 2-12 years.

Exclusion criteria:

Children with persistent diarrhea or infection.

Children with chromosomal abnormalities.

Children with neurological diseases except cerebral palsy.

Children with chronic liver disease or kidney disease.

Children with cerebral palsy under 2 years, or older than 12 years.

Ethical considerations:

Ethical permission was sought from a Faculty of Medicine Research Ethics Committee before the beginning of the study. The aim of study was explained to parents of each participate before collection of data. Consent was taken from those who welcome to participate in the study. All included studies and investigations are widely used in clinical practice and are safe to children. Privacy of all data was assured.

Results

Table (1): Correlations between body weight and micronutrients in studied groups.

Correlation	groups		
	Group (I) Cases	Group (II) Control	Total cases
	Weight	Weight	Weight
Magnesium	0.35*	0.18 ^{NS}	0.26*
Zinc	0.12 ^{NS}	0.16 ^{NS}	0.19 ^{NS}
Copper	0.07 ^{NS}	0.24*	0.29*
Iron	0.27*	0.19 ^{NS}	0.32**

Discussion

Cerebral palsy is the most common cause of physical disability in children, with a prevalence of 2.5-2.0/1000 live births (Abas et al., 2017) and it was reported that CP prevalence was 2.04 per 1,000 live births in Egypt (El-Tallawy et al., 2011).

Micronutrients such as iron, zinc, magnesium and copper have an important impact on health, social interaction and behavioral outcomes (Schoendorfer et al., 2012). In addition, micronutrients have been implicated in the functioning of nervous system and their deficiencies are a critical concern among cerebral palsy children (Kalra et al., 2015).

This is a prospective case control study included a total of 90 children aging (2-12) years who were classified into two groups: Group (I): Cases: Included 45 children with a diagnosis of cerebral palsy. Group (II): Control: Included 45 normal healthy control children age, sex matched and neurologically normal. The aims of this study are to measure levels of micronutrients in children with cerebral palsy, compare serum level of micronutrients in children with cerebral palsy with neurologically normal children of similar nutritional status and to study the relation between serum micronutrients level and nutritional status of children with cerebral palsy.

The present results revealed that CP children had statistically significant higher rural residence, vaginal delivery and consanguinity, also, CP children had higher incidence of NICU admission and maternal problems compared to controls (Table 1). These results agreed with those of Schoendorfer et al., (2011) they found that CP cases had higher incidence of vaginal delivery and consanguinity compared to controls. Also, Kalra et al., (2015) reported similar findings.

Recommendations

From the obtained results, it could be concluded that:

Our present results revealed that children with cerebral palsy have significantly lower level of micronutrients (Zinc, copper, magnesium and iron) and abnormal CBC values as compared to neurologically normal controls. Also, micronutrients levels were positively associated with body weight.

Lower levels of these micronutrients may affect cognition, behavior, social interaction and developmental outcomes and hence quality of life.

In light of our findings, it is recommended to follow children with CP by a clinical dietitian.

Also, adjuvant micronutrients therapy should be seriously considered in the management of cerebral palsy children to obviate complications that may arise from such nutritional insufficiencies.

Nutrition education should therefore be included families of children with cerebral palsy, especially to formulate and implement nutrition education programs to correct micronutrient deficiency.

This study had some limitations such as, the relatively small sample size, blood sampling and storage methods till analyses which may have one of improper steps that might give inaccurate results and also, micronutrients analyses require an expertise and equipments that are not readily available in clinical laboratories. So, further prospective larger studies are warranted focusing on the nutritional assessment and micronutrients levels in relation with cerebral palsy in children.

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