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The Effect of Dezful's Day Care Center Interventional Program to Fight Malnutrition and Improvement of Anthropometric Indices among Preschool Children

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Abstract

Introduction: One of the most important irresistible world wiles is to supply adequate and appropriate nourishment for children. According to malnutrition spectrum, under-nutrition and overnutrition are placed in the two ends of the malnutrition spectrum, which carries on as a key public health issue in developing countries including Iran. Under-nutrition complications including, wasting, stunting and underweight are related to delayed mental development, faltered growth and reduction of intellectual capacity.

Methods and Materials: For 436 participants, anthropometric Z-scores, including weight for height Z-score (WHZ), weight for age Z-score (WAZ), height for age Z-score (HAZ), and BMI for age Z-score (BAZ) were added by using Anthro V.3.2.4 and for above 5 years old using Anthro Plus V.1.04 software of the World Health Organization. All of these data classified based on WHO child growth standards guideline. In this study, SPSS was used for statistical analysis.

Results: In this interventional study of 2-6 years old children living in Dezful (in the western south part of Iran), among the total study population that surveyed, about %6 had moderate to severe wasting before the intervention which was decreased to about 5% after the intervention. Obesity and overweight did not show a significant difference based on scale. The most remarkable results to emerge from the data is that there was a significant association for the following status: Weight, height, body mass index (BMI), WHZ, WAZ, and BAZ while comparing after intervention with baseline. Whereas, there was no significant association for HAZ which is interpreted as stunting. All of the anthropometric indices were increased after intervention vs baseline.

Conclusion: Nutritional education must be conducted more seriously for both healthcare professionals in day care centers and mothers of children. Consequently, intervention program to improve the nutritional status of children aged 2-6 years in day care centers must be promoted and continued to disappear or at least fight against malnutrition. Furthermore, due to no national studies have been planned for nutritional status of adolescent and adult individuals, in near future, this kind of intervention should be managed for these age groups.

Keywords: *Obesity, Overweight, Pediatric, Malnutrition, Underweight*

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Introduction:

One of the most important irresistible world wiles is to supply adequate and appropriate nourishment for children[1]. Poor socio-economic status deteriorates the condition which can lead to malnutrition[2] as one of the most influential non-communicable diseases in populations[3].

According to malnutrition spectrum, under-nutrition and over-nutrition are placed in the two end of the malnutrition spectrum, which carries on as a key public health issue in developing countries [4] including Iran [3,5].

According to the recently published fact sheet by World Health Organization (WHO), 462 million adults are underweight, as well as 52 million, 17 million and 155 million f children under 5 years age are wasted, severely wasted and stunted, respectively. Likewise, 45% all of the deaths occurring in under 5 years old children are associated with under-nutrition [3].

In addition, several aspects of health such as; physical, psychological, cognitive, spiritual and social affected by under-nutrition as result of uncontested food intake. Under-nutrition complications including, wasting, stunting and underweight are related to delayed mental development, faltered growth and reduction of intellectual capacity [6,7]. The previous study recognized that among children with weight faltering, they possessed low BMI however, later they obtained weigh growth [8,9]. Whereas longitudinal studies expressed that children with low BMI and Low weigh growth, would be stunted more probably [10].

In the last decade, the concept of Nutritional transition was defined to considerate the trend of under-nutrition and over-nutrition. The nutritional transition has two-time-frame. The first time frame occurred when there were increases of underweight, wasting and stunting and absent of overweight and obesity. The second time frame with reversed consequences was occurred through the increment of urbanization depend on better Scio-economic level, whereas under-nutrition persist yet [11].

Due to above mentioned, the aim of present study is to consider the effect of Dezful day care center interventional program to fighting malnutrition & improvement of anthropometric indices among preschool children, which has been conducted by Ministry health and Medical Education of Iran.

Materials and Methods:

This Interventional study was designed by the Ministry of Health and Medicinal Education of Iran, which has done an intervention in a period of 6 months through monetary support from the Welfare Organization of Iran (WOI). All the rural day care centers of Dezful in the western south part of Iran were asked to serve one hot meal for their children at the centers, which was supported by WOI and planned by a nutritionist in each center. Generally, children (boys and girls) from Dezful were included in this study. Weight and height of all participants were measured before and after the intervention. The height was measured using the Seca Bodymeter to the nearest 0.1 cm. The weight was measured using the Seca weighing scale to the nearest 0.1 kg. For participants, anthropometric Z-scores, including weight for height Z-score (WHZ), weight for age Z-score (WAZ), height for age Z-score (HAZ), and BMI for age Z-score (BAZ) were added by using Anthro V.3.2.4 and for above 5 years old using Anthro Plus V.1.04 software of the World Health Organization. All of these data classified based on WHO child growth standards guideline. In this study, SPSS was used for statistical analysis.

Results

From the total 436 children under 5 years old that surveyed, according to the WHZ score, about %6 had moderate to severe wasting

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before the intervention which was decreased to about 5% after the intervention (Table 1). In addition, there was no significant difference between girls and boys in this index.

Based on the details shown in Table 2 and among 1511 children that were assessed for the WAZ score, moderate to severe underweight changed from 6% to 4%, respectively for before and after the intervention. Results show that the moderate underweight in girls before and after the intervention was higher than boys. According to the frequency of overweight between the genders, boys had more overweight than girls did. Moreover, boys exhibited obesity approximately 3 fold more than girls (Figure 2).

The frequencies of normal, obese, and overweight children were not significantly different after the intervention.

The HAZ score was also similar before and after the intervention (Table 3 and Figure 3).

Based on the BAZ, moderate to severe wasting decreased from about 6% to 2% (Table 4). Obesity and overweight did not show a significant difference on the basis of scale.

Overall, according to the present data, except height for age Z-score (HAZ), the other indicators show significant differences (Table 5).

Table 1. The comparison of weight for height Z-score (WHZ) based on WHO guideline, before and after the intervention, among 2-6 years old children, in Dezful

Status	Before intervention		After intervention	
	Frequency	percent	Frequency	percent
Severe Wasting	4	0.92	1	0.35
Moderate Wasting	23	5.28	13	4.50
Normal	329	75.46	202	69.90
At risk of overweight	55	12.61	58	20.07
overweight	20	4.59	14	4.84
obese	5	1.15	1	0.35
Total	436	100.00	289	100.00

Table 2. The comparison of weight for age Z-score (WAZ) based on WHO guideline, before and after the intervention, among 2-6 years old children, in Dezful

Status	Before intervention		After intervention	
	Frequency	Percent	Frequency	percent
Severe Underweight	10	0.66	6	0.40
Moderate Underweight	74	4.90	53	3.51
Normal	1287	85.18	1262	83.52
At risk of overweight	110	7.28	156	10.32
overweight	15	0.99	20	1.32
obese	15	0.99	14	0.93
Total	1511	100.00	1511	100.00

Table 3. The comparison of height for Age Z-score (HAZ) based on WHO guideline, before and after the intervention, among 2-6 years old children, in Dezful

status	Before intervention		After intervention	
	Frequency	percent	Frequency	percent
Severe stunting	26	1.72	14	0.93
Moderate stunting	101	6.68	91	6.02
Normal	1374	90.93	1402	92.79
Tall	10	0.66	4	0.26
Total	1511	100.00	1511	100.00

Table 4. The comparison of body mass index for age Z-score (BAZ) based on WHO guideline, before and after the intervention, among 2-6 years old children, in Dezful

Status	Before intervention		After intervention	
	Frequency	percent	Frequency	percent
Severe Wasting	22	1.46	15	0.99
Moderate Wasting	65	4.30	27	1.79
Normal	1156	76.51	1118	73.99
At risk of overweight	209	13.83	249	16.48
overweight	43	2.85	71	4.70
obese	16	1.06	31	2.05
Total	1511	100.00	1511	100.00

Table 5. The comparison of the mean of anthropometric indices based on WHO guideline, before and after the intervention, among 2-6 years old Children, in Dezful

Index	Before intervention	After intervention	P
Age	63.64±9.31	68.04±9.36	0.0001
Weight	18.25±3.26	19.60±3.49	0.0001
Length	108.92±6.85	111.24±6.66	0.0001
BMI	15.33±1.87	15.78±1.94	0.0001
WHZ	0.00±1.27	0.21±1.25	0.030
WAZ	-0.33±1.09	-0.12±1.06	0.0001
HAZ	-0.47±1.16	-0.44±1.09	0.466
BAZ	-0.07±1.27	0.21±1.23	0.0001

Table 6. The comparison of the mean of anthropometric indices based on WHO guideline, before and after the intervention, among 2-6 years old girls and boys, in Dezful

Index	Boys			Girls		
	Before	After	P	Before	After	P
Age	63.53±8.81	67.89±8.83	0.0001	63.74±9.74	68.17±9.80	0.0001
Weight	18.76±3.21	20.18±3.54	0.0001	17.80±3.23	19.09±3.36	0.0001
Length	109.68±6.90	112.05±6.64	0.0001	108.25±6.74	110.53±6.59	0.0001
BMI	15.55±1.79	16.02±1.94	0.0001	15.14±1.91	15.57±1.91	0.0001
WHZ	0.16±1.28	0.19±1.22	0.826	-0.16±1.24	0.22±1.27	0.004
WAZ	-0.18±1.11	0.04±1.11	0.0001	-0.47±1.05	-0.26±1.00	0.0001
HAZ	-0.40±1.20	-0.36±1.13	0.529	-0.54±1.11	-0.52±1.04	0.690
BAZ	0.10±1.28	0.38±1.29	0.0001	-0.22±1.24	0.05±1.15	0.0001

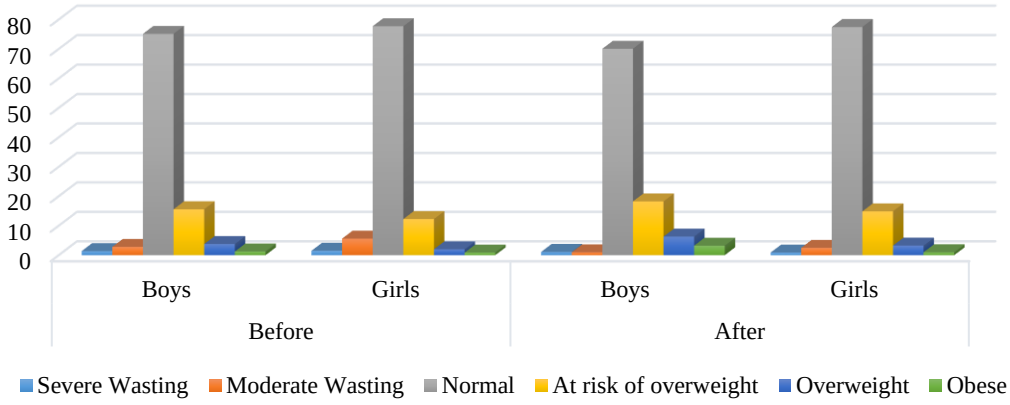

Figure 1. The comparison of weight for height Z-score (WHZ) based on WHO guideline, before and after the intervention, among 2-6 years old girls and boys, in Dezful

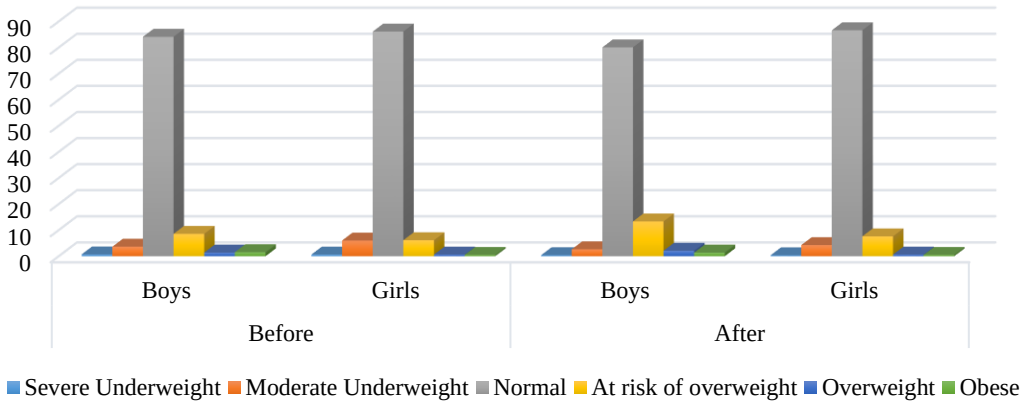

Figure 2. The comparison of weight for age Z-score (WAZ) based on WHO guideline, before and after the intervention, among 2-6 years old girls and boys, in Dezful

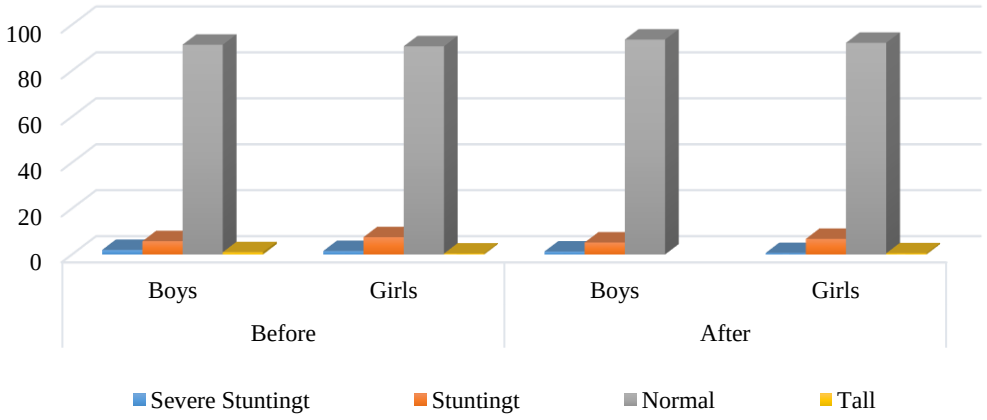

Figure 3. The comparison of height for age Z-score (HAZ) based on WHO guideline, before and after the intervention, among 2-6 years old girls and boys, in Dezful

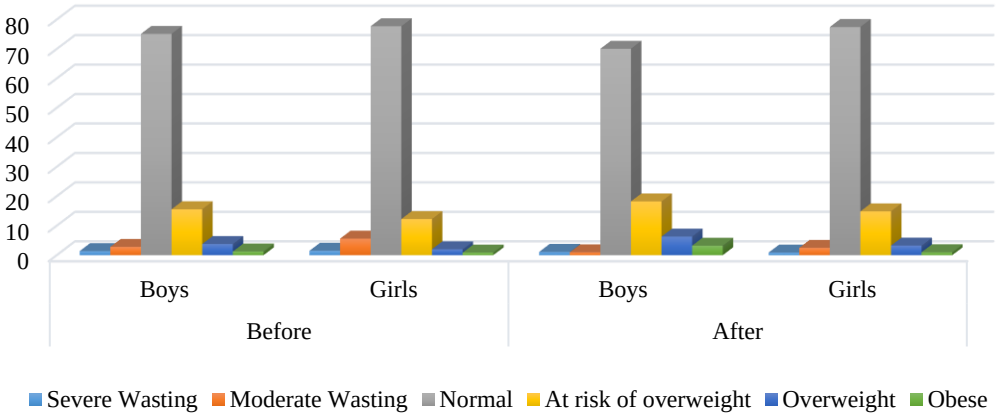

Figure 4. The comparison of body mass index for age Z-score (BAZ) based on WHO guideline, before and after the intervention, among 2-6 years old girls and boys, in Dezful

Discussion

In this interventional study of 2-6 years old children living in Dezful, the most remarkable results to emerge from the data is that there was significant association for the following status: weight, height, body mass index (BMI), weight for height Z-score (WHZ), weight for age Z-score (WAZ) and BMI for age Z-score (BAZ) while comparing after intervention with baseline. Whereas there was no significant association for height for age Z-score (HAZ) which is interpreted as stunting. All of the anthropometric indices were increased after intervention vs baseline. Our results have a number of similarities with Payandeh et al [9].

In etiology of stunting internal and acquired factors affected on stature. Among all of these factors, nutrition, as an acquired factor, in the template of under-nutrition plays the most important role in stunting [12]. Intra-uterine and maternal under-nutrition, insufficient infant's complementary foods, absorption disorder, and intestinal infections are an integrated condition which attributes to nutritional stunting [13]. Several studies presented that childhood under-nutrition leads to change the operation of the GH–insulin-like growth factor (IGF) axis through increasing and decreasing the plasma concentration of GH and IGF, respectively [14,15]. Reduced IGF level is known as the substantial factor in growth disorders. According to resistance to GH induced by under-nutrition mechanism in the liver, three following status regulate resistance to GH: 1. Increased concentration of cortisol, 2. Decreased concentration of insulin and 3. Diminished essential amino acids in the blood system [16]. Increased concentration cortisol due to under-nutrition, has a destructive outcome in long duration which is called stunting. Elevated cortisol and ACTH leads to reduced insulin release which is imputed to insulin resistance and on the other hand, supports hepatic gluconeogenesis. This causes increasing glucose synthesis and stimulation of lipolysis and inhibition of the IGF-1. Consequently, these processes terminate stunting [17].

Since 40 years ago, United States Department of Agriculture (USDA) designed The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) as a cost-effective instrument that leads to increase breastfeeding and prevent premature birth and maternal and childhood overweight and obesity. This program by increasing families accessibly could achieve national public health goals [16].

Data from Healthy Apple Program (HAP), which is accomplished in child care centers, demonstrated improvement in child BMI by

modifying nutrition and physical activity practices when combining HAP with public health services [18].

Salehi M and colleagues designed the study to assess community-based education intervention on 406 children of Qashqa'i tribe families with the age of 0-59 months. They measured anthropometric indices including weight, height and mean arm circumference (MAC) before and after the intervention. Findings demonstrated that education intervention group had better growing on WHZ, WAZ, HAZ, and BAZ compared with control group. In conclusion, a nutritional education program for poor families could increase the growth of children through the changing of family attitudes and beliefs [19].

Chuanlai Hu and colleges showed the Positive effect of Kindergarten-based nutrition education on nutritional behaviors among preschool children, Even though no statistically significant changes were concluded on WAZ and HAZ between the intervention group and their Counterpart [20].

Based on WHO standard, Stunting is one of the outcomes of malnutrition in the concept of child growth. Individual's body sizes get reflected by both weight and height whereas the cause of obesity and thinness could not be proved by a poor indicator by themselves. Furthermore, it has to be stated that the benefits of BMI will be effected height with regarding the age of children, which has been reported that it is a false alarm according to the overweight and obesity. However, due to low HAZ as even in normal, WAZ for children and higher BAZ is an indication of low HAZ indeed [21].

Considering no significant association for HAZ, it can reasonably be assumed that the duration of intervention (one year) is not long enough for increasing HAZ. Furthermore, this apparent lack of significant increment of HAZ can be attributed to distribute only one warm meal for each day. Therefore, providing more meal, especially at least 3 main meal, including breakfast, lunch, and dinner for every day, may change the outcome.

Despite these limitations, coverage of the large population in the present study is the strong point that should be attended.

Conclusion

According to aforementioned successful achievements, nutritional education must be conducted more seriously for both healthcare professionals in Day Care Centers and father of children. Consequently, intervention Program to Improve the Nutritional Status of Children Aged 2-6 Years in Day Care Centers must be promoted and continued to disappear or at least fight against malnutrition. Furthermore, due to no national studies have been planned for nutritional status of adolescents and adult individuals, in near future, this kind of intervention should be managed for these age groups.

Conflict of interest

The authors declare no conflicts of interest.

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