



## Research paper

### Infant feeding knowledge and practices among parents of infants aged 4–12 months in Poland: an online cross-sectional survey study

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#### ABSTRACT

**Introduction:** A better understanding of current infant feeding practices and factors influencing them may improve the implementation of infant feeding guidelines in the future.

**Aim:** To assess the confidence in knowledge and knowledge of selected infant feeding statements, and to assess selected infant feeding practices among parents of infants aged 4 to 12 months.

**Material and methods:** A cross-sectional study was conducted in Poland. Self-selected parents were recruited through the Internet. Data from 6934 responders, almost exclusively (99.2%) mothers, were analysed.

**Results and discussion:** Almost 68.8% of mothers assessed their knowledge of infant complementary feeding practices as sufficient. In line with current recommendations, most mothers agreed that fruits are a good source of vitamins for infants (75.3%); and disagreed that fruit juices should be given to infants younger than age 1 year (61.1%); plant-based beverages are an appropriate alternative to breast-milk substitutes for infants (59.9%); potentially allergenic foods should be included into infant diet only after other complementary food had been introduced (68.4%), and, the introduction of other potentially allergenic foods should be delayed, if symptoms following the introduction of a new food occur (55.7%). However, some participants, albeit minority, reported the introduction of plant-based beverages (12.5%), cow's milk (16.7%), and fruit juices to infants younger than 12 months (15.8%), thus, it was against the current recommendations.

**Conclusions:** A discrepancy exists between the confidence in knowledge and knowledge of selected infant feeding statements and feeding practices among Polish mothers of infants aged 4 to 12 months.

## 1. INTRODUCTION

The importance of adequate nutrition during early life is well recognized. The way in which infants are fed has important short and long-term consequences for their growth, development, and health. Most recent (2021) infant feeding recommendations in Poland, developed by the Polish Society of Pediatric Gastroenterology, Hepatology and Nutrition,<sup>1</sup> are in line with the guidance from the European Society of Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN).<sup>2–5</sup> Similarly as in previous recommendations,<sup>6</sup> a desirable goal is that all infants should be exclusively breastfed from birth for around 6 months. Complementary foods should not be introduced before 4 months (17 weeks, beginning of the 5th month of life) but should not be delayed beyond 6 months of age (26 weeks, beginning of the 7th month). Main important changes compared to previous recommendations,<sup>6</sup> were associated with: introduction of allergenic foods and gluten, as well as, use of plant-based drinks and fruit juices in the first year of life. In line with current recommendations,<sup>1</sup> allergenic foods may be introduced when complementary food is commenced any time after 4 months. Infants at high risk of peanut allergy (those with severe eczema, egg allergy, or both) should have peanut introduced between 4 and 11 months, following evaluation by a specialist. Gluten may be introduced between 4 and 12 months, but consumption of large quantities should be avoided during the first weeks after gluten introduction. Fruit juices and sugar-sweetened beverages should be avoided, as the recommended beverage is water. Additionally, in line with the recommendations from the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN),<sup>7</sup> the Polish guidelines recommend against using plant-based beverages (i.e., drinks manufactured from nuts, seeds, grains, fruits, vegetables) in infants. Only appropriate commercial infant formulas should be used as an alternative to human breast milk in the first year of life.

In Poland, for many years, various strategies have been used to communicate and disseminate infant feeding guidelines to inform and influence healthcare providers and caregivers. However, data on parent's adherence to infant feeding recommendations are limited. A better understanding of current infant feeding practices and factors influencing them may improve the implementation of infant feeding guidelines in the future.

## 2. AIM

A main aim of this study was to assess the confidence in knowledge and knowledge of selected infant feeding statements, and to assess selected infant feeding practices among parents of infants aged 4 to 12 months.

## 3. MATERIAL AND METHODS

The methodology of this study was fully described elsewhere (the questions were asked as part of a survey of in-

fant feeding practices during the COVID-19 restrictions in Poland).<sup>8</sup> In brief, this was a cross-sectional study, involving a convenience series of participants, with the use of an one-time online questionnaire. The questionnaire was developed by the members of the study team from the Medical University of Warsaw (AH, AS, PD) (for full questionnaire, see Appendix 1). The questionnaire was anonymous and accessible via an on-line link, during two intervals (May 27 to June 3, 2020, and March 17 to May 13, 2021).

Study included 6934 parents of infants aged 4 to 12 months (mostly aged 7–12 months; 75.5%), almost exclusively females (99.2%) (Appendix 2). Almost half of responders (47.0%) were in the age group 26–30 years. There were no incentives to participate in the survey. Respondents could discontinue the survey at any time.

The outcomes were as follows: self-assessed confidence on complementary feeding knowledge, agreement with selected infant feeding statements (objectively assessed participants knowledge), and complementary feeding practices. The feeding statements and practices of interest were related to the introduction of plant-based beverages and potentially allergenic foods, and fruit juice consumption. The issues were selected as being important from the clinical perspective and reflecting some of the recent changes in the infant feeding recommendations.<sup>1,3,4,6</sup>

Data were analysed by an independent statistician. Statistical analysis was conducted using R package, v. 4.0.5. Data for all outcomes are reported for all participants, and if feasible, for both years (2020 and 2021), jointly. All responses to questions are presented with total number of responses (*n*) and frequencies of subgroup (%). The relationship between nominal variables was evaluated using the two-sided  $\chi^2$  test with a significance level of  $\alpha = 0.05$ .

## 4. RESULTS

Most participants (68.8%) judged their knowledge on infant feeding as sufficient, 27.0% had no opinion, and only 4.2% of respondents considered their knowledge as insufficient (Appendix 3).

Significantly more participants agreed that with the statement that fruits are good source of vitamins in infants compared with those who did not agree (75.2% vs. 22.7%; difference 52.6%; 95% CI 51.2% to 54.0%;  $P < 0.0001$ ). Only 2% had no opinion. Significantly more participants did not agree with the statement that fruit juices should be given to infants younger than age 1, compared with those who did agree (61.1% v. 24.0%; difference 37.1%; 95%CI 35.5% to 38.5%;  $P < 0.0001$ ). Almost 15% had no opinion. Significantly more participants did not agree with the statement that plant-based beverages, so-called 'plant-based milks' (i.e., coconut-based or almond-based beverages) are an appropriate alternative to breast-milk substitutes such as an infant formula or protein hydrolysate, compared with those who did agree (59.9% v. 18.1%; difference 41.8%; 95% CI 40.3% to 59.9%;  $P < 0.0001$ ). As many as 22.0% had no

opinion. Significantly more participants did not agree with the statement that potentially allergenic foods (such as eggs, wheat, fish) should be included into infant diet only after other complementary food had been already introduced, compared with those who did agree (68.4% v. 22.9%; difference 45.5%; 95% CI 44.0% to 50.0%;  $P < 0.0001$ ). Almost 8.7% had no opinion. Significantly more participants did not agree with the statement that, if an infant develops symptoms following the introduction of a new food such as an egg, the introduction of other potentially allergenic foods should be delayed, compared with those who did agree (55.7% v. 34.3%; difference 21.4%; 95% CI 19.7% to 23.0%;  $P < 0.0001$ ). In total, 10% had no opinion.

Infant feeding practices were reported overall and for infants aged 4 to 6 months and 7 to 12 months (Table 1). Considerable proportion of responders reported undesirable complementary feeding practices, that included introduction of (1) cow's milk (12.6% and 18.0%, respectively); (2) plant-based beverages (9.2% and 13.6%, respectively); and (3) fruit juices (12.1% and 17.0%, respectively).

## 5. DISCUSSION

The cross-sectional study carried out in Poland assessed the confidence in knowledge and knowledge of selected infant feeding statements, and selected infant feeding practices among parents of infants aged 4 to 12 months. The survey involved more than 6900 participants, almost exclusively mothers. Most of these mothers assessed their knowledge about infant complementary feeding practices as sufficient. Indeed, in line with current recommendations, most mothers agreed that fruits are a good source of vitamins for infants; disagreed that fruit juices should be given to infants younger than age 1; disagreed that plant-based beverages are an appropriate alternative to breast-milk substitutes; disagreed that potentially allergenic foods such as eggs, wheat, fish should be only included into infant diet after other complementary food had been introduced, and disagreed that if an infant develops symptoms following the introduction of a new feed such as an egg, the introduction of other potentially allergenic foods should be delayed. However, some mothers, albeit minority, reported the introduction of plant-based beverages, cow's milk, and fruit juices to infants younger than 12 months, thus against current recommendations.

The size of the study sample is the strength of this online survey. We used convenience sampling, i.e., the participants were self-selected through parenting websites, and social media. It is likely that those participants were more interested in infant feeding. Moreover, those with no Internet access, potentially more disadvantaged individuals, were excluded from participating in this survey. Thus, sampling bias is possible. As with any cross-sectional study, our study is subject to non-response bias, i.e., the participants who agreed to contribute may differ from those who did not participate. Thus, the representativeness of the in-

**Table 1. Summary of data on complementary feeding, n(%).**

	Total (n = 6934)	Infants 4–6 month of age (n = 1695)	Infants 7–12 month of age (n = 5239)
Fruits, mouses, fruit smoothies in tubes/sachets	4275(61.7)	944(55.7)	3331(63.6)
Fruit juices	1095(15.8)	205(12.1)	890(17.0)
Cow's milk	1159(16.7)	214(12.6)	945(18.0)
Plant-based beverages e.g., coconut-based, rice-based	866(12.5)	156(9.2)	710(13.6)

fant population may be questioned. There were almost no fathers among the responders. However, this finding reflects the real-world situation in Poland where care of infants and young children is usually undertaken by mothers.

Two recent studies assessed infant feeding practices in Poland.<sup>9,10</sup> None of these studies is directly comparable with our study due to the differences in the objectives and study designs. However, some comparisons are possible. A 2016 study,<sup>12</sup> known as PITNUTS study, involved 1059 randomly selected (using personal identification number) children aged 5 to 36 months. Compared to the PITNUTS study in our study more participants reported the introduction of cow's milk to infants at 4–6 months of age (4.5% vs. 12.1%, respectively); however, less responders reported offering fruit juice to their infants at 4–6 month of age (12.1% vs 49.8%, respectively). In the PITNUTS 2016 study, plant-based beverages were not addressed as they were not an issue at that time and were addressed in the recommendations only recently. More recently, a study involving almost 300 mothers was performed in the south-eastern part of Poland. This study assessed factors affecting complementary feeding of infants.<sup>13</sup> The age of mother, level of education, and the scores of nutrition knowledge were associated with the timing of complementary food introduction. In line with our findings, inappropriate early introduction of cow's milk was reported by some mothers. Overall, these recent studies carried out in Poland found discrepancies between what is recommended (and known to parents) and what is practiced. Good parental awareness of infant feeding guidelines was also confirmed in other studies reviewed jointly in at least two recently published systematic reviews.<sup>11,12</sup>

Our study did not address factors influencing parental decision-making on infant feeding practices. However, a 2021 systematic review evaluated such factors.<sup>13</sup> Among other, based on data from 47 studies, the authors concluded that in high-income countries understanding of the evidence behind complementary feeding guidelines is inadequate and is perceived as 'a one-size-fits-all approach.' The supposed health benefits are considered when making decisions on the choice of complementary foods. However, uncertainty exists regarding which and when certain foods need to be avoided.

## 6. CONCLUSION

- (1) In conclusion, our cross-sectional study involving almost 6900 Polish mothers showed that they value themselves as confident in infant feeding.
- (2) A discrepancy exists between the confidence in knowledge and knowledge of selected infant feeding statements and feeding practices among mothers of infants aged 4 to 12 months.

### Conflict of interest

Authors declare that AH, PD, and HS have participated as speakers for Nutricia. HS serves as a scientific advisory board member of the Nutricia Foundation. AS has nothing to declare.

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This study was performed within scientific activities of the Medical University of Warsaw and was partially supported by the Nutricia Foundation. The Nutricia Foundation contributed to the development of the study questionnaire and supported the online data collection. The Nutricia Foundation had no role in data analysis, interpretation, and its dissemination.

### Ethics

Ethical approval was requested from the Medical University of Warsaw; however, it was judged not to be required. All participants agreed voluntarily to participate in the study and were informed that the data would be analyzed anonymously.

### Supplementary material

Additional materials for this paper (Appendixes 1–3) are available online.

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