Nutritional Assessment and Intervention in Children with Cerebral Palsy (Clinical Audit)

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Abstract

Background: Neurologically Impaired (NI) children are at increased risk of malnutrition due to several nutritional and non-nutritional factors. Among nutritional factors, insufficient dietary intake as a consequence of feeding difficulties is one of the main issues. Feeding problems are frequently secondary to oropharyngeal dysphasia, which usually correlates with the severity of motor impairment and presents in around 90% of preschool children with Cerebral Palsy (CP) during the first year of life. Other nutritional factors are represented by excessive nutrient losses, often subsequent to gastro esophageal reflux and altered energy metabolism. Among the non-nutritional factors, the type and severity of neurological impairment, ambulatory status, the degree of cognitive impairment, and use of antiepileptic medication altogether concur to determination of nutritional status.

Aim: To assess the degree of adherence of medical staff at neurology unit to new guidelines for nutritional assessment and intervention of children with cerebral palsy.

Patients and Methods: The study included all cerebral palsy children admitted at Neurology Unit Assiut University Children Hospital from 1st of January to 30th of June 2017. An observational checklist based on new guidelines developed by the investigators in order to assess the degree of adherence of medical staff at Neurology Unit at Assiut University Children Hospital to protocol for nutritional assessment and intervention in children with cerebral palsy according to this new guidelines.

Results: The study included 101 cerebral palsy children, their age ranged from 1 month to 15 years, 65 cases were males and 36 were females.

• Children who need no intervention were 7.9% of cases.
• Children who need to increase caloric intake were 19.8% of cases.
• Children who need micronutrient supplementation were 19.8% of cases.
• Children who need to increase caloric intake and micronutrient supplementation were 14.9% of case.
• Children who need to insert gastrostomy tube were 37.6% of cases.

Conclusion: Malnutrition is a frequent complication in CP children impacting on overall health and quality of life. Severity of feeding issues generally increases with reduction of general motor function and cognitive ability. Nutritional assessment and support should be an integral part of the care of CP children aiming at early identification of children at risk of nutrition-related comorbidities. To ensure success of interventions, close monitoring of nutritional status should be performed by a multidisciplinary team.

Key Words: Cerebral palsy – Neurologically impaired – Gastro esophageal reflux – Body mass index – Bioelectrical impedance assessment.

Introduction

NUTRITIONAL status has a significant impact on overall health and quality of life in children with neurodevelopment disabilities; both under and over nutrition generally lead to increased health care use and reduced participation in educational and social activities. Malnutrition is frequently associated with impairment of linear growth, reduced peripheral circulation and wound healing, increased spasticity and irritability. The overall prevalence of malnutrition in NI children is difficult to estimate, due to the heterogeneity of neurological disorders. The majority of scientific literature on nutrition in NI children has focused on the population with Cerebral Palsy (CP) in which malnutrition has been observed in 46%-90% of cases [1,2].

Abbreviations:
CP : Cerebral Palsy.
NI : Neurologically Impaired.
GER : Gastro Esophageal Reflux.
BMI : Body Mass Index.
BIA : Bioelectrical Impedance Assessment.
Etiology of malnutrition in CP children is multifactorial including both nutritional and non-nutritional factors. Among the nutritional factors, the main is represented by inadequate dietary intake as a consequence of gastrointestinal disorders including oral motor dysfunction, gastro esophageal reflux and constipation. Among non-nutritional factors, the type and severity of underlying neurological disability, influencing ambulatory and cognitive status, and antiepileptic use are crucial factors involved in determination of nutritional status.

**Subjects and Methods**

All cerebral palsy children admitted at Neurology Unit Assiut University Children Hospital from 1st of January to 30th of June 2017 were included in the study.

**Inclusion criteria:**

All cerebral palsy children admitted to Neurology Unit at Assiut University Children Hospital.

**Exclusion criteria:**

Severely non ambulant or motor disabled cerebral palsy children.

**Tools of study:**

An observational checklist based on a new guidelines [1] developed by the investigators in order to assess the nutritional status and intervention for children with cerebral palsy admitted at Neurology Unit Assiut University Children Hospital from 1st of January to 30th of June 2017.

**Results**

Table (1): Recorded data about age distribution of studied cases.

<table>
<thead>
<tr>
<th>Age</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>50</td>
<td>49.5</td>
</tr>
<tr>
<td>2-6 years</td>
<td>30</td>
<td>29.7</td>
</tr>
<tr>
<td>&gt;6 years</td>
<td>21</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Fig. (1): Sex of studied cases.

Table (2): Recorded data about neonatal history of studied cases.

<table>
<thead>
<tr>
<th>Neonatal history</th>
<th>Done</th>
<th>Not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Neonatal history</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Delivery:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVD</td>
<td>58</td>
<td>97.4</td>
</tr>
<tr>
<td>CS</td>
<td>43</td>
<td>42.6</td>
</tr>
<tr>
<td>Prematurity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FT</td>
<td>93</td>
<td>92.1</td>
</tr>
<tr>
<td>PT</td>
<td>8</td>
<td>7.9</td>
</tr>
<tr>
<td>Admission to NICU:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NICU</td>
<td>31</td>
<td>30.7</td>
</tr>
<tr>
<td>Not</td>
<td>70</td>
<td>69.3</td>
</tr>
<tr>
<td>Causes of admission to NICU:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convulsion</td>
<td>7</td>
<td>22.6</td>
</tr>
<tr>
<td>Sepsis</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Intestinal obstruction</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>HIE</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>Hypoglycemia/cyanosis</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Jaundice leading to kernicterus</td>
<td>5</td>
<td>16.1</td>
</tr>
</tbody>
</table>

Table (3): Recorded data about feeding difficulties of studied cases.

<table>
<thead>
<tr>
<th>Feeding difficulties</th>
<th>Done</th>
<th>Not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>63</td>
<td>62.4</td>
</tr>
<tr>
<td>Yes</td>
<td>38</td>
<td>37.6</td>
</tr>
<tr>
<td>When:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Since birth</td>
<td>17</td>
<td>44.7</td>
</tr>
<tr>
<td>After brain insult</td>
<td>6</td>
<td>15.8</td>
</tr>
<tr>
<td>After introducing complementary foods</td>
<td>15</td>
<td>39.5</td>
</tr>
</tbody>
</table>

Fig. (2): Recorded data about anthropometric parameters.
**Discussion**

**According to recorded data about medical history:**
- Data of the name, age, and sex were recorded in 100% of cases.
- Data of neonatal history which include types of delivery (NVD, CS), type of prematurity (FT, PT), admission to NICU and cause of admission were fulfilled in 100% of cases.
- Data of history of feeding difficulty, time of starting, types of gastro enterological problems, underlying neurological disorders and using of anti epileptic drugs were fulfilled in 100% of cases.
- In a study conducted by Lopes et al., difficulty in chewing solid food was observed in (26%) of cases, and for swallowing, in (9%) of cases.
- In our study, 37.6% of our cases having difficulty swallowing and difficulty in chewing solid food.
- In a study conducted by Walker et al., a modified three-day weighed food record for measuring energy intake has been validated for preschool-aged children with CP.
- In our study, modified three-day weighed foods were not done at any cases.

**According to recorded data about physical examination:**
- As regard physical examination searching for signs of protein energy malnutrition and micro nutrient deficiency were done in 100% of cases [3].
According to recorded data about anthropometric parameters:
- (Weight, height, BMI) were done in 100% of cases but Triceps Skin fold Sickness (TSS) and Mid Upper arm Circumference (MUC) not done at any case 0% [4].
- In a study conducted by Oeffinger et al., have shown that that BIA and two skin fold measurements (using CP specific equations) are accurate and non-invasive methods to estimate body fat percentage in children with CP.
- In our study, BIA and two skin fold measurements were not done for any case.

According to recorded data about laboratory investigations:
- Full Blood Count (FBC), serum albumin were done in 100% of cases but serum calcium was done in 99% of cases, serum ferritin was done in 41.6% of cases, serum phosphorus was done in 2% of cases [5].
- In a study conducted by Papadopoulos et al., found a high incidence of anemia in patients with CP, anemia was found in 87% and iron deficiency was found in 95.6% of cases.
- In our study, 60.4% of our studied cases were anemic and 80% were found to be iron deficiency anemia.

According to recorded data about oral feeding management:
- Was fulfilled in 100% of cases, children which need no intervention 100% of cases were done, children which need to increase caloric intake only 70% of cases were done, children which needs to micronutrient supplementation only 90% of cases were done, children which need to increase caloric intake and micronutrient supplementation 60% of cases were done [6].
- A Norwegian study conducted by Hillesund et al., a low micronutrient intake approximately 50% of all children.
- In our study, 10% of all studied cases having a low micronutrient intake.

According to recorded data about tubal feeding management:
- Gastrostomy tube which indicated in 36 cases not done in any case 0% [7].

References
1- FRANCESCA PENAGINI, CHIARA MAMELI, VALENTINA FABIANO, DOMENICA BRUNETTI, DARIO DILILLO and GIAN VINCENZO ZUCCOTTI RECEIVED: Pediatric Department, V. Buzzi Children's Hospital, University of Milan Nutrients 2015, 7, 9400-9415; doi: 10.3390/nu7115469, 2015.
دراسة تدقيقية في تقييم الحالة الغذائية وطرق التدخل في الأطفال الذين يعانون من شلل الدماغ

الحالة الغذائية لديها تأثير كبير على الصحة العامة وطبيعة المعيشة للأطفال الذين يعانون من شلل دماغي. وكثيراً ما يرتبط سوء التغذية بضعف النمو، ضعف النمو، ضعف الدورة الدموية الطفيفة، طرق إلقاء الجروح زيادة معدل التشنج.

الدعم الغذائي هو جزء أساسي من رعاية الأطفال الذين يعانون من الشلل الدماغي التي لديها إشارات واضحة وبدقة في استعادة الدعم الكافي للنمو والوصول للوزن المطلوب للأطفال. وقبل ذلك، يمكن أن يساعد على تحسين الصحة العامة والمعيشة لدى الأطفال الذين يعانون من شلل الدماغ.

أهداف الدراسة: تقييم مدى إلزام الأطفال بالبروتوكول الغذائي لتقسيم الحالة الغذائية وطرق التدخل للأطفال الذين يعانون من الشلل الدماغي والمصابين على قسم العصبية في مستشفى الأطفال الجامعي بسبيسوط في الفترة من 1/1/2017 إلى 30/6/2017.

النتائج: تم توثيق 55 حالة من الأطفال الذين يعانون من الشلل الدماغي يبلغون من العمر 10 إلى 65 سنة، وأظهرت نتائج الدراسة أن إجراءات التدخل في الأطفال المصابين بالشلل الدماغي في وحدة العصبية في مستشفى الأطفال بجامعة سبيسوط تنتج عن تحسين المعايير المرجعية للدراسة.

تتم إستئصال البيانات الخاصة بالإسم والمرأة والسبب في 100% من الحالات.

تتم إنجاز البيانات الخاصة بال التاريخ الفيترة مدة الولادة والتي تشمل نوع الولادة (طبيعي أو قبضي)، الطفل (كامل النمو أو ناقص النمو)، دخل المحمض من عدمه وسبب الدخول في 10% من الحالات.

تتم إنجاز البيانات الخاصة بالتاريخ الغذائي للطفل من حيث وجود صعوبة في التغذية. ترتيب حصولها، انواع الأعراض الناتجة عنها، وجود أي مشاكل ومشكلات حاليا المعالجة، إستعمال الأدوية الخاصة بالتشنج في 100% من الحالات.

تتم إستئصال البيانات الخاصة بالفحص البصري للبحث عن علامات نقص التغذية ونقص المكملات الغذائية في 100% من الحالات.

تتم إستئصال البيانات الخاصة بالقياسات البديلة (الوزن، الطول، كتلة الجسم) ولكن كان في حدد الحالات (الوزن، الطول، كتلة الجسم) لكن كان.

البيان الخاص بجنيغ وسط الذراع (mid upper arm circumference) في 100% من الحالات، لذا لم يتم إستئصال Triceps skin fold thickness) Triceps skin fold thickness) في 100% من الحالات.

تتم إستئصال البيانات الخاصة بالكشف البصري للبحث عن علامات نقص التغذية ونقص المكملات الغذائية في 100% من الحالات.

البيان الخاص بجنيغ وسط الذراع (mid upper arm circumference) في 100% من الحالات، لذا لم يتم إستئصال Triceps skin fold thickness) Triceps skin fold thickness) في 100% من الحالات.

تم إنتاج نتائج الدراسة في معظم الحالات من حيث صورة الدم ونسبة الائيون والكالسيوم في معظم الحالات لكن ملم عن نسبة الحديد في 98% من الحالات.

تم إنتاج نتائج الدراسة في معظم الحالات من حيث صورة الدم ونسبة الائيون والكالسيوم في معظم الحالات لكن ملم عن نسبة الحديد في 98% من الحالات.

يرجى العلم بأنه لا يتم إنتاج النتائج الخاصة بالقص، إلا أن الفحص الغذائي بطريقة الفحص الغذائي من خلالرصد حالات وعلاج حالات معينة من الحالات التي تحتاج إليها.
الوصول لأهداف إعادة التأهيل الغذائي في الأطفال الذين يعانون من الشلل الدماغي:

أ - تناول البوتاسيوم والمعادن الدقيقة بنسبة مائوية متساوية نسب العمر للأطفال السليمة.
ب - النسبة النسبية للوزن كل 4 أسابيع.
ج - الوصول بالوزن 20٪ / من مساحة النمو الخاصة بالأطفال الذين يعانون من الشلل الدماغي.
د - الوصول لمستوى الجلد العضلية الثلاثية بنسبة 10-20٪ بالنسبة لعمر الطفل.