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Effectiveness of Early Home-Based Intervention on the Children's Physical Growth from 2 to 5 Years

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Abstract: **Background: Physical growth in children is a key element in evaluating their health status. Early home based intervention is a system of coordinated services that assure that families who have at-risk children in this age range receive resources and supports that assist them in maximizing their child's physical, cognitive, and emotional development and respecting the diversity of families and communities. The aim of this study was to assess the effectiveness of early home based intervention on children's physical growth from two to five years. Design: Quasi-experimental design (pre-post) test was utilized. Settings:-This study was conducted at Maternal and Child Health Centers at Tanta city, Gharbiya Governorate, Egypt. Sample: A convenience sample of 100 children and their mothers. Tools: 1) A structured interviewing questionnaire including; the socio-demographic data of children's and their parent's. 2) Physiological measurements to assess weight, height, head, and chest, mid arm circumference. 3) 24 hours dietary recall. Results: More than half of children between 4-5 years (55%). Female were more than males (52%, and 48%). There was significant differences between pre and post 2 intervention regarding body mass index. The effect of early home based intervention on physiological measurements among total studied children showed significant improvements of all physiological measurements (P< 0.05 for each) except in head and arm circumference (p> 0.05 for each). Conclusion: Home based intervention had positively effect on physical growth of children. Recommendation: Implement mother class sessions for mothers attending Maternal Child Centers on normal growth and development of their children and how to early detect any deviation from normal ranges.**

Keywords: **Home based Intervention, Children Physical Growth.**

1. INTRODUCTION

Physical growth is a dynamic process that is characterized by physiological changes and increase in the mass of body tissues in an individual from infancy into adulthood. Growth should be monitored sequentially. It is an important tool in the early detection of chronic disease in children. This process in a child who is physically and emotionally healthy, and is adequately nourished, will proceed at a normal rate. However, normal growth is not a uniform process and is dependent on the sex, pubertal stage and racial as well as ethnic background of the child. Adequate nutrition and exercise are important factors in the attainment of normal growth, maturation and bone mineral accretion [1].

Physical growth in children is a key element in evaluating their health status. Physical growth parameters include weight, height (length), skin fold thickness, arm circumference, and head circumference. Values for these growth parameters are plotted on percentile charts, and the child's measurements in percentiles are compared with those of the general population [2].

During 2 to 5 years, the rate of the physical growth and changes slowly compared to the rates experienced during years of infancy and toddlerhood. Children gain an average of 2 to 3 Kg (4.5 to 6.5 Ibs) per year in weight and 6.5 to 9 cm (2.5 to 3.5 inches) per year in height. The preschool body contour also changes, it become slimmer, taller and more pastorally erect. Body systems also continue to mature and stabilize [3]. Visual acuity reaches 20/20 with intact color vision. The bones continue to increase in length and the muscles continue to strengthen and mature. Bowel and bladder control include night time. Sleep pattern becomes organized [4].

Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development [5]. Undernutrition is the underlying cause of child mortality in about 45% of all deaths reported for children under-5 years of age [6]. In 2015, globally about 15% of children were underweight. The African region and south- East Asia have reported the highest prevalence of undernutrition, with the accounting for about 24.9% of the underweight children under5 years of age [7]. Underweight was highest in Burundi (28.8%) and Ethiopia (25.2%) in East Africa; Niger (36.4%), Nigeria (28.7%), Burkina Faso (25.7%), Mali (25.0%) in West Africa; and Chad (28.8%) in Central Africa [8]. In Egypt, malnutrition is a major health problem as 5.5% of under-five children are underweight, 8.4% are wasted and 21.4% are stunted [9].

Preschool age children overweight and obesity is one of the most serious public health challenges of 21st century. The problem is global and affecting much low and middle income country especially in urban settings. Worldwide prevalence has increased at an alarming rate. Globally, in 2016 the number of overweight children under the age of five is estimated to be over 41 million. Almost half of all overweight children under 5 lived in Asia and one quarter lived in Africa [10].

The Central Agency for Public Mobilization and Statistics (CAPMAS) announced that the proportion of children under-five years, who were overweight in both genders during 2014; was 14.9% of them. Gender specific prevalence was; males 15.3% and females 14.3%, and by location the proportion was; urban 16.1% and rural 14.3% [11]. Issues related to underweight and overweight can negatively affect the physical growth and psychological development of children [12].

Parents and family play an integral role in shaping a developing child's eating and physical activity behaviors [13]. Parents should watch their children's weight and make sure that the diet is consistent with the recommendation of the food guide pyramid. Parents should limit time spent in television viewing and increase a daily level of physical activity [14].

Community health nurse play a significant role in preventing and providing intervention to children suffering from nutritional problems. To ensure the appropriateness of a treatment, nurses must recognize the characteristics and lifestyles of the children and their families as well as the risk factors of being underweight or overweight among the children. Nurses can provide intervention to families and children regarding the basic concepts of balanced nutrition and undesirable effect of insufficient nutrition [15].

AIM OF THE STUDY

The aim of this study was to assess the effectiveness of early home based intervention on children's physical growth from two to five years.

RESEARCH HYPOTHESES:

1. Children's growth measurements will improve after implementation of intervention than pre intervention.

2. Children's macronutrients intake will improve after intervention than pre intervention.

2. METHODS

2.1 Design: Quasi-experimental design (pre-post) test was utilized.

2.2 Settings: This study was conducted at Maternal and Child Health Centers at Tanta city in Gharbiya Governorate, Egypt.

2.3 Sample: A convenience sample of 100 children aged 2-5 years old and their mother's at Maternal and Child Health Centers (MCH) was selected.

2.3.1 Inclusion criteria:

- Free from any chronic diseases or handicap.

- Children should not follow a special medical regimen.

2.3.2 Exclusion criteria:

- Having prematurity or low birth weight.

- Having endocrine disorder or cardiac disease.

- Having teeth decay.

2.3.3 Sample Size:

It is formed by Epi website (Open Source Statistics for Public Health)*. Our assumptions were: A two sided confidence level of 95% = (1- α). A power (1- β) or (% chance of detecting) of 80%. Ratio of sample size, unexposed (pre intervention) / exposed (post intervention) =1% of pre intervention with exposure = 40%.

Then enter one of four parameters which was % of post intervention cases = 22%, and the others three parameters would be calculated by the Epi website program.

Kelsey method was used with nearly 200 children aged 2-5 years who were attending MCHCs with their mothers as our sample size (100 children pre- intervention, and the same 100 children will constitute the post-intervention group).

2.3.4 Sampling technique: The technique used to select the sample was:-

A multistage random technique was used to select the setting according to the following:-

The first stage was random selection of one district from eight districts in Gharbiya Governorate. The selected distract was Tanta. Tanta city which has 7 Maternal and Child Health Centers, affiliated to the Ministry of Health and Population offering maternal and child health care.

The second stage was random selection of 2 Maternal and Child Health Centers. The selected centers were Alomoma Care Center and Childhood and Family Health Center from which the sample was taken.

2.4 Data Collection Instruments:

Data was collected through using the following tools:

1. A structured interviewing questionnaire developed by researcher depending on a review of related literature, which include the following:

   Socio-demographic data of children's and their parent's including child name, age, gender, residence, birth weight, parent's educational level, occupation, and monthly income.

2. Physiological Measurements of children included height, weight, head circumference, chest circumference, and mid arm circumference. Using Egyptian growth charts; body mass index for age percentiles was adopted by the researcher from National Nutrition Institute (2008) to assess the body mass index for boys and girls [16].

3. 24 hours dietary recall that was adopted from the National Nutrient Database for Standard Reference, (2000) to recall nutritional elements of the 24 hours recall of dietary intake for the last 3 days [17].

2.4.1 Reliability of the tools:

Reliability was applied by the researcher for testing the internal consistency of the tool by administration of the tool to the same subjects before collecting the data actually to assess clarity and simplicity of the questions. Reliability was estimated among 15 participants by using test retest method with two weeks apart between them. Then correlation coefficient was calculated between the two scores. Correlation coefficient for each of the three tools: interviewing questionnaire data (r= 0.83), physiological measurements (r=0.87), and 24 hours food retrieval questionnaire for three

consecutive days for children (r=0.80). Correlation coefficient was 0.85 which indicates that the questionnaire is reliable to detect the objectives of the study.

2.4.2 Validity of the tools:

The questionnaire was tested for its content by jury of two experts in the field of Community Health Nursing and pediatric nursing to ascertain relevance and completeness. Validity of the questionnaire was assessed using content validity by an Expert. The relevancy, clarity, fluency, and simplicity of each component in the questionnaire were examined by the expert and she found the questionnaire is useful and helpful.

2.5 Pilot Study:

A pilot study was carried out on 10 mothers to assess the clarity, feasibility, applicability of the study tools, and time needed to fill the tool. The necessary modifications were done as revealed from the pilot study. The sample of pilot study was excluded from the total sample to assure the stability of the result.

2.6 Ethical Consideration:

For ethical reasons the protocol was approved by the ethical committee of the "Faculty of Nursing, Menoufia University". An official permission was taken from the directors of MCH centers. Before data collection, each mother was informed about the aim of the study and its importance. They were given an opportunity to refuse to participate. Also they were assured that the information would remain confidential and used for the research purpose only.

2.7 Procedure and Data Collection:

- Duration of study: Data were collected during the period of time from the beginning of May 2016 to the end of April 2017.
- A review of past and current literature covering the various aspects of the problem was done using books, article, magazines, and studies related intervention on the children's physical growth from two to five years.
- An official permission were obtained from the Faculty of Nursing, Menoufia University and sent to the directors of directors of MCH centers to get their permission for data collection. The letters explained the aim of the study and sought their cooperation.
- Before starting the data collection, the agreement and the aim of the study were explained to each head of nursing at MCH centers to gain their cooperation.
- According to the physical growth follow up visit time schedule, the researcher met the subjects in the waiting room, in each selected MCH centers. The researcher introduced herself and explained to the mother's the aim of the study and their consent to participate was obtained.
- Each mother was personally interviewed and sometimes groups of mothers in the MCH centers. Then mothers name, address and telephone number were taken as primary assessment.
- The researcher distributed and filled a copy of the pretest questionnaire to all mothers. Mother's were interviewed at home.
- Filling in the pretest questionnaire took about 20-30 minutes.
- Physiological measurements of children included: Height, weight, head circumference, chest circumference, mid-upper arm circumference of it was extracted Body Mass Index (BMI):- and that the following equation: BMI = weight (kg) / height (m) 2.
- After the measurements were taken, the researcher explained 1st session of the educational intervention. The researcher explained the definition, factors, and classification of physical growth. The first visit took about one hour.
- The researcher distributed the educational intervention booklet developed by the researcher and reviewed by a panel of two experts in fields of community health nursing , and was written in Arabic word office and printed out according to the sample size with additional copies.

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- On the second session, education was given about the component of nutrition, nutritional needs, balanced diet and false diet habits. This session took about 35-50 minutes.
- Third session included information about causes of underweight, and its complication, safe weight gain tips and causes of obesity and its complication.
- The fourth session was about information about key concepts of management of underweight and obesity.
- After three months, first post-test was done.
- The pretest questionnaire took about 10 minutes to evaluate their physiological measurements.
- After six months, second post-test was performed by using the same pretest questionnaire took about 35 minutes.

2.8 Statistical analysis:

The collected data was entered and analyzed by using SPSS version 22 (Statistical Package for Social Science). Graphics were done using Excel program. Graphics were done using Excel program.

Quantitative data were presented by mean (X) and standard deviation (SD). If data was normally distributed, it was analyzed using student t- test for comparison between two means, and ANOVA (F) test for comparison between more than two means. However, if data was not normally distributed, non - parametric tests were used.

Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square ($\chi 2$) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used (if the table was 4 cells), or Likelihood Ratio (LR) test (if the table was more than 4 cells). Level of significance was set as P value <0.05 for all significant tests.

3. RESULTS

Table (1) showed distribution of sociodemographic characteristic of studied sample. The table showed that, more than half of children between 4-5 years (55%). Female were more than males (52%, and 48%). Regarding ordering of child in his/ her family, 28% of children were the second child. Regarding to residence, 54% of children were from rural and 46% of them from urban areas. Regarding father's education and occupation, 42% of father had university education and more than half 56% of fathers were manual workers. Also, the table reveals that, 48% of mothers had secondary education, and most of them 70% were housewife. Regarding monthly income the majority (84%) of mothers reported that income were enough.

Table (2) described distribution of socio demographic characteristic in relation to children Body Mass Index (BMI) pre intervention. The table revealed that 56.3% of male children with normal weight compared to 40.4% of female children, while, 11.5% of female children were overweight. There was no one overweight of male children. Also, there was statistically significant difference between children sex, mother education and BMI (p=0.007&0.02 respectively). On the other hand, there was no statistically significant difference between both family residence and mother occupation and children's BMI (p= 0.07 & 0.06 respectively).

Answering the hypothesis 1:

Children's growth measurements will improve after implementation of intervention than pre intervention.

Figure (1) showed that there was increase in percentage of normal BMI from 48% pre intervention and 54% post1intervention to 79% post 2 intervention, while decrease in underweight from 34% pre intervention and 31% post 1 intervention to 14% post 2 intervention. Also, decrease in percentage of obese from 12% pre intervention to 4% post 2 interventions. There was significant differences between pre and post 2 intervention regarding body mass index classification p=0.001

Table (3) reflected that there was no statistically significant difference between male and female children regarding pre intervention BMI (P1=0.07). There was statistically significant between male and female children regarding BMI post 2 intervention P2=0.01.

In addition, there was statistically significant improvement post 2 intervention than pre intervention of BMI among male in all physiological items (P3 for each < 0.05) except body mass index. Also, there was statistically significant improvement post 2 intervention than pre intervention of BMI among female in height, BMI, chest circumference, and arm circumference (items P4 for each < 0.05). However, both weight and head circumference were not statistically significant (P4=0.06 for each). Generally, the effect of early home based intervention on physiological measurements among total studied children showed significant improvements of all physiological measurements (P< 0.05 for each) except in head and arm circumference (p> 0.05 for each).

Answering the hypothesis 2:

Children's macronutrients intake will improve after intervention than pre intervention.

Figure (2) showed that there was highly statistical significant improvement post 2 intervention than pre intervention of different BMI classes in main intake of carbohydrate, total fat and RDA of total protein.

Figure (3) showed that there was highly statistical significant improvement post 2 intervention than pre intervention of different BMI classes in main intake of vitamin A, vitamin C, and folate.

Table 1: Distribution of sociodemographic characteristic of studied sample (N=100)

Sociodemographic characteristic		Frequency	Percent
Age of children	2 -	20	20.0
	3 -	25	25.0
	4 to 5 years	55	55.0
Sex of children	Male	48	48.0
	Female	52	52.0
Child order	First	39	39.0
	Second	28	28.0
	Last	33	33.0
Residence	Rural	54	54.0
	Urban	46	46.0
Birth weight	Normal	91	91.0
	Abnormal	9	9.0
Feeding	Breast feeding	70	70.0
	Formula feeding	11	11.0
	Both of them	19	19.0
Father education	Illiterate	10	10.0
	Elementary	16	16.0
	Secondary	32	32.0
	University	42	42.0
Father occupation	Employee	39	39.0
	Manual worker	56	56.0
	Unemployed	5	5.0
Mother age	20 -	17	17.0
	26 -	44	44.0
	31- 40 years	39	39.0
Mother education	Illiterate	3	3.0
	Elementary	9	9.0
	Secondary	48	48.0
	University	40	40.0
Mother occupation	Housewife	70	70.0
	Working	30	30.0
Monthly income	Not enough	9	9.0
	Enough	84	84.0
	More than enough	7	7.0
Total		100	100.0

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Table 2 : Distribution of socio demographic characteristic in relation to children Body Mass Index (BMI) pre intervention

Some socio demographic data		BMI								Total		P value
		Underweight		Normal		Overweight		Obese				
		No.	%	No.	%	No.	%	No.	%	No.	%	
Child sex	Male	18	37.8	27	56.3	0	0.0	3	6.3	48	100	LR=12.2, P= 0.007 S
	Female	16	30.8	21	40.4	6	11.5	9	7.3	52	100	
Residence	Rural	20	37.0	29	53.7	1	1.9	4	7.4	54	100.0	LR=6.9, P=0.07NS
	Urban	14	30.4	19	41.3	5	10.9	8	17.4	46	100.0	
Mother education	Illiterate	3	100.0	0	0.0	0	0.0	0	0.0	3	100.0	LR=18.6, P=0.02 S
	Elementary	2	22.2	4	44.4	0	0.0	3	33.3	9	100.0	
	Secondary	15	31.3	23	47.9	6	12.5	4	8.3	48	100.0	
	University	14	35.0	21	52.5	0	0.0	5	12.5	40	100.0	
Mother occupation	Housewife	26	37.1	29	41.4	6	6.8	9	12.9	70	100.0	LR=7.6, P=0.06 NS
	Working	8	26.7	19	63.3	0	0.0	3	10.0	30	100.0	
Total		**34**	**34**	**48**	**48**	**6**	**6**	**12**	**12**	**100**	**100**	

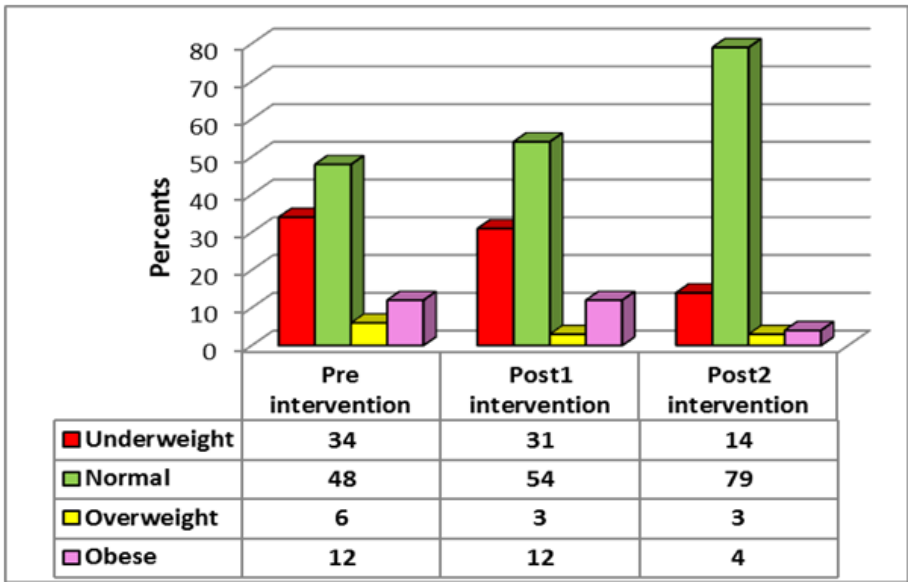

Figure 1: Distribution of pre, post 1 and post 2 intervention in relation to BMI of studied children.

Table 3: Mean and standard deviation of physiological measurements among male and female children pre and post 2 intervention

Child sex		Pre intervention						Post 2 intervention					
		Weight (kg)	height (cm)	Body mass index	Head circumference	Chest circumference	Arm circumference	Weight (kg)	height (cm)	Body mass index	Head circumference	Chest circumference	Arm circumference
Male	Mean	15.58	99.54	15.56	49.64	55.97	17.87	17.0938	102.0000	16.1655	51.0313	58.6146	19.3750
	±SD	4.21	9.38	2.59	2.72	7.44	6.17	3.38592	9.16747	2.79074	2.40877	4.57588	4.79971
Female	Mean	16.6	98.5962	16.0	49.19	56.40	16.93	17.5962	101.5385	18.0425	50.3038	57.7788	18.2692
	±SD	3.60831	9.29318	2.57	2.40	4.34	2.67	3.16698	9.09312	1.96329	2.42955	4.61818	2.62429
P1 value		0.21	0.61	0.07	0.37	0.72	0.31	P2: 0.16	0.73	0.01 S	0.26	0.26	0.90
P3		0.04 S	0.03 S	0.3	0.04 S	0.01 S	0.02 S	P4: 0.06	0.02 S	0. 02 S	0.06	0.04 S	0.01 S
Total	Mean	16.0950	99.0500	15.61	49.41	56.20	17.38	17.3550	101.7600	17.6215	50.6530	58.1800	18.8000
	±SD	3.92267	9.30230	2.67	2.55	6.01	4.68	3.26699	9.08559	2.42425	2.43491	4.59387	3.84616
	P_{total}	0.03 S	0.01 S	0.04 S	0.10	0.02 S	0.07						

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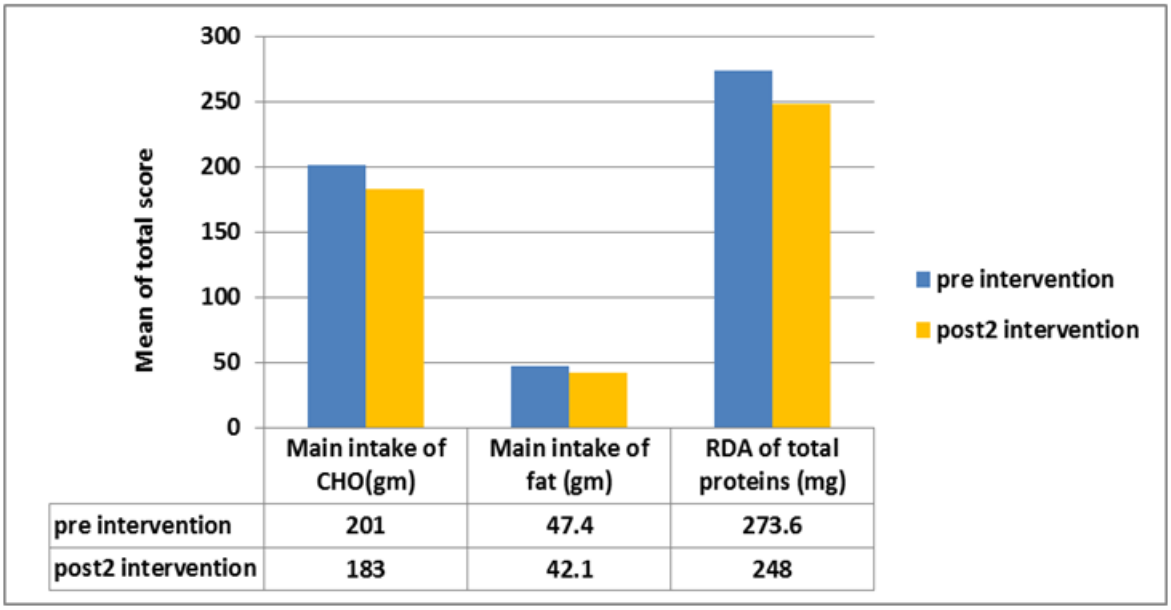
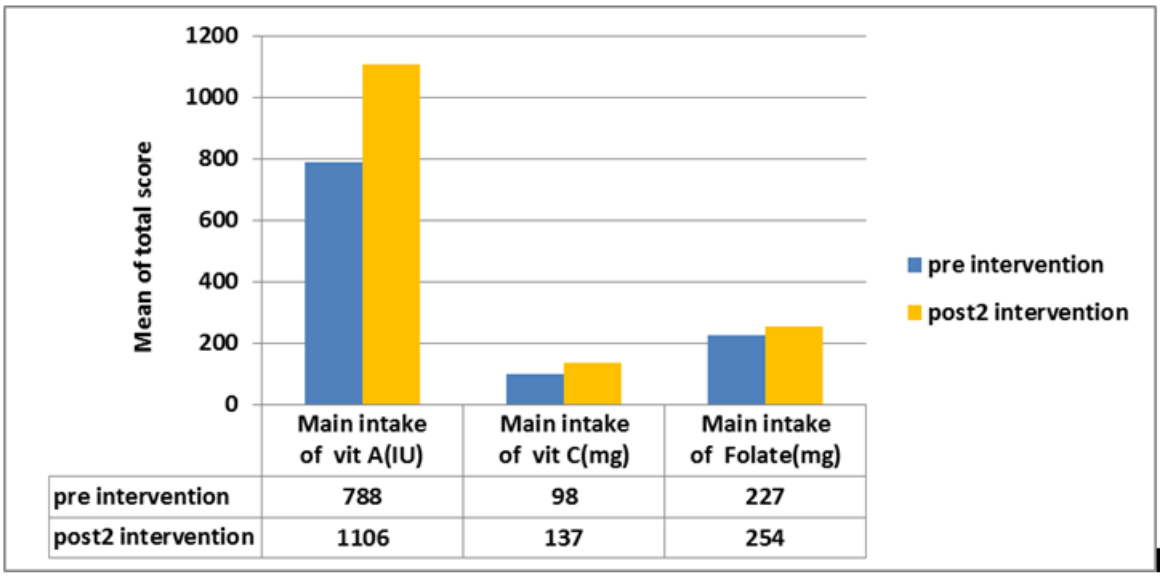


	Main intake of CHO(gm)	Main intake of fat (gm)	RDA of total proteins (mg)
pre intervention	201	47.4	273.6
post2 intervention	183	42.1	248

Figure 2: Mean of total score macronutrients /24 hours recall pre and post 2 intervention



	Main intake of vit A(IU)	Main intake of vit C(mg)	Main intake of Folate(mg)
pre intervention	788	98	227
post2 intervention	1106	137	254

Figure 3: Mean of total score vitamin A, vitamin C, and Folate micronutrients / 24 hours recall pre and post 2 intervention.

4. DISCUSSION

Children grow at a steady rate during the kindergarten and early school years. This slower growth rate is reflected a decrease of appetite and less interest in food [18]. Thus preschool period is a time when children develop many habits likely to continue in adulthood [19]. Aim of this study was to assess the effectiveness of early home based intervention on children's physical growth from two to five years.

Regarding to children Body Mass Index (BMI) pre intervention, the current study revealed that more than third of children whose parents resided in rural areas were underweight than those residing in the urban areas (30.4%) (Table 2). The current study finding was consistent with [8] who studied "multilevel analysis of factors associated with wasting and underweight among children under-five years in Nigeria". They reported that children whose parents resided in rural areas were more undernourished than those residing in the urban areas. Also, this finding came in agreement with results from a cross-sectional study carried out in the Democratic Republic of Congo (DRC), which also found that the rate of

malnutrition was significantly higher in rural areas compared to urban areas [20]. This similarity could be due to low socioeconomic status.

The present study revealed that obesity is higher among females compared to males (Table 2). This current finding study was contradicted with [21] who studied "prevalence of obesity among Head Start preschoolers in Western Ohio". He reported that obesity is higher among males compared to females, 20% and 15% respectively.

The current study results, regarding underweight was higher in males than females (Table 2).The current study finding was consistent with [22] who studied "multilevel analysis of factors associated with wasting and underweight among children aged 0–59 months in Nigeria". They declared that male children had a significantly higher risk of being wasted and underweight than their female counterparts. Those variations might be due to male children tending to engage in higher intensity physical activity thereby using up large amounts of energy that was meant for proper growth and development. Meanwhile, female children are culturally expected to perform lower intensity physical activity which includes staying at home with their mothers near food preparation thereby conserving and channeling more energy to growth and development. Also, these finding came in agreement with [23] who studied "assessment of nutritional status for preschool children (from 3-6 years) in Cairo Governorate". They stated that underweight is higher in males than females. Additionally, the finding of current study supported by [24] who studied "the nutritional status of the under five children in Kabkabia Locality, North Darfur State". He found that prevalence of underweight was higher in boys than girls.

The current study revealed that there was statistically significant difference between both children's sex, and BMI (Table 2). The current study finding was contradicted with [25] who studied "children's eating behavior, feeding practices of parents and weight problems in early childhood in the Netherlands". They reported that no gender differences were found in weight status of the children. This discrepancy might be due to difference sample size.

Answering hypothesis 1:

Children's growth measurements will improve after implementation of intervention than pre intervention.

Regarding BMI of the studied children pre intervention: the current study revealed that, more than third of children was underweight (Figure 1). This finding was inconsistent with [23] who studied "assessment of nutritional status for preschool children (from three - six years) in Cairo Governorate". They found that prevalence of underweight was17.8% of studied children. Also, these current study finding not supported by [26] who studied "a comparison of snack serving sizes to United States Department of Agriculture (USDA) guidelines in healthy weight and overweight minority preschool children enrolled in Head Start". They found that five children were underweight (9.1%). These discrepancies may be due to food poverty (the inability to access a healthy diet) is rising across the Egypt, as prices have increased and real incomes fallen.

Regarding normal weight, the current study revealed that about half of children were normal weight (pre intervention) (Figure 1). This finding was inconsistent with [27] who studied "assessment of nutritional status of under five years rural children in Delta Region in Egypt". They found that 78.2% of the children were normal weight. Also, these finding was not supported by [26] who studied "a comparison of snack serving sizes to United States Department of Agriculture (USDA) guidelines in healthy weight and overweight minority preschool children enrolled in Head Start". They found that 63.3% of the children were healthy weight. This might be due to high food price and lack of nutritional knowledge.

Concerning overweight the current study, less than one third of children were overweight and obese (pre intervention) (Figure 1). This finding was consistent with [28] who studied "prevalence of overweight and obesity among a sample of under five rural children in Lower Egypt". They reported that the prevalence of overweight was 11.8% and the prevalence of obesity was 3.7% among the children. Additionally, the present study findings were supported by [29] who studied "level of overweight, obesity and associated factors among preschool children in Dire Dawa City, Eastern Ethiopia". The researcher reported that the prevalence of overweight and obesity in the study area were 11.4% and 5.5% respectively, while the current study finding was not supported by [27] who studied "assessment of nutritional status of under five years rural Children in Delta Region in Egypt". They found that overweight (12.7 %), and obese (14.5%). This might be due to the urbanization, which was accompanied by changes in lifestyle and food consumption. Also, the present study findings were contradicted with [30] who studied "the prevalence of overweight and obesity in children under five years

in Tehran, Iran, in 2012". They declared that the prevalence of overweight and obesity were 12% and 23.7% in Iran. The prevalence of obesity was higher in north Tehran (24.2%) than south Tehran (23.4%). This might be due to excessive consumption of food, inappropriate diet, excessive feed¬ing, and food insecurity.

Regarding BMI of the studied children pre intervention, the current study revealed that about one third of children were underweight, nearly half of them were normal, less than one third of them were overweight and obese (Figure 1). This finding came in agreement with [25] who studied "children's eating behavior, feeding practices of parents and weight problems in early childhood in the Netherlands". They reported that the majority of the children included in the study population (78%) had a normal weight, 13% of the children had underweight, 8% overweight, and 2% obesity. While, the current study finding was not supported by [31] who studied "overweight and obesity among preschool children in port harcourt, Nigeria". They reported that nineteen (8.6%) were obese, (15%) were overweight, 65.9% had normal body mass index (BMI), (10.5%) were underweight. These variations of BMI could be a reflection of cultural and environmental differences.

Regarding BMI of studied children pre, post1, and post 2 intervention, the present study reveled that there was decrease percent of overweight/ obese BMI classes from 6%, 12% (pre intervention) to 3%, 12% (post1 intervention), 7% (post 2 intervention) (Figure 1). These findings were supported by [32] who studied "a childhood obesity intervention developed by families for families in New York". They reported that compared with pre intervention, children at post intervention had marginally lower BMI and significantly lower rates of obesity. This finding could be due to educational session has an important role in improvement of nutritional knowledge and practice.

Regarding physiological measurement, the present study revealed that there was statistically significant improvement post1 intervention than pre intervention of BMI among male in all physiological items (P3 for each < 0.05) except BMI . Also, there was statistically significant improvement post1 intervention than pre intervention of BMI among female in height, BMI, chest circumference, and arm circumference (items P4 for each< 0.05). However, both weight and head circumference were not statistically significant (P4= 0.06 for each) (Table 3). The present study findings were supported by [33] who studied "effect of nutritional guideline for kindergarten teachers on healthy physical growth of preschool children in Shebin El-kom City Menofia Egypt". The researcher reported that mean and stander deviation for physical growth of study sample children through three months were 107.77 ± 6.70 regards pre test of nutritional guideline compared to 108.68± 6.56 post test regarding length, 20.49±3.29 pretest weight and 22.83±3.35 post test as well as least physical measures as Head circumference 50.86±1.95pretest and 51.14±1.96 post test for private and governmental preschool. This might be due to children grow at a steady rate during the kindergarten and early school years. This slower growth rate is reflected in a decrease in appetite and less interest in food. While, the present study findings were contradicted by [34] who studied "effects of responsive stimulation and nutrition interventions on children's development and growth at age 4 years in a disadvantaged population in Pakistan". They reported that mean levels of height-for-age, weight-for-age, and weight-for-height Z scores or proportions of moderate to severe undernutrition did not differ significantly across groups. No significant interaction effects were observed between the two interventions on child growth indicators.

Answering hypothesis 2:

Children's macronutrients intake will improve after intervention than pre intervention.

Regarding macronutrients/ 24 hours recall and BMI classes pre and post 2 intervention among preschool children. The current study revealed that there was highly statistically significant improvement post 2 intervention than pre intervention of overweight/ obese BMI classes in main intake of total fat, carbohydrate, and RDA of total protein (Figure 2). The present study finding was consistent with [32] who studied "a childhood obesity intervention developed by families for families". They reported that for dietary measures, at post intervention children had significantly lower total energy intake and macronutrient intake (fat, protein, and carbohydrate) compared with pre intervention. This might be due to excessive caloric intake is considered one of the leading causes of weight gain in children.

Regarding micro nutrient vitamins intake and BMI measurements pre and post 2 intervention (Figure 3). The current study revealed that there was highly statistically significant improvement post 2 intervention than pre intervention of different BMI classes in main intake of vitamin-A. This study finding was supported by [35] who studied "the impact of

home gardens on preschoolers nutrition in Eat onside in the Vaal Triangle, South Africa". They reported that paired sample t-tests were used to compare the average food consumption frequencies before and after the project. These tests showed that the only statistically significant increases in intakes were vitamin A.

5. CONCLUSION

The home based intervention had positively effect on physical growth of children.

6. RECOMMENDATIONS

1. Implement mother class sessions for mothers attending Maternal Child Centers on normal growth and development of their children and how to early detect any deviation from normal ranges.
2. Underweight rate was drastically increased in the age group of 2-5 years, so in order to reduce the problem of underweight the dietary modifications have to be done to ensure the increased calorie and protein intake.

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