

## ORIGINAL ARTICLE

## Micronutrient Supplementation, Dietary Intervention and Resulting Body Weight Gain of Severe Acute Malnourished Children – A Pilot Project Study of OJUS Medical Institute with Existing ICDS Project in Nasik District, Maharashtra

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### Abstract

**Introduction:** OJUS Medical Institute in collaboration with Women & Child development department of Nashik District, Maharashtra conducted a target oriented pilot project study to see the improvement in body weight gain of SAM children, supplemented with nutritionally enriched diet and micronutrients. The Egg-DOT project is a target vertical intervention study that involved both Anganwadi workers and Community health workers to bring a fruitful result by working hand-in-hand. **Rationale:** ICDS is one of the best supplementary nutrition programs to address and eliminate malnutrition from the country. To make it more comprehensive and result oriented the pilot project study is formulated and executed to see if the addition in existing system could eradicate malnutrition in an effective manner and strengthen the Govt. health machinery. **Objective:** The study aimed at working along with the Govt. to reduce severity of malnutrition. It shouted for a healthy public-private relationship to bring optimum result from the existing Govt. project in reducing burden of malnutrition, spreading health education and behavioural modification in the community members by adopting a systematic micronutrient-diet-health education intervention strategy. **Materials & methods:** Along with existing nutritional intervention, a small modification in diet is introduced to fulfill the deficit of 300 Kcal approximately. Good quality fat and protein are added to the Anganwadi meal with daily micronutrient supplementation. The supplementation is continued for 30 days in 25 SAM children of 3 to 5 years. The baseline and end line body weight measurements are taken and compared to see the improvement. **Result:** After 30 days of intervention the supplemented SAM children showed statistically significant increased body weight ( $P < 0.01$ ) with an overall healthy nutritional status. **Conclusion:** The study showed that public-private collaborative systematic strategy with proper monitoring and evaluation can actually eliminate malnutrition in an effective manner by improving linear growth of the SAM children.

### Key Words

Nasik; OJUS Medical Institute; Egg-DOT; SAM; ICDS; Micronutrient

### Introduction

Children under five years of age form a large and vulnerable or special risk group, as 50% of all deaths are occurring during this first five years of life in the developing world(1). This age group is mostly vulnerable to infectious diseases like diarrhoea, respiratory tract infection, food borne illness and state of undernutrition enhances the chance of developing these diseases resulting into high

morbidity and mortality(2). Eradicating malnutrition is one of the prior aims of Government of India to reach the Millennium Development Goal (MDG). A report entitled "children in 2012 states – A statistical appraisal notes" confers that 48% of children under age of five years are stunted, which indicates that half of the country's children are chronically malnourished(3). According to UNICEF, one in three malnourished children in the world is Indian. It is

estimated that reducing malnutrition could add some 3% to India's GDP(4).

Being the wealthiest state of India, Maharashtra is not exceptional in terms of child malnutrition. According to National Health Family Survey 2005-2006, the feeding practice for children aged 6 to 9 months shows an alarming pattern with only 48% of children receiving solid or semi-solid food and breast milk(5). This is significantly lower than the national average of almost 56%. Furthermore, the prevalence drops to 40% for rural areas and as low as 23.3% for non-educated mothers compared with the national average of 49% (5).

The Indian Govt. has been trying to address malnutrition problem through its Integrated Child Development Services (ICDS) project. Launched in 1975, the ICDS operates a network of daycare centres called Anganwadi across the country(6). These centres are meant to provide supplementary breakfast and lunch, along with immunizations and pre-school education to children aged 3-6 years and cater to the health needs of pregnant and lactating women(6).

The anganwadi programs estimated to be the world's largest child nutrition provider. But, the state of malnutrition in India shows that anganwadi workers need a shot in the arm. OJUS Medical Institute, launched in 2012 is a Mumbai based trust who dedicatedly serving child malnutrition as one of its project, Egg-DOT in Igatpuritaluka of Nashik district, Maharashtra. Being a tribal belt Nashik district is having a high percentage of malnutrition due to lack of resource, poor socio-economic condition, illiteracy and lack of awareness among the community people. Egg-DOT project was started with a vision to provide optimum nutrition to each child across the Igatpuritaluka and functioned jointly with the existing ICDS project. 'Egg-DOT:Direct Observed Therapy' involved Community Health Workers (CHW) who worked with Anganwadi Workers (AWW) hand in hand to eradicate malnutrition by providing one boiled egg (non-vegetarian) or one soy milk packet (vegetarian) with the standard anganwadi meal. But, the progress in linear growth of the children is noticed to be very poor. Therefore, the current pilot project study was conducted to locate the loop holes of the existing program, calculate the nutritional deficiency and formulate a nutritional interventional strategy to bridge the gap by modifying the existing meal with easy addition of good quality fat and micronutrients.

The study thus aimed to provide a sustainable energy dense meal model in eradicating malnutrition and strengthening the Govt. health machinery

## Aims & Objectives

The pilot project intervention has aimed to –

- Study the body weight gain in the SAM children after adding ghee, soymilk and egg in the existing ICDS diet along with supplementation of appropriate micronutrient dosage.
- Strengthen the ICDS machinery by working hand in hand.
- Spread nutrition education among community members by involving them into active participation procedure.
- Establish private-public partnership model as an integral way out in combating public health issues.

## Material and Methods

The community based pilot project study was conducted within the anganwadi set up after taking consent from the CDPO of Igatpuri Taluka. The study was short term, comprehensive and result oriented. Thirty Severe Acute Malnourished (SAM) children of four anganwadi centres were selected as subjects of study. The sample was selected from the children who are already enrolled both in the ICDS project as well as in the Egg-DOT program. Very severe cases of SAM with infections, disease or infirmity were excluded from the study and samples were selected purposively. The sample size kept small due to the short time span and effective

**Study Procedure:** The weight and height/length of the selected children were recorded at the 1st day of the interventional study and converted into three summary indices of nutritional status - Weight for age, height for age and weight for height. According to WHO criterion, based on standard deviation (SD) units, who are falling under Z score of three standard deviation (-3SD) were considered as Severe Acute Malnourished (SAM) i.e. underweight, stunted and wasted(7). Digital weighing machine and length board were used to measure the parameters with high order of accuracy.

Anganwadi hot cooked meal was modified and enriched by adding 15 g of pure ghee that provides 135 kcal. Boiled egg and soy milk were continued as component of Egg-DOT project. Within the structure of nutritional intervention each child has received approximately 315 kcal everyday along with the anganwadi meal. The meal comprised of khichdi (rice

and green gram or lentil or Bengal gram or moong dal), one packet of soymilk, one boiled egg and 15 g pure ghee. The children are also supplemented with zinc, folic acid and multivitamin as per the on board paediatrician's recommendation. The nutritional intervention has continued for 30 days and end line weights are recorded.

## Results

Out of the 30 SAM children, 5 children were marked as irregular at the anganwadi centres and excluded from the study. Among 25 SAM children 16 are boys (64%) and 9 are girls (36%). All are Hindu by religion. Average weight gain in 25 children is 0.912 kg in 30 days which is 8.930% more than that of the baseline body weight.

Baseline body weight, end-line body weight, weight gain and percentage of weight gain of 25 children are shown in [Table 1](#).

The result shows that all 25 children gained weight among which, 18 (72%) children have increased 1% to 10% of their baseline body weight and 7 (25%) children have gained 11% to 25% of the baseline body weight ([Table 2](#)).

The result strongly supports association between nutritionally enriched diet, micronutrient supplementation and body weight gain in SAM children of Igatpuritaluka which emphasizes a statistical significance of the result. The modified meal has proved to be successful and optimum as maximum number of children i.e. 18 among 25 children have gained 1% to 10% of their baseline body weight that upgrade the SAM children into Moderate Acute Malnutrition (MAM) status; further intervention can bring them into normal nutritional status. Whereas, 7 children have gained 11% to 25% of their baseline body weight which is actually brought them into their target body weight and they are upgraded into normal nutritional status.

## Discussion

Malnutrition in early childhood has serious, long term consequences because it impedes motor, sensory, cognitive, social and emotional development. Malnourished children are less likely to perform in life and more likely to grow into malnourished adults, at greater risk of disease and early death (8).

To address child malnutrition ICDS is one of the best supplementary nutrition programs run by Government of India. In spite of vast network, hard work of anganwadi workers and strategic planning

from the expert level, progress in linear growth of malnourished children is not up to the mark in the study area. In this context, by collaborating with Women & child development department of Nashik district, Maharashtra OJUS Medical Institute has conducted a target oriented small pilot project study to point out the gaps in program implementation, formulate a nutritionally enriched meal and assess the body weight gain in SAM children, when supplemented with nutritionally enriched diet and micronutrients. The Egg-DOT study involved both the anganwadi workers and community health workers to bring out the optimum result. Modified nutritionally enriched anganwadi meal showed statistically significant body weight gain in every child with an overall healthy nutritional status. The study points out some crucial issues which need to be addressed and solved for maximum result. Poverty, poor socio-economic condition, illiteracy, occupational hazard, lack of resource, poor hygiene, multiple pregnancies, maternal malnutrition, lack of nutrition education are sensitive public health issues which need special attention to lower the burden of malnutrition and offer the tribal population an easy and sustainable mode of life. Availability of safe drinking water needs to be ensured. Cultivation, agricultural facilities, water preservation and rehabilitation of the dwellers are to be taken as prior importance while encountering severe problem like malnutrition in the project area. Development should be implemented in a strategic manner to ensure food security at home as the study found that the parents solely dependent upon the anganwadi meal for their children which creates a marked deficiency in calorie consumption and turning the children into severe-acute cases of malnutrition, developing infections and causing several disorders. Current pilot project study depicts that, hand-in-hand effort of public and private institutes can work better in fighting public health issues like malnutrition. A little modification in normal homely meal brought remarkable improvement in SAM children without adding any sort of processed food in their daily diet. The study encourages and invites other private bodies to come forward and work with Govt. in providing a comprehensive-quick-long sustaining result. The study admits that socio-economic condition is an important determinant factor to delay the improvement in health status of the malnourished children, enrolled in the ICDS

project though they are supplemented with nutritious diet.

The pilot project study strongly emphasizes that public-private collaboration with proper monitoring and evaluation can strengthen the Govt. health machinery to accelerate the process of eradicating malnutrition as a whole with resolving other related socio-economic issues.

In conclusion this target oriented pilot project study suggests that short, medium and long term planning is needed to address the problem of malnutrition among under five children residing in the tribal belt of Igatpuritaluka and similar locations throughout India. Not only planning and implementation but also monitoring and evaluation are to be done continuously to address the problem in serious manner. OJUS Medical Institute specially focuses on pursuing more operation and action research along with the Govt. to address both the malnutrition cases of moderately acute and severely acute & bound to assess the determining factors of malnutrition more precisely and take intervention accordingly

### Conclusion

Average weight gain of 0.912kg in 30 days among 25 children has proven the wellness of good fat and protein in the daily diet of a SAM child. More effective result is drawn though joint venture that shouts for public-private collaborative systematic strategy with proper monitoring and evaluation to eliminate malnutrition in an effective manner by improving linear growth of the SAM children.

### Recommendation

The study has find out that the general home diet of the children of rural tribal India is deficient in good quality fat and protein. Even, the ICDS food supplementation alone cannot fulfill the gap, as assessed by the 24 hour dietary recall. In such condition, not only from malnutrition perspective but also from overall public health point of view, an effective association of public and private sector is needed and recommended.

### Limitation of the study

Mobilizing the whole community was a biggest challenge, we have faced while conducting the pilot project due to severe lack of education and awareness. Poverty, being the second most important issues has compelled many parents to distribute the anganwadi food among all their

children. Due to lack of human as well as monetary resource we had to restrict ourselves within a very small sample size. A bigger intervention should be initiated to study the outcome of prescribed nutritional regimen in eliminating malnutrition within a shorter period of time under the scope of community based management of SAM.

### Relevance of the study

The current study emphasized upon community based care of malnutrition as facility based care is limited and less accessed in our country. Large section of SAM and MAM children are treated under ICDS food supplementation program. The anganwadi food can be enriched with little addition of good quality fat and protein to bring out the result at a faster pace. The chance of infection will be less in easy and faster upgradation of malnourished status among the SAM children. The study has proven the rationale behind enrichment of nutrition supplementation and put across a way forward to apply the same strategy in bigger scale for more statistically significant result.

### Authors Contribution

SR: Study concept, Study designing, Literature search, Data collection, Data analysis, Manuscript writing and Presentation all are done.

### Acknowledgement

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**Tables**

**TABLE 1 BODY WEIGHT GAIN IN SAM CHILDREN**

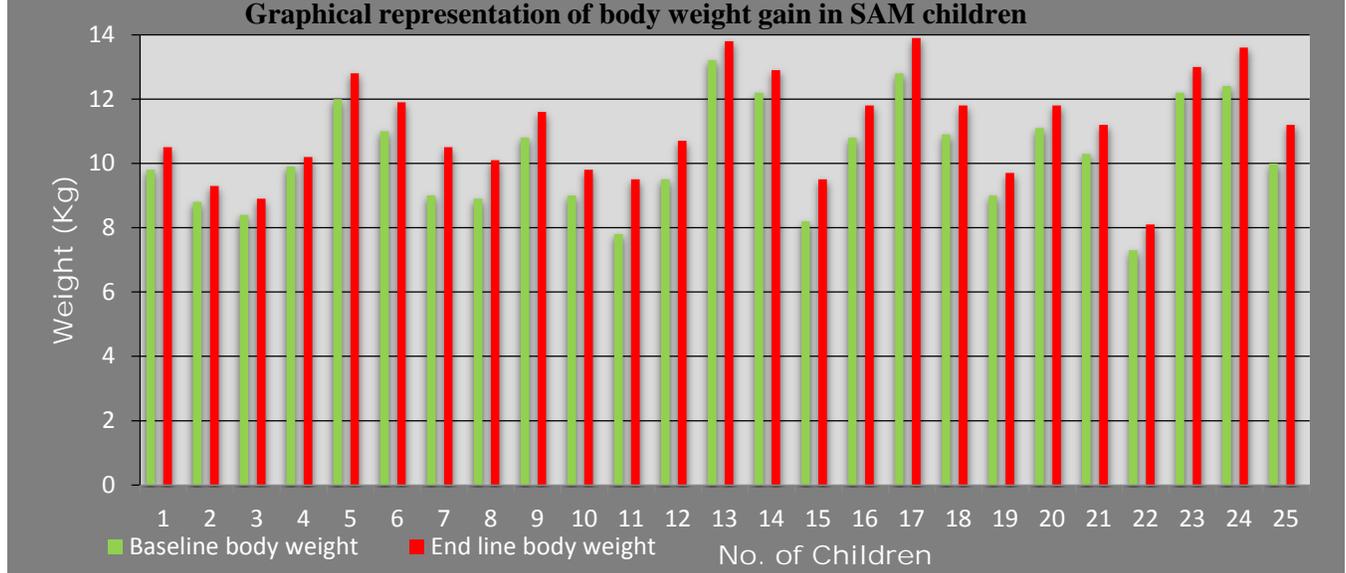
No. of Children (16 boys & 9 girls)	Weight (Kg)		Weight gain	
	Baseline	End line	Kg	percentage
1	9.8	10.5	0.7	7.142857
2	8.8	9.3	0.5	5.681818
3	8.4	8.9	0.5	5.952381
4	9.9	10.2	0.3	3.030303
5	12	12.8	0.8	6.666667
6	11	11.9	0.9	8.181818
7	9.0	10.5	1.5	16.66667
8	8.9	10.1	1.2	13.48315
9	10.8	11.6	0.8	7.407407
10	9.0	9.8	0.8	8.888889
11	7.8	9.5	1.7	21.79487
12	9.5	10.7	1.2	12.63158
13	13.2	13.8	0.6	4.545455
14	12.2	12.9	0.7	5.737705
15	8.2	9.5	1.3	15.85366
16	10.8	11.8	1	9.259259
17	12.8	13.9	1.1	8.59375
18	10.9	11.8	0.9	8.256881
19	9.0	9.7	0.7	7.777778
20	11.1	11.8	0.7	6.306306
21	10.3	11.2	0.9	8.737864
22	7.3	8.1	0.8	10.9589
23	12.2	13.0	0.8	6.557377
24	12.4	13.6	1.2	9.677419
25	11.3	12.2	0.9	7.9646017

**TABLE 2 CLASSIFIED WEIGHT GAIN IN PERCENTAGE**

Weight gain in percentile	Number of Children	Number of Children in percentage
Nil	0	0
1 to 5	2	8
6 to 10	16	64
11 to 15	4	16
16 to 20	2	8
21 to 25	1	4

**Figures**

**FIGURE 1 GRAPHICAL REPRESENTATION OF BODY WEIGHT GAIN IN SAM CHILDREN**



**FIGURE 2 GRAPHICAL REPRESENTATION OF CLASSIFIED WEIGHT GAIN IN SAM CHILDREN**

