



Mixed feeding among infants aged 0-6 months in an urban setting of Eldoret, Kenya

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Abstract

The objectives of the study were to determine the age at which infants were introduced to mixed feeding, types of mixed foods given to infants and the nutrient content of these foods. This was a cross sectional study carried out in Huruma and West clinics in the urban setting of Eldoret, where 384 mother infant pairs visiting the clinics were studied. A structured questionnaire was used to collect data from the mothers. A 24-hour recall method was used to collect information on infant feeding. The informed consent of the participant was sought before the study commenced. Data was analysed using Statistical Package for Social Scientist version 12.0. Food composition tables were used to determine the nutrient content of each food the infant consumed. Means for various nutrients were worked out for each age and compared to the Recommended Daily Allowance for the same age. The median and mean ages for introducing mixed feeding were 2.4 and 2 months, respectively. Majority (71.5%) of the infants was introduced to mixed feeding between the ages of 0-2 months, 25.7% and 2.8% were introduced at the age of 3-4 months and 5-6 months, respectively. Infants were fed on water based liquid (4%), milk (7%) and semi solid foods (89%). The mean energy intakes (278, 530) at 2 and 6 months were 52.5 and 80%, respectively. The mean protein intakes (9.5, 13.4) were 76 and 105% at 0-2 months and 5-6 months, respectively. At 2 and 6 months consumption of vitamin A was 11 and 43%. Iron consumption was 66% at 6 months and all these were inadequate for the infants. Calcium intakes at 0-2, 3-4 and 5-6 months were 44, 87 and 96.8%. Introduction of foods before the age of 6 months was high, there is need for intensify education on infant feeding practices in the clinics and community.

Key words: Mixed feeding, infants, types of mixed foods, age for introducing foods, nutrient content, energy intake, protein intake, vitamin A intake, iron intake, calcium intake, ascorbic acid intake, Eldoret.

Introduction

Rapid growth occurs during the first 6 months of life. This requires adequate supply of nutrients. Mixed feeding is one of the feeding methods mostly used by mothers¹. The availability of nutrients in mixed feeding depends on the digestion and absorption of nutrients in the body given that the digestive system of the infant is not fully developed. Mixed feeding may increase the risks of overweight, allergies, low scores on intelligence test and infections such as upper respiratory tract infections (URTI), diarrhoea and other life threatening infections². Mixed feeding may also be a risk factor to under-nutrition among infants. In this era of HIV/AIDS mixed feeding may increase the risk of transmitting the virus from the mother to the infant through breastfeeding³.

In Kenya, URTI and diarrhoea are ranked first and second among the top ten diseases affecting under fives in the country⁴. The prevalence of diarrhoea among under fives in Kenya is 14%, this resulted to mortality of 12% among under fives in Kenya⁵. Over 60% of Kenyans live below the poverty line⁴ and this poses a challenge to purchasing power as well as hygienic preparation and handling of baby food and the knowledge on nutrient content of various foods. Mixed feeding (MF) may increase the risk of ovarian cancer and breast cancer to the mother and does not help to delay a pregnancy⁶.

Infant feeding is a public health concern especially in the resource poor countries. Compliance to WHO recommendation on infant and young child feeding is a challenge to many countries. A number of studies indicated high rates of MF. According to a

study in South Africa, MF among infants aged 0-6 months was 78%⁷ whereas in Ethiopia it was 68.5%⁸. In Tanzania MF was 86.5%⁹, while in Kenya this was higher (97.2%)⁵. It becomes of paramount importance to find out the nutrient content of these foods and if they meet the Recommended Daily allowances (RDA). Mixed feeding in this study was considered to be any feed given to the infant in addition to breast feeding before the age of 6 months. The objectives of the study were to establish the age at which mixed feeding is introduced to the infant, the types of mixed feeds and the nutrient content of the foods.

Materials and Methods

This study was carried out in an urban setting in Eldoret municipality, Uasin-Gishu District, Kenya, between May and July 2005. The research was done in the Maternal and Child Health (MCH) department of Huruma and West clinics. The subjects studied were mother-infant pairs visiting the clinics. The infants were aged between 0 and 6 months.

Study design, sample size determination and sampling: A cross-sectional design was used in the study. This design was used since data was collected once from the respondent. The formula suggested by Mugenda¹⁰ was used to arrive at the sample size. MF prevalence in the population was considered to be 50%. Simple random sampling technique was used to get the desired sample size of 384.

Inclusion and exclusion criteria: The inclusion criteria in the study were: a term infant born at or after 37 weeks of gestation with a weight of at least 2.5 kg, mothers with at least one birth and willing to participate in the study. Subjects excluded in the study were infants born before 37 weeks of gestation (pre-term infants), low birth weight (<2.5 kg) infants and all mothers without children and those who refused to give consent to the study.

Data collection procedures: A structured questionnaire was used to collect data from the respondents. A 24-hour recall method was used to collect information on feeding. The infant's age was worked out from the child's clinic card, this was calculated from the date of birth to the date of data collection. The mothers selected for the study were interviewed on feeding practices. To establish the amount of food infants' consumed during any feeding time, common household equipment such as calibrated pediatric bottle and cup were used to estimate the amount of liquids consumed. A tablespoon and teaspoon were used to estimate mashed foods. These foods were then converted to grams. Face-to-face interviews were used to collect data.

Data analysis: Information in the questionnaires was coded and entered into Statistical Package for Social Scientists (SPSS) computer package (Version 12.0) for analysis. Percentages, medians and means were calculated. The amount of food the infant consumed in a day was quantified by summing up all the foods infant consumed in 24 h as per measuring tools that were used. Each food consumed was converted into grams. Food composition tables¹¹ were used to determine the nutrient content of each food. Different nutrients in various foods were summed up categorically (energy, protein, iron, vitamin A, calcium and ascorbic acid) to establish the total nutrient intake. The total nutrient was compared to the RDA. The nutrient intake was expressed as a percent of RDA.

Research ethics: A letter of approval to carry out the research was obtained from Institutional Research and Ethics Committee (IREC) of Moi University before research commenced. Permission to carry out the research was obtained from local administrative units and the informed consent was obtained from all study participants.

Results

Most (49.6%) of the infants were aged between 0 and 2 months. This was followed by infants aged 3-4 months (28.8%) and lastly infants aged 5-6 months (21.6%). Over half (198, 51.5%) of infants were female and 48.5% (186) were male in the study. The total number of mother infant pair interviewed was 384. Some (n = 140) of the mothers were on exclusive breastfeeding, and n = 244 were on mixed feeding and this category provided information on mixed feeding.

Age for introducing mixed foods: Majority (71.5%) of the infants was introduced to mixed foods at the age of 2 months. At ages 3-4 and 5-6 months 25.7 and 2.8% were introduced to MF, respectively. Among infants aged 3-4 months 65.6% had been introduced to mixed foods at 2 months and 34.4% was on MF at 3-4 months. Among infants aged 5-6 months 48.8% was introduced

to MF at 0-2 months, 42.7% was introduced to MF at 3-4 months and 8.5% at 5-6 months (Table 1). The median and mean age for introducing MF was 2.4 and 2 months, respectively.

Table 1. Age for introducing mixed foods (n = 244).

Age in months	Age for introducing mixed foods in months		
	0-2	3-4	5-6
0-2 (n = 72)	72 (100%)	-	-
3-4 (n = 90)	59 (65.6%)	31 (34.4%)	-
5-6 (n = 82)	40 (48.8%)	35 (42.7%)	7 (8.5%)
Overall % (n = 244)	171 (71.5%)	66 (25.7%)	7 (2.8%)

Types and proximate nutrient content of mixed foods consumed:

The type of foods infants consumed in the study included water based liquids (4%), cow's milk (7%) and semi solid foods (89%). Most of the infants in the study were fed on semi solid foods in all categories. At the age of 0-2, 3-4 and 5-6 months 76.4, 94.5 and 96.3%, respectively, were on semi solid foods. A number of infants were fed on plain cow's milk, at 0-2, 3-4 and 5-6 months 13.9, 3.3 and 3.7%, respectively, were on cow's milk. Few infants were fed on water-based liquids at 0-2 months (9.7%) and at 3-4 months (2.2%). At the age of 5-6 months no infants were receiving water-based liquids (Table 2). Water-based liquids implied that the infant was feeding on orange juice and/or cows milks diluted with water. Infants who were on semi solids were feeding on foods such as cooked mashed green bananas and potatoes, enriched porridge with milk, avocado and paw paw fruits.

Proximate energy, protein and micronutrient intake: Infants aged 0-2 and 5-6 months received mean energy intake of 278 and 530, respectively. These translated into 52.5% and 80% of the RDA (Table 3). Both groups did not meet the RDA.

Mean protein intake of infants aged 5-6 months was above the RDA (105%). Infants aged 0-2 months consumed below the RDA (76%). Consumption of protein among infants aged 0-2 months was therefore inadequate (Table 4).

Micronutrient intake such as vitamin A, iron and calcium among all categories of infants was below the RDA. Vitamin A intake among infants aged 0-2, 3-4 and 5-6 months was 11, 21 and 43%, respectively. Iron intake among infants at 5-6 months was 66%, and this is below the RDA. Calcium intake among all groups of infants was below the RDA, as infants aged 0-2, 3-4 and 5-6 months consumed 44, 87 and 96.8%, respectively. Ascorbic acid consumption was equally inadequate at ages of 0-2 and 3-4 months and adequate at 5-6 months (Table 5).

Table 2. Type of mixed foods.

Type of foods	Age in months			% total
	0-2 (n = 72)	3-4 (n = 90)	5-6 (n = 82)	
Water based liquids	7 (9.7%)	2 (2.2%)	-	4%
Cow's milk	10 (13.9%)	3 (3.3%)	3 (3.7%)	7%
Semi solid foods	55 (76.4%)	85 (94.5%)	79 (96.3%)	89%
Total	100	100	100	100

Table 3. Estimated mean energy intake (n = 244).

Age in months	RDA*	Daily Energy Intake	% of RDA
0-2	530	278	52.5
3-4	-	368	-
5-6	663	530	80

Source*: Recommended Daily Allowance by FAO/WHO, 1985.

Table 4. Estimated mean protein intake (n = 244).

Age in months	RDA*	Daily Protein Intake	% of RDA
0-2	12.5	9.5	76
3-4	-	12.2	-
5-6	12.7	13.4	105

Source*: Recommended Daily Allowance by FAO/WHO, 1985.

Table 5. Estimated micronutrient intake.

Age in months	Vitamin A			Iron			Calcium			Ascorbic acid		
	RDA	Intake	% RDA	RDA	Intake	% RDA	RDA	Intake	% RDA	RDA	Intake	% RDA
0-2	350	37	11	-	2.9	-	500	220	44	20	10.4	52
3-4	350	74	21	-	3.8	-	500	435	87	20	18	90
5-6	350	150	43	8.5	5.6	66	500	484	96.8	20	21	105

Source*: Recommended Daily Allowance by FAO/WHO, 1970, 1986, 1988 and 1996.

Discussion

Early introduction of foods to the infants before the age of 6 months in the study was high as the median and mean age for introducing MF was 2.4 and 2 months, respectively. This implies that most of the infants in this study were introduced to early MF around the age of 2 months. The median age for introduction of MF is similar with a study in Malawi whose median age was 2.5 months¹². Studies done in Ethiopia, United Kingdom¹³ and South Africa¹⁴ have indicated late introduction of MF as compared to this study.

Infants were fed on water based liquids (4%), milk (7%) and semi solid foods (89%). Water-based liquids in this study meant that the infant was receiving fruit juice or cow's milk diluted with water. Most of the infants received this food until the age of 3-4 months and by the age of 5-6 months no infant was receiving water-based liquids. Infants were given water-based liquids because most mothers reported that infants were unable to digest other foods such as whole cow's milk. Cow's milk was consumed across all age groups (0-6 months) in the study, although high consumption of plain cow's milk was in age group 0-2 months since some mothers reported that infants were unable to swallow semi solid foods and water-based liquids were unsatisfying to the infant. Infants who were fed on semi solid foods were the majority in the study, and this food was consumed by all age groups in the study. Infants' were fed on semi solid foods because mothers reported that these foods were filling (satisfying) to the infant and they were more nutritious. Results on types of mixed foods are comparable with the Kenya⁵ and Tanzania⁹ demographic and health surveys. The findings in this study differ with a study done in Indonesia where most infants were first introduced to liquids, fruits and biscuits¹⁵.

Mean protein intake for infants at 0-2 month was inadequate, this may be due to the consumption of water-based liquid. Infants were given cow's milk diluted with water. Dilution lowers the nutrient content in the milk and this contributed to inadequate protein intake at 0-2 months. At 6 months mean protein intake was adequate, this may be explained by the fact that at 6 months infants were consuming whole cow's milk and semi solid foods. These semi solid foods include foods that had been enriched with cow's milk such as porridge, mashed cooked potatoes and green bananas.

At 0-2 months mean energy intake was inadequate as infants were given porridge. This porridge had thin consistency which lowered the nutrient value, which contributed to inadequate mean

energy at this age. At 5-6 months infants were fed on porridge and mashed potatoes as sources of energy. Infants were given inadequate amounts of porridge and mashed potatoes and this lowered the mean energy intake. In India mixed fed infants had a low calorie intake of 40%¹⁶ which is below the RDA and supports the findings of our study.

Vitamin A (retinol) intake was inadequate to all infants in the study. The main source of vitamin A (retinol) was cow's milk. Foods such as oranges, pawpaw, avocado and green bananas were rich in carotene. Iron intake was equally inadequate to all infants in the study, most of foods infants consumed contained iron in little amounts. Calcium intake at 0-2 and 3-4 months was inadequate due to consumption of inadequate amounts of foods (porridge, milk and smashed cooked green bananas) containing calcium. Ascorbic acid levels at 0-2 months were inadequate, and this may be attributed to consumption of water-based liquid (orange juice) which is not a rich source of ascorbic acid. Other foods (milk and porridge) that infants consumed at this age had little amounts of ascorbic acid. At 6 months ascorbic acid level was adequate since infants consumed fruits (oranges and pawpaw) and vegetable (kales) in adequate amounts.

Conclusions

In conclusion, therefore, infants were introduced to mixed feeding early enough before the age of 6 months. At the ages of 0-2 and 3-4 months the foods infants fed on did not meet the RDA. At 5-6 months protein and ascorbic acid met the RDA. There is need for intensive education on infant feeding in the clinics and community.

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