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Original Research Article

The study of dietary diversity score in children between 6 months to 23 months: a hospital based study

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ABSTRACT

Background: Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods and is also a proxy for nutrient adequacy of diet of individual. Breast-feeding and complementary feeding practices are fundamental to children's survival and development. Feeding practices have an impact on physical growth, which is one of the best indicators of children's well-being. However, the relation between the quality of feeding practices during early age and nutritional status are difficult to establish, and, depending on the context and overall living conditions, the influence of feeding factors on children's nutritional status can vary considerably. This study helps us to assess the dietary diversity score by simple food count method which is a good indicator of adequate micronutrient intake.
Methods: The study was a retrospective study conducted on babies between 6 months to 23 months of age presenting in Paediatric outpatient Department. Data was collected by 24-hour recall method for 3 days and an average.
Results: 30% of subjects had weight for age below 2 SD and 8% had length for age below 2 SD. Dietary diversity Score of 1and 6 in 8%, 2 in 48%, 3 and 5 in 6%, 4 in 24% was noted. The average scoring was low among 6-9 and10-12 months and it increased between 13-23 months. With increase in age there was increase in dietary diversity score and vice versa.
Conclusions: Limited diversity in complementary foods is a strong predictor of the nutritional status of children. Inclusion of a variety of food groups may be more essential to improve child's nutritional status.

Keywords: Dietary diversity score, Micronutrients

INTRODUCTION

Chronic malnutrition is still a major problem among young children. Inadequate nutrition during early childhood is among the main contributing factors for stunting.[1] Further risk factors for impaired growth and development are inappropriate breastfeeding as well as complementary feeding practices in children under two years of age.[2,3] Attempts of establishing some association between dietary diversity score and nutritional quality have been known since 1960s, and recoded evidences exist starting early 1980s.[4,5] Several trials are conducted to qualify appropriate feeding practices of the population in developing countries since the global consultation on complementary feeding convened by WHO identified lack of indicators as one of the constraints of improving young child feeding.[6-8] Consequently, dietary diversity score (DDS) which quantifies the number of food groups in a diet consumed over a reference period emerged as a potential indicator of nutritional adequacy.[9] There is evidence that not only food calories but dietary diversity (DD) is significantly associated with a child's growth and

weight.[10,11] Sufficient DD, meaning using a variety of foods to cover the nutritional needs of the growing child, is often not achieved in vulnerable populations. To meet basic nutritional needs, the World Health Organization (WHO) recommends a consumption of at least a minimum of four out of seven different food groups per day for children 6-23 months of age, measured as minimum dietary diversity (MDD).[12] There is some evidence indicating that DDS and nutritional status can both correlate or interact. This inconsistency is attributable to some confounding factors that include location (urban/rural), socioeconomic, demographic, and within food group variability.[13] There has also been the possibility that diagnostic interpretation of the results of correlation lead to wrong conclusion.[5,14-16] The variability of nutrient content within each food group could be another source of inconsistency.[7,17] These variations limit the comparison and generalization of findings, which in turn hinder the standardization of DDS as a measure of nutritional adequacy.[18,19] Despite the problems of standardization, dietary diversity is still being validated as a measure of nutritional quality by the same old correlation method.[20]

METHODS

The study was a retrospective study conducted on babies between 6 months to 23 months of age presenting in Pediatric outpatient Department at Rajarajeswari Medical College and hospital data was collected by 24-hour recall method for 3 days and an average.

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation.

Mann Whitney U test was used as test of significance to identify the mean difference between two qualitative variables. Kruskal Wallis test was the test of significance to identify the mean difference between more than two groups for qualitative data.

Spearman's correlation was done to find the correlation between two quantitative variables and qualitative variables respectively.

RESULTS

In the study 30% of subjects were <2SD with respect to Weight for age and 8% were <2SD with respect to height for age. In the study 8% had Score of 1 and 6 respectively, 48% had score of 2, 6% had score of 3 and 5 respectively and 24% had score of 4.

Table 1: Demographic profile of subjects in the study.

Parameters		Count	%
Age	6 to 12 months	25	50.0
	>12 months	25	50.0
Sex	Female	28	56.0
	Male	22	44.0
Education status of mother	Primary school	11	22.0
	Middle school	16	32.0
	High school	13	26.0
	Graduate	10	20.0
SES	Upper middle	3	6.0
	Lower middle	31	62.0
	Upper lower	16	32.0
Birth order	1st	19	38.0
	2nd	27	54.0
	3rd	4	8.0
Delivery	LSCS	23	46.0
	Vaginal delivery	27	54.0
Breastfeeding status	Continuing	20	40.0
	Stopped	30	60.0
Breastfeeding stopped at months	Before 6 months of age	14	46.7
	After 6 months of age	16	53.3

In the study median (Mean±SD) dietary diversity score among those in age group 6 to 9 months was 2 (1.8±0.5), among 10 to 12 months age group was 2 (2.3±0.9) and among 13 to 23 months age group was 4 (3.8±1.4).

This difference in median and mean dietary diversity score with respect to age distribution was statistically significant.

Table 2: Anthropometric measurements of subjects.

		Count	%
Weight for age	±2SD	35	70.0
	<2SD	15	30.0
Length for age	±2SD	46	92.0
	<2SD	4	8.0

Table 3: Food groups pattern of consumption.

	Yes		No	
	Count	%	Count	%
Grains, roots and tubers	48	96.0	2	4.0
Legumes and nuts	20	40.0	30	60.0
Dairy products	46	92.0	4	8.0
Flesh	3	6.0	47	94.0
Egg	7	14.0	43	86.0
Vit A rich fruits and vegetables	13	26.0	37	74.0
Other fruits and vegetables	13	26.0	37	74.0

Table 4: Dietary diversity score among subjects.

		Count	%
Dietary diversity score	1	4	8.0
	2	24	48.0
	3	3	6.0
	4	12	24.0
	5	3	6.0
	6	4	8.0

Table 5: Mean dietary diversity score with respect to age distribution.

		Dietary diversity score		
		Mean	SD	Median
Age	6 to 9 months	1.8	0.5	2
	10 to 12 months	2.3	0.9	2
	13 to 23 months	3.8	1.4	4
	P value	<0.001*		

Table 6: Spearman's rho correlation between dietary diversity score and age.

Correlations				
			Dietary Diversit Score	Age (months)
Spearman's rho	Dietary diversity score	Correlation Coefficient	1.000	0.698**
		P value		<0.001*
		N	50	50

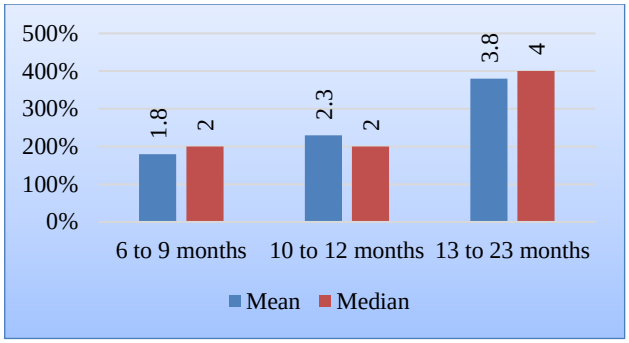

Figure 1: Bar diagram showing mean dietary diversity score with respect to age distribution.

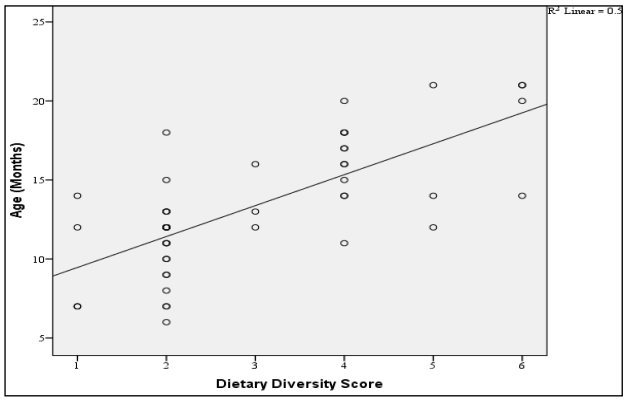

Figure 2: Scatter plot showing correlation between dietary diversity score and age.

In the study there was significant positive correlation between age and dietary diversity score i.e. with increase in age there was increase in dietary diversity score and vice versa.

DISCUSSION

Dietary diversity scores are useful predictors of probability of adequate dietary intake of micronutrients in children. Dietary diversity has been shown to be associated with increased nutrient adequacy of children and adults in developed countries.[21,22] Similar results showing that higher dietary diversity was associated with increased nutrient intake or better child nutritional status were also found in developing countries.[10,23-27]

In our study we found 50% children were in the age group 6 to 12 months and 50% were in the age group above 12 months. Gender wise distribution we found 56% were females and 44% were males. We found that education status of the mother influenced the nutritional status of the children. In the present study 22% of mothers had studied till primary school, 32% till middle school, 26% till high school and 20% were graduation. The positive association between dietary diversity and SES corroborates previous studies in developing countries (Hatloy et al and Torheim et al).[28]

Recently, Thorne-Lyman et al also showed that the DDS is associated with total household expenditures.[28] This indicates that the household's capability to acquire necessary foods and the general availability of food is a prerequisite to achieve the diversification of child diets (Torheim et al). In the study we found 63% belonged to lower middle class, 32% belonged to upper lower class and 6% belonged to upper middle class.

We found 40% were continuing breast feeding and 60% stopped breast feeding. Out of 30 subjects who stopped breast feeding, 46.7% stopped before 6 months and 53.3% stopped after 6 months. In the present study we found the DDS was low among children who were on continuing on breastfeeding. In the present study we found 30% of subjects were below 2SD with respect to Weight for age and 8% were below 2SD with respect to Length for age. There are various studies which shows association between stunting and dietary diversity (Arimond and Ruel, Sawadogo et al).[10,26] Despite the inconsistencies in age ranges and types and methods of dietary indices applied, most studies showed a positive association between dietary diversity and height for age using national or multinational samples.

Using data from multiple countries in Africa, Asia and Latin America, Arimond and Ruel showed that improved dietary diversity was associated with a higher Height for age among children aged 6-23 months.[10] Similarly, Sawadogo et al found a positive relationship between infant and child feeding index and height for age in all age groups of children 6-35 months in rural Faso B.[26] On the other hand, in a study conducted in rural China, infant and child feeding index was shown to be associated with weight-for-length and weight-for-age z-scores, but not with height for age (Zhang et al).[30] This lack of association may be explained by the low prevalence of stunting 8% and sample size of 50 children aged 6-23 months. The findings of this analysis and previous research reinforce the notion that improved food variety may indeed reflect a greater likelihood of meeting daily energy and nutrient requirements, which would result in improved nutritional status among young children

In the study 96% were consuming grains, roots and tubers, 40% were consuming legumes and nuts, 92% were consuming dairy products, 6% were consuming flesh, 14% were consuming egg, 26% were consuming Vitamin A rich fruits and vegetables and 26% were consuming other fruits and vegetables.

In the study 8% had dietary diversity score of 1 and 6 respectively, 48% had score of 2, 6% had score of 3 and 5 respectively and 24% had score of 4. Maximum children had a score of 2. In the study median (mean±SD) dietary diversity score among those in age group 6 to 9 months was 2 (1.8±0.5), among 10 to 12 months age group was 2 (2.3±0.9) and among 13 to 23 months age group was 4 (3.8±1.4). This difference in median and mean dietary diversity score with respect to age distribution was statistically significant. Similarly, in Filipino, Using 9 food groups, children had a mean DDS of nearly 5.[24,31] In a study of school-aged children in Kenya, the mean DDS was 5.18 (based on 7 food groups).[32]

The average scoring was low among 6-9 and 10-12 months of age and it increased in children between 13-23 months. We found that there was significant positive correlation between age and dietary diversity score i.e. with increase in age there was increase in dietary diversity score and vice versa.

CONCLUSION

This analysis revealed that limited diversity in complementary foods is a strong predictor of the nutritional status of children. Optimizing the overall quality of complementary foods through the inclusion of a variety of food groups may be more essential to improve child nutritional status, rather than prolonged breastfeeding itself, particularly after the one year of life. However, further research on the methodological issues related to the construction of better dietary diversity indicators is required.

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REFERENCES

1. Stewart CP, Iannotti L, Dewey KG, Michaelsen KF, Onyango AW. Contextualising complementary feeding in a broader framework for stunting prevention: Complementary feeding in stunting prevention. Matern Child Nutr. 2013;9:27-45.
2. Kuchenbecker J, Jordan I, Reinbott A, Herrmann J, Jeremias T, Kennedy G, et al. Exclusive breastfeeding and its effect on growth of Malawian infants: results from a cross-sectional study. Paediatr Int Child Health. 2015;35(1):14-23.
3. Reinbott A, Kuchenbecker J, Herrmann J, Jordan I, Muehlhoff E, Kevanna O, et al. A child feeding index is superior to WHO IYCF indicators in explaining length-for-age Z-scores of young children in rural Cambodia. Paediatr Int Child Health. 2015;35(2):124-34.
4. Daniel MC. Dietary diversity as a measure of nutritional adequacy throughout childhood. PhD Thesis, Department of Nutrition. University of North Carolna, Chapel Hill, United States; 2006:1-143.
5. Guthrie HA, Sheer JC. Validity of dietary score for assessing nutrient adequacy. J Am Diet Assoc. 1981;78:240-5.
6. WHO. World health report. World Health Organization, Genava. 2002. Available at http://www.who.int/whr/2002/en/whr02_en.pdf?ua=1

7. Xu Y, An D, Li H, Xu H. Review: breeding wheat for enhanced micronutrients. Can J Plant Sci. 2001;91:231-7.
8. Ng M, Fleming T, Robinson M, Thomson B, Graetz N. Global regional and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the global burden of disease study 2013. Lancet. 2014;384:766-81.
9. Food and Agriculture Organization of the United Nations. Developing food-based dietary guidelines: a manual from the English speaking Caribbean. 2007. Available at ftp://ftp.fao.org/docrep/fao/010/ai800e/ai800e00.pdf
10. Arimond M, Ruel MT. Dietary diversity is associated with child nutritional status: evidence from 11 demographic and health surveys. J Nutr. 2004;134(10):2579-85.
11. Mallard SR, Houghton LA, Filteau S, Mullen A, Nieuwelink J, Chisenga M, et al. Dietary diversity at 6 months of age is associated with subsequent growth and mediates the effect of maternal education on infant growth in Urban Zambia. J Nutr. 2014;144(11):1818-25.
12. WHO. Indicators for assessing infant and young child feeding practices: part 2: measurement. 2010. Available at http://apps.who.int/iris/handle/10665/44306 Accessed 22 February 2016.
13. Kennedy GL, Pedro MR, Seghieri C, Nantel G, Brouwer I. Dietary diversity score is a useful indicator of micronutrient intake in non-breast-feeding Filipino children. J Nutr. 2007;137:472-7.
14. Moursi MM, Arimond M, Dewey KG, Treche S, Ruel MT, et al. Dietary diversity is a good predictor of the micronutrient density of the diet of 6-to 23-month-old children in Madagascar. J Nutr. 2008;138:2448-53.
15. SCF. Tolerable upper intake levels for vitamins and minerals. European Food Safety Authority. 2006:1-482.
16. Swindale A and Bilisky P. Development of a universally applicable household food insecurity measurement tool: process, current status, and outstanding issues. J Nutr. 2006 May;136(5):1449S-1452S.
17. FAO. Food composition table for use in Africa. Agriculture and Consumer Protection; 1966. Available at http://www.fao.org/docrep/003/x6877e/x6877e02.htm
18. Guidelines for measuring household and individual dietary diversity. Agriculture and Consumer Protection, FAO, Rome. 2011. Available at http://www.fao.org/3/a-i1983e.pdf
19. Sealey-Potts C, Potts AC. An assessment of dietary diversity and nutritional status of pre-school children. Austin J Nutri Food Sci. 2014;2:1040.
20. Hatloy A, Halland J, Diara MM, Oshaug A. Food variety socioeconomic status and nutritional status in urban and rural areas in Koutiala (Mali). Public Health Nutr. 2000;3:57-65.
21. Kant AK. Indexes of overall diet quality: a review. J Am Diet Assoc. 1996;96:785-91.
22. Kant AK. Dietary patterns and health outcomes. J Am Diet Assoc. 2004;104:615-35.
23. Ferguson EL, Gibson RS, Obisaw OC, Opare OC, Lamba F, Ounpuu S. Seasonal food consumption patterns and dietary diversity of rural preschool Ghanaian and Malawian children. Ecol Food Nutr. 1993;29:219-34.
24. Hatloy A, Torheim LE, Oshaug A. Food variety: a good indicator of nutritional adequacy of the diet? A case study from an urban area in Mali, West Africa. Eur J Clin Nutr. 1998;52:891-8.
25. Onyango AW. Dietary diversity, child nutrition and health in contemporary African communities. Comp Biochem Physiol A Mol Integr Physiol. 2003;136:61-9.
26. Sawadogo PS, Martin-Prevel Y, Savy M, Kameli Y, Traissac P, Traore AS, et al. An infant and child feeding index is associated with the nutritional status of 6- to 23-month-old children in rural Burkina Faso. J Nutr. 2006;136:656-63.
27. Tarini A, Bakari S, Delisle H. The overall nutritional quality of Nigerian children is reflected in their growth. Sante. 1999;9:23-31.
28. Torheim LE, Ouattara F, Diarra MM, Thiam FD, Barikmo I, Hatloy A, et al. Nutrient adequacy and dietary diversity in rural Mali: association and determinants. Eur J Clin Nutr. 2004;58:594-604.
29. Thorne-Lyman AL, Valpiani N, Sun K, Semba RD, Klotz CL, Kraemer K, et al. Household dietary diversity and food expenditures are closely linked in rural Bangladesh, increasing the risk of malnutrition due to the financial crisis. J Nutr. 2010;140:182S-8S.
30. Zhang J, Shi L, Wang J, Wang Y. An infant and child feeding index is associated with child nutritional status in rural China. Early Hum Dev. 2009;85:247-52.
31. Truswell S. Evolution of dietary recommendations, goals and guidelines. Am J Clin Nutr. 1987;45:1060-72.
32. Ruel M, Graham J, Murphy S, Allen L. Validating simple indicators of dietary diversity and animal source food intake that accurately reflect nutrient adequacy in developing countries. Report submitted to GLCRSP. 2004.

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