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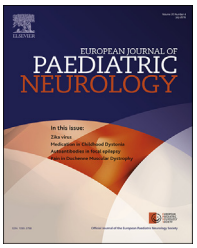

Review article

Gastrointestinal and nutritional problems in neurologically impaired children

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ABSTRACT

The current increasing survival of children with severe central nervous system damage has created a major challenge for medical care. Gastrointestinal and nutritional problems in neurologically impaired children have been recently recognized as an integral part of their disease, often leading to growth failure and worsened quality of life for both children and caregivers. Nutritional support is essential for the optimal care of these children. Undernourished handicapped children might not respond properly to intercurrent diseases and suffer unnecessarily. On the other hand, restoring a normal nutritional status results in a better quality of life in many. The easiest and least invasive method to increase energy intake is to improve oral intake. However, oral intake can be maintained as long as there is no risk of aspiration, the child is growing well and the time required to feed the child remains within acceptable limits. When oral intake is unsafe, insufficient or too time consuming, enteral nutrition should be initiated.

Damage to the developing central nervous system may result in significant dysfunction in the gastrointestinal tract and is reflected in impairment in oral-motor function, rumination, gastro-oesophageal reflux (GER), with or without aspiration, delayed gastric emptying and constipation. These problems can all potentially contribute to feeding difficulty in disabled children, carrying further challenging long-term management issues.

Contents

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1. Introduction

The current increasing survival of children with severe central nervous system damage has created a major challenge for medical care. Although the primary problems for patients with developmental disabilities are physical and mental incapacities, several clinical reports have indicated that brain damage may result in significant gastrointestinal dysfunction.[1–4] The enteric nervous system contains more neurones than the spinal cord and thus it is not surprising that insults to the central nervous system may affect the complex integrated capacities underlying feeding and nutrition.[5] As a consequence, many children with cerebral palsy are at high risk of poor nutritional status, particularly those with severe gross motor impairment and oropharyngeal dysfunction.[6–8] The increased awareness of such conditions, together with a better understanding of their etiology and interplay, is essential to achieve an optimal global management of this group of children.

2. Feeding and nutritional aspects

A significant proportion of children with neurodevelopmental disabilities are undernourished.[9–12] This state of malnutrition was once considered to be part of the disease and accepted as an unavoidable and irremediable consequence of neurological impairment. Poor nutritional state was often marked by linear growth failure, decreased lean body mass, and diminished fat stores.[13,14] Over the past two to three decades, multidisciplinary feeding programs providing comprehensive evaluation and treatment of feeding disorders in children with developmental disabilities have been instrumental in improving the nutritional status, quality of life and reduced hospitalization rates.[15] Studies on small number of children with developmental disabilities have demonstrated that adequate nutritional support, provided by less invasive enteral access methods and better tolerated enteral formulas, may improve weight, muscle mass, subcutaneous energy store, peripheral circulation, the healing of decubitus ulcers, and general well-being, while decreasing irritability and spasticity.[16,17]

The true prevalence of undernutrition in neurologically impaired children is unknown. It has been estimated that approximately one-third of them are undernourished and many exhibit the consequences of malnutrition.[14] Yet, the incidence and severity of malnutrition increases with the duration and the severity of neurological impairment.[18–20] Parameters to assess malnutrition and possible overnutrition in the handicapped child have to be adjusted. Height is a proper parameter for growth and nutritional status, but difficult in children with malformations and spasticity.[21–23] Also, disproportionate development of the head, rump and extremities makes assessment of height as a parameter of nutritional status difficult.[24–26] Therefore, crown–rump length, width, crown–heel length, distal femoral length and distal arm length (spender growth curve) have been developed to assess growth and to relate height to developmental abnormalities or to nutrition.[27]

The predominant nutritional deficit in neurologically impaired children is in energy intake, with only 20% of these children regularly ingesting 100% of their estimated average requirement.[28] Estimating the energy requirements for a child with neurological impairment is not straightforward, due to the heterogeneity of the group, altered body composition, and reduced physical activity levels. What is evident is that many children and adolescent with cerebral palsy have decreased requirements in comparison with typically developing groups and that these differences increase with increasing severity of gross motor impairment.[11,29–31] Energy requirements of children and adolescents who utilise a wheelchair for mobility have been reported to be between 60 and 70% of those of healthy typically developing children.[18,20,22] Possible participation in physical activity, including intense rehabilitation, may increase the energy needs of patients and has to be considered when estimating the overall requirements.

Adequate protein intake is essential to build and repair tissue, for adequate growth and development in childhood and adolescent and to promote lean tissue gain. There is currently no evidence to suggest that protein requirements of neurologically impaired children and adolescents differ to those of typically developing populations, and therefore recommendations for typically developing children and adolescents can be applied.

It has been reported that approximately half of the children with severe disabilities consume less than 81% of the reference nutrient intake for copper, iron, magnesium, and zinc, with that influenced by their large consumption of milk.[28] Inadequate dietary intakes may be addressed through the inclusion of foods rich in the micronutrient at risk or through supplementation.

A global nutritional support is essential for the care of neurologically impaired children. Undernourished handicapped children might not respond properly to intercurrent diseases and suffer unnecessarily. On the other hand, restoring a normal nutritional status results in a better quality of life in many. Assessment of nutritional status requires a proper follow-up of height, body weight and assessment of the standard deviation score. By so doing, negative changes are easily discovered and appropriate nutritional intervention can be initiated. An individualized intervention plan that accounts

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