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Comparisons of severity classification systems for oropharyngeal dysfunction in children with cerebral palsy: Relations with other functional profiles



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ABSTRACT

This study aimed to investigate the relationships between various classification systems assessing the severity of oropharyngeal dysphagia and communication function and other functional profiles in children with cerebral palsy (CP). This is a prospective, cross-sectional, study in a university-affiliated, tertiary-care hospital. We recruited 151 children with CP (mean age 6.11 years, SD 3.42, range 3–18 yr). The Eating and Drinking Ability Classification System (EDACS) and the dysphagia scales of Functional Oral Intake Scale (FOIS), Swallow Function Scales (SFS), and Food Intake Level Scale (FILS) were used. The Communication Function Classification System (CFCS) and Viking Speech Scale (VSS) were employed to classify communication function and speech intelligibility, respectively. The Pediatric Evaluation of Disability Inventory (PEDI) with the Gross Motor Function Classification System (GMFCS) and the Manual Ability Classification System (MACS) level were also assessed. Spearman correlation analysis to investigate the associations between measures and univariate and multivariate logistic regression models to identify significant factors were used. Median GMFCS level of participants was III (interquartile range II–IV). Significant dysphagia based on EDACS level III–V was noted in 23 children (15.2%). There were strong to very strong relationships between the EDACS level with the dysphagia scales. The EDACS presented strong associations with MACS, CFCS, and VSS, a moderate association with GMFCS level, and a moderate to strong association with each domain of the PEDI. In multivariate analysis, poor functioning in EDACS were associated with poor functioning in gross motor and communication functions.

What this paper adds

In present study, we found very strong to strong relationships between EDACS and dysphagia scales. These findings provide the evidence that EDACS is a useful system reflecting the ability to swallow safely. The EDACS were strongly related with MACS and CFCS/VSS and moderately related with gross motor function, but the correlation coefficient was highest between EDACS and CFCS/VSS. These findings imply a close inter-relationship between feeding and speech/communication functions. Poor functioning in eating and drinking ability were related with poor functioning in gross motor function and communication function.

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1. Introduction

Oropharyngeal dysphagia (OPD) is characterized by impairments in oral preparatory, oral propulsive, and/or pharyngeal phases of swallowing associated with eating, drinking, and controlling saliva (Benfer et al., 2013; Matsuo & Palmer, 2008). The prevalence of OPD in children with cerebral palsy (CP) is unclear, but it is estimated to range from 19% to 99%, depending on the definitions and tools used (Benfer et al., 2013; Calis et al., 2008; Parkes, Hill, Platt, & Donnelly, 2010; Reilly & Skuse, 1992; Wilson & Hustad, 2009).

Classifying CP by functional independence is the prevailing trend in clinical practice. Several functional classifications are currently used to characterize the functional profile of children with CP. According to a previous study (Sellers, Pennington, Mandy, & Morris, 2014), there are 15 severity scales used to classify OPD for people with CP, but none of the scales are valid, reliable classifications. Recently, the Eating and Drinking Ability Classification System (EDACS) was developed to classify the functional eating and drinking abilities in people with CP and is analogous to other functional classification systems. It links the key features of safety and efficiency (time taken in relation to peers and loss of food and fluid from the mouth) with limitations to oral skills required for biting, chewing, and swallowing (Sellers, Mandy, Pennington, Hankins, & Morris, 2014). The EDACS is gaining attention as a useful tool for classifying the eating and drinking abilities in children with CP (Benfer et al., 2017; Sellers, Mandy et al., 2014). The ability to swallow safely is to be a primary concern of clinician who involved in the management of children with OPD because of its significant implication for respiratory health. The dysphagia scales capture primarily safety relating with the food consistency that able to swallow. Functional Oral Intake Scale (FOIS), Food Intake Level Scale (FILS), and Swallow Function Score (SFS) are dysphagia scales that used as valid and reliable tools to quantify the severity of OPD or therapeutic effects for people with disability, especially those who have survived a stroke (Crary, Mann, & Groher, 2005; Freed, Freed, Chatburn, & Christian, 2001; Huang et al., 2014; Kunieda, Ohno, Fujishima, Hojo, & Morita, 2013; Sun et al., 2013). The safety issue also considered in determining the level of EDACS (Sellers, Pennington et al., 2014), but it is uncertain how well EDACS reflects the safety issue relating to swallow in children with CP.

There was a trend to have more severe gross motor function to also have more limited function in other functions such as manual ability and communication function (Coleman, Weir, Ware, & Boyd, 2013; Compagnone et al., 2014; Hidecker et al., 2012). As part of the effect showing the relationships between functional classification systems in children with CP, the significant associations between EDACS and Gross Motor Function Classification System- Expanded and Revised (GMFCS- E&R) were shown in previous studies (Benfer et al., 2017; Sellers, Mandy et al., 2014). However, there is still a paucity of data regarding the relationships between EDACS and other functional classifications of Manual Ability Classification System (MACS) and Communication Function Classification System (CFCFS). In addition, feeding and speech shared common oromotor function and thus close interrelationships are expected. As far as we know, the relationships have not yet investigated in the children with CP.

Therefore, the aim of this study was three-fold; 1) to test the relationships between EDACS and the dysphagia scales; 2) to assess the relationships between EDACS and functional classification systems of GMFCS and MACS; 3) to test the associations between EDACS and communication/speech functions in children with CP.

2. Participants and methods

2.1. Participants

This prospective, cross-sectional, observational study was conducted in a university-affiliated, tertiary-care hospital. Children with CP were recruited for this study if they were admitted to our hospital for intensive therapy between March 2016 and February 2017 and were 3–18 years old. Of the 167 eligible children with CP, 151 children who or whose parents agreed to participate in the study were recruited for present study. Tone abnormality, motor function, and distribution of CP were assessed by a physiatrist (Choi JY).

The Institutional Review Board (IRB) of the hospital approved this study protocol (approval number: 4-2016-0006). Informed consent was obtained from the primary caregiver and/or the participant according to the rules of the IRB of our hospital.

2.2. Feeding and swallowing ability

The EDACS is a system for classifying functional eating and drinking abilities in children with CP starting at an age of 3 years (Sellers, Mandy et al., 2014). According to a previous study, the EDACS has strong reliability between professionals (Sellers, Mandy et al., 2014). The level of EDACS was determined during mealtime with children well positioned in their typical mealtime seating arrangements using their regular utensils. After that, we interviewed with primary caregiver or parents to check out whether the mealtime behavior of the child was as usual. If not, the child was re-evaluated. The assistance level of EDACS was also investigated into 3 level (independent, requires assistance, and totally dependent) to assess degree of help needed at mealtimes.

The FOIS has been developed for stroke patients to document the changes in oral feeding. It is a valid and reliable scale that classifies functional oral intake from level 1 (nothing by mouth) to level 7 (total oral diet with no restrictions) (Crary et al., 2005). It has been used to examine the effects of therapeutic intervention for dysphagia in children with pediatric dysphagia with high inter-rater reliability (Christiaanse et al., 2011). The FILS is a 10-point scale to measure the severity of dysphagia based on food forms and ratios of oral intakes on a daily basis; the validity and reliability were demonstrated in a previous study (Kunieda et al., 2013). The SFS has been validated with demonstrated reliability as a 7-point scale that describes the severity of swallowing function based on the consistency of food that patients are able to swallow (Freed et al., 2001; Shaker & Geenen, 2011). All of these tools include 7 to 10 levels, and higher scores indicate better functions.

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