Demographic, Socio-Economic Factors and Physical Activity Affecting the Nutritional Status of Young Children Under Five Years

Thanaa. A. Elkholy*; Naglaa, H. M. Hassanen and Rasha, M.SC.

Department of Clinical Nutrition, Faculty of Applied Medical Sciences
King Abdul-Aziz University, Jeddah, Saudi Arabia
*telkholy@kau.edu.sa

Abstract: Background: Modern lifestyle extends the umbrella of social responsibility for provision of appropriate nutritionally balanced foods to children of all age groups in particular the children under 5 years of age of all socio-economic groups of civil society which starts from home leads to the health professionals at all health outlets, Nutritionists, Dieticians, schools and the food industry. This was a cross-sectional descriptive study performed to investigate the relation between demographic, Socio-Economic Factors and physical activity affecting the nutritional status of young children under five Years of Age. One hundred twenty one young children, anthropometric data were taken using standard methods. Physical activities and other socioeconomic family parameters were assessed using validated questionnaire from Kindergarten children's and young children mothers by direct contact or by telephone. Logistic regression analyses were performed to estimate the influence of various parameters. SPSS computer software ver.10 was used in data analysis. Results: This study revealed that the impact of family size on nutritional status of children was significantly different. Birth order was a highly significant factor in relation to nutritional status in WAZ and WHZ $P<0.001$. High prevalence of underweight was in Low income children. There was correlation between BMI and anthropometric measures. The breastfed group was better than the other group regard nutritional indicators; HAZ the differences were significant $P<0.05$. A significant different by duration of breast-feeding in months $P< 0.01$. A significantly different exercising in WAZ Score $P\leq0.05$, HAZ Score $P\leq0.01$ and WH Z-Score $P<0.001$. When the number of hours watching TV increased, the nutrition status gets worse ($\pm$2SD & > + 2SD).

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1. Introduction

The young children designed, for a child between infancy and school age, usually one three to five years of age **(Grant, 1984).**

It is well recognized that preschool children are a nutritionally vulnerable segment of population, also very susceptible to morbidity due to infections **(Prema and Gopalan; 2009).**

Nutrition of preschool child is of paramount importance, because the foundation for life time health, strength and intellectual vitality is laid during that period **(Calliara; 1989).**

In early childhood, adequate dietary intake is important for growth and development and to prevent nutrient-related deficiencies and toxicities, but excess dietary intake is linked to obesity **(Ernst and Obarzanek; 2010)**. Prevalence of excessive body weight and obesity among children is increasing in many countries **(Ogden *et al.,* 2002; Yngve *et al.,* 2008 and Perveen, *et al.,* 2010)**. It is believed that one of the two most important reasons for this increase is insufficient physical activity of children **(Dietz; 1985, and Dennison *et al.,* 2002) and.** Developing healthy diet and physical activity patterns early in life is essential so that these practices follow into adulthood, which may prevent obesity, type 2diabetes, and other chronic diseases **(Tara *et al.,* 2010).**

Adequate dietary intake and nutritional status among children are important for their own growth, development and function, and there is now increasing evidence that childhood nutrition also influences adult health. Thus, childhood diet needs to be taken seriously in order to improve a nation's health as well as producing bright and active children **(Tomkins; 2001).**

Growth assessment best defines the health and nutritional status of children, because disturbances in health and nutrition, regardless of their etiology, invariably affect child growth and hence provide an indirect measurement of the quality of life of an entire population **(Onis *et al.,* 1993).**

The growth and mental developments are indicators of good health and nutrition **(WHO; 1995).** The accurate assessment of the physical growth and development of children is a subject that gains the

interest of pediatricians and public health officers **(Tanner; 1966).** There is a worldwide variation in size and shape between children belonging to different populations of mankind **(Maysoon *et al.*, 2004).**

Breastfeeding is considered as the first four strategies promoted by UNICEF for improving infant and child survival as reported by **(Grant, 1984).** This may enhance child survival up to 3 years of age even in undernourished children **(Brined *et al.*, 1988).**

Malnutrition is still a major public health problem over large areas of the world, especially developing countries and particularly amongst low socio-economic groups **(Samai *et al*; 2009).** Malnutrition of pre-school children was documented to depressed growth, impaired intellectual development and altered behavioral responsiveness **(Birch, 1972; Read, 1973).**

Previous studies have observed that several diet and physical activity behaviors may be related to overweight in children including low fruit and vegetable intake, high sweetened beverage consumption, low levels of physical activity, and watching television more than two hours per day **(Adams; 2004).** previous findings, was developed for preschool aged children and their families that focused on four nutrition and physical activity behavior goals: increasing fruit and vegetable intake, decreasing sweetened beverage and sugar intake, increasing physical activity, and decreasing television watching **(Tara *et al.*, 2010)**. The purpose of this paper therefore was to explore basic and underlying factors determining the nutritional status of young children in KSA Jeddah City.

Subjects and Methods

Subject and setting:

A cross-sectional descriptive study was conducted on one hundred and twenty one Saudi male children aged 24- 60 months were chosen by a systemic random method, recruited from two kindergartens in KSA Jeddah city , all children were in kindergartens and their houses. Data collected by questionnaire from Kindergarten children's and preschool child mothers by direct contact or by telephone.

Methods:

The data collection initiated in October 2010 and complete in March 2011. All the studied children were subjected to the following criteria.

Demographic, socio-economic aspects

Standard questionnaires were designed to cover the majors' variables to demographic and socio-economic aspects.

After pre-testing and justifying the questionnaires was translated in to Arabic and applied in kindergartens and preschool child mother. The questionnaire contains several sections; the first is household schedule which included questions on basic demographic and socio-economic characteristics of the households. This section constitutes the essential part of the questionnaire which collects data on individual characteristics as to : age, educational status, occupational and employment status, marital status and finally questions on fertility in terms of number of children ever born and number of children alive.

The children were interviewed by the investigator; either in kindergartens or in their houses, to filling the detailed questionnaire from the mothers to collect information on the family socio-demographic characteristics and including information about number of children in the family, the rank of the child in siblings, educational level and employment of the parents.

Anthropometric measurements.

The weight and height of the children were assessed. Height was measured by a meter. The children were standing without shoes on a flat surface with feet parallel and heel together, and the head, back and heels in contact with the vertical board. The height was recorded to the nearest 0.1 cm **(WHO, 1995).**

Weight of children was determined by using an electronic scale (Piscover, Poland) and was recorded to the nearest 0.1 kg. The children were weighed with light indoor clothing and without shoes **(WHO, 1995).**

Anthropometric indices are combinations of measurements. They are essential for the interpretation of measurements. In children, the four most commonly used indices are weight-for-height, height-for-age, weight-for-age and BMI-for-age.

The anthropometric indices can be expressed in terms of Z-scores to compare a child or group of children with a reference population to assess their growth **(WHO, 1995).**

To assess the nutritional status of individual children, WHO recommends the use of Z-score indicators of weight-for-age (WAZ) (under-weight), height-for-age (HAZ) (stunting) and weight-for-height (WHZ) (wasting). To compute the anthropometric indices, information on each individual's gender, age, weight, and height are needed. WHZ and HAZ are the most commonly used indices for determining nutritional status (WHO, 2007).

The dependent variables for this study were the three anthropometric measurements:

Height-for-age (H/A), which indicates the level of stunting, weight-for-age (W/A), this indicates the level of underweight, and weight-for-height (W/H) which indicates the level of wasting. The independent variables were: education of the mother, family income, and breastfeeding, number of children under three in the family, parents' occupation and marital status of parents. Reference standards used were those of the National Center for Health Statistics (NCHS). Each of the three nutritional status indicators is expressed in standard deviation units (z-scores) from the median of this reference population **(UNSCN, 2004).**

Data about the Child

Gender, Birth date, Weight, Child orders, twining (single or multiple births), Pattern of feeding at times of questionnaire either breast feeding, formula feeding and mixed food. The mothers of children above 2 years were asked about the feeding pattern through the 1st year, besides their actual feeding at the moment of the interview.

Education of the mother and father

The state of education was scored according to the following classification: Illiterate (not educated at all), Primary educational certificate, Preparatory educational certificate, Secondary educational certificate, University educational certificate.

Occupation of the mother and father

The occupation of the mother and father was assessed according to the following classification: No occupation, unskilled worker, skilled worker, Semi – Professional and Professional.

Ethical Considerations

Permission was attained from the relevant kindergartens authorities; the kindergarten directors, and their staff.

Statistical analysis: has been achieved by using SPSS program SPSS Version 10 (1998)

The qualitative data were presented in the form of number and percentage. Chi-square was used as a test of significance for qualitative data. The quantities data were presented in the form of mean, standard deviation and range. One way ANOVA and student T test was used to compare quantities data and Pearson's correlation coefficient (r) has been also applied in this study between two quantities variables. Significance was considered when P value ≤ 0.05. Insignificance was considered when P value > 0.05.

3. Results

One hundred and twenty one Saudi children aged 24- 60 months were chosen by a systemic random method recruited from two kindergartens in KSA Jeddah city. Descriptive of Nutrition Status of Studied Sample of young age children, presented in **Table (1)** It was found that the mean± SD, minimum and maximum for WAZ were (-0.3637± 1.328), (-3.81), (2.95) respectively; while for HAZ the mean± SD (-0.9597±2.0169), the minimum (-10.39) and maximum (3.8). Also, the mean± SD, minimum and maximum for WHZ were (0.1896 ± 2.0725), (-5.47) and (4.93) respectively.

Table (1): Distribution and (Mean ± SD) of Nutrition Status Studied Sample of young Children

Anthropometry measurements	No.	%	Nutritional Status	(mean ± SD)	Min	Max
WAZ	10 107 4	8.3 88.4 3.3	Underweight Normal Overweight	-0.3637± 1.328	-3.81	2.95
HAZ	23 94 4	19.0 77.7 3.3	Stunted Normal Tall	-0.9597±2.0169	-10.39	3.8
WHZ	15 83 23	12.4 68.6 19.0	Wasted Normal Overweight	0.1896 ± 2.0725	-5.47	4.93
Total	121	100.0				

The same table shows that according to Weight /Age 88.4 % were normal, 8.3% were underweight and 3.3% were overweight. According to Height / Age (77.7 %) were normal, 19.0 % were stunted and 3.3 % were tall. According to Weight/Height (68.6%) were normal, 12.4 % were wasted and 19.0 % were overweight.

Table (2) shows the distribution of children by family size and nutritional status .Family size in this study seems to be one of the most effective factors on the nutritional status of the children.

The highest mean of underweight was found in family size more than 7 persons, while the highest mean of stunting children was found in family size more than 6 persons while the lowest mean of normal

nutritional status was shown in the least family size (5.57 persons). The highest mean of wasting children came from big families of size (6.6 persons).There was a significant association between nutritional status and family size in the nutritional indicator WAZ at P< 0.01.

As can be seen in **table (2)**, the (Mean ± SD) of birth order of the study children by nutritional status. The analysis of the results revealed that the high means of underweight, stunting and wasting (<-2SD) was found among the group of high birth order. The reverse of that was shown in the normal nutritional status (±2SD). In summary the (underweight, stunting and wasting) was high among high birth order children and normal among low birth orders. Birth order was a highly significant factor in relation to nutritional status in WAZ and WHZ at P< 0.001.

Also **table (2)** presented (Mean ± SD) of income of the study preschool children by nutritional status. The analysis of the results revealed that the low means of income appears in the stunting group (<-2SD). While the high mean of income was shown in the normal nutritional status (±2SD). Income was significant factor in relation to nutritional stat

Table (2): (Mean ± SD) of Family Size, birth order and Income of the study children by nutritional status

Indicator	Family Size	Z-Scores				
		< - 2SD	±2SD	> + 2SD	Total	F-value P
WAZ	No.	10	107	4	121	6.28
	Mean	7.70	5.57	5.0	5.73	0.003**
	SD	2.5	±1.80	1.82	1.95	
HAZ	No.	23	94	4	121	1.47
	Mean	6.35	5.57	5.75	5.73	NS
	SD	2.33	±1.83	1.89	1.95	
WHZ	No.	15	83	23	121	1.82
	Mean	6.60	5.57	5.74	5.73	NS
	SD	2.41	±1.85	1.89	1.95	
Indicator	Birth Order					
WAZ	No.	10	107	4	121	9.75
	Mean	6.90	3.80	4.50	4.08	0.000***
	SD	2.02	±2.12	2.65	2.28	
HAZ	No.	23	94	4	121	0.257
	Mean	4.39	4.00	4.00	4.08	NS
	SD	2.68	±2.17	2.94	2.28	
WHZ	No.	15	83	23	121	18.67
	Mean	7.00	3.57	4.04	4.08	0.000***
	SD	1.89	±1.92	2.34	2.28	
Indicator	Income(RS)					
WAZ	No.	10	107	4	121	0.193
	Mean	5100	5205.61	4500	5173.55	NS
	SD	2282.78	±2239.18	2886.75	2246.03	
HAZ	No.	23	94	4	121	4.282
	Mean	4043.48	5393.62	6500	5173.55	0.016*
	SD	2225.44	±2205.65	1000	2246.03	
WHZ	No.	15	83	23	121	7.664
	Mean	4866.67	5638.55	3695.65	5173.55	0.001**
	SD	2386.47	±2069.39	2183.29	2246.03	

NS: Not Significant *P< 0.05 **P<0.01 ***P< 0.001

Table (3) shows the anthropometrics indices of children by breastfeeding. It is apparent that the breastfed group was better than the other group regard nutritional indicators; HAZ. However, the differences were significant P < 0.05.

Mean ± SD of breastfeeding duration of the study children by the anthropometrics indices WAZ, HAZ, and WHZ presented in the same table. It is apparent that the normal nutritional status (±2SD) improved with increase of (mean ± SD) duration of breast-feeding. Nutritional status (In WAZ, HAZ and WH Z-Score) of children was significantly different by duration of breast-feeding P< 0.01.

Table (3): Distribution of the study children by nutritional status and Breast-feeding and Breastfeeding duration

Indicator	Breast-feeding	Z-Scores								χ^2 P
		< - 2SD		±2SD		> + 2SD		Total		
		No.	%	No.	%	No.	%	No.	%	
WAZ	Yes	10	9.3	94	87.0	4	3.7	108	100.0	1.91
	No	0	0.0	13	100.0	0	0.0	13	100.0	NS
	Total	10	8.3	107	88.4	4	3.3	121	100.0	
HAZ	Yes	21	19.4	85	78.7	2	1.9	108	100.0	6.66
	No	2	15.4	9	69.2	2	15.4	13	100.0	0.04*
	Total	23	19.0	94	77.7	4	3.3	121	100.0	
WHZ	Yes	14	13.0	74	68.5	20	18.523.1	108	100.0	0.38
	No	1	7.7	9	69.2	3		13	100.0	NS
	Total	15	12.4	83	68.6	23	19.0	121	100.0	

Indicator	Breastfeeding duration	Z-Scores				
		< - 2SD	±2SD	> + 2SD	Total	F-value P
WAZ	No.	10	94	4	108¶	4.98
	Mean	5.70	13.57	13.25	12.83	0.009**
	SD	4.88	±7.7	7.89	7.78	
HAZ	No.	21	85	2	108¶	5.69
	Mean	8.43	14.08	6.0	12.83	0.004**
	SD	4.93	±7.98	1.41	7.78	
WHZ	No.	14	74	20	108¶	6.34
	Mean	7.14	14.39	11.05	12.83	0.003**
	SD	6.26	±7.79	6.58	7.78	

¶ 108 No. of breastfeeding and the rest 13 not breastfeeding *p<0.05 **P< 0.01

Table(4) shows that the level of underweight, stunted and wasted were in children of low mean of BMI 13.3,15.78 and 14.85 respectively as compared to well nutritional status of moderate mean of BMI 16.3,16.06 and 16.02 respectively. Nutritional status (In WAZ and HAZ Z-Score) of children was significantly different by BMI P< 0.01 and P< 0.05 but no statistically significant association was observed in Nutritional status (In WHZ Z-Score).

As can be seen in **table (4)** the same table the BMI was highly significant and positively correlated to the WHZ and WAZ and negatively correlated to the HAZ.

From **Figure (1)** It was found a negative significant correlation between BMI and HAZ in preschool children r = - 0.635 negative moderate correlation.

Table (5) shows that the nutritional status (±2SD) improved with increase % of Exercising. Nutritional status of children was significantly different by Exercising in WAZ, HAZ and WH Z-Score. Also the table shows the anthropometrics indices of children by (mean ±SD) of the number of hours watching TV. The association between nutritional statuses is indicated by WAZ, HAZ & WHZ and the number of hours watching TV. When the number of hours watch TV Increased the nutrition status gets worse.

Table (4): (Mean ± SD) and Pearson Correlation of BMI of the study children by nutritional status

Indicator	BMI	Z-Scores						
		< - 2SD	±2SD	> + 2SD	Total	F-value P	Pearson Correlation	Sig.
WAZ	No.	10	107	4	121	4.901	0.454	0.000***
	Mean	13.30	16.3	20.68	16.2	0.009**		
	SD	2.56	±4.26	1.27	4.24			
HAZ	No.	23	94	4	121	3.724	- 0.635	0.000***
	Mean	15.78	16.06	21.73	16.2	0.027*		
	SD	3.07	±3.9	11.63	4.24			
WHZ	No.	15	83	23	121	2.35	0.242	0.008**
	Mean	14.85	16.02	17.71	16.2	NS		
	SD	7.08	±3.73	3.22	4.24			

***P< 0.05 **P<0.01 **Correlation is significant at the 0.01 level ***Correlation is significant at the 0.001 level**

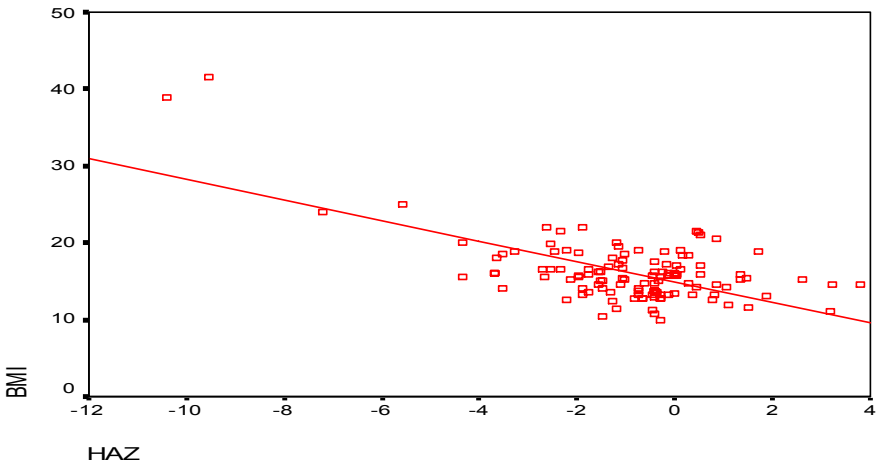

Figure (1): Correlation between BMI and HAZ of preschool children

4. Discussion

The present study reports on the level of nutrition status and the impact of some socioeconomic and demographic characteristics of households on the nutritional status of children under-five years of age in Jeddah KSA. One hundred twenty one households and mothers of young children representing the tow kindergarten in Jeddah participated in the study; hence the study may be regarded as a reasonable reflection of the nutritional status of children less than five years. A number of similar studies have been conducted in various parts of the world **(Gobotswang, 1998; Maria Nnyepi; 2006; Timothy and Richard, 2008; Vipin Chandran. , 2009 and Maria, *et al.*, 2011).**

The questionnaire used in the present study was valid and reliable tool covered demographic information, breastfeeding practices, socio-cultural and economic factors and anthropometric data. Measuring the correlation of nutritional status for preschool children, physical activity and the duration of breast-feeding in month and television viewing habits in the study group. Although more objective measurements may be recommended, questionnaires can be good instruments for measuring the perceived environment in larger samples of young children.

Table (5): Distribution of the Exercising and (Mean ± SD) of the number of hours watching TV of the study children by nutritional status

Indicator	Exercising	Z-Scores								χ^2
		< - 2SD		±2SD		> + 2SD		Total		
		No.	%	No.	%	No.	%	No.	%	P
WAZ	No	9	11.5	65	83.3	4	5.1	78	100.0	5.69
	Yes	1	2.3	42	97.7	0	0.0	43	100.0	0.05*
	Total	10	8.3	107	88.4	4	3.3	121	100.0	
HAZ	No	22	28.2	53	67.9	3	3.8	78	100.0	12.64
	Yes	1	2.3	41	95.3	1	2.3	43	100.0	0.002**
	Total	23	19.0	94	77.7	4	3.3	121	100.0	
WHZ	No	14	17.9	41	52.6	23	29.5	78	100.0	
	Yes	1	2.3	42	97.7	0	0.0	43	100.0	26.36
	Total	15	12.4	83	68.6	23	19.0	121	100.0	0.000***

Indicator	The number of hours watching TV	Z-Scores				
		< -2SD	±2SD	> + 2SD	Total	F-value P
WAZ	No.	10	107	4	121	0.472
	Mean	3.70	3.93	5.0	3.95	NS
	SD	2.31	2.29	3.16	2.31	
HAZ	No.	23	94	4	121	1.056
	Mean	3.52	4.0	5.25	3.95	NS
	SD	1.62	2.44	2.22	2.31	
WHZ	No.	15	83	23	121	0.125
	Mean	4.13	3.88	4.09	3.95	NS
	SD	3.02	2.12	2.52	2.31	

*P≤0.05 **P<0.01 ***P<0.

Socioeconomic Characteristics:

A challenge in estimation of birth order and family size effects is that birth order relates to family size. Theory suggests a tradeoff between child quantity and 'quality'. Family size might adversely affect the production of child quality within a family **(Alison and Hiau; 2005).** The present study reveals impact of family size on the nutritional status of children as present in table (2); the study did not demonstrate significant differences; but only in the nutritional indicator WAZ the significant was at P< 0.003. Other study by **(Alison and Hiau, 2005)** which use unique retrospective family background data from the 2003 British Household Panel Survey find that children from larger families have lower levels of education and that there is in addition a separate negative birth order effect. In contrast to (Black *et al.,* 2005), the family size effect does not vanish once we control for birth order. Our study revealed that birth order was a significant factor in relation to nutritional status in WAZ and WHZ P< 0.001 as shown in Table (2) which represent the (Mean ± SD) of birth order of the study preschool children by nutritional status. The analysis of the results revealed that the high means of underweight, stunting and wasting (<-2SD) was found among the group of high birth order. The reverse of that was shown in the normal nutritional status (±2SD) the present study is agreement with study by (Vipin; 2009)) which found the association between stunting, wasting and birth order was found to be significant at 0.05 levels. These findings reveals that a birth order of three or more show a birth interval of less than 24 months which is unhealthy for the mother.

Household economic status is positively related with child stunting in our group study. Finding of this study showed that compared with children residing in medium/higher economic status households. The analysis of the results revealed that the low means of income appears in the stunting group (<-2SD). While the high mean of income was shown in the normal nutritional status (±2SD). Income was significant factor in relation to nutritional status in HAZ and WHZ at P < 0.05 and P< 0.01 respectively. Our results are agreement with study in Addis Ababa, Health and Nutrition Research Institute Ethiopia by (Girma *et al.,* 2002) which indicates the association of household economic status with household food security that is a prerequisite for access to adequate dietary intake for all members of the household in general and for young children in particular. Small-scale studies (Getaneh *et al.,* 1998) and (Yimer, 2000) undertaken in Ethiopia have also shown the importance of household economic status to improve stunting in children.

Breast Feeding

It has been proposed that breastfeeding promotion might be an effective way to prevent the development of obesity **(Gillman; 2002).**

The available evidence suggests that breastfeeding may have long-term benefits. Subjects who had been breastfed were found to have a lower mean blood pressure and lower total cholesterol, and showed higher performance in intelligence tests. Furthermore, the prevalence of overweight/ obesity and type-2 diabetes was lower among breastfed subjects **(WHO, 2007).** Concerning obesity, whereas **(Summer, 2005)** reported that combined dietary education and physical activity interventions were not effective in reducing childhood obesity and overweight, but **(Bernardo *et al.,* 2007)** noticed that breastfeeding was associated with a 22% reduction in the prevalence of overweight/obesity.

The present study depicted the correlation of anthropometrics indices of young children by breastfeeding which shown in **table (3)** .It is apparent that the breastfed group was better than the other group, regard nutritional indicators; HAZ. However, the differences between groups were significant at P < 0.05. The protective effects of breastfeeding on children's nutritional status observed in this study suggest that breastfeeding is an important part of child care. However, there is need to educate mothers on safe breastfeeding and timely introduction of complementary foods because poor breastfeeding practices such as prolonged breastfeeding or failure to introduce adequate complementary foods as recommended places children at risk for stunting or underweight **(Madzingira,1995& Fawzi,1998)**

Also we are showing in the same table that Mean ± SD of breastfeeding duration (in months) of the study preschool children by the anthropometrics indices WAZ, HAZ, and WHZ. It is apparent that the nutritional status (±2SD) improved with increase of (mean ± SD) duration of breast-feeding in months. Nutritional status (In WAZ, HAZ and WH Z-Score) of children was significantly different by duration of breast-feeding in months P< 0.01.The same results showed by **(Roy; 2000and, Tewari *et al.,* 2005).** That preschool children of the Shabar tribal community in Orissa were suffering from underweight (<-2 SD weight for age), which is an essential and rapid indicator to assess nutritional status in children as well as under nutrition (<-2.00 SD MUAC for age).

WHO (2001) considered that exclusive breast feeding for the first 6 months was the most appropriate infant feeding practice but in most of the studied children breast milk was initiated after 24 hours of birth and exclusive breastfeeding stopped before completion of 6 months of age. Therefore, these may be the major causes for high prevalence of

malnutrition among preschool children. Exclusive breastfeeding for less than 6 months may be a significant risk factor for high prevalence of underweight among Shabar preschool children. It is felt that there is an urgent need to inform women about the importance of early and extended breastfeeding among the Jeddah community.

Several possible biological mechanisms for a protective effect of breastfeeding against overweight and obesity have been proposed. Differences in protein intake and energy metabolism may be one of the biological mechanisms linking breastfeeding to later obesity. Lower protein intake and reduced energy metabolism were reported among breastfed infants **(Whitehead; 1995).**

Rolland-Cachera *et al.* (1995) observed that higher protein intakes in early life regardless of type of feeding was associated with an increased risk of later obesity. Another possibility is that breastfed and formula- fed infants have different hormonal responses to feeding, with formula feeding leading to a greater insulin response resulting in fat deposition and increased number of adiposities **(Lucas; 1980).** Finally, limited evidence suggests that breastfed infants adapt more readily to new foods such as vegetables, thus reducing the caloric density of their subsequent diets **(Birch and Fisher; 1998).**

Anthropometrics Measurements

Anthropometry provides non-invasive, easy and cheap but yet valuable information on nutritional status. Anthropometric measures of most significance in children include: weight and height **(Smith and Brown; 1970, FAO/WHO; 1971, Waterlow; 1972 and Sudesh; 2000)**. A well-nourished child is one whose weight and height measurements compare very well with the standard normal distribution of heights and weights of healthy children of the same age and sex **(Salah *et al.*, 2006).** Our result as can seen in table (4) the level of underweight, stunted and wasted were in children of low mean of BMI 13.3,15.78 and 14.85 respectively as compared to well nutritional status of moderate mean of BMI 16.3,16.06 and 16.02 respectively. Our results are agreement with the results of **(Maria; 2006)** that show that malnutrition was prevalent, with 11.3 %, 13.7%, and 3.9 % of children estimated to be underweight, stunted, and wasted respectively. The prevalence of stunting and underweight was higher ($p < .05$).

As we can see in the same table, the nutritional status (In WAZ and HAZ Z-Score) of children was significantly different by BMI $P< 0.01$ and $P< 0.05$ but no statistically significant association was observed in nutritional status (In WHZ Z-Score). The same table shows that BMI was highly significant and positively correlated to the WHZ and WAZ and negatively correlated to the HAZ.

From **Figure (1)** It was found a negative significant correlation between BMI and HAZ in preschool children r = - 0.635 negative moderate correlation.

Also according to Pearson Correlation our Study revealed that there was correlation between BMI and anthropometric measures. It was found a positive correlation between BMI and WHZ in preschool children r = +0.454, and Correlation is significant at the 0.001 level. A negative significant correlation between BMI and HAZ in preschool children r = - 0.635 negative moderate correlation significantly at the 0.001 level. But there was found a positive significant correlation between BMI and WAZ in preschool children r = + 0.242 positive weak correlation and this Correlation was significant at the 0.01 level.

Physical Activity:

Overweight and obesity are directly caused by a positive balance between food energy intake and energy expenditure over a prolonged period of time, which provides a basis for the large quantity of scientific research dedicated to these two factors. It is generally accepted that increased levels of obesity can be explained through increased food energy intake and sedentariness **(Deforche; 2005, and Vieno *et al.*, 2005)** and Weight is a sensitive index for the evaluation of nutritional status of preschool children, particularly where their precise ages are known **(Samai Mohamed, *et al.*, 2009).** Thus weight alone cannot be the most suitable index in the evaluation of the nutritional status of preschool children in Jeddah. Thus the current study was undertaken to determine the relative merits of anthropometric measurements commonly used in nutrition survey for the evaluation of the nutritional status of preschool children in the kindergarten.

However, it is important to point out that the results of some studies suggest that information regarding the cause effect relationship between physical activity and childhood obesity is lacking, and that not enough data is available to determine the quantity and types of physical activity required achieving and maintaining a healthy body weight. In addition, too little data is available to determine the time of day when moderate and intense physical activity should be performed in order to prevent or reduce obesity **(Rennie *et al.*, 2005 and Wareham, *et al.*, 2005),** but it has been accepted that regular, systematic participation in moderate and intense physical activity offers significant health benefits, including the prevention of obesity **(Predel and Tokarski; 2005).**

A study of the relationship between physical activity and childhood obesity revealed that children whose total physical activity amounted to less than one hour per day tended to be more obese than those who participated in physical activity for more than two hours every day, (Ekelund *et al.,* 2004). Other studies of physical activity tendencies have revealed that physical activity is higher among boys and among school children with greater economic resources, which indicates that lack of knowledge among poorer children leads to a more negligent attitude with regard to childhood obesity **(Montgomery *et al.,* 2004and,MOF *et al.,* 2005)**. This is demonstrated by the present study test correlation in Table (5) which shows that the nutritional status at (±2SD) improved with increase % of Exercising. Nutritional status of children was significantly different by Exercising in WAZ Score at P≤0.05, HAZ Score at P≤0.01 and WH Z-Score at P<0.001.

Television watching and media use has been shown to be positively associated with BMI in children **(Gortmaker *et al.,* 1996; Gortmaker; 1985;Kaur *et al.,* 2003,Dietz and Epstein *et al.,* 2008**) the American Academy of Pediatrics recommends that children over two years should not watch more than two hours of television per day **(American Academy of Pediatrics Committee; 2001).** This is demonstrated by the data presented in our study shows that young children, which the number of hours watching TV increased the nutrition status gets worse (±2SD & > + 2SD) as shown in **table (5)** which revealed that the association between nutritional status as indicated by WAZ, HAZ & WHZ.

Conclusions

Improving dietary and lifestyle patterns and reducing obesity will require a sustained public health effort, which addresses not only individual behaviors but also the environmental context and conditions in which people live and make choices. Individual behavior change is difficult to achieve without addressing the context in which people make decisions.

Breastfeeding was found to reduce the occurrence of underweight among children. The study findings imply that efforts for redressing child undernutrition issues in Jeddah city should focus on factors associated with development outcomes such as maternal income, maternal education, and the creation of employment or economic engagements that do not Compromise important child care practices such as breastfeeding.

Physical inactivity among Saudi children represents a growing public health challenge, and actions to control obesity and promote physical activity must begin now. It is very critical that preventive strategies are implemented through schools and community-based programs, with involvement from health care providers, school teachers, community leaders, and policy makers, as well as parents.

It appears that poverty family size and housing conditions influenced the height and the health of this cohort. These findings are consistent with other evidence showing that childhood height is a marker for bio-physiological processes that can affect future health.

This finding underlines the need for properly conducted surveys to ensure accurate information about the nutritional status of children. Participatory approaches are particularly well suited for research work with young children.

Corresponding author
Thanaa. A. Elkholy
Department of Clinical Nutrition, Faculty of Applied Medical Sciences
King Abdul-Aziz University, Jeddah, Saudi Arabia
telkholy@kau.edu.sa

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