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Research paper

Introduction of new food textures during complementary feeding: Observations in France

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ABSTRACT

Introduction: Complementary feeding plays a crucial role in the development of infants and toddlers and studies suggest benefits specific to the introduction of food textures.

Objectives: Evaluate the recommendations given to parents, their practices, and their attitudes towards the introduction of food textures during complementary feeding in France.

Methods: This was a cross-sectional pilot study conducted in 2013. One hundred and eighty-one parents with at least one child aged 6–36 months living in France completed an ad hoc questionnaire.

Results: Eighty-eight percent of the parents surveyed received oral information on complementary feeding, but only 46% received such information on the introduction of food textures. Pediatricians were the most frequently listed source of oral information on complementary feeding. More than half the parents also looked for additional information in books and on the internet. While oral recommendations matched parents' practices, they seemed to occur at a later age compared to infants' physiological ability to handle new textures. The quality of information on food texture advice available in paper and electronic formats evaluated using a 4-point scale was found to be limited. Introducing new food texture was spontaneously reported as the most common difficulty in complementary feeding (16%). Fear of choking when first introducing food pieces was reported by 54% of the parents.

Conclusions: The parents' lack of information on the introduction of food textures, as well as their fear that their child may choke, should encourage providing new recommendations in France.

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1. Introduction

In industrialized countries, complementary feeding is defined as the introduction of solid or liquid foods, other than breast milk and infant formula, to a young child's diet [1]. Timely introduction of complementary foods is necessary to meet the evolving nutritional requirements of infants but also for developmental reasons as infants gradually develop the ability to chew [2].

During their first years of life, the diet of infants and children diversifies regarding food tastes as well as food textures and gradually becomes more varied and complex. During this period, neurological and physiological development allows infants and children to eat increasingly complex food textures (from liquid to soft then hard foods). At birth, self-feeding is ensured based on the nutritive suckling reflex. From 4 to 6 months, cortical and cognitive development, associated with increasing oral cavity volume,

improves tongue mobility while the lengthening of the neck along with the descent of the larynx lead to progressive control of oral food transport. At this period, infants are able to swallow or spit out foods. From nearly 6 months onwards, the appearance of temporary inferior and superior incisors means the child can handle biting, while from 12 to 18 months, the appearance of new teeth such as molars creates new dental contacts in the oral cavity, improving intraoral food mixing ability. Mixing and chewing functions appear one after another. Infants learn to move foods from side to side in their mouth without swallowing them directly. Children's food experience will render oral movements more complex, specialized, and structured to reach refined and effective chewing at age 6 [3–6].

Numerous publications have underlined the rapidity of oral skills development during the first years of life (especially between 6 and 12 months, more or less independently of dental eruptions) [7,8] and the key role of the introduction of particular food textures for the development of oral movement patterns (such as lateral tongue movements) [9]. More specifically, orthodontics have suggested that inadequate timing of the introduction of hard and

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chewy foods may lead to the underdevelopment of the jaw muscles and bones [10]. Speech therapists also consider that respecting complementary feeding recommendations (including food texture introduction) could ensure correct development of praxis, given that the organs involved in the chewing process are also involved in the speaking function (enunciation) [11], although additional studies are required to confirm this hypothesis. Moreover, different studies investigated the impact of the timing of introducing different food textures on the eating behavior of young children: the results of the Avon Longitudinal Study of Parents and Children (ALSPAC, UK) showed that children introduced to lumpy solids after the age of 9 months reduced consumption of many of the food groups at 7 years more than those introduced to lumpy foods between 6 and 9 months [12]. Also, they were reported as having more feeding problems at 15 months and 7 years [12,13]. In another study investigating 12-month-old infants, those consuming significantly more chopped carrots were the most familiar with carrots presented under a variety of textures [14]. This is an even greater concern since observational data suggest that the food repertoire could take shape early in life and continue until adulthood [15].

Several recommendations on food texture have been released worldwide to guide parents and healthcare practitioners [6,16]. The World Health Organization (WHO) indicates that pureed foods could be consumed and swallowed at 4–7 months, mashed or chopped foods and finger foods (bread) at 7–12 months, and foods eaten by the family at 12–24 months [17]. The European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) committee on nutrition emphasized that there may be a critical window for introducing solid foods before the age of 10 months [2]. Its recently updated recommendations are widely developed: foods should be of an appropriate texture and consistency for the infant's developmental stage, ensuring timely progression to finger foods and self-feeding. Prolonged use of pureed foods should be discouraged and infants should be eating lumpy foods by 8–10 months at the latest [18]. The researchers from the recent European HABEAT research program focused on promoting healthy eating habits, encouraging parents to introduce finger food forms (soft cooked vegetables and slices of soft fruit) by around 7–8 months [19].

However, the literature on parents' practices and behaviors towards the introduction of food textures is scarce and poorly described. Therefore, the aims of the present study were to investigate practices and behaviors, as well as to identify and evaluate the sources of information used by parents living in France.

2. Material and methods

The survey was based on a cross-sectional pilot study conducted in 2013 on a sample of parents living in France. A questionnaire developed for the study, made up of closed, semi-closed, and open questions, was constructed with the aim of capturing different dimensions of food texture introduction behaviors and attitudes in parents. The study was approved by the ethics committee (Comité d'évaluation de l'éthique des projets de recherche de Robert-Debré) and was registered at the French Data Protection Authority (Commission nationale de l'informatique et des libertés [CNIL], authorization number 1906397).

2.1. Study population

The study population consisted of parents with young children who received the study questionnaire by e-mail from 29th January to 15th February 2013. The inclusion criteria were having young children aged 6–36 months and living in France.

A sample of 150 subjects in the main author's social network (including parents, healthcare practitioners, and childcare providers) was also asked to disseminate this questionnaire to parents matching the same criteria. The final number of parents who were requested to participate was not known. One hundred and ninety-nine parents sent back the questionnaire between 29th January and 7th March 2013 either by e-mail ($n = 190$) or by regular mail ($n = 9$). The children were split into five age classes: every 3 months until the first year (6–8 and 9–11 months), every 6 months until the second year (12–17 and 18–23 months), and in only one age class during the last year (24–36 months). This age division was determined in accordance with the infant's oral development pattern.

2.2. Data collection

Data was collected by sending the parents a short introduction letter and an anonymous questionnaire (an estimated 15 min was needed to complete the questionnaire). The study questionnaire was developed to collect:

- the sociodemographic characteristics of the parents (age, marital status, age at birth, education level, department of residence in France);
- the characteristics of the infants and toddlers (birth date, gender, pre- or at-term birth, weight and height at birth, the healthcare referent);
- the data related to infants and toddlers' environment (presence of other children at home, person in charge of the child's care during the week, places where meals were taken);
- the type of feeding at birth and in the first months of life (breastfeeding, mixed breastfeeding, or infant milk formula).

The questions then focused on complementary feeding practices: type of food textures introduced; timing and patterns for introducing new food, new texture; foods used for complementary feeding and cooking methods, the child's acceptance when introducing new textures, and potential problems encountered during complementary feeding. Other questions dealt with the sources of information regarding complementary feeding and parents' attitudes towards introducing food textures. The questionnaire contained 49 questions that were not all related to food textures so that parents did not think that the main purpose of the study was to gather data on this subject.

2.3. Evaluation of quality and completeness of information sources

Based on the results gathered in questionnaires on sources of information used by parents, a qualitative analysis of the information related to the introduction of food textures in available paper (books, booklets) and electronic (websites) resources was conducted. The quality of the data retrieved in these documents was rated:

- 0 if the texture topic was not addressed;
- 1 if the topic was addressed but the information provided was unclear and/or inappropriate (i.e., not aligned with WHO's guidelines [17]);
- 2 if the topic was addressed correctly through at least one but not all of the following items: development, indicative age of introduction, adequate age of introduction, advantages of introducing new textures, texture examples, recipes with food texture progression, choking prevention recommendations;
- 3 if all the previous items were addressed.

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