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Development of oral motor behavior related to the skill assisted spoon feeding

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ABSTRACT

Milestones in the typical development of eating skills are considered to be nippling (breast or bottle), eating from a spoon, drinking from a cup, biting and chewing.

The purpose of this research was to study the development and consolidation of oral motor behavior related to the skill assisted spoon feeding in young infants. The present study longitudinally investigated the development of this skill in 39 healthy children from the start of spoon feeding until the skill was acquired. The Observation List Spoon Feeding with 7 observation items for oral motor behavior and 6 items for abnormal behavior was used. Results showed that infants between 4 and 8 months of age needed 5.7 weeks (SD 2.1), with a range of 8 weeks (from 2 to 10 weeks) to acquire this skill. No significant correlation ($p = .109$) between age at start spoon feeding and weeks needed to develop the skill was found. During this period oral motor behavior consolidated and abnormal behavior diminished.

With this study it is shown that the period in weeks needed to acquire the oral motor behavior for the skill assisted spoon feeding is important in case of feeding problems.

1. Introduction

Professionals involved in assessment and treatment of infants with feeding problems must have knowledge of normal development of oral motor and eating skills (Delaney & Arvedson, 2008). Feeding and swallowing disorders vary widely, from transient and developmental to chronic or progressive (Arvedson, Clark, Lazarus, Schooling, & Frymark, 2010). Developmental feeding or swallowing problems differ from dysphagia in children with cerebral palsy, Down syndrome, neuromuscular disorders or with other etiology, in terms of severity and frequency.

Normal developmental acquisition of eating skills in infants is described in terms of milestones (Sheppard, 2008). The milestone sequences are considered to be nippling (breast or bottle), eating from a spoon, drinking from a cup, biting and chewing (Arvedson, 2008). Weaning is the process of expanding the diet of an infant to include food and drinks other than breast milk or formula (Northstone, Emmett, & Nethersole, 2001). Feeding in the weaning period is considered not only as transitional from milk to solids, but also transitional from sucking to chewing and biting. Furthermore the obligatory interaction between carer and child is gradually replaced by independent feeding by the child (Parkinson & Drewett, 2001). Parents consider the start of spoon feeding as an important moment: a new way of feeding their child is started. In a study with in-home interviews mothers reported the child's age of opening the mouth when food approached for the first time at

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a mean of 4.4 months (SD 1.37) (Carruth & Skinner, 2002). In the period of 3–8 months active social interactions between parents and child develop. In this period solids were found to be introduced to infants (Negayama, 1993). In the initial months of feeding from a spoon infants are passively fed by their parents, followed by the development of active self-feeding in the period of 9–11 months (Negayama, 1993).

The new skill is gradually improved by experience and in combination with different utensils and types of food (Sheppard, 2008). The first attempts by the child to remove the food from the spoon are followed by other attempts. Through trial and error with repetitions during daily feeding sessions the new skill is acquired. In this motor learning process efficiency and independency in different circumstances are achieved as the skill improves.

Information on this development is important in light of the motor learning processes in feeding and swallowing and may clinicians help to judge whether the development of this skill is delayed and/or disturbed. A wide range of ages is reported for the acquisition of specific oral motor skills for feeding (Delaney & Arvedson, 2008). Also in the study of Carruth and Skinner (2002) mothers reported that individual children exhibited a wide range for achieving behaviors related to feeding.

Scales and checklists have been developed to observe feeding and swallowing systematically in infants and children. For example, the Pre-speech Assessment Scale (PSAS) examines 27 pre-speech performance areas in the categories of feeding behavior, sucking, swallowing, biting and chewing, respiration-phonation, and sound play (Morris, 1982). The scale was intended for use in children with cerebral palsied and other children with developmental delays to evaluate feeding behaviors at the birth through 2-year age level. This scale is time consuming in administration and scoring. The Schedule for Oral Motor Assessment (SOMA) was developed for the purpose of objectively rating the oral-motor skills, related to a range of food textures, of preverbal children from 8 to 24 months (Skuse, Stevenson, Reilly, & Mathisen, 1995). These scales and checklists for oral motor performance during feeding are usually developed to observe oral motor skills for different food textures at a specific moment. However, the process of motor learning involves improving the smoothness and accuracy of movements and is obviously necessary for complicated movements such as eating and chewing (Schmidt & Lee, 2011). Oral sensory disorders related to feeding are described, such as vomiting, gagging and refusing food (Arvedson, 2008). However, no information is available on the development of the specific oral motor and sensory behavior related to the skill eating from a spoon in typically developing infants (Sheppard, 2008). This information is essential to judge whether the skill is delayed or disturbed.

Therefore, the aim of this research was to study the development and consolidation of the oral motor behavior related to the skill assisted spoon feeding in young infants. First, we aimed to answer how long it takes to acquire the oral motor behavior related to the skill assisted spoon feeding in typically developing children. Secondly, we aimed to study the presence and diminishing of abnormal oral sensory behavior during consecutive weeks from the start of offering pureed food from a spoon. The present study longitudinally investigated the acquisition of the skill assisted spoon feeding in healthy children from the start of assisted spoon feeding until the skill was acquired.

2. Methods

2.1. Participants

The study population consisted of 39 typically developing infants (23 boys and 16 girls, aged at the start of the observation from 17 until 33 weeks; mean = 24.1, SD = 3.8 weeks). Participants were recruited via informal contacts and information letters send to day nurseries in the eastern region of the Netherlands and the western region of Germany.

The inclusion criteria were birth at term and no oral or facial anatomically deficits or neurological problems. After parents gave their informed consent, a series of weekly observations started. The first observation was planned at the feeding session infants were offered spoon feeding for the first time. The children were observed in their own environment and parents did not get instructions how to feed their child, in terms of posture during feeding and the use of utensils. Parents were asked to offer pureed food during all observations.

2.2. Material

Based on current assessment scales for feeding and swallowing (Prespeech Assessment Scale (Morris, 1982) and the SOMA (Skuse et al., 1995)) a list of 12 observation items for oral motor behavior and 6 items on abnormal behavior, related to spoon feeding was composed and tested in 124 infants between 4 and 12 months. To enhance the applicability we developed a short version of this list by eliminating 5 items (a. the infant looks at the spoon; b. the infant bites on the spoon; c. the tongue performs sucking movements when the food enters the mouth; d. the tongue performs sucking movements during transport; e. the tongue is used to clear the lips) that were not distinctive (items a and e) or too difficult to observe reliable (items b, c and d). The final Observation List Spoon Feeding (OSF) consisted of 7 observation items for oral motor behavior and 6 items for abnormal behavior (Table 1), published for the first time in the Netherlands as the Nijmeegse Observatielijst Lepelvoeding (NOL) (van den Engel-Hoek, van Haaften, & de Groot, 2007).