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## Energy Intake, Dietary Habits and Life Style in Obese School Children with Dyslipidemia in the UAE

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### Abstract

**Background:** The incidence of obesity in children is increasing. In the United Arab Emirates (UAE), childhood overweight and obesity reached up to 25% of the population. In addition, UAE has become one of the highest countries in the prevalence of type 2 diabetes. Various forms of life style behavior and dietary habits have contributed to obesity and the development of the metabolic syndrome. We aim to study energy intake, dietary habits and life style behavior in obese children with dyslipidemia in the UAE and to examine the extent of metabolic syndrome components in their first degree relatives.

**Patient & method:** School children referred to obesity clinic at our center whose BMI centile above the 97<sup>th</sup> and diagnosed with dyslipidemia were approached to enroll in the study. Clinical and dietetic assessment were performed through a diet recall of food intake, consumption of fruits and vegetable, recording of family history of metabolic syndrome components, frequency of exercise, screen watching and breakfast skipping.

**Results:** 63 children were enrolled in the study. Median age (range) was 10 (5-16) years. All children had at least one abnormal variable of dyslipidemia. 51(91%) had a high total cholesterol to HDL ratio, 16 (46%) had high LDL, 9 (16%) had low HDL, 6 (10%) had high triglyceride and 5 (9%) had high total cholesterol. Family history in a parent or a sibling was positive in 46 for obesity, 30 for dyslipidemia, 16 for type 2 diabetes and 27 for cardiovascular disease. There was a statistically-significant difference between the estimated and the recommended calorie intake in both genders. None of the children studied complied with the recommended intake of fruits and vegetables. 45 children (80%) did not take breakfast regularly. All consumed high calorie drink on daily basis and only 4 patients (7%) exercised in compliance with guidelines.

**Conclusion:** Obese children with dyslipidemia consume higher calories than recommended and a poor quality diet. They adopt unhealthy life style and have a strong family history of the metabolic syndrome components. Early intervention is required to prevent the likely cardiovascular disease and type 2 diabetes in the future.

### Keywords

Obesity, Dyslipidemia, Exercise, Diet, Children, Metabolic syndrome

### Introduction

The incidence of obesity in children is increasing [1]. In the UAE, prevalence of childhood overweight and obesity reached up to 25% [2]. It is estimated that 75% to 90% of the cardiovascular disease epidemic is related to dyslipidemia, hypertension, and diabetes mellitus with physical inactivity, and obesity being the principal risk factors [3]. The UAE is ranked at the top countries in the prevalence of type 2 diabetes and the metabolic syndrome [4]. However, studies on the disease risk factors during childhood and adolescence are lacking. This is particularly important as studies showed that pediatric metabolic syndrome is a significant predictor of metabolic syndrome, type 2 diabetes and cardiovascular disease in adults [5]. As the obesity rate has increased in the UAE, it is expected to see its co-morbidities getting more frequently in the region. In a school-based study at the UAE, it was found that metabolic syndrome is seen in 13% of obese adolescents between 12-18 years which is a higher prevalence than that reported from the neighboring countries of the KSA, Egypt and Iran [6]. It is also shown that childhood obesity, dyslipidemia and family history of the metabolic syndrome are linked [7]. Accordingly, it is important to examine the extent of the disease in family members. As early recognition and focused management are shown to be effective in improving dyslipidemia in affected children [8], it is crucial to have a thorough understanding of life style and behavior of these children which enables implementing effective strategies within the community and prevent the resultant morbidity. Identifying the unhealthy attitude related to food and physical activity amongst children and adolescents gives an early window to prevent morbidity in later life.

### Aim

We aim to study energy intake, dietary habits and life style behavior in obese children with dyslipidemia in the UAE and to examine the extent of metabolic syndrome components in their first degree relatives.

### Patients & Method

School children between the age of 5 and 16 years who are referred

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to obesity clinic at the Paediatric Endocrinology Department, Mafraq hospital between January and December 2013 were approached to be enrolled in the study. Inclusion criteria included BMI centile score above the 97<sup>th</sup> centile [9] and presence of at least one biochemical parameter of dyslipidemia (high total cholesterol to HDL ratio, low HDL, high LDL, high triglyceride) according to local lab reference range [10]. Local hospital Ethics Committee approved the study and written consents were obtained. Enrolled patients were interviewed to assess their estimated energy intake through a dietary recall over the previous 3 days prior to the visit. Estimated energy intake was compared with recommended daily intake according to the recommendation of the Institute of Medicine [11]. Reported data from the food recall included type, quantity, approximate time of every food and beverage item consumed over the previous 3 days. Nutrient information for consumed food was provided either through food labels, description of traditional food, or naming well-known commonly drunk fluid brands. Dietary food recall included reporting typical dietary intake of vegetable and fruit serving per day, breakfast taking and an estimate of daily high calorie drink, frequency of high calorie drink consumption, fruit and vegetable intake. Subjects and parents were asked about the usual daily exercise routine over a period of a week, daily duration of TV watching or screen game play and frequency of breakfast skipping. Detailed family history of components of the metabolic syndrome (obesity, diabetes, dyslipidemia or cardiovascular disease) in a first degree relative (parent or sibling) is recorded.

### Statistical analysis

Paired t test was used to assess the difference between variables.

### Results

63 children were identified and all were enrolled in the study. Results were analyzed from 56 children (33 males) as data was incomplete in 7. The median age (range) is 10 (5-16) years. All children had at least one abnormal variable of dyslipidemia. 51 patients (91%) of the total group had a high total cholesterol to HDL ratio, 16 (46%) had high LDL, 9 (16%) had low HDL, 6 (10%) had high triglyceride and 5 (9%) had high total cholesterol. Distribution of dyslipidemia variables per gender is detailed in **Table 1**. Family history in a first degree relative (parent or sibling) was positive in 46 for obesity. 30 parents had a confirmed dyslipidemia and 16 had type 2 diabetes. Cardiovascular disease (including hypertension) was found positive in 27 parents. In 2 patients, 2 fathers had myocardial infarction below the age of 40 years (**Table 2**).

Higher energy intake was found compared to the recommended amount for age and sex. Based on the paired t-test, there was a statistically-significant difference between the estimated and the recommended calorie intake in both genders ( $p<0.001$ ). The difference was more pronounced in girls. None of the children studied complied with the recommended intake of fruits and vegetables. 45

children (80%) do not take breakfast regularly. All consumed high calorie drink on daily basis with a daily median (range) amount of 360 ml (120-900). Only 4 patients (all males) out of the 56 (7%) exercised in compliance with guidelines. The overall median (range) duration of exercise per week is 90 minutes (15-420). Majority of the children (54%) did not comply with the recommendation related to daily television and screen play. Median (range) duration for these activities was 270 (45-450) min/day.

### Discussion

Cross sectional studies showed that individuals consuming fast food meals have larger energy intake with lower nutritional values than others [12]. It is becoming evident that tastier treats are made available at a lower cost and a greater convenience [13]. In our region and particularly in Abu Dhabi area, there is easy access and abundant availability of fast food and high calorie drinks. Local grocery stores are widely available and many of them offer free delivery service. Vending machines for high calorie drink, sweets and crisps are distributed in most public places including hospitals and some schools. In our study group, there was a statistically-significant difference between the estimated and the recommended calorie intake in both genders ( $p<0.001$ ) with more pronounced difference noted in girls. Cost is a major factor in obesity origin. Energy-dense foods tend to be less costly than such foods as whole grains, fruits, and vegetables [14]. The Center for Disease Control and prevention recommends a daily intake for fruits of 1.5 cups (1.5 serving) and for vegetable is 2-2.5 cups (4-5 servings) [10]. None of the subjects studied complied with the recommended intake of fruits and vegetables. A major source of energy is sweet beverages, mainly soft drinks and condensed juice. Drinking these beverages results in higher energy intake. A link is documented between overweight and soft drink consumption [15,16]. Finkelstein et al. [17] showed that sugar-sweetened beverages are the largest single-source contributor to total energy intake which constituted 7% of calorie consumption [17]. Studies documented that children's consumption of soft drink has risen, with the average intake more than doubling from five to twelve ounces a day [18]. All subjects of our study group consumed high calorie drink on daily basis. The daily median (range) amount was 360ml (120-900). Common condensed juices and energy drinks consumed by school children contain an average of 0.4-1.0kCal/ml.

Researchers showed that each additional hour of TV watching per day increases the prevalence of obesity by 2%. Television viewing may affect weight in several ways. Time spent watching TV will reduce time of physical activity and indirectly leads to weight gain. In addition, television advertising may encourage children to consume fast food and high energy drink. TV watching also encourages energy-dense snacking [19]. Studies, consistently, find that reducing children's television watching lowers their BMI [20].

The American Academy of Pediatrics recommends less than 2 hours of television and screen play daily. 95% of our group did

**Table 1:** Variables of dyslipidemia in study group

Abnormal Lipid Profile in the Study Group; Males (n=33)				
High Cholesterol	Low HDL	High LDL	High Triglyceride	High Cholesterol HDL ratio
3 (9%)	4 (13%)	14 (43%)	2 (6%)	29 (90%)
Abnormal Lipid Profile in the Study Group; Females (n=32)				
2 (13%)	5 (21%)	12 (52%)	4 (17%)	22 (95%)
Abnormal Lipid Profile in the whole Study Group; (n=56%)				
5 (9%)	9 (16%)	26 (46%)	6 (10%)	51 (91%)

**Table 2:** Family history of metabolic syndrome components in a first degree relative (parent or sibling)

Family History in a First Degree Relative (parent or sibling) in the Male Group (n=33)				
Obesity	Dyslipidemia	Cardiovascular Disease (including hypertension)	Type 2 Diabetes	Remarks
22 (68%)	9 (28%)	8 (25%)	9 (28%)	2 fathers had heart attacks below the age of 40
Family History in a First Degree Relative (parent or sibling) in the Female Group (n=23)				
17 (74%)	7 (30%)	4 (17%)	7 (30%)	
Family History in a First Degree Relative (parent or sibling) in the whole Group (n=56)				
39 (70%)	16 (29%)	12 (21%)	16 (29%)	Total Group

not comply with these recommendations. Mean duration for these activities was 270 minutes per day with some spending over seven hours on screen watching per day. There is a very wide trend of using screen games through various electronic devices in the UAE (personal observation). Children have easy access to play stations as well as mobile devices (iPod, iPads, phones, laptops) which have advanced entertainment systems.

Long-term studies have shown an association between increased activity and decreased BMI [21]. The Center for Disease Control and Prevention recommends 60 minutes of daily physical activity for children. Minority of our group complied with this recommendation with only 4 out of the 63 exercising in compliance with the guidelines. Various environmental/cultural issues have contributed to reduced children activity. In a study investigating travel to school, in Abu Dhabi, it was found that children in the UAE are increasingly using cars for their short travels compared to earlier periods of time and far fewer children are cycling or walking to school [22]. Absence of active travel culture in the community is seen as a significant contributory factor. The children who complied with exercise guidelines in this study were all boys. A similar observation is observed in an earlier study by our group in which boys are found more educated about exercise than girls [23]. This observation could be related to the cultural and social aspects in the UAE where boys are more encouraged and have more access to exercise than girls.

The dyslipidemia pattern associated with childhood obesity is described to consist of a combination of decreased high density lipoprotein (HDL) and elevated triglycerides (TG) with mildly elevated low density lipoprotein cholesterol (LDL) [24,25]. In our group, the majority had high total cholesterol to HDL ratio and approximately half had elevated LDL (Table 1). There was a strong family history of metabolic syndrome components in a first degree relative with 46 had history of obesity in a parent or a sibling or both. 30 parents had a confirmed dyslipidemia and 16 had type 2 diabetes. Cardiovascular disease (including hypertension) was found positive in 27 parents. In 2 patients, 2 fathers had myocardial infarction below the age of 40 years (Table 2).

## Conclusion

In conclusion, obese school children in the UAE consume high calorie and poor quality diet with majority not achieving recommended daily level of physical activity. Children with obesity and dyslipidemia have a strong family history of metabolic syndrome components in a first degree relative which is a confounding factor for future cardiovascular disease. We have identified different modifiable lifestyle and dietary factors that are characteristic in children with dyslipidemia in the UAE. Early intervention by encouraging a healthy life style and dyslipidemia screening for high risk children is warranted.

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