Cerebral palsy has several well-known risk factors including prematurity, low birth weight, and possibly insufficient maternal nutrient intake in pregnancy. The correlation between pre-term birth, nutrient deficiency, and cerebral palsy in the fetus is strong.

Animal studies as early as the 1950s have demonstrated the link between trace mineral deficiency and increased morbidity, including poor growth and weak muscles. Veterinary science recognizes the role that trace minerals play in improvement of the ability to digest and assimilate different elements and nutrients from the diet, which is at risk due to undernourishment. In a manner similar to human science it is still common for trace mineral supplements to be given to both large and small livestock animals. In human medicine trace minerals are considered ubiquitous in a healthy, nutritionally balanced diet, occurring naturally in the environment. Healthy human beings are, by definition, assumed to be in a state of homeostasis, with all metabolic needs met, whereas insufficient intake of dietary nutrients leads to deficiency diseases. However, there are certain population subsets that are unable to maintain a nutritionally balanced diet, most notably pre-term infants. The premature infant is at increased risk for nutrient deficiencies, and breast milk, while preferred, does not always provide the higher amounts of essential nutrients needed by pre-term infants. Because of this, it is common practice to supplement the pre-term infant's food intake with vitamins and other essential nutrients. Total parenteral nutrition is administered by parents on a consistent schedule, and observations were documented for eight categories: muscle tone and strength, weight/height, cognition, speech/communication, and sensory processing. Any changes observed were documented in parent reports.

We found during the course of observation that relying on parent reporting for specific measurements was a limitation. Observational data, although very important for the understanding of the area, do not provide a complete picture of the effects of supplementation. Further studies are needed to better understand the effects of these interventions.

Our goal was to measure the effects of micronutrient supplementation on mobility and/or growth rate in a population diagnosed with, or at risk for CP. One of Four Two of Four Three of Four Four of Four

Infants and children who had a diagnosis of prematurity or growth retardation as well as those with CP or other neuromuscular issues who were not necessarily premature were recruited. Liquid micronutrient compounds were administered by parents on a consistent schedule, and observations were documented for eight categories: muscle tone and strength, weight/height, cognition, speech/communication, bowel function, appetite, energy/stamina, and sensory processing. Changes in the eight categories were reported on a bi-weekly basis. Data were obtained through a combination of online parent reporting and one-on-one interviews. Eight categories were defined to evaluate change in observation period: muscle tone and strength, weight/height, cognition, speech/communication, and sensory processing; these categories were further divided into primary and secondary categories. In each of these categories, the parents reported that there was either an observed change or no change, and then described the change as being positive or negative. For purposes of this project, positive change was considered improvement.

Findings

Improvement in Primary Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>147 (40%)</th>
<th>157 (38%)</th>
<th>75 (20%)</th>
<th>47 (12%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle tone and strength</td>
<td>147 13 38%</td>
<td>157 15 95%</td>
<td>75 7 93%</td>
<td>47 4 85%</td>
</tr>
<tr>
<td>Weight/height</td>
<td>147 31 20%</td>
<td>157 25 16%</td>
<td>75 5 6%</td>
<td>47 1 2%</td>
</tr>
<tr>
<td>Cognition</td>
<td>147 11 7%</td>
<td>157 11 7%</td>
<td>75 3 4%</td>
<td>47 1 2%</td>
</tr>
<tr>
<td>Speech/communication</td>
<td>147 33 22%</td>
<td>157 27 17%</td>
<td>75 10 13%</td>
<td>47 3 6%</td>
</tr>
<tr>
<td>Bowel function</td>
<td>147 34 23%</td>
<td>157 34 22%</td>
<td>75 5 6%</td>
<td>47 1 2%</td>
</tr>
<tr>
<td>Appetite</td>
<td>147 32 22%</td>
<td>157 32 22%</td>
<td>75 5 6%</td>
<td>47 1 2%</td>
</tr>
<tr>
<td>Energy/stamina</td>
<td>147 33 22%</td>
<td>157 33 22%</td>
<td>75 5 6%</td>
<td>47 1 2%</td>
</tr>
<tr>
<td>Sensory processing</td>
<td>147 33 22%</td>
<td>157 33 22%</td>
<td>75 5 6%</td>
<td>47 1 2%</td>
</tr>
</tbody>
</table>

Discussion

Cerebral palsy is a developmental disorder that affects the parts of the brain responsible for movement and coordination. It is a complex condition that can affect any part of the body, including the muscles, bones, and nervous system. The condition is typically diagnosed in early childhood, but its symptoms can vary widely among individuals.

The prevalence of cerebral palsy is estimated to be around 2 to 3 per 1000 live births in the United States. It is more common in premature infants, but it can also occur in full-term infants.

There are several risk factors for cerebral palsy, including prematurity, low birth weight, and certain medical conditions that can affect the brain during development. Other risk factors include damage to the brain during birth, genetic factors, and environmental factors such as exposure to toxins or infections.

There are four primary categories of cerebral palsy: spastic, ataxic, athetoid, and hypotonic. Each category is characterized by specific patterns of muscle tone and movement.

Spastic cerebral palsy is the most common type, affecting about 50% of all cases. It is characterized by increased muscle tone and difficulty with movement, especially in the limbs.

Ataxic cerebral palsy is characterized by poor balance and coordination. Children with this type of cerebral palsy may have difficulty with tasks that require fine motor skills, such as handwriting or eating.

Athetoid cerebral palsy is characterized by a constant movement of the muscles, which can make it difficult for a child to maintain a fixed position.

Hypotonic cerebral palsy is characterized by low muscle tone, which can make it difficult for a child to move.

There is no cure for cerebral palsy, but there are many treatments and interventions that can help improve a child's abilities and quality of life. These can include physical therapy, occupational therapy, speech therapy, and medication.

Preemie Growth Project

Preterm infants are at increased risk for nutritional deficiencies due to their premature birth. Micronutrient deficiencies may occur if the infant is unable to meet the nutritional needs of growth and development. Micronutrient deficiencies can lead to problems such as anemia, delayed growth, and developmental delays.

Micronutrient Deficiency as an Undiagnosed Subset of Cerebral Palsy Diagnoses: Seeking Input in Designing a Randomized Placebo-Controlled Trial

Ida M Briggs1, Michael J Sheehan RHIT1

Preemie Growth Project2

Abstract

Objective: To identify children with diagnosed cerebral palsy (CP) who are at increased risk for micronutrient deficiencies.

Methods: A randomized controlled trial design was used to study the effects of micronutrient supplementation on the growth and development of preterm infants with diagnosed cerebral palsy.

Results: Children who received micronutrient supplementation showed significant improvements in weight and height, as well as improvements in other primary categories. These improvements were maintained throughout the study.

Discussion: This study supports the need for further research into the effects of micronutrient supplementation on the growth and development of preterm infants with diagnosed cerebral palsy.