

EFFECT OF NUTRITION EDUCATION ON NUTRITIONAL STATUS OF
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Abstract**Objective:** The objective of this study is to determine the effect of nutrition educational intervention on malnourished children's nutritional status of age 6 months- 8 years in twin cities of Pakistan.**Study Design:** The present study interventional study involving moderately malnourished children of age 6 months to 8 years. Study samples were selected randomly from outpatient pediatric department of tertiary hospital.**Methods:** Total 150 children of both genders were included in this study from Islamabad and Rawalpindi region. 94 study samples were from age group 6 months – 5 years and 56 study samples were from age group 5 years – 8 years. Data were collected through interview-based questionnaire from mothers/caregivers to find out socio-demographic status, to evaluate height- for- age (stunting), weight- for- height (wasting) and weight- for- age (underweight) of children before and after intervention.**Results:** Results proved improvement in underweight, wasting, mid-upper arm circumference and calorie intake amongst children after nutritional education intervention. The improvement level at the end of study varied significantly for weight (13.5 ± 3.6 , 15.5 ± 4.1 ; $p = 0.00$), underweight (-1.762 ± 0.434 , -0.662 ± 0.65 ; $p=0.00$), stunting (-0.827 ± 0.635 , -0.712 ± 0.542 ; $p=0.004$) and wasting (-1.899 ± 0.616 , -0.3490 ± 0.916 ; $p=0.00$) of children before intervention.**Conclusion:** Results of this study provide suggested that nutrition education is an effective and inexpensive approach to reduce the frequency of child malnutrition.

INTRODUCTION

Malnutrition is prevalent among children world widely. Undernutrition, over nutrition and hidden hunger are the three hallmarks of malnutrition. Inadequate and poor nutritional basis can also put a child at risk for health issues from infancy through maturity. First 1000 days (window of opportunity) are considered important regarding growth and development of child, this can be important predictor of improved child's nutritional status. In developing countries, wasting, stunting, low BMI for age and underweight are common health problems.¹ Iron deficiency is affecting the lives of malnourished children in Pakistan.²

In accordance with, recent National Nutrition Survey in Pakistan, prevalence of wasting, underweight and overweight is 17.7%, 28.9% and 9.5% respectively while out of every 10 children 4 are suffering from stunting. The burden of malnutrition is increasing day by day.³

Most researchers in Pakistan used WHO classification in their studies because it provides comprehensive study for all child malnutrition types.⁴ Nutritional status of children can be improved by providing nutrition education to primary carers in developing countries. Nutrition education significantly affects mothers' attitudes, nutritional knowledge and practices, as well as nutritional status of children also improved. Nutrition education is basis for improvements in dietary patterns and eating habits of population especially vulnerable groups. Various studies and systematic reviews conducted in Asia and Africa that reported effect of many nutrition education interventions on nutritional status and malnutrition among children.⁵ Different studies proved that by providing proper complementary food as well as maternal nutritional counseling, notable improvement in the nutritional status of malnourished children was seen. Improvement depends upon the type and duration of nutrition intervention.⁶ It has been seen in literature that by providing nutrition education in combination with supplementary feedings, dietary diversity and meal frequency of moderately malnourished children was improved.⁷

The aim of present study was to improve nutritional status of malnourished children through nutrition education intervention. This study reports the results of a four-month intervention (November 2022 - March 2023) on the change in nutritional status of moderately malnourished children living in twin cities of Pakistan.

METHODS

This study was pre and post interventional study including moderately malnourished children of age 6 months to 8 years. Study samples were selected randomly from outpatient pediatric department of tertiary hospital (Clinics and Diagnostics Hospital, G13/1, Islamabad). Total 150 children of both genders were included in this study from Islamabad and Rawalpindi region. 94 study samples were from age group 6 months - 5 years and 56 study samples were from age group 5 years - 8 years. Data were collected through interview-based questionnaire from mothers/caregivers to find out socio-demographic status, to evaluate height- for- age (stunting), weight- for- height (wasting) and weight- for- age (underweight) of children before and after intervention. Anthropometric data was collected (before and after intervention) by using different tools and techniques related to each index. Weight, length, height, and mid upper arm circumference (MUAC) were measured by measuring tape, weighing scale, baby length measuring mat/height measuring bar and MUAC tape, respectively. Anthropometric measurements were taken according to procedures given in *Measuring a Child's Growth*, of the WHO child growth assessment course. Undernutrition was classified based on WHO (2006) criteria: healthy, moderately and severely malnourished relating to length/height-for-age (HAZ), weight-for-age (WAZ) and body mass index-for-age (BAZ). A child's MUAC determines whether they are healthy, moderately or severely malnourished, with values of >12.5cm, 11.5-12.5cm.

After completion of data collection, nutrition education was delivered to mothers of malnourished children in all interventional groups. The nutrition education package was

designed according to *Pakistan Dietary Guidelines for Better Nutrition*. The nutritional educational package included three modules such as diet plan, recipes and nutritional guidelines and other educational materials in the form of pamphlets. These modules addressed three major aspects: nutrition, healthy diet awareness and hygiene. The whole research process is shown in fig 1.

Statistical analysis:

Z-scores for anthropometric indicators were calculated using WHO Anthro v 3.2.2 and WHO AnthroPlus v 1.0.4 by processing height, weight and age of children and then all data transferred into SPSS for statistical analysis. Z-scores are

exclusively computed for children 0 to 60 months of age by using WHO Anthro. For children age 5-19 years, WHO AnthroPlus is used. Percentages and frequencies were used to describe demographic distribution, socio-economic characteristics, of study subjects. Chi-square and Paired samples t-test statistical analysis were used to show comparison of frequencies and means of anthropometric indicators pre and post intervention. Results were presented in the form of tables.

Study approval was obtained from managing director of hospital as well as from pediatrician of the hospital. Verbal consent was taken from participating mothers before taking part in this study.

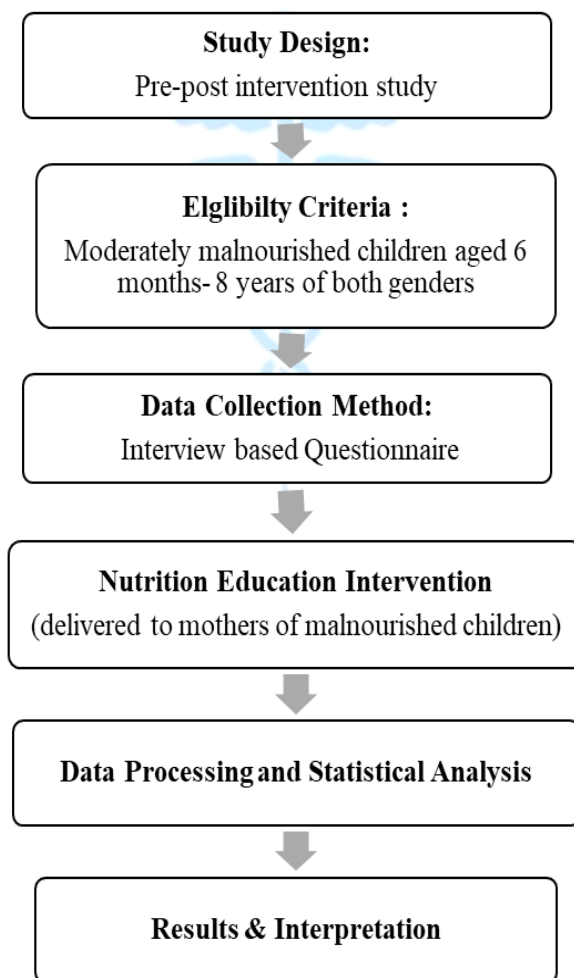


Fig 1: Research Flow Chart

RESULTS

Childhood malnutrition is still one of the most significant public health issues in some developing countries including Pakistan. It has been linked to rising rates of pediatric mortality and morbidity, growth impairment, and altered neurobehavioral development. In present study, effectiveness of nutrition education intervention on malnourished children has been seen. A total of 150 study subjects were sampled having children aged 6 months to 8 years. The results of the study are showed in tabulation form.

Socio demographic characteristics:

The Socio demographic characteristics of the subjects are showed in (Table I). Age wise distribution of the children showed that majority of the children (63 %) were in 6 months-5 years age group while 37 % of children were in 5 years-

8 years age group. Although, every age group in Pakistan is prone to malnutrition, but young children are most affected. In present study, the frequency of malnutrition was seen more in children less than 5-year age. Out of 150 children, 55 % children were male while 44% were female. Majority of the mothers belong to age group 20-30 years.

Among 150 children, 23% mothers had master level of education while 41.3% mothers had bachelor level of education and only 1 mother was illiterate. While 26% of the fathers had master level of education followed by 7% had PhD level of education and 10.7 % were undergraduate (bachelor's degree). Most of the mothers were housewife (90%). While 60% fathers were job holder followed by 40% were businessmen. Majority of the children (40%) had family monthly income between Rs 50000 and Rs 75000.

Table -I: Socio demographic characteristics of subjects

Variables	Category	Frequency (n=150)	Percentage
Age of child	6 months-5 years	94	63
	5 years- 8 years	56	37
Gender	Male	83	55
	Female	67	44
Region	Rawalpindi	15	10
	Islamabad	135	90
Family size	<4	61	40
	≥4	89	60
Educational status of mother/care takers	Illiterate	1	0.7
	Primary	6	4.0
	Secondary	26	17.0
	Higher secondary	21	14.0
	Bachelors	62	41.3
	Masters	34	23.0
Educational status of father	Secondary	31	20.7
	Higher secondary	57	38.0
	Bachelors	16	10.7
	Masters	39	26.0
	PhD	7	4.7
Mother age	20-30 Years	97	64.7
	31-40 Years	46	30.7
	41-50 Years	7	4.7
Father age	20-30 Years	59	39.3
	31-40 Years	65	43.3

Family Income	41-50 Years	26	17.3
	25k-50k	11	7.3
	50k-75k	41	27.3
	75k-100k	60	40.0
	100k-125k	17	11.3
	125k-200k	16	10.6
	More than 200k	5	3.3
Occupation of mother/care taker	Job	15	10
	Housewife	135	90
Occupation of father	Job	90	60.0
	Business	60	40.0

Effect of Nutrition Education on Nutritional Status of Children:

The findings of children's nutritional status at pre and post nutritional education intervention are reported in (Table -II). The average height after intervention was statistically non-significant ($p =$

0.2) while average weight after nutrition education was significant. The differences in mean values of BMAZ, WAZ, and HAZ before and at the end of intervention were significant (all values $p < 0.05$).

Table -II: Effect of nutrition education on nutrition status

Nutritional Status Indicators	Before-intervention Mean $\pm$ SD	After-intervention Mean $\pm$ SD	p-value
Height (cm)	100.446 $\pm$ 15.162	100.761 $\pm$ 14.987	0.285
Weight (kg)	13.523 $\pm$ 3.631	15.540 $\pm$ 4.155	0.001*
Weight-for-Age (Underweight)	-1.762 $\pm$ 0.434	-0.662 $\pm$ 0.655	0.001*
Height-for-Age (Stunting)	-0.827 $\pm$ 0.635	-0.712 $\pm$ 0.542	0.004*
BMI-for-Age (Wasting, acute malnutrition)	-1.899 $\pm$ 0.616	-0.3490 $\pm$ 0.916	0.00*
MUAC (cm)	12.067 $\pm$ 0.508	12.657 $\pm$ 0.483	0.00
Weight-for-Height (Wasting, acute malnutrition)	-1.843 $\pm$ 0.587	-.263 $\pm$ 0.994	0.00*

Note: p values with asterisks are significant at $p < 0.05$

ZScore Classification of Nutritional Indicators:

Table III indicates that out of 150 children, 55 children were mildly stunted while 5 were stunted before intervention. 116 of children were had normal HAZ ($-1SD$ - $+1SD$) after intervention. 38 children were underweight ($-3SD$ - $<-2SD$) and 106 were mildly underweight ($-2SD$ - $<-1SD$) before intervention.

69 children were wasted ($-3SD$ - $<-2SD$) before intervention. The frequency of underweight

children significantly decreased after imparting nutrition education. WAZ improved in children and 118 children had normal WAZ after nutrition education. These findings indicated that there was significant improvement in nutritional status of malnourished children after imparting nutrition education. This shows that nutrition education has positive effects on malnutrition status.

Table -III: Z score classification of nutritional indicators

Z-score classification	Interpretation	Before-intervention	After-intervention
HAZ WHO classification			
-3SD - <-2SD	Stunted	5	0
-2SD - < -1SD	Mildly stunted	55	34
-1SD - +1SD	Normal height	88	116
>+1SD - ≤+2SD	Normal height	0	2
WAZ WHO classification			
-3SD - <-2SD	Underweight	38	0
-2SD - < -1SD	Mildly underweight	106	32
-1SD - +1SD	Normal WAZ	6	118
BMI/A WHO classification			
-3SD - <-2SD	Wasted	69	0
-2SD - < -1SD	Mildly wasted	77	38
-1SD - +1SD	Normal BMI/A	0	116

WAZ= weight-for-age; BMI/A= body mass-index-for-age; HAZ= height-for-age; WHO=World Health Organization

DISCUSSION

The study evaluated the effect of nutrition education intervention on nutritional status of malnourished children of aged 6 months to 8 years in twin cities of Pakistan. Majority of children were from age group 6 months to 5 years. Although, every age group in Pakistan is prone to malnutrition, but young children are most affected. In current study, the malnutrition was seen more in children of age less than 5 years. Out of 150 children, 55 % children were male while 44% were female. When evaluating child malnutrition, gender is another significant factor that must be taken into consideration. Male children often require more calories for development and growth, making them more susceptible to wasting and stunting. In present study, male children were more malnourished as compared to female children.

Education levels of parents is one of the major determinants of malnutrition. Educated parents are more likely to provide better care to children as compared to un-educated parents. Low literacy rate of parents can significantly reduce the chances of provision of better nutrition to the child that can result in poor growth and development of the child. Maternal education has significant effect on the nutritional status of children. Educated mothers have better knowledge regarding which

food is healthful or not. In this study, majority of mothers (41.3%) had bachelor's level of education, despite this fact, children were suffering from malnutrition

The majority of researchers emphasized that demographic, socioeconomic, and lifestyle factors play a role in childhood malnutrition. Malnourished children are strongly correlated with household income and family size. But in present study, the majority of children had good household income and small family size, which indicating that the reasons of malnutrition in them were mainly due to poor dietary factors.

In Pakistan, there is no any doubt that poverty is a significant risk factor for malnutrition, but economic resources are not the main constraint. There are many other contributing factors for malnutrition like inadequate child feeding practices and lack of awareness regarding nutrition. In present study, although socio-economic status of studied children was good, but poor eating habits and inadequate dietary patterns were main reason for malnutrition. Different studies suggested that nutrition education intervention improves the nutritional status of children in developing countries.⁸ In present study, nutrition education was delivered by professional dietitian resulting in improved

dietary intake of children as well as nutritional status.

The findings of present study reported that the children's nutritional status was improved significantly after nutrition education intervention. Before intervention, none of child had normal weight while after nutrition education nearly half of the children achieved normal weight, however moderate and mild underweight rates reduced after nutrition education. These results are similar to those of Awuuh et al., 2019 who also reported that nutritional status of children was significantly improved after imparting nutrition education.⁹ Other studies conducted in China also showed reduced prevalence of underweight with nutrition education intervention.¹⁰ 34 children were mildly stunted even after intervention. These findings also correspond with results of other study.¹¹ As stunting is sign of chronic malnutrition, therefore it is possible that a three-fourth period was insufficient to result in a favorable change in stunting status. A study also reported that dietary counseling of mothers was effective in treating childhood malnutrition.¹² The substantial improvements in the anthropometric indicators of children are due to fact that, the nutrition education was delivered by professional dietitian which had positive impact on child feeding practices as well on the maternal knowledge regarding childhood nutrition

Although poverty may be a contributing factor to malnutrition, this intervention reinforces the idea that nutrition education might be useful in raising families' awareness about significance of a balanced diet.

Limitations of the study:

The duration of study was only four months. Therefore, we suggest longer duration of nutrition education intervention to see the more effective results on nutritional status.

CONCLUSIONS

After imparting nutrition education, the nutritional status of malnourished children improved. Children's undernutrition rates could be effectively decreased by nutrition education.

Hence, health workers and community nutritionists that involved in policy decisions on health and nutrition problems regarding young children and infants would contemplate nutrition education, an effective and inexpensive treatment for childhood malnutrition. More studies are too desired to measure the lasting effect such interventions in community.

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