WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Early introduction of solid foods in early infant nutrition and long-term effects on childhood

Diksha

LOVELY PROFESSIONAL UNIVERSITY

ABSTRACT :

The objective of this study was to identify the level of national recommendations related to the timing of the introduction of solid foods. Timing of introducing solid food during infancy may have potential effects on life-long health during childhood such as obesity, feeding difficulties and diabetes type1. After six months, breastfeeding is not essential to provide adequate nutrition, along with breastfeeding, solid food should be introduced. Perceived temperament, is a factor which may be important in infant feeding, it is related to weight gain and feeding outcomes during preschool years. Childhood obesity increase the risk of medical and psychosocial problems and also linked to adolescent and adult obesity. Cross-sectional studies, observational study, cohort study used to evaluate the relation between timing of introduction to solid food and later-outcomes. The early introduction means less than 4 months is being associated with increased weight gain. Optimum age for introducing solid food is a much-debated issue.

Keyword: Complementary food, breastfeeding, health consequences infant nutrition, nutrients.

Introduction

According to World health organisation [WHO], if complementary food is not introduced during the age of six-months, the growth and development of child may be delayed. Breastfeeding also accompanies many advantages to the health and development of children, but beyond the age of six months it is necessary to add solid food for providing enough nutrition to infant [1-2]. Some studies suggest that introducing solid food to early or too late may lead some problems introducing to early lead to increases risk of chronic disease such as diabetes, obesity, adult-onset celiac disease, eczema, too late introduction may increase feeding difficulties. Importance of early feeding, both timing and amount in the later outcomes, metabolic problems in adulthood [3]. The nutritional intake for very low birth weight infant and preterm infants VLBW requires specific attention whereas preterm are assumed to have higher nutritional requirements even after discharged from the hospital [4]. Late introduction of complementary nutritious food can lead to micronutrient deficiencies in infants, especially in lower income countries [5]. Timing for introducing solid food has been hypothesized as critical or sensitive period, but there is no evidence that introduction of solid food during sensitive period influences children's later acceptance [6].

Table 1

Guidelines on introducing solid foods

Age range	Recommended food	Key notes
4-6 months	Iron-fortified cereals, pureed vegetables	Start with single-ingredient food
6-8 months	Mashed fruits, soft proteins	Gradual increase in texture and variety
8-10 months	Finely chopped meats, finger foods	Encourage self-feeding
10-12 months	Family meals with soft textures	Monitor for choking hazards and allergens

Children are particularly vulnerable at first two years of life, during this time the required adequate nutrition which is essential for physical health and mental development [7]. Childhood obesity increase the risk of medical and psychosocial problems and also linked to adolescent and adult obesity, obese children have 78% risk of progressing obesity in adolescence and 25-50% in adulthood [8]. Delaying in the introduction of solid food in infant nutrition may lead to aversion to certain flavours and textured of food and possibly feeding difficulties in later childhood, some studies indicate that there may be critical period or window in infancy when children are receptive to new food flavours [9-15]. There is a large randomized clinical study (EAT) The enquiry about to tolerance they did the trial of infant that examined the effects of the early introduction of 6 allergic foods from age 3 months has compared with the impact encouraged to exclusively breastfed until 6 months [16]. At birth, an infant's gestational age will have an influenced on its nutritional status [17]. Evidence from increases systematic review suggest that feeding is protective against obesity in children and later-life [18]. Perceived temperament, is a factor which may be important in infant feeding, it is related to weight gain and feeding outcomes during preschool years [19]. Several

studies conducted the interaction between the age of introducing solid food and duration of breastfeeding. The early introduction means less than 4 months is being associated with increased weight gain only for infants who are breastfed for less than four months not for infants who breastfed for longer [20-22]. Optimum age for introducing solid foods to an infant diet is a much debated contentious issue [23]. Health consequences included in later outcomes like musculoskeletal disorders, diabetes, body mass index, cardiovascular disease, obesity [24-25]. The American Academy of Pediatrics (AAP) and World Health Organisation (WHO) recommends exclusive breastfeeding for first six months, and continued for one year even after complementary food is introduced [26].

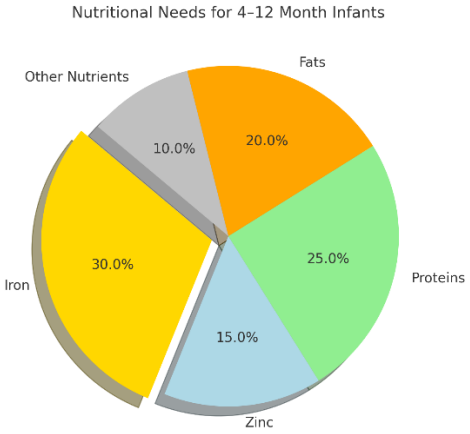

Fig 1: Nutritional needs for infants

Methodology

The aim of this study is to evaluate the relation between the timing of introducing solid foods and later outcomes in childhood. Various methods used to evaluate.

Inclusion and exclusion criteria: include cross-sectional, casecontrols, observational and cohort studies that evaluated the correlation between early introduction of solid foods and long-term outcomes in childhood. Cohort study is being conducted, a sample of 845 mothers who delivered their infants in one hospital for women and children and five community health centers in the city of Chengdu (April 2010-January 2012) was selected.

Measures: the survey is done, question asked to parents "How old was child", "When you introduced solid food". The study was conducted, total survey participants 2,020 answered the question, 25 not yet introduced, 22 did not know, 1 refused the answer to question.

The outcome measures was done at the age when infant introduced to solid food. The exposure measure, two characteristics identified the sociodemographic and biomedical. Sociodemographic variables include, maternal age, education level, socioeconomic status and biomedical include, gestational age, infant's gender, birth weight, delivery method.

Statistical analysis: statistical significance was set at $p<0.05$. The statistical packages for social sciences used to analyse the data, version 24 (SPSS for window, SPSS Inc., Chicago, 1L, USA). Student t-test was used to compute the variations between two groups.

Study design: this study was based on a double-blind, randomized controlled trial that compared two group of children fed cow-milk formula with either higher or lower protein content for the first year of life. This was descriptive, cross-sectional, observational study
focused on children under 1 year of age.

Anthropometrics: include measurements of height, weight, circumferences of child. In study
anthropometrics measures reported for 2492 children overall and 1180 at one, 1006 at two,
281 at three, 23 at four and 2 at five pediatric visit.

Study population: this study was designed to determine the effects of infertility treatment on childhood development and growth. For this analysis, a subset of singletons and twins from the main cohort with information on weight or height.

Result

Various method used to identified the relation between the timing of introduction and later-outcomes. Inclusion and exclusion criteria include cross-sectional, observational, case-controls and cohort studies. Cohort study is being conducted over a sample of 845 mothers, in the city of Chengdu. Anthropometric measurements reported for 2492 children, overall 1180 at one, 1006 at two, 281 at three, 23 at four and 2 at five, pediatric visit. Study population, was designed to determine the effects of infertility treatment on child development and growth. T-test was used to compute the radiations , statistical significance was set at $p<0.05$. The survey is done, different questions asked to parents, about their infants, how old was child, when you introduced solid food. The study was conducted, total survey participants 2,020 answered the question, 25 not yet introduced, 22 did not know, 1 refused the answer to question.

Discussion

Solid food did not simply replace formula feeds but also added additional energy to the diet during the introduction period. When your infant is ready, at around six months, but not before four months start to introduce a variety of solid food while continuing breastfeeding. A complex relationship exist between breastfeeding and the introduction of solid food. Health consequences included in later outcomes like musculoskeletal disorders, diabetes, body mass index, cardiovascular disease, obesity. Childhood obesity increase the risk of medical and psychosocial problems and also linked to adolescent and adult obesity, obese children have 78% risk of progressing obesity in adolescence and 25-50% in adulthood. Different outcome measure used to determine overweight and obesity, include, weight, body mass index, length, skin-fold measures.The early introduction means less than 4 months is being associated with increased weight gain only for infants who are breastfed for less than four months not for infants who breastfed for longer. Cross-sectional studies, observational study, cohort study used to evaluate the relation between timing of introduction of solid food and later-outcomes. Measures conducted on the basis of surveys, questions asked to parents related to their infants, example: how old is your infant, when you introduced solid food in their diet, different number of samples were collected during survey some of answer the question, some refuse to answer while some of parents did not know about this. Search strategy, outcome or exposure measures (sociodemographic and biomedical variables), statistical analysis (version 24), various other methods used to evaluate the study. Optimum age for introducing solid foods to an infant diet is a much-debated contentious issue.

Conclusion

Timing for introducing solid food has been hypothesized as critical or sensitive period. At the age of six months, solid food is introduced in infant's diet. According to World health organisation [WHO], if complementary food is not introduced during the age of six-months, the growth and development of child may be delayed. Introduction of solid food to early or to late may lead to some health problems in later age, obesity, diabetes. Breastfeeding also accompanies many advantages to the health and development of children, but beyond the age of six months it is important to add solid food in infant's diet for fulfilling the other nutritional needs. Delaying in the introduction of solid food in infant nutrition may lead to aversion to certain flavours and textured of food. Inclusion and exclusion criteria, anthroprometrics, measures, statistical analysis these are some of the methods which are use to evaluate the relation between the timing of introducing solid food and later outcomes in childhood.

REFERENCES

1. Kuo.A.A., Inkelas.M., Slusser.M.W., Msidenberg.M., Halfon.N., Introduction of solid food to young infants (2010), Matern Child *Health Journal*, 15 (8).

2. Evangeler Antonious , Maria Dagla , Maria Lliadoes, Ermioni Palaska, Eirine Orovou Early introduction of solid foods in- infants nutrition and long -term effects on childhood (2022).

3. Antoniou.E., Dagla.M., LIiadou.M., Palaska.E., Orovou.E., Early introduction of solid foods in infant's nutrition and longterm effects on childhood: Asystematic review (2022), *International Journal of Innovative Research in Medical Science*,
4. (7) 12.
5. Gsoellpointner.M., Eibensteiner.F., Thanhaeuser.M., Effects of early introduction of solid foods on nutrients intake in preterm infants during their 1st year of life: a secondary outcome analysis of a prospective, randomized intervention study (2023), *Frontiers in Nutrition*, (10).
6. Scott.A.J., Binns.W.C., Graham.I.K., Oddy.H.W., Predicators of early introduction of solid foods in infants: results of a cohort study (2009), *BMC Pediatrics*, (60).
7. Moorcoft.E.K., Marshall.L.J., McCormick.M.F., Association between timing of introducing solid foods and obesityin infancy and childhood: A systematic review (2011), *Maternal and Child Nutrition*, (7).
8. Mannan.H., Early infant feeding of formula or solid foods and risk of childhood overweight or obesity in a socioeconomically disadvantaged region of Australia: A longitudinal cohort analysis (2018), *International Journal of Environmental Research and Public Health*, (15) 8.
9. Perkin.R.M., Bahnson.T.H., Logan.K., Association of early introduction of solids with infant sleep (2018), *JAMA Pediatrics*, 172(8).

10. Northstone,K, Emmett, P& Nethersole, F (2001) The effect of age of introduction to lumpy solids on foods eaten and reported feeding difficulties at 6 and 15 months. *J Hum Nutr Diet* 14, 4354.

11. Illingworth, RS& Lister,J (1964) The critical or sensitive period, with special reference to certain feeding problems in infants and children, *J Pediatr* 65, 839-848.
12. Mason,SJ, Harris, G& Blissett,J (2005) Tube feeding in infancy: implications for the development of normal eating and drinking skills. Dysphagia 20, 46-61.
13. Blossfeld, I, Collins, A, Kiely, M, eta al, (2007), Tetxure preferences of 12-months-old infants and the role of early experiences, *Food Qual Pref* 18, 369-404.
14. Coulthard,H, Harris, G& Emmett, P (2009) Delayed introduction of lumpy foods to children during the complementary feeding period affects child's food acceptance and feeding at 7 years of age, *Matern Child Nutr* 5, 75-85.
15. Coulthard, H, Harris, G& Fogel, A (2014) Exposure to vegetable variety in infants weaned at different ages, *Appetite* 78, 89-94. • Clark, BJ & Laing, S (1990) Infant feeding: a review of weaning, *J Hum Nutr Diet* 3, 11-16.

16. Palmer.J.D., Makrides.M., Introducing solid foods to preterm infants in developed countries (2012), *Annals of Nutrition and Metabolism*, 31-38.

17. Bell.S., Yew.Y.S.S., Devenish.G., Ha.D., Do.L., Scott.J., Duration of breastfeeding, but not timing of solid food, reduces the risk of

18. overweight and obesity in children aged 24 to 36 months: Findings from an Australian cohort study (2018), *International Journal of Environmental Research and Public Health*,15(4).

19. Kuo.A.A., Inkelas.M., Slusser.M.W., Maidenberg.M., Halfon.N., Introduction of solid food to young infants (2010), *Maternal and Child Health Journal*, (15) 1185.

20. Veit.G., Et.al., The introduction of solid food and growth in the first 2 year of life in formula-fed children: analysis of data from a European cohort study (2011), *The American Journal of Clinical Nutrition*, (94) 1785-1793.

21. Vadiveloo.M., Tovar.A., Ostbye.T., Benjamin-neelom.E.S., Association between timing and quality of solid food introduction with infant weight-for-length z-scores at 12 months: Findings from the nurture cohort (2019), *Appetite*, 141.

22. Palmer.D.J., Makrides.M., Introducing solid foods to preterm infants in developed countries (2012), *Annals of Nutrition and Metabolism*, 60, 31-38.

23. Robinson.S., Fall.C., Infant nutrition and later health: A review of current evidence (2012), *Nutrients*, 4, 859-874.

24. Clayton.K.P., Putnick.L.D., et al, Early infant feeding practices and associations with growth in childhood (2024), *Nutrients*, 16, 714.

25. Arora.A., Manohar.N., et al, Determinants for early introduction of complementary foods in Australian infants: findings from the HSHK birth cohort study (2020), *Nutrition Journal*, 19.

26. Catassi, G., Aloi, M., Giorgio, V., Gasbarrini, A., Cammarota, G., & Ianiro, G. (2024). The role of diet and nutritional interventions for the infant gut microbiome. *Nutrients, 16*(3), 400.

27. Campoy, C., Leis, R., & Comité de Nutrición y Lactancia Materna de la Asociación Española de Pediatría. (2023). Methods of introduction of complementary feeding in the first year of life. *Anales de Pediatría (English Edition), 98*(4), 247–248.

28. Perez-Escamilla, R., Hromi-Fiedler, A., Rhodes, E. C., Neves, P. A. R., Vaz, J., Vilar-Compte, M., Segura-Pérez, S., & Nyhan, K. (2022). Impact of prelacteal feeds and neonatal introduction of breast milk substitutes on breastfeeding outcomes: A systematic review and meta-analysis. *Maternal & Child Nutrition*.

29. Parikh, P., Semba, R., Manary, M., Swaminathan, S., Udomkesmalee, E., Bos, R., Poh, B. K., Rojroongwasinkul, N., Geurts, J., Sekartini, R., & Nga, T. T. (2021). Animal source foods, rich in essential amino acids, are important for linear growth and development of young children in low- and middleincome countries. *Maternal & Child Nutrition, 17*(4), e13190.

30. Hamer, D. H., Solomon, H., Das, G., Knabe, T., Beard, J., Simon, J., Nisar, Y. B., & MacLeod, W. B. (2022). Importance of breastfeeding and complementary feeding for management and prevention of childhood diarrhoea in low- and middle-income countries. *Journal of Global Health, 12*, 10011.

31. Bergamini, M., Simeone, G., Verga, M. C., Doria, M., Cuomo, B., D'Antonio, G., Dello Iacono, I., Di Mauro, G., Leonardi, L., Miniello, V. L., Palma, F., Scotese, I., Tezza, G., Caroli, M., & Vania, A. (2022). Complementary feeding caregivers' practices and growth, risk of overweight/obesity, and other noncommunicable diseases: A systematic review and meta-analysis. *Nutrients, 14*(13), 2646.

32. Indrio, F., Dargenio, V. N., Francavilla, R., Szajewska, H., & Vandenplas, Y. (2023). Infantile colic and long-term outcomes in childhood: A narrative synthesis of the evidence. *Nutrients, 15*(3), 615.

33. Buonsenso, D., Di Gennaro, L., De Rose, C., Morello, R., D'Ilario, F., & Zampino, G. (2022). Long-term outcomes of pediatric infections: From traditional infectious diseases to long COVID. *Frontiers in Pediatrics, 10*, 551-571.