Nutrient Intakes Affecting the Nutritional Status of preschool Children by Nationality Compared with RDA in Jeddah KSA

Thanaa. A. El-kholy*; Naglaa, H. M. Hassanen, Rasha. M Hassan and Sahar Anter

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

Abstract: Background: Dietary pattern established in early childhood significantly influence the probability of having less tendency towards junk food which certainly result in malnutrition whether under/overweight or obesity. Nutrient intakes were compared with Recommended Dietary Allowances RDA (1989) and percent RDAs were computed. Objective: The main objective of the current study to report nutrient intake among preschool- aged children in some kindergartens in kingdom of Saudi Arabia, in Jeddah and compare as percent of RDA. Subjects and Methods: A cross-sectional descriptive study was conducted on preschool children male (n= 66), female (n=55). Anthropometric data were taken using standard methods, from 121 children Saudi (77.7%) and the remaining was non-Saudi (22.3%). Aged 24 - 72 months with the aid of a questionnaire from Kindergarten children's and preschool child mothers by direct contact or by telephone. Logistic regression analyses were performed to estimate the influence of various parameters. Seven 24-hour dietary recalls assessed nutrient intakes, which were compared to the Recommended Dietary Allowances of National Academy of Science's. Results: The mean ages in months of the studied preschool children were 52.2 ± 11.20 months. Diet quality has been shown to be better among children that do meet current recommendations. The average intake of energy was lower than RDA by 35% for preschool children. Energy from carbohydrates was below the recommended values (53.5% of energy was observed vs. 55 % of energy is recommended). Low intake of calcium (85.6%), iron (72.45%) and potassium (57.45%) as percent of the RDA among children of all age groups observed in this study. Mean intake of vitamins; thiamin, niacin and vitamin D (0.48 ± 0.196, 4.99 ± 2.6503 and 3.92 ± 2.33) for Saudi and, (0.38 ± 0.16, 3.768 ± 2.11 and 2.88 ± 2.41) for non Saudi children respectively. It found that the difference between the two groups was significant at $p < 0.05$. Data was analyzed by SPSS statistical package version 10. Conclusion: These results indicated to the need for improvement in dietary habits among Jeddah children in order to produce a healthful diet and to prevent diet-related diseases in our future adult population. Community and/or school based nutrition education programs are needed to increase children and parents' awareness of the health risks arising from food intakes deviating importantly from the recommendations. It should be further investigated in more detail how this preschool age group dietary pattern, influences their nutrient intakes in order to check whether the current recommended dietary allowances represent the most optimal dietary intake for this group of preschool-aged children. At last, research should assess the health risks associated with these unhealthy eating habits of young children, deviating importantly from the age specific recommendations.

[Thanaa. A. El-kholy; Naglaa, H. M. Hassanen, Rasha. M Hassan and Sahar Anter. **Nutrient Intakes Affecting the Nutritional Status of preschool Children by Nationality Compared with RDA in Jeddah KSA.** Journal of American Science 2012; 8(2):221-230]. (ISSN: 1545-1003). http://www.americanscience.org. 35

Key words: Nutritional status - Nutrient intakes - Children - Macronutrients, Vitamins – Minerals - The Recommended Dietary Allowances.

1. Introduction

As mammals, we all begin life on an exclusive milk diet. During our first years, the transition to a modified adult diet takes place; to maintain growth and health, the infant must learn to accept at least some of the foods offered. Individual differences among children in the controls of food intake begin to emerge during this early transition period. As children's genetic predispositions are modified by learning and their experiences with food and eating, food preferences and more adult-like controls of food intake begin to emerge. Early experiences with food provide learning opportunities that are critical in the formation of food preferences and the controls of food intake (**Leann; 2002**).

Although good nutrition is important during the whole life course, it is especially important during the first years of life, since these are the most crucial years for normal physical and mental development.

In young children, dietary intake is not only linked to growth, development and nutrition-related diseases (such as deficiencies and toxicities), but also to risk factors for chronic diseases such as obesity, increased cholesterol levels and hypertension (**Ernst and Obarzanek, 1994**). In these first years of life children acquire many of the physical attributes and the social and psychological structures for life and learning (**BMA; 2005 and Huybrechts *et al.,* 2008**). Because unhealthy lifestyle patterns might continue into adulthood (**Boulton, 1995**), it is important to strive as early in life as possible for a high-quality diet with optimal levels of food and nutrients to help maintain optimal health.

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**). Child malnutrition is a wide spread public health problem having international consequences because good nutrition is an essential determinant for their well-being. The most neglected form of human deprivation is malnutrition, particularly among Preschool children. (**Vipin Chandran, 2009**). 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**).

The role of certain nutrients and foods in the prevention of chronic diseases like cardiovascular disease (CVD) and some cancers has been highlighted by a large number of studies (**Ascherio and Willett1995** and **Cummings and Bingham1998**). Specifically, diets with high fruit and vegetable intakes have been shown being associated with a lower risk of mortality (**Huijbregts *et al.,* 1997**) and of suffering cancer (**Cummings and Bingham, 1998**) or CVD (**Kant *et al.,* 2000**). Because of this major role of nutrition in the prevention of diseases as well as in growth and development, a series of recommended dietary allowances (RDA) (**CEC,1993**) ranging from infancy until old age, have been set both at a national and international level. In order to motivate the public to meet such recommendations, Food-Based Dietary Guidelines (FBDG) were developed based on these RDA, though expressing recommended daily intakes at the food group level, have been drawn up in different countries (**VIG, 2004 and US Department of Agriculture, 2007**).

Dietary pattern established in early childhood significantly influence the probability of having less tendency towards junk food which certainly result into malnutrition whether under/overweight or obesity (**Perveen *et al.,* 2010**). Like many other domains of development, young children's eating patterns are largely influenced by learning about what is edible and non-edible and what is acceptable within a family and the culture. A carefully timed development exists between children's early physiological and their increasing nutrition needs. The literature regarding early childhood nutrition has focused upon children's changing nutrient requirements for growth and health and has neglected the social developmental framework from which children's eating behaviors and intake patterns emerge (**Perveen *et al.,* 2010**). Appropriate nutrition during the childhood is essential for the maintenance of normal growth and good health (**Ministry of Health, 1997**).

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**). In this context, the present study focuses its attention on the nutrient intakes affecting the Nutritional Status of preschool Children by Nationality Compared with RDA in Jeddah KSA.

2. Subjects and Methods

Study population and design

Data used for these analyses derived from a cross-sectional study in preschool children (2-6 years) include 66 boys and 55 girls were chosen by a systemic random method, Saudi (77.7%) and the remaining was non-Saudi (22.3%). Aged 24-72 months recruited from Two Kindergartens Kingdom of Saudi Arabia, Jeddah city, all children were in kindergartens and their house. The data collection initiated in October 2010 and complete in April 2011.

The methodology of this study:

In order to satisfy the objective of the study standard questionnaires was designed to cover the Food habit; which includes appetite, number of meals per day, favorite meal, and snacks. Seven days of food intake (24-hour recall) was collected. The 24-hour recall method was used to assess the usual intake of energy and nutrients for seven consecutive days. On the same day of the interview, the mothers were asked to recall type and quantity of all foods and beverages or snakes that consumed by the child during the previous 24 hours, and they were also asked to record the food intake during the other six days in their homes. Then we conformed these units or parts into grams to calculate the daily intake from different nutrients by using food composition tables (**Robert *et al.*, 2003**). Data of the 24-hour food intake were coded and entered into the computer program of food analysis. The food intake data were analyzed based on food composition tables of the Egyptian National Nutrition Research Institute**.** The nutritional content of the food consumed or provided was calculated from the data collected using standard food tables (**National Nutrition Institute, 2006**). Results were compared with current recommendations for nutrient intakes Institute of Medicine (**2010**) and the percentages of energy derived from macronutrients; for the appropriate age-gender groups from the Institute of Medicine, Food and Nutrition Board, November **2010** which were compared to the Recommended Dietary Allowances of National Academy of Science's (**1998**).

Anthropometric indices

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.

Weight and Height:

The weight and height of the children in the two groups (boy and girl) 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**). 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**). Data of height and weight were entered into ENA (Emergency Nutrition Assessment) for the SMART program (**WHO, 2007**) and were transformed into Z-score.

The statistical analysis included:

Data were analyzed by SPSS statistical package version 10 (**1998**). The quantitative data were presented in the form of mean, standard deviation and range. One way ANOVA and the student T test was used to compare quantitative 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

A cross-sectional descriptive study was conducted on preschool children male (n= 66), female (n=55). Saudi (77.7%) and the remaining were non-Saudi (22.3%). Aged 24- 72 months were chosen by a systemic random method recruited from two kindergartens, in Kingdom of Saudi Arabia, Jeddah city.

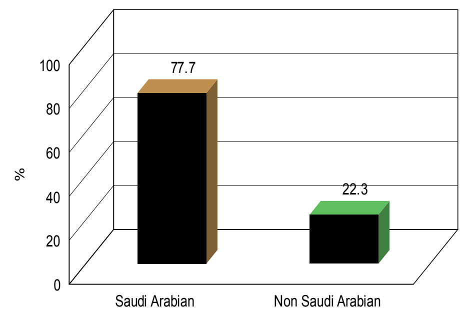

Figure (1): Percent Distribution of Nationality of Preschool Children

Most of the children were Saudi (77.7%) and the remaining was non-Saudi (22.3%) as shown in the same table and figure (1).

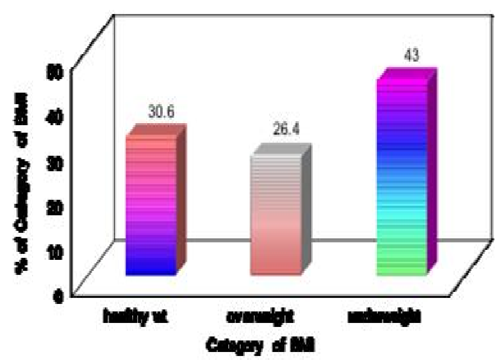

Figure (2): Percent Distribution of Categories of BMI of Preschool Children

Figure (2) showed that the highest percent of preschool children (43%) were underweight, followed by (30.6%) had healthy weight and (26.4%) were overweight.

Table (1): Describes Anthropometric measurements of a Studied Sample of Preschool Children

Variables	(Mean ± SD)	Min	Max
Weight of Preschool Children (Kg)	16.19± 3.29	9	26
Ideal of body weight	16.68±1.96	12	21
Preschool Children's height (Cm)	100.87 ± 10.37	60	119
Body Mass Index	16.19 ± 4.24	10	41.6
Ideal of Body Mass Index	15.57±0.48	14.5	18

Table (1) depict descriptive anthropometric measurements of the study sample of Preschool Children. We show mean ± SD of body weight of total males and females (16.19± 3.29 kg) and minimum weight 9kg, maximum weight 26 kg; and the mean ± SD ; minimum and maximum of ideal body weight for representing subjects i. e. (16.68±1.96, 12 and 21kg) respectively. Mean ± SD , minimum and maximum height of total responds (100.87 ± 10.37 cm) and minimum height 60cm, maximum height 119 cm. While the mean ± SD; minimum and maximum of body mass index (16.19 ± 4.24, 10 and 41.6) respectively. The same table represents also mean ± SD; minimum and maximum Ideal of Body Mass Index i.e. (15.57± 0.48, 14.5 and 18) respectively.

Table (2) Distribution of Nutritional Status of Preschool children

Anthropometry measurements	No.	%	Nutritional Status
WAZ	10	8.3	Underweight
	107	88.4	Normal
	4	3.3	Overweight
HAZ	23	19.0	Stunted
	94	77.7	Normal
	4	3.3	Tall
WHZ	15	12.4	Wasted
	83	68.6	Normal
	23	19.0	Obesity
Total	121	100.0	

As can be seen in table 2, the logistic regression analysis identified the distribution of nutritional status of Preschool children by anthropometric measurements. 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. While the percent of normal, wasted, and obesity children according to weight/height were 68.6%, 12.4 % and 19.0 %, respectively.

Table (3) depict (Mean ± SD) and Pearson Correlation of BMI of the study children by nutritional status. As can be seen in table (3) the level of underweight, stunted and wasted were in children of low mean of BMI (< - 2SD), 13.3, 15.78 and 14.85 for (WAZ), (HAZ) and (WHZ) respectively as compared to good nutritional status of moderate mean of BMI (normal±2SD) 16.3, 16.06 and 16.02 for WAZ , HAZ and WHZ respectively. However the level of overweight, tall and obesity were in the children of over Mean of BMI (> + 2SD) i. e., 20.68, 21.73and 17.71 for (WAZ), (HAZ) and (WHZ) respectively. As can be seen in the same table the nutritional status in WAZ and HAZ Z-Score of children was significantly different by Mean of BMI at $P< 0.01$ and $P< 0.05$ respectively but no statistically significant association was observed in Nutritional status In WHZ Z-Score.

Table (3): (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
WAZ	No. Mean SD	10 13.30 2.56	107 16.3 ±4.26	4 20.68 1.27	121 16.2 4.24	4.901 0.009**
HAZ	No. Mean SD	23 15.78 3.07	94 16.06 ±3.9	4 21.73 11.63	121 16.2 4.24	3.724 0.027*
WHZ	No. Mean SD	15 14.85 7.08	83 16.02 ±3.73	23 17.71 3.22	121 16.2 4.24	2. 35 NS

*P< 0.05 **P<0.01

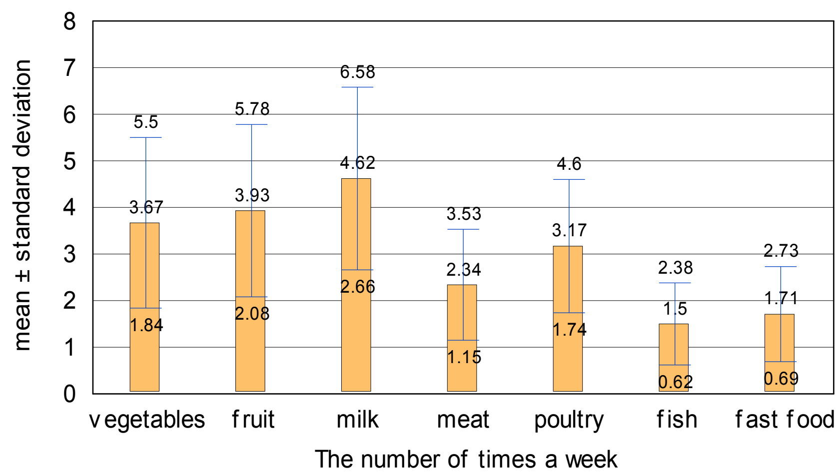

Figure (3) mean ± SD of the number of times of food intake a week of Preschool children

The means of the number of times a week of foods shown in Figure (3), it is clear that the mean of the number of times intake a week of milk (4.62±1.96) was consistently higher than the other foods, followed by 3.93±1.85 for fruit, 3.67±1.83 for vegetables and 3.17±1.43 for poultry while the lowest number of times a week was for fish 1.50±0.88. The Minimum intake was one meal per week and the Maximum was seven meals per week.

Table (4) showed that the mean±SD of energy and macronutrient intake of preschool children by nationality. The mean of energy, protein, fat and carbohydrate for Saudi children were 1096.95±336.72, 39.48 ± 14.06, 40.39± 17.41 and 146.73±50.59, respectively. As can be seen in the same table the mean of energy, protein, fat and carbohydrate for non Saudi children were 909.17± 438.46, 32.81± 14.17, 31.43 ± 21.44 and 123.24± 61.78, respectively.

It can be noticed that the difference in energy, carbohydrate, protein and fat were significant at (p < 0.05*) between Saudi and non- Saudi preschool children.

Table (5) showed that the mean±SD of vitamin intake of preschool children by nationality. The mean intake of thiamin, riboflavin, niacin, vitamin A, vitamin C and vitamin D for Saudi and non -Saudi children were (0.48 ± 0.196 mg/d), (0.87 ±0. 545 mg/d), (4.99 ± 2.65 mg/d), (591.99 ± 763.6 µg/d), (47.85 ± 49.35 mg/d), and (3.92± 2.33 µg/d) and (0.38 ±0. 16 mg/d), (0.62 ±0. 38 mg/d), (3.768 ± 2.1091 mg/d), (288.75± 186.91 µg/d), (19.82 ± 32.85 mg/d), and (2.88 ± 2.41 µg/d) respectively. It can be noticed that the difference in thiamin, riboflavin, niacin, vitamin A and vitamin D were significant at (p< 0.05) between Saudi and non- Saudi preschool children and the difference is highly significant in vitamin C intake among Saudi and non- Saudi preschool children at (p<0.01).

Table (4): Mean ± SD of Macronutrients Intakes of Preschool children by Nationality

Variables Nutrients	Saudi Arabian Mean ± SD	Non Saudi Arabian Mean ± SD	RDA	% of RDA For Saudi Arabian	% of RDA For Non Saudi Arabian	P
Energy	1096.95±336.72	909.17± 438.46	1300	84.37	69.93	0.019*
Protein	39.48 ± 14.06	32.81± 14.17	16	246.7	205	0.032*
Fat	40.39± 17.41	31.43 ± 21.44	32.5	124.3	96.7	0.027*
Carbohydrate	146.73 ±50.59	123.24 ± 61.78	130	112.8	94.8	0.046*

Table (5): (Mean ±SD) and % of RDA of Vitamins and minerals Intakes of Preschool children

Indicator	Saudi Arabian	Non Saudi Arabian		Saudi Arabian	Non Saudi Arabian	p
	Mean ± SD	Mean ±SD	RDA	% of RDA	% of RDA	
Thiamin (mg/d)	0.48 ± 0.196	0.38 ± 0.16	0.53	90.5	71.7	0.014*
Riboflavin (mg/d)	0.87 ± 0.545	0.62 ± 0.38	0.55	158.2	112.7	0.023*
Niacin (mg/d)	4.99 ± 2.6503	3.768 ± 2.11	7	71.3	53.7	0.03*
Vitamin A (µg/d)	591.99 ±763.62	288.75± 186.91	350	169.1	82.5	0.044*
Vitamin C (mg/d)	47.85 ± 49.35	19.82 ± 32.85	20	239.2	99.1	0.006**
Vitamin D (µg/d)	3.92± 2.33	2.88 ± 2.41	5	78.4	57.6	0.044*
Calcium (mg/d)	641.69±444.38	443.35±290.55	650	98.7	68.2	0.03
Iron (mg/d)	6.98±5.15	5.45±1.5038	8.5	82.1	64.1	NS
Potassium (mg/d)	2041.59±1094.39	2029.03±1079.18	3400	60.0	59.6	NS
Phosphorus (mg/d)	666.99±273.4	529.26±222.1	480	138.9	110.2	0.01
Magnesium (mg/d)	131.36±91.73	90.97±57.84	105	125.0	86.6	0.032
Zinc (mg/d)	9.78±13.56	3.94±1.29	4	244.5	98.5	0.022

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

The same table showed also the mean±SD of minerals intake of preschool children by nationality. The mean of calcium, iron, potassium, phosphorus, magnesium and zinc for Saudi and non-Saudi children were (641.69 ± 444.38 mg/d), (6.98±5.15 mg/d), (2041.59 ± 1094.39 mg/d), (666.99 ± 273.94 mg/d), (131.36 ± 91.73 mg/d) and (9.78 ± 13.56 mg/d) and (443.35± 290.55 mg/d), (5.45 ±1. 5038 mg/d), (2029.03 ±1079 mg/d), (529.26 ± 222.51 mg/d), (90.97 ± 57.84 mg/d) and (3.94 ± 1.29 mg/d) respectively.

4. Discussion

The present study is a cross sectional descriptive study was conducted on preschool children was Saudi (77.7%) and the remaining was non-Saudi (22.3%). As shown in figure (1), aged 24 - 72 months were chosen by a systemic random method recruited from two kindergartens, in Kingdom of Saudi Arabia, Jeddah city. To report food consumption, nutrient intake among preschool- age and compared with Recommended Dietary Allowances (**RDA,1989**) and the percent of intake from RDAs were computed. The mean ± SD for age in the months of the studied preschool children was 52.2 ± 11.20 months.

Nutritional Status

Table (1) shows that the mean body weight of total males and females (16.19± 3.29kg) and minimum weight 9kg , maximum weight 26 kg and the mean height of total males and females (100.87 ± 10.37 cm) and minimum height 60cm, maximum height 119 cm.

Weight for age is the most widely used indices for assessment of nutritional status in children. Using the international age and sex specific child BMI cutoff values define overweight and obesity (**Cole *et al.*, 2000).** We calculated the combined prevalence of overweight and obesity; in the present study according to categories of BMI revealed that the majority of preschool children (43%) were underweight, (30.6%) had healthy weight, and (26.4%) were overweight as can be seen in Figure (2). Data from national surveys by **Prema and Hema, 2009** have shown that in India nearly half the preschool children are under –weight or stunted and less than a fifth are wasted. According to these results it is clear that the nutritional status between preschool children in Jeddah KSA better than in India study.

Al-Hazzaa *et al.* (2007) Study of adiposity and physical activity levels among preschool children in Jeddah, KSA calculated the combined prevalence of overweight and obesity in his study to be 41.8 %. These prevalence rates were higher than what was reported in our study which revealed that prevalence of overweight and obesity were (26.4%).

Our results as shown in table (3) revealed 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 good nutritional status of moderate which the mean of BMI was 16.3, 16.06 and 16.02, respectively. However the level of overweight, tall and obesity were in the children of over Mean of BMI by 20.68, 21.73and 17.71 Nutritional status in WAZ and HAZ Z-Score of children was significantly different by BMI at P< 0.01 and P< 0.05 respectively but no statistically significant association was observed in Nutritional status In WHZ Z-Score.

It is generally accepted that childhood obesity is directly related to the elevated consumption of food products containing high concentrations of simple or refined sugars and fried foods, as well as poor dietary habits and lack of moderate and intense physical activity. It has also been pointed out that different individuals whose diets contain equivalent energy densities may accumulate different levels of neutral fats in their adipose tissue, due to differences in the efficiency of free energy utilization in the body's general biosynthetic processes, and in the efficiency of other types of biological processes. It has been suggested that these differences may be due to differing metabolic structures based on variations in individual genes; furthermore, a variety of environmental factors that may lead to diverse types of metabolic expression when acting upon individual genes also contributes to these differences **(Chellini *et al.*, 2005).**

Consumption of food

The questionnaire used in the present study was valid and reliable tool for measuring the environmental factors availability, food rules, correlation of nutritional status for preschool children Food intake and their effect on BMI of preschool children in line with finding from another study **(Perveen *et al.*, 2010; Tara *et al.*, 2010; and Mohammad et al., 2008).** Most American preschoolers are not meeting dietary recommendations (**Krebs-Smith *et al.*, 1996; Nicklas *et al.*, 2001; Padget, and Briley 2005Kranz *et al.*, 2006a; and Ball *et al.*, 2008)** even though diet quality has increased slightly in preschoolers over the past few decades **Kranz *et al.*, 2005.**

Diet quality has also been shown to be better among children that do meet current recommendations **(Padget and Briley 2005 Kranz *et al.*, 2006a, and Kranz *et al.*, 2006b).** The data presented in these studies aimed to report dietary intake and physical among preschool-aged children living in rural American Indian (AI) communities prior to a family-based healthy lifestyle intervention and to compare data to current age-specific recommendations; they results showed that most children were meeting requirements of macro- and micronutrients that do meet current recommendations but are not consuming recommended amounts of fruits, vegetables, whole grains and consuming excessive amounts of added sugar, partially due to sweetened beverage intake. It is important to consider food sources that may explain the discrepancy between adequate micronutrient intakes and inadequate food group intakes. White bread and ready-to-eat cereal, food sources that are often fortified with vitamins and minerals, were among the most frequently reported foods in this sample of children.

In a recent another large cross-sectional study among children aged two to five years, children's dietary intake of nutrients and food groups decreased as added sugar intake increased (**Kranz *et al.*, 2005**). Changes in beverage pattern consumption may also change nutrient and food intake. Increased sweetened beverage consumption is related to decreased milk consumption among children **(Harnack *et al.*, 1999, Frary *et al.*, 2004 ; Blum *et al.*, 2005 andMarshall *et al.*, 2005).**

Our study in contrast of these studies as shown in figure (3) it is clear that the mean number of times intake a week of milk (4.62±1.96) was consistently higher than the other foods, followed by, (3.93±1.85) for fruit, (3.67±1.83) for vegetables, (3.17±1.43) for poultry while the lowest number of times intake a week was for fish i.e. (1.50±0.88). The Minimum was one meal per week and the Maximum was seven meals per week.

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. Dietary pattern established in early childhood significantly influence the probability of having fewer tendencies towards junk food which certainly result into mal nutrition whether under/overweight or obesity **(Perveen *et al.,* 2010).**

Energy and Dietary intakes:

Vijay *et al.,* 1995 study results indicated that the mean energy intakes of all age group children were below the RDA ; thus their average energy intakes were 229 kcal,,3384kcal below the RDA for 1-3 and 4-6 group, respectively . Our results indicated that the mean energy intakes of all age groups Saudi and non Saudi children 1096.95±336.72 and 909.17± 438 respectively were below the RDA as presented in table (4); thus their average energy intakes as percent of RDA were 84.37% and 69.93% for Saudi and non Saudi children respectively. Low level of energy reported in this study was likely due to underreporting of food intakes **(Murphy *et al.,* 1992).** According to **Livingstone *et al.,* 1990 and Mertz *et al.,* 1991** the underreporting of energy intake was approximately 20% compared with measured energy requirements. When estimated 20% underreporting is included, the mean energy intakes of children would be closed RDA for energy.

On average, the American child's diet was high in total fat, over consumption of fat, saturated fat and cholesterol by American children has been reported from New Hampshire Farm Burea (NHANFB II) (**Kimm *et al.,* 1990).** Although percent of energy from fat remained relatively constant over age, mean percent of energy from fat was 5.3 to 6.8 higher than the recommended (30% of energy is recommended) by expert committees **(Weidman *et al.,* 1983 & Consensusl., 1985).** Our study represents that an average intake from fat also higher than RDA. Data from Continuing Survey of Food Intakes by Individuals (**CSFII,1986**) indicated that the average percent of energy from total fat for children ages l-5 years was 34% and that 88 % of them had intakes exceeded fat recommendations **(Nicklas *et al.,* 1993).** Similar results were reported from the The Nationwide Food Consumption Survey (NFCS), 1977-78 **(Albertson *et al.,* 1992**), the Bogalusa Heart Study **(Nicklas *et al.,* 1989**), and the Lipid Research Clinics Program Prevalence Study **(Salz *et al.,* 1983).** Our results indicated that the average percent of energy from total fat for children ages l-5 years were 32.6%. So our results are agreeing with these reports.

Energy from carbohydrate in our study was below the recommended values i.e. (53.5% of energy was observed vs. 55 % of energy is recommended). This was primarily due to higher contribution of energy from fat toward total calories. Our resulting agreement with **(Viji *et al.,* 1995)** that's who reported that the energy from carbohydrate was below the recommended values (49 to 51% of energy was observed vs. 55 % of energy is recommended).

Calcium and vitamin D are two essential nutrients long known for their role in bone health. Over the last ten years, the public has heard conflicting messages about other benefits of these nutrients—especially vitamin D—and also about how much calcium and vitamin D they need to be healthy. Scientific evidence indicates that calcium and vitamin D play key roles in bone health. The current evidence, however, does not support other benefits of vitamin D or calcium intake. More targeted research should continue. Higher levels have not been shown to confer greater benefits, and in fact, they have been linked to other health problems, challenging the concept that "more is better **(IOM, 2010).**

Low intake of , calcium (85.6%), iron (72.45%) and potassium (57.45%) as percent of RDA among children of all age groups observed in our study is a concern as presented in table (5). Absolute intake of vitamin thiamin and niacin was below the RDA for all age groups studied. Percent intakes of thiamin and niacin were 80% and 63.45% from RDAs respectively. While copper, sodium and potassium were not computed because RDA values are not available for these nutrients **(National Academy of Sciences (1989).** However, the intakes of copper, sodium and potassium were adequate.

Conclusion: These results indicate the need for improvement in dietary habits among Jeddah children in order to produce a healthful diet and to prevent diet-related diseases in our future adult population. Community and/or school based nutrition education programs are needed to increase children and parents' awareness of the health risks arising from food intakes deviating importantly from the recommendations. It should be further investigated in more detail how this preschool dietary pattern, influences their nutrient intakes in order to check whether the current recommended dietary allowances represent the most optimal dietary intake for this group of preschool-aged children.

At last, research should assess the health risks associated with these unhealthy eating habits of young children, deviating importantly from the age specific recommendations

Corresponding author
Thanaa. A. El-kholy

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

References

1. Adams A, Prince R, Webert H, (2004):. The Wisconsin Nutrition and Growth Study (WINGS), a Participatory research project with three Wisconsin tribes. The Great Lakes EpiCenter News. pp. 1–3.
2. Albertson AM, Tobelmann RC, Engstrom A, Asp E. (1992): Nutrient intakes of 2- to lo year- old American children: lo-year trends. J Am Diet Assoc., 92:1492-1496.
3. Al-Hazzaa M.Al-Hazzaa., ACSM, AmaniA. Al-Rasheedi (2007): Adiposity and physical activity levels among preschool children in Jeddah, Saudi Arabia Sadi Med J.,.28(5):766-773.
4. Ascherio, A.; and Willett, W.C.(1995): New directions in dietary studies of coronary heart disease. J. Nutr., 125:647S-655S.
5. Ball SC, Benjamin SE and Ward DS, (2008): Dietary intakes in North Carolina childcare centers: Are children meeting current recommendations? J Am Diet Assoc.; 108:718–721.
6. Birch, H.G. (1972): Malnutrition, learning and intelligence. Am. J. Publ. Health, 62: 773.
7. Boulton, T.J.; Magarey, A.M.; and Cockington, R.A. (1995): Tracking of serum lipids and dietary energy, fat and calcium intake from 1 to 15 years. ACTA Paediat., *84*:050-1055.
8. Blum JW, Jacobsen DJ and Donnelly JE, 2005. Beverage consumption patterns in elementary school aged children across a two-year period. J Am Coll Nutr.; 24:93–98.
9. CEC Commission of the European Communities. (1993): Nutrient and energy intakes for the European Community (thirty-first series). Directorate General Industry: Brussels, Belgium,. pp1- 9
10. BMA. British Medical Association Board of Science (2005): *Preventing childhood obesity*. BMA publications unit: ISBN: 0-9548965-8-0 London, U.K.,
11. Chellini E, Talassi F, Corbo G, Berti G, De Sario M, Rusconi F, Piffer S, Caranci N, Petronio MG, Sestini P, Dell'Orco V, Bonci E, Armenio L La Grutta S; Gruppo Collaborativo SIDRIA-(2005): Environmental, social and demographic characteristics of children and adolescents, resident in different Italian areas. Epidemiol Prev.; 29 (2 Suppl): 14-23.
12. Cole T, Bellizzi M, Flgal K**,** and Dietz W.(2000): Establishing a standard definition of child overweight and obesity worldwide International survey .BMJ., 320: 1-6.
13. Consensus (1985): Development Panel. Lowering blood cholesterol to prevent heart disease. JAMA; 253:2080-2086.
14. Cummings, J.H.; and, Bingham, S.A. (1998): Diet and the prevention of cancer. Brit. Med. J., 317:1636-1640.
15. Dietz WH Jr and Gortmaker SL (1985): Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. Pediatrics; 75:807–812.
16. Ernst ND and Obarzanek E, (1994): Child health and nutrition: Obesity and high blood cholesterol. Prev Med.; 23:427–436.
17. Frary CD, Johnson RK and Wang MQ (2004): Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food groups. J Adolesc Health; 34:56–63.
18. Grant JP, (1984): The state of the world's children. Oxford University Press: Oxford. Calliara M. Profile of an Indian Child. Social Welfare ; 36: 33 - 4.
19. Handbook; Edited by Christopher G .Fairburn and Kelly D. Brownell.Text Book Eating Disorders and obesity; Topic , 13: 71-85
20. Harnack L, Stang J and Story M (1999): Soft drink consumption among US children and adolescents: Nutritional consequences. J Am Diet Assoc.; 99:436–441.
21. Harnack L, Stang J and Story M (1999): Soft drink consumption among US children and adolescents: Nutritional consequences. J Am Diet Assoc.; 99:436–441.
22. Huijbregts, P.; Feskens, E.; Rasanen, L.; Fidanza, F.; Nissinen, A.; Menotti, A.; and Kromhout, D.(1997): Dietary pattern and 20 year mortality in elderly men in Finland, Italy, and The Netherlands: longitudinal cohort study. Brit. Med. J., 315:13-17.
23. Huybrechts, I.; Christophe Matthys; Carine Vereecken; Lea Maes; Herman Van Oyen; Elisabeth HM Temme; Guy De Backer; and Stefaan De Henauw (2008): Food Intakes by Preschool Children in Flanders Compared with Dietary Guidelines. Int. J. Environ. Res. Public Health, 5:243-257; DOI: 10.3390/ijerph5040243.
24. Institute of Medicine, Food and Nutrition Board November (2010): Dietary reference intakes for calcium and vitamin D, Washington, DC, National Academies Press. www.iom.edu/vitamind
25. Kant, A.K.; Schatzkin, A.; Graubard, B. I.; and Schairer, C. (2000): A prospective study of diet quality and mortality in women. JAMA-J. Am. Med. Assn., 283: 2109-2115.
26. Kimm SYS, Gergen PJ, Malloy M, Dresser C, and Carroll M. (1990): Dietary patterns of US children: implications for disease prevention. Prev Med.; 19:432-442.
27. Kranz S, Hartman T, Siega-Riz AM and Herring AH (2006a):. A Diet quality index for American preschoolers based on current dietary intake recommendations and an indicator of energy balance. J Am Diet Assoc.; 106:1594–1604. [PubMed: 17000192].
28. Kranz S, Smiciklas-Wright H and Francis L, (2006b): Diet quality, added sugar and dietary fiber intakes in American preschoolers. Pediatric Dent.; 28:164–71. [PubMed: 16708792]
29. Kranz S, Siega-Riz AM, and Herring AH (2005): Changes in diet quality of American preschools between 1977 and 1998. AMJ Public Health, 94: 1525 – 30.
30. Leann L. Birch (2002): Acquisition of Food Preferences and Eating Patterns in Children. 2ndEditio
31. Comprehensive
32. Livingstone MBE, Prentice AM, Strain JJ, Coward WA, Black AE, Barker ME, Mckenna PG and Whitehead RG (1990): Accuracy of weighted dietary records in studies of diet and health. BR MED J; 300:708 -712.
33. Marshall TA, Eichenberger Gilmore JM, Broffitt B, Stumbo PJ and Levy SM, 2005. Diet quality in young children is influenced by beverage consumption. J Am Coll Nutr.; 24:65–75.
34. Maysoon M. Al-Amoud, Yagob Y. Al-Mazrou, Sirrag E. El-Gizouli, Tawfik A. Khoja and Khalid A. Al-Turki (2004):.Saudi Med J; Vol. 25 (11): 1679-1682
35. Mertz W, Tsui JC, Judd ST, Reiser S,Hallfrisch J, Morris ER, Steele PD, and Lashley E (1991): What are people really eating ? The relation between energy intake derived

from estimated diet records and intake determined to maintain body weight. AM J Clin Nutr.; 54: 291 - 295

36. Ministry of Health, (1997). Food and Nutrition Guidelines for Healthy Children Aged 2-12 Years Nutr., 76: 245-252.
37. Murphy SP, Rose D, Hudes M and Viteri FS (1992): Demographic and economic factors associated with dietary quality for adults in the 1987 – 88 Nationwide Food Consumption Survey. J Am Diet Assoc., 92: 1352 – 1357.
38. National Academy of Sciences, (1989): National Research Council Recommended Dietary Allowances, Subcommittee on the Tenth Edition of the RDAs Food and Nutrition Board Commission on Life Sciences NATIONAL ACADEMY PRESS Washington, 10th Edition
39. Nationale Raad voor de Voeding. Voedingsaanbevelingen voor België (Herziene versie 2003): Brussels: Hoge Gezondheidsraad, Ministerie van Sociale Zaken, Volksgezondheid EnLeefmilieu
40. National Nutrition Institution (2006) Food composition Tables for Egypt 2nd Cairo A.R.C.
41. Nicklas TA, Webber IS, Srinivasan SR, and Berenson GS (1993):. Secular trends in dietary intakes cardiovascular risk factors of lo-y-old children: the Bogalusa Heart Study (1973-1988). Am J Clin Nutr.; 57:930-937.
42. Nicklas TA, Webber LS, Thomson B, Berenson GS (1989):. A multivariate model for assessing eating patterns and their relationship to cardiovascular risk factors-the Bogalusa Heart Study. Am J Clin Nutr.; 49:1320-1327
43. Ogden C, Flegal K, Carroll M and Johnson C (2002):. Prevalence and trends in overweight among US children and adolescents, 1999- 2000. JAMA; 288(14):1728-32
44. .Onis, M, Monteiro C, Akre J and Clugston, G, (1993): The worldwide magnitude of protein- energy malnutrition: an overview from the WHO Global Database on child growth. Bulletin of the World Health Organization, 71: 703-712.
45. Padget A and Briley ME, (2005): Dietary intakes at child-care centers in central Texas fail to meet Food Guide Pyramid recommendations. J Am Diet Assoc; 105:790–793. [PubMed: 15883557]
46. Perveen Liaqat, Nazish zulfiqar, Hajra Ahmed and Asma Afreen (2010): Emerging dietary patterns fromdaily food intake patterns of young children under five, Pakistan Jurnal of Nutrition, 9(5): 504 – 511.
47. Prema Ramachandran and HemaS.Gopa, (2009). Under nutrition & risk of infection in preschool children an Indian J Med Res., 130: 579-583
48. Read, M.S, (1973): Malnutrition, hunger, and behavior.2.hunger school feeding problems and behavior J. AM. Diet. Assoc., 63: 386.
49. Robert DL and David CN (2003): Nutritional Assessement 3 rd ed. New York: McGraw Hill Companies; 163- 215.
50. Salz KM, Tamir I, Ernst N(1983): Selected nutrient intakes of free living white children ages 6-19 year. Th Lipid Research Clinics Program Prevalence Study. Peadiatr Res.,; 17: 124-130.
51. Samai Mohamed1, Samai Hajah H2, Bash-Taqi Donald A3, Gage George N4 and Taqi Ahmed M3, 2009. The Relationship between Nutritional Status and Anthropometric Measurements of Preschool Children in a Sierra Leonean Clay Factory Displaced Camp. Sierra Leone Journal of Biomedical Research, Vol. 1 (1) pp.: 21-27, August
52. Statistical Package for Social Science (SPSS) Computer software, ver. 10. SPSS Company.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 London, UK 1998 .
53. Tanner JM, Whitehouse RH, and Takaishi M, (1966):. Standards from birth to maternity for height and weight. Height velocity and weight velocity: British children, 1965 (part I), Archives of Disease in Childhood; 41: 454-471.
54. Tara L. Alexandra K. Jared B. Kate A. SuAnne M. and Ronald J, (2010):. Dietary Intakes and Physical Activity among Preschool Aged Children living in Rural American Indian Communities Prior to a Family-based Healthy Lifestyle Intervention., 110 (7): 1049–1057. doi:10.1016/j.jada.2010.04.009.
55. Tawfik A. Khoja and Khalid A. Al-Turki, (2004): Clinical growth charts for pre-school children Saudi Med J.; Vol. 25 (11): 1679-1682
56. Tomkins A, (2001): Vitamin and mineral nutrition for the health and development of the children of Europe. Public Health Nutrition, 4 No (1A): 91-99.
57. US Department of Agriculture. (2007): Center for Nutrition Policy and Promotion. MyPyramide: Washington, DC,
58. VIG.(2004): De voedingsdriehoek: een praktische voedingsgids 2004 Available from
59. http://www.vig.be/content/pdf/VD_praktischegids.pdf
60. Vijay Ganji, Ph.D., R.D., N. Betts, Ph.D., R. D. and D. Whitehead, M.S., R.D.(1995):Nurrient intakes of l-3,4-6 and 7-10 year age group children : analysis of diets reported in 1987-88 nationwide food consumption survey Nutrition Research, Vol. 15, No.(5): pp.: 623-631
61. Vipin Chandran. k. p (2009): Nutritional Status of Preschool Children:Socio- Economic Study Of Rural Areas of Kasaragod District in Kerala.
62. Weidman W, Kwiterovich P, Jesse MJ(1983): Diet in the healthy child. Circulation; 67: 141 lA-1414A.
63. World Health Organization, (1995):. Physical Status: the use and interpretation of anthropometry. World Health Organ Tech Rep Ser; 854:273.
64. WHO Multicentre Growth Reference Study Group (2007): WHO Child Growth Standards: Head circumference-for-age, arm circumference-for-age, triceps skinfold-for-age and subscapular skinfold-for-age: Methods and development. Geneva: World Health Organization, (217 pages).

1/21/2012