

## Original Research Article

# Association of minimum dietary diversity and minimum meal frequency with anthropometric parameters among children of 6 to 23 months of age attending immunization clinic of a tertiary care hospitals

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## ABSTRACT

**Background:** The age of 6–23 months is the golden period in the first 1000 days of life. Insufficient quantities, frequencies, and inadequate quality of complementary feedings have a negative effect on child health and growth, especially in the first two years of life.

**Methods:** A hospital based descriptive type of observational study was carried out in the immunization clinic. The source population were the mothers who had children in age group of 6-23 months brought to the clinic in the month of January 2021 comprise the “target population”. The sample size of 102 was calculated with 80% of power, confidence level of 95% and considering prevalence of MDD as 15.2%. Purposive sampling technique was employed for selection of study sample. Proportion of Minimum Meal Diversity and Minimum Meal Frequency was calculated and their association was assessed with anthropometric characteristics.

**Results:** Proportion of MDD was found to be 72.5% (Figure 1) whereas Proportion of MMF was found to be 87.3 %. The proportion of MDD was significantly high among the children who had minimum meal frequency. MDD and MMF were protective against the acute malnutrition among the children.

**Conclusions:** This study shows that consumption of a diverse diet and MMF is associated with a reduction in undernutrition among children of 6 to 23 months of age. Measures to improve the type of complementary foods given to children to meet their needs for energy and nutrients should be considered.

**Keywords:** Minimum dietary diversity, Minimum meal frequency, Immunization clinic, Children, Anthropometric parameters

## INTRODUCTION

Proper infant and child feeding practice is fundamental for optimal child growth and development.<sup>1</sup> From birth until the age of 6 months, the baby's nutrition has been fulfilled with exclusive breastfeeding, whereas, when the baby is more than six months old, the nutritional needs will increase so that there is need for complementary feeding.<sup>2</sup> The age of 6–23 months is the golden period in the first 1000 days of life. This period is called the

window of opportunity and an important stage to optimize the growth and development of children.<sup>2</sup> Insufficient quantities, frequencies, and inadequate quality of complementary feedings have a negative effect on child health and growth, especially in the first two years of life.<sup>3</sup>

Minimum dietary diversity (MDD) is defined as the proportion of children 6–23 months of age who receive foods from four or more food groups out of the seven

food groups.<sup>4</sup> Based on the June 2017 expert consultation, breast milk has been added as an 8th food group and the criterion for MDD has shifted accordingly, from 4 of 7 groups to 5 of 8 groups.<sup>5</sup>

Minimum Meal Frequency (MMF) 4 is defined as Children 6–23 months of age who consumed solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) at least the minimum number of times during the previous day. Minimum Dietary Diversity (MDD) is a widely used indicator of adequate dietary micronutrient density for children 6-23 month's old.<sup>6</sup>

Globally, it has been estimated that only 25 percent receive the minimum dietary diversity (MDD) and 51 percent receive the minimum required meal frequency (MMF).<sup>7</sup> Tanzania Demographic and Health Survey showed that 39 % of children aged 6–24 months are given minimum recommended meal frequency and 26 % are given minimum recommended diverse diet.<sup>7</sup> According to regional estimates, South Asia was revealed to have one of the highest burdens of undernutrition (31.7% stunted; 14.3% wasted). While among South Asian countries, Pakistan is ranked as having the highest prevalence of stunting (40.2%), wasting (17.7%) and underweight (28.9%).<sup>8</sup> Similarly, for under-five nutritional status, more than one-third of the world's malnutritional children live in India. The prevalence of wasting, stunting, and underweight in urban areas is 27.2%, 17.0%, and 26.2%, respectively.<sup>9</sup> Dietary diversity and minimum meal frequency are the core indicators for assessing the feeding practices and nutritional status of children.

Hence this study has been planned with the objective to find out association between anthropometric parameters with minimum dietary diversity and Minimum Meal Frequency. This will help to educate parents on good feeding practices and also help us to provide recommendations to improve education on dietary practices.

## METHODS

A hospital based descriptive type of observational study was carried out in the immunization clinic under the department of Community Medicine. To have detail and valid information, data for the present study was obtained from the mothers of the beneficiaries who had children in age group of 6-23 months. All the beneficiaries under UIP (Universal Immunization Programme) brought to the clinic in the month of January 2021 for immunization purpose and fulfilling inclusion criteria were selected for the study comprises the "target population". All the information about the study was shared with the mothers, followed by taking consent and data was collected by taking a detailed interview using a predesigned and pretested proforma.

The sample size of 102 was calculated with 80% of power, confidence level of 95%, absolute error of 10%

and considering prevalence of MDD as 15.2%.<sup>10</sup> Purposive sampling technique was employed for selection of study sample.

### Inclusion criteria

Children in age group of 6-23 months attending immunization clinic. Mothers available for information and willing to participate in the study.

### Exclusion criteria

Children below 6 months and above 23 months, mothers not available for information, not willing to participate.

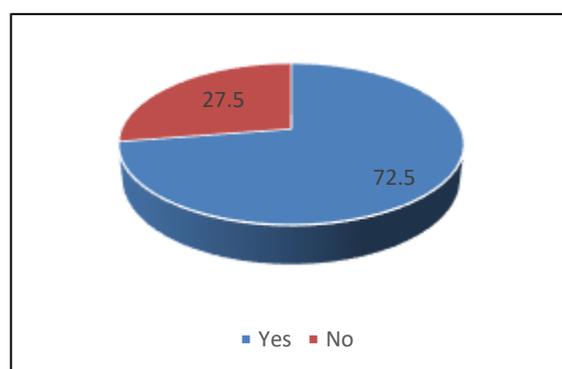
### Data analysis

Data was entered into MS excel. The results were tabulated and presented. Descriptive and inferential analysis of data was carried out by the use of qualitative and quantitative methods with hypothesis testing by using suitable tests of significance. Some part of the data was also presented by construction of appropriate diagrams. The whole process of data analysis was carried out using Statistical package for social sciences (SPSS) version 26.

Study was approved by ethics committee of the institution, (Ethics Committee of B.J Government Medical College, Pune). Utmost care was taken to maintain privacy and confidentiality.

## RESULTS

The mean age of the subject was 13.7 months with SD of 4.4 months. Majority 57 (55.9) were females and 45 (44.1%) were males with a male to female ratio 1:1.3. Majority of participants i.e. 71 (69.6%) belonged to Upper Lower (IV) socioeconomic status.



**Figure 1: Proportion of minimum dietary diversity.**

Proportion of MDD was found to be 72.5% (Figure 1) whereas Proportion of MMF was found to be 87.3 % (Figure 2).

When the association of minimum meal frequency and minimum dietary diversity was assessed it was found that

the proportion of MDD was high among the children who had minimum meal frequency as compared to those children who didn't have MMF and it was statistically significant ( $p < 0.0001$ ) (Table 1).

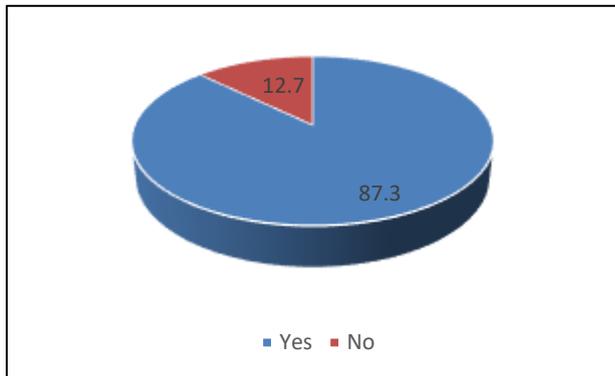


Figure 2: Proportion of minimum meal frequency.

Table 1: Association of minimum meal frequency and minimum dietary diversity.

Minimum meal frequency	Minimum dietary diversity present n=74 (%)	Minimum dietary diversity Absent n=28 (%)	Total n=102 (%)
Present	72 (97.3)	17 (60.7)	89 (87.3)
Absent	2 (2.7)	11 (39.3)	13 (12.7)

$\chi^2 = 24.44, df=1, p < 0.0001$

When association between various anthropometric parameters and MDD was assessed, it was found that MDD was high among normal child as compared to child with stunting, Underweight and malnourished as per mid upper arm circumference (Table 2).

Table 2: Association between anthropometric parameters and MDD.

Anthropometric parameters	Min dietary diversity present n=74 (%)	Min dietary diversity Absent n=28 (%)	Total n=102 (%)	P Value
<b>Weight for height (Wasting)</b>				
$\pm 2SD$	62 (83.7)	19 (67.8)	80 (78.4)	p=0.07
$<2SD$	12 (16.2)	9 (32.1)	22 (21.5)	
<b>Height for age (Stunting)</b>				
$\pm 2SD$	61 (82.4)	13 (46.4)	56 (54.9)	p<0.0001
$<2SD$	13 (17.5)	15 (53.5)	46 (45.0)	
<b>Weight for age (Underweight)</b>				
$\pm 2SD$	70 (94.5)	17 (60.7)	87 (85.3)	p<0.0001
$<2SD$	4 (5.4)	11 (39.3)	15 (14.7)	
<b>Mid upper arm circumference</b>				
$\pm 2SD$	68 (91.9)	20 (71.4)	88 (86.3)	p<0.01
$<2SD$	6 (8.1)	8 (28.6)	14 (13.7)	

Table 3: Association between anthropometric parameters and MMF.

Anthropometric parameters	Minimum meal frequency present N=89 (%)	Minimum meal frequency Absent n=13 (%)	Total n=102 (%)	P value
<b>Weight for height (Wasting)</b>				
$\pm 2SD$	75 (84.3)	5 (38.5)	80 (78.4)	p<0.0001
$<2SD$	14 (15.7)	8 (61.5)	22 (21.5)	
<b>Height for age (Stunting)</b>				
$\pm 2SD$	61 (82.4)	13 (46.4)	56 (54.9)	p<0.20
$<2SD$	13 (17.5)	15 (53.5)	46 (45.0)	
<b>Weight for age (Underweight)</b>				
$\pm 2SD$	70 (94.5)	17 (60.7)	87 (85.3)	p<0.0001
$<2SD$	4 (5.4)	11 (39.3)	15 (14.7)	
<b>Mid upper arm circumference</b>				
$\pm 2SD$	68 (91.9)	20 (71.4)	88 (86.3)	p=0.85
$<2SD$	6 (8.1)	8 (28.6)	14 (13.7)	

When association between various anthropometric parameters and MMF was assessed, it was found that MMF was significantly high among normal child as

compared to child with wasting and underweight (Table 3). There was no significant association was seen among

MMF and stunting and malnutrition as per mid upper arm circumference.

## DISCUSSION

Dietary diversification is a long term, sustainable strategy to reduce micronutrient malnutrition. Earlier studies have shown highly diverse diets as reflected by high dietary diversity as a pointer to adequate micronutrient intake. Dietary diversity is particularly important among the children following rapid growth which heighten nutritional requirements and risks of undernutrition at this early phase of life.<sup>11</sup> Moreover, this stage of life gives opportunity to recover and support growth spurt and development to break the cycle of undernutrition. Without adequate diversity and meal frequency, infants and young children are vulnerable to undernutrition, especially stunting and micronutrient deficiencies, and to increased morbidity and mortality. Dietary diversity is a proxy for adequate micronutrient-density of foods. Minimum dietary diversity means feeding the child food from at least four food groups. The cut-off of four food groups is associated with better-quality diets for both breastfed and non-breastfed children. The minimum meal frequency is a proxy for a child's energy requirements; for infants and young children, the indicator is based on how much energy the child needs. 12MDD and MMF were the IYCF indicator 5 and 6 respectively. MDD reveals whether the child is receiving a complete and balanced diet or not.<sup>11,13,14</sup>

In the present study, MDD was observed in 74 (72.5%) of the children between 6 and 23 months whereas proportion of MMF was found to be 87.3%. Our study was similar to that of Vietnam (85.6%), Zimbabwe (91%), and Kenya (85.3%) as observed by Aysheshim et al in their study.<sup>3</sup> The 2015-16 NFHS indicates MDD of 22% and MMF of 36% which was quiet lower than the findings observed in this study.<sup>15</sup> This could be due to the reason that this study was conducted in hospital settings, among the children coming for immunization. The mothers of these subjects might be more aware of the diversity and frequency as compared to the mothers in the community.

It was also found that the proportion of MDD was significantly high among the children who had minimum meal frequency as compared to those children who didn't have MMF. Definitely when somebody increases the meal frequency diversity increases on its own; children won't like to eat same items repeatedly, menu had to be changed which in turn increases the diversity in diet.

This study also aimed to examine the association between MDD and MMF with undernutrition of children aged 6 to 23 months. In this study, MDD was found to be a protective factor against stunting (HAZ) and underweight (WAZ) and malnourishment as per mid upper arm circumference among children. These results are consistent with findings reported from other developing

countries like Burkina Faso, Bangladesh and Ethiopia.<sup>16-18</sup> Our study suggests that undernutrition can be reduced by improving the dietary diversity of complementary foods. This is supported by the fact that dietary diversity is a good predictor of dietary quality and micronutrient density in children.<sup>19</sup> Therefore generally, this makes dietary diversity one of the important factors that policy makers should adopt to improve the nutritional status of children in the country. However, this study did not find an association between wasting and the dietary diversity of children using the MDD indicator. This is in line with findings from other study.<sup>16</sup> As a previous study from Ethiopia has shown, wasting is more likely to be associated with diseases or household food insecurity rather than dietary diversity.<sup>18</sup> This might be due to the fact that wasting refers to acute malnutrition as a result of shorter-term episodes of inadequate feeding or illnesses. However, it is important to mention some important observation of this study. Only considering the dietary diversity as indicator of the overall quality of the child's diet was not enough; the quantity of the foods consumed was also very important. MMF was significantly protective against wasting and underweight. But there was no significant association was seen among MMF and stunting and malnutrition as per mid upper arm circumference. Our findings were similar to the findings of other studies in most low and middle-income countries.<sup>20</sup> The minimum number of meals per day is required in order to attain the necessary level of energy and nutritional requirement and prevent deficiencies that could result into undernutrition.<sup>21</sup> These findings are in contrast with the findings in a study done in Ghana which found that minimum meal frequency was not associated with stunting.<sup>22</sup> The apparent lack of association in this study may be because there was very little variation in the study population with respect to this indicator. MMF was an indicator of acute malnutrition and stunting is the result of chronic malnutrition; this might be the reason for insignificant association of MMF with stunting.

The strength of this study was that this was among the very rare study to examine the effect of MDD and MMF on the child's nutritional status.

The limitation of the study was that this study was conducted in hospital setting and so applicable to the children attending immunization clinic of the hospital. Its cross sectional nature examines the child only once so we recommend further longitudinal studies.

## CONCLUSION

This study shows that consumption of a diverse diet and MMF is associated with a reduction in undernutrition among children of 6 to 23 months of age. Measures to improve the type of complementary foods given to children to meet their needs for energy and nutrients should be considered. Moreover, strong commitment by the government and public health officials is needed to ensure adequate foods and education on what to feed are

available. Further prospective investigation is hereby recommended to understand the pathway of this association.

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