

Effectiveness of introducing fresh fruits in Anganwadi menu among children between 3–6 years in Mysuru city

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ABSTRACT

Introduction: Micronutrient malnutrition remains a huge public health problem, with the main issues lying with the lack of diet diversity, either lack or less of animal products, sparse amount of fruits and vegetables. Fruits are a very good source of vitamins and minerals to help in the growth and development of the child. There are a lot of implementation hurdles at the ground level. Hence there is a need for further exploration of the role of fruits and dietary diversity on the growth and development of the children. **Methodology:** The study is an interventional study, conducted over 3 months. There was a systematic random sampling performed. A total of 60 participants, were taken out of which 30 were given the intervention. The assessment was conducted through anthropometry and semi-structured questionnaire. **Results:** When asked about their reluctance to include fruits in their diet, 58.3% did not prioritise it in their daily diet, while the rest found it expensive to buy it. There was a significant difference in the height and MUAC between the groups and that had no influence on the intervention. There was a slight increase in height over the three months in the interventional groups. **Conclusion:** Malnutrition is not a single-factor disease but happens because of many factors which include, education, income, environment and nutritional awareness among mothers and families. Fruits are a major component in the diet and have to be included by the family for the children to improve their basic anthropometry and also more functions.

Keywords: Development, fruits, mothers, nutrition, under five

Introduction

In most developing countries micronutrient malnutrition remains to be a huge public health problem, with the main issues lying with the lack of diet diversity, either lack or less of animal products, sparse amount of fruits and vegetables. Here dietary diversity is a

key factor that can help in the growth and development of children and adults alike.^[1] When it comes to micronutrients vitamin C has a number of properties that are useful and enhancing for the human body. To name a few they are strong antioxidants, promote wound healing, and help in the synthesis of collagen. Similarly, there are other fruits as well, like banana, apple, papayas and guava which serve as a very good source of vitamins and minerals for the children and help in the growth and development of the child.^[2,3] Citrus fruits have ample quantities of vitamin C content, with oranges having 12.78 mg/100 ml and lemon 12.68 mg/100 ml and lemon 12.68 mg/100 ml.

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It is evident from studies that among citrus fruits oranges have a high content of vitamin C and can prove to be a vital and accessible source for human consumption. Moreover, its accessibility, lime and oranges are easily available in most localities in India. Hence it can be a regular source in the daily diet.^[4] When it comes to children, there is sufficient evidence that they suffer from micronutrient deficiencies and decreased vitamin C seems to correlate with more micronutrient deficiencies. Vitamin C seems to have a very short half life and is usually depleted if it is not taken for 4 to 12 weeks, human beings lack the enzymatic process for the conversion of glucose to ascorbic acid via gluconolactone oxidase, therefore hence there has to be a regular consumption of fruits and vegetable.^[5-7] Though this can be ideated, it has a lot of implementational challenges, when it comes to the ground with the social backgrounds, they come from, their nutritional awareness, their educational status, their economic status, poor maternal health and the availability of the fruits and vegetables, the stigmas, their work settings and their behaviours and habits, all of them influencing their choices on their child’s upbringing. And for any kind of reduction in malnutrition, there needs to be awareness as well as interventions with the mother and the family as a whole on early nutrition for the children.^[8,9]

It is not only an immediate intervention, but fruits and vegetables daily have several benefits on the physiology and the anthropometry of children over the years, and this cannot be performed with only carbohydrates, or only fruits or an increase in one with a decrease or absence in another component. Stunting holds children back from reaching their physical and cognitive potential. Children with low weight for age are known as underweight.^[10-13] A child who is underweight may be stunted, wasted or both. There have to be regular balanced portions. Fruits are widely considered expensive and not of priority in middle and lower income countries and hence lacking in the food diet of children especially. With the food habits of childhood, being tracked into adulthood quite seamlessly, nutritional patterns of the children need to be a priority for child development in our country.^[14-17]

Limited studies have been conducted to assess the role of fruits in children. Hence there is a need for further exploration of the role of fruits and dietary diversity on the growth and development of the children.

Objectives

- To assess growth and development patterns through anthropometric measurements, after the implementation of fruits in the child’s diet.
- To find an association between socio-demographic factors, feeding habits and anthropometry.

Methodology

Study design: interventional study

Study duration: 3 months (January–March 2023)

Sampling technique: Systematic random sampling.

Sample size: 30 cases and 30 controls. The sample size was based on convenient sampling.

Study setting: Anganwadis in Medhar block and bannimantap, Mysuru

Implementation: After obtaining the necessary permission. For the cases, fruits will be given thrice weekly to each child and will be administered by the helper of the anganwadi. For controls, no intervention will be given.

The assessment of the growth of the child will be through a self-structured questionnaire through socio-demographic measurements, frequency of attendance and illness history, feeding habits of the child, monthly anthropometric measurements. Milestones of the child like gross motor, fine motor and social milestones will be assessed by the subject experts using the standardised scale.

The questionnaire will structured and validated. Every month the data will be entered and analysed for both cases and controls.

Table 1: Frequency and descriptives for socio-demographic details

Parameter	Frequency	Percentage
Gender		
Female	28	46.7
Male	32	53.3
Mother’s education		
Primary	34	56.7
High School	26	43.3
Father’s education		
Primary	10	16.7
High School	36	60.0
Degree	14	23.3
Mother’s occupation		
House Wife	58	96.7
Coolie	2	3.3
Father’s occupation		
Coolie	42	70.0
Business	18	30.0
Family size		
3	22	36.7
4	20	33.3
5	12	20.0
6	4	6.7
7	2	3.3

Table 2: Descriptives of their opinions on fruits

Variables	Frequency	Percentage
Difficulty in buying because they are busy with work/not a priority	35	58.33
Difficulty in buying as it is expensive	25	41.66
Frequency of buying:		
Once a week	10	16.7
Once in ten days	45	75
Do not buy at all	5	8.3

Table 3: Association of mother's education with anthropometry (intervention and control groups)

Groups	Mother's Education	Mean±SD	P	
Interventional Group	Height	Primary High School	89.7±7.74 89.58±8.21	0.969
	Weight	Primary High School	13.22±1.59 12.76±1.51	0.431
		Mid-upper arm circumference	Primary High School	13.71±1.02 14.00±1.41
Control Group	Control	Primary High School	98.3±6.55 97.64±7.51	0.799
	Weight	Primary High School	12.72±1.12 13.34±1.49	0.208
		Mid-upper arm circumference	Primary High School	14.61±0.65 14.69±0.74

Table 4: Association of mother's education with anthropometry (interventional and control groups)

Groups	Mother's Occupation	Mean±SD	P	
Intervention	Height	House Wife Coolie	89.66±7.94 89.33	0.967
	Weight	House Wife Coolie	13.03±1.58 13	0.985
		MUAC	House Wife Coolie	13.86±1.20 13
Control	Height	House Wife Coolie	97.74±6.82 106	0.244
	Weight	House Wife Coolie	12.95±1.32 14	0.444
		MUAC	House Wife Coolie	14.67±0.68 14

Inclusion criteria: Children between the ages of 3 to 6 years, whose mothers have given consent.

Exclusion criteria: Any child with allergies to given fruits, any congenital anomalies or psychiatric illness in the child.

Ethics permission was obtained from the Institutional Ethics committee of JSS Medical College. It was obtained on 28.08.2022.

Statistical analysis

Data obtained will be entered in an MS Excel spreadsheet followed by analysis using SPSS version 22 (licensed to JSS Medical College). The demographic characteristics such as age, gender, occupation, anthropometry, diet, cognitive measurements, etc., will be represented using arithmetic mean, standard deviation and percentages. The possible associations between the selected demographic variables (age, gender, education) will be found using *t*-test.

Results

Table 1 shows that among the study participants, 53.3% were males. When it came to education, 56.7% of the mothers had

completed primary education, while 60% of the fathers had completed high school. In their employment, 97% of the mothers were housewives and 70% of the fathers were coolies. Family had sizes varying from 3 (37%), 4 (33%) and 5 (20%).

Table 2 shows, when asked about their reluctance on including fruits in their diet, 58.3% did not prioritise it in their daily diet, while the rest found it expensive too. A total of 75% of the families bought them fruits once in ten days when they visited the markets.

Table 3 shows there was no significant association between mother's education and the anthropometry.

Table 4 shows there was no significant association between mother's occupation and the anthropometry.

Table 5 shows there was a significant difference in the height and MUAC difference between the interventional and control groups and that has no influence on the intervention, but rather is a result of the selection of participants based on inclusion criteria of similar are and socio-economic status.

There was a slight increase in height over the three months in the interventional groups.

Discussion

Our study shows that among mothers who were the primary caregivers of the child, 57% of them had primary education only, and were housewives. Similarly when it came to employment for father majority of them were coolies. Their socio-economic status does seem to have an effect on early childhood care including their nutrition. A study by Ghosh *et al.*^[18] tells that mothers with higher education were more likely to be given better early childhood care and education and fathers with better employment also put good emphasis on early childhood care.

There is a significant effect on their earnings when it comes to their education and nutrition choices. In our study, when it came to why fruits were not a priority, their reasons were expensive and they had housework, which meant they did not prioritise nutrition for the growing child as their main activity. It is shown in the study by Janssens *et al.*^[19] where education for children is considered a family decision in many parts of India, based on their immediate needs. With a low income, and with monetary benefits not an immediate return in education, many families opt out of educating the child, and similarly with the food, they prefer to stick to the usual carbohydrates and vegetables, without any inclusion of fruits in the diet. The socio-demographic factors are not limited just to their occupation but also their awareness and habits, fathers and mothers have their respective roles in nurturing their children. A study by Devi and Geervani^[8] shows that fathers who spend less time with their families, who do not prioritise on the needs of the family, have shown to have a rather negative effect on the nutritional status of the child. This is in line with our findings that families do not priorities the nutrition

Table 5: T-test to find association between anthropometries of intervention and control groups

Groups	Categories	Mean±SD	P		
Height	March	intervention	89.3±7.96	<0.001	
		control	97.85±6.90		
	April	Intervention	89.37±7.90		<0.001
		Control	98.15±6.92		
	May	Intervention	90.3±7.61		<0.001
		Control	98.05±6.82		
Weight	March	Intervention	13.03±1.55	0.819	
		Control	12.94±1.34		
	April	Intervention	13.03±1.55		0.913
		Control	12.99±1.32		
	May	Intervention	13.03±1.55		0.98
		Control	13.04±1.30		
Mid-upper arm circumference	March	Intervention	13.83±1.19	0.001	
		Control	14.65±0.67		
	April	Intervention	13.83±1.19		0.001
		Control	14.65±0.67		
	May	Intervention	13.83±1.19		0.001
		Control	14.65±0.67		

of their children over other household activities. It is a common factor in many of the underprivileged classes in our country and the world and discussions and awareness are the way forward for it.^[19]

Though exact interventions were not introduced with fruits in the daily diet in this age category, there are studies that show that regular interventions in the form of nutritional education, policy changes and availability have reduced the prevalence of obesity and overweight significantly, which is not very precisely in line with our study, but our study is heading in the direction that with fruits, awareness and availability there was an increase in the height of the participants over the three months, though more data needs to be taken.^[20]

Limitation

The study has to be continued for a longer duration to get more precise and strong data. The sample size also has to be taken many folds more, also including children from other areas, and more diverse socio-economic settings.

Conclusion

Malnutrition is not a single-factor disease but happens because of many factors which includes, education, income, family settings, environment and nutritional awareness among mothers and families. Fruits are a major component in the diet and have to be included by the family for the children to improve their basic anthropometry and also more functions. Therefore, making fruits more available and supplementing them to the children will be beneficial for the long-term and immediate health as well.

Recommendation

At the implementation levels, malnutrition is not a single-factor disease, Along with supplementing fruits, more discussions

to understand the mothers' issues, alternatives to increase their family income, regular awareness on the role of fathers, increasing availability of fruits and vegetables close by, monitoring and reporting and continuous engagement with the people has to be performed to keep the nutritional status within the check.

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Conflicts of interest

There are no conflicts of interest.

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